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PROJECT #

STRUCTURAL CALCULATIONS

FOR

Legacy Livermore

AT

First and S. L Street
Livermore, CA

PREPARED FOR:

Katerra
542 1st Ave. S., Ste 4
Seattle, WA 98104

INDEPENDENT CODE CONSULTANTS
INCORPORATED

FEB 22 2019

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PEOPLES ASSOCIATES
STRUCTURAL ENGINEERS

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PLANCHECK

PROJECT #

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STRUCTURAL ENGINEERS

LEGACY LIVERMORE

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Design Maps Summary Report

User-Specified Input

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 37.681°N, 121.772°W

Site Soil Classification Site Class D – "Stiff Soil"

Risk Category I/II/III

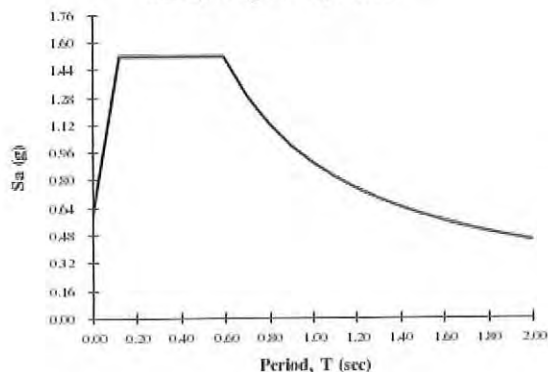


USGS-Provided Output

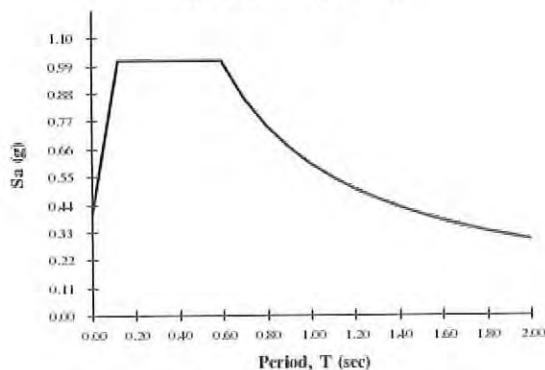
$S_s = 1.516 \text{ g}$	$S_{MS} = 1.516 \text{ g}$	$S_{DS} = 1.011 \text{ g}$
$S_1 = 0.600 \text{ g}$	$S_{M1} = 0.900 \text{ g}$	$S_{D1} = 0.600 \text{ g}$

For information on how the S_s and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



For PGA_M , T_L , C_{RS} , and C_{R1} values, please [view the detailed report](#).

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

BY **ACM** DATE 2/6/19**PEOPLES ASSOCIATES**
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CHKD. BY _____ DATE _____

JOB NO. **18-234****Legacy at Livermore****Katterra**

JWK version 1.1

Last modified 3/5/14

GOVERNING CODES & DESIGN CRITERIA

California Building Code, 2016 Edition

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

SEISMIC COEFFICIENTS**Site Criteria and Seismic Design Category**

Importance Factor -----> I = 1.00 (*Table 11.5-1)

Occupancy Category = II (*Table 1-1)

Site Class: = D (Table 1613.5.2)

Mapped Short Term Response Spectral Acceleration -----> $S_S = 1.52$ (*Fig. 22-3)Mapped 1s period Spectral Response Acceleration -----> $S_1 = 0.60$ (*Fig. 22-4)Site Coefficients -----> $F_a = 1.00$ (Table 1613.5.3(1)) $F_v = 1.50$ (Table 1613.5.3(2))Modified MCE Spectral Response Acceleration at 0.2s -----> $S_{MS} = F_a S_S = 1.52$ (Eqn 16-37)Modified MCE Spectral Response Acceleration at 1s -----> $S_{M1} = F_v S_1 = 0.90$ (Eqn 16-38)Design Spectral Acceleration at 0.2s -----> $S_{DS} = (2/3) S_{MS} = 1.01$ (Eqn 16-39)Design Spectral Acceleration at 1s -----> $S_{D1} = (2/3) S_{M1} = 0.60$ (Eqn 16-40)

Seismic Design Category: D (*Table 11.6-1 and 11.6-2)

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JOB NO. 18-234**Legacy at Livermore****Kattera**

JWK version 1.1

Seismic Base Shear (Equivalent Lateral Force Procedure Section 12.8*)

Structural System Light-Framed Walls With Wood Shear Panels
 Response Modification Factor -----> $R = 6.50$ (*Table 12.2-1)

Fundamental Period Worksheet (*Section 12.8.2)**Using Approximate Method:**

Structural Type -----> All other structural Systems
 $C_t = 0.02$ (*Table 12.8-2)
 $\alpha = 0.75$ (*Table 12.8-2)
 Height of structure -----> $h_n = 40$ ft
 Number of Stories -----> $N = 4$
 Approximate Fundamental Period $T_a = C_t h_n^\alpha = 0.318$ (*Eqn 12.8-7)
 Approximate Fundamental Period $T_a = 0.1N = \text{n.a.}$ (*Eqn 12.8-8)

Using properly substantiated analysis: $T = \text{not used}$

Fundamental Period of the Structure: $T = 0.318$ sec

Long Period Transition Period -----> $T_L = 12$ (*Figure 22-16)
 Seismic Response Coefficient, $C_s = S_{DS} / (R / I) = 0.16$ (*Eqn 12.8-2)
 Upper Limit (for $T \leq T_L$): $S_{D1} / (T (R / I)) = 0.29$ (*Eqn 12.8-3)
 Upper Limit (for $T > T_L$): $S_{D1} T_L / (T^2 (R / I)) = \text{na}$ (*Eqn 12.8-4)
 Lower Limit: 0.01 (*Eqn 12.8-5)
 Lower Limit ($S_1 \geq 0.6$): $0.5 \times S_1 / (R / I) = 0.05$ (*Eqn 12.8-6)
 $T < 0.5s$; $N \leq 5$ stories; using $S_s = 1.5 \text{ max}$ = na (*Section 12.8.1.3)
☐ Regular Structure (*Section 12.3.2)

Seismic Base Shear (Strength): $V = C_s W = 0.16 W$ (*Eqn 12.8-1)

Redundancy Factor: For Diaphragm Design -----> $\rho = 1.00$ (*Section 12.3.4.1)
 For SDC D through F -----> $\rho = 1.00$ (*Section 12.4.3.2)

Earthquake Load:

Strength Design:	$E_h = \rho V = 0.155 W$
	$E_v = .2 S_{DS} D = 0.202 D$
Allowable Stress Design:	$E_h / 1.4 = 0.111 W$
	$E_v / 1.4 = 0.144 D$

($E_v = 0$ for foundation dgn)

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JOB NO. **18-234****Legacy at Livermore****Katerra**

JWK version 1.1

Seismic Base Shear (Equivalent Lateral Force Procedure Section 12.8*)Structural System **Special Reinforced Concrete Shear Walls**Response Modification Factor ----- R = **5.00** (*Table 12.2-1)**Fundamental Period Worksheet (*Section 12.8.2)****Using Approximate Method:**

Structural Type -----> All other structural Systems ▼

Ct = 0.02 (*Table 12.8-2)

x = 0.75 (*Table 12.8-2)

Height of structure -----> $h_n = 20$ ft

Number of Stories -----> N = 1

Approximate Fundamental Period $T_a = C_t h_n^x = 0.189$ (*Eqn 12.8-7)

Approximate Fundamental Period $T_a = 0.1N = \text{n.a.}$ (*Eqn 12.8-8)

Using properly substantiated analysis: T = not used

Fundamental Period of the Structure: T = 0.189 sec

Long Period Transition Period ----- $T_L = 12$ (*Figure 22-16)Seismic Response Coefficient, $C_s = S_{DS} / (R / I) = 0.20$ (*Eqn 12.8-2)Upper Limit (for $T \leq T_L$): $S_{D1} / (T (R / I)) = 0.63$ (*Eqn 12.8-3)Upper Limit (for $T > T_L$): $S_{D1} T_L / (T^2 (R / I)) = \text{na}$ (*Eqn 12.8-4)

Lower Limit: 0.01 (*Eqn 12.8-5)

Lower Limit ($S_1 \geq 0.6$): $0.5 \times S_1 / (R / I) = 0.06$ (*Eqn 12.8-6) $T < 0.5\text{s}$; N ≤ 5 stories; using $S_s = 1.5\text{max}$ = na (*Section 12.8.1.3)☐ Regular Structure (*Section 12.3.2)Seismic Base Shear (Strength): $V = C_s W = 0.20$ W (*Eqn 12.8-1)Redundancy Factor: For Diaphragm Design -----> $\rho = 1.00$ (*Section 12.3.4.1)For SDC D through F -----> $\rho = 1.00$ (*Section 12.4.3.2)Earthquake Load: Strength Design: $E_h = \rho V = 0.202$ W $E_v = .2 * S_{DS} D = 0.202$ DAllowable Stress Design: $E_h / 1.4 = 0.144$ W $E_v / 1.4 = 0.144$ D

(Ev = 0 for foundation dgn)

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Design Loads - Wood Superstructure

LOW SLOPE ROOF (TRUSSES)

	Dead Load	Live Load
Tapered TPO Roofing (Avg depth = 3 in)	4.5 psf	
1/2" T&G Plywood or OSB	1.5 psf	
Manufactured Roof Trusses @ 24"o.c.	3.0 psf	
Insulation (9.5" @ 0.04 psf/in)	0.4 psf	
Sprinklers	1.0 psf	
2 layers 5/8" gypboard ceiling	5.6 psf	
Miscellaneous	2.0 psf	
	18.0 psf	20.0 psf
	+ 6psf (At Rooftop Equipment and Solar)	

MANSARD ROOF (TRUSSES)

Light Wt Conc Tile	10.0 psf	
Waterproofing	1.0 psf	
1/2" T&G Plywood or OSB	1.5 psf	
Manufactured Roof Trusses @ 24"o.c.	3.0 psf	
Slope Adjustment (4:12)	0.8 psf	
Insulation (9.5" @ 0.04 psf/in)	0.4 psf	
Sprinklers	1.0 psf	
2 layers 5/8" gypboard ceiling	5.6 psf	
Miscellaneous	2.7 psf	
	26.0 psf	20.0 psf

FLAT ROOF (RAFTERS)

Tapered TPO Roofing (Avg depth = 3 in)	4.5 psf	
1/2" T&G Plywood or OSB	1.5 psf	
11-7/8" I-Joists @ 24" o.c.	1.5 psf	
Insulation (9.5" @ 0.04 psf/in)	0.4 psf	
MEP and Sprinklers	1.0 psf	
2 layers 5/8" gypboard ceiling	5.6 psf	
Miscellaneous	1.5 psf	
	16.0 psf	40.0 psf

BOILER ROOM (RAFTERS)

4" NW Concrete Pad	50.0 psf	
Built-up Roofing	3.0 psf	
1/2" T&G Plywood or OSB	1.5 psf	
11-7/8" I-Joists @ 12" o.c.	3.0 psf	
Insulation (9.5" @ 0.04 psf/in)	0.4 psf	
MEP and Sprinklers	1.0 psf	
2 layers 5/8" gypboard ceiling	5.6 psf	
Miscellaneous	2.5 psf	
	67.0 psf	40.0 psf

TYPICAL FLOOR

Finish (Carpet)	1.5 psf
1 1/4" Gypcrete	12.0 psf

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Design Loads - Wood Superstructure

	Dead Load	Live Load
Acoustimat	0.5 psf	
3/4" Plywood or OSB	2.3 psf	
11-7/8" I-Joists @ 16" o.c.	2.3 psf	
Insulation (5.5" @ 0.04 psf/in)	0.2 psf	
MEP & Sprinklers	1.5 psf	
2 layers 5/8" Gypboard + RC Channel	5.6 psf	
Miscellaneous	3.2 psf	
	29.0 psf	40.0 psf
	+3 psf (At Bath)	

FLOOR ABOVE COMMON AREAS

Typical Floor (See above)	29.0 psf	
Beam Framing (Steel and GLBs)	6.0 psf	
Additional Ceiling (T-bar and 5/8" Gypboard)	5.0 psf	
	40.0 psf	40.0 psf

CORRIDOR

Finish (Carpet)	1.5 psf	
1 1/4" Gypcrete	12.0 psf	
3/4" Plywood	2.3 psf	
2x10 Joists @ 16" o.c.	2.5 psf	
MEP & Sprinklers	2.0 psf	
5/8" Gypboard	2.8 psf	
2x4 or Metal Soffit Framing	1.0 psf	
5/8" Gypboard	2.8 psf	
Miscellaneous	3.2 psf	
	30.0 psf	100.0 psf

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Design Loads - Wood Superstructure

	Dead Load	Live Load
PRIVATE DECKS		
Dex-o-Tex or equal	2.5 psf	
3/4" Plywood	2.3 psf	
2x12 Joists @ 16" o.c. (Ripped to slope)	3.1 psf	
MEP & Sprinklers	1.5 psf	
1/2" Glass Mat Sheathing	2.0 psf	
Plywood Siding Panel T1-11	1.5 psf	
Stucco	10.0 psf	
Miscellaneous	2.2 psf	
	25.0 psf	60 psf
EXTERIOR WALLS		
7/8" Plaster	10.0 psf	
1/2" Plywood	1.5 psf	
2x8 @ 16" o.c.	2.1 psf	
Insulation (5.5" @ 0.04 psf/in)	0.2 psf	
5/8" Gypboard	2.8 psf	
Top & Bottom Plates	0.6 psf	
Miscellaneous	1.8 psf	
	19.0 psf	
INTERIOR CORRIDOR WALLS		
5/8" Gypboard	2.8 psf	
1/2" OSB	1.5 psf	
2x6 @ 16" o.c.	1.5 psf	
Top & Bottom Plates	0.6 psf	
Insulation (5.5" @ 0.04 psf/in)	0.2 psf	
2 layers 5/8" Gypboard	5.6 psf	
Miscellaneous	1.8 psf	
	14.0 psf	
PARTY WALLS		
5/8" Gypboard	2.8 psf	
2x4 @ 16" o.c.	1.0 psf	
Insulation (5.5" @ 0.04 psf/in Ea. Wall)	0.4 psf	
2x4 @ 16" o.c.	1.0 psf	
1/2" OSB	1.5 psf	
5/8" Gypboard	2.8 psf	
Top & Bottom Plates	0.8 psf	
Miscellaneous	1.8 psf	
	12.0 psf	
INTERIOR WALLS		
5/8" Gypboard	2.8 psf	2.8 psf
2x @ 16" o.c.	1.0 psf	1.5 psf
Insulation (0.04 psf/in)	0.1 psf	0.2 psf
5/8" Gypboard	2.8 psf	2.8 psf

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Design Loads - Wood Superstructure

	Dead Load	Live Load
Top & Bottom Plates	0.4 psf	0.6 psf
Miscellaneous	1.4 psf	1.6 psf
	8.5 psf	9.5 psf

MecaWind Pro v2.2.8.2 per ASCE 7-10

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Date : 2/6/2019 Project No. : JobNo
 Company Name : True Designed By : Engineer
 Address : Address Description : Description
 City : City Customer Name : Customer
 State : State Proj Location : Location
 File Location: Y:\Jobs\18-jobs\18-234 Legacy at Livermore\ (C) Calculations\Design Criteria and Design
 Loads\18-234 Wind Calc.wnd

Directional Procedure Simplified Diaphragm Building (Ch 27 Part 2)

Basic Wind Speed(V)	=	110.00 mph	Exposure Category	=	C
Structural Category	=	II	Flexible Structure	=	No
Natural Frequency	=	N/A	Kd Directional Factor	=	0.85
Importance Factor	=	1.00	Zg	=	900.00 ft
Alpha	=	9.50	Bt	=	1.00
At	=	0.11	Bm	=	0.65
Am	=	0.15	l	=	500.00 ft
Cc	=	0.20	Zmin	=	15.00 ft
Epsilon	=	0.20	Slope of Roof(Theta)	=	.00 Deg
Pitch of Roof	=	0 : 12	Type of Roof	=	FLAT
h: Mean Roof Ht	=	44.00 ft	Eht: Eave Height	=	44.00 ft
RHt: Ridge Ht	=	44.00 ft	Overhead Type	=	No Overhang
OH: Roof Overhang at Eave	=	.00 ft	Bldg Width Across Ridge	=	370.00 ft
Bldg Length Along Ridge	=	280.00 ft			

Gust Factor Calculations

Gust Factor Category I Rigid Structures - Simplified Method
 Gust1: For Rigid Structures (Nat. Freq.>1 Hz) use 0.85 = 0.85

Gust Factor Category II Rigid Structures - Complete Analysis
 Zm: $0.6 * Ht$ = 26.40 ft
 lzm: $Cc * (33 / Zm)^{0.167}$ = 0.21
 Lzm: $1 * (Zm / 33)^{Epsilon}$ = 478.18 ft
 Q: $(1 / (1 + 0.63 * ((B + Ht) / Lzm)^{0.63}))^{0.5}$ = 0.80
 Gust2: $0.925 * ((1 + 1.7 * lzm * 3.4 * Q) / (1 + 1.7 * 3.4 * lzm))$ = 0.82

Gust Factor Summary
 Not a Flexible Structure use the Lessor of Gust1 or Gust2 = 0.82

Table 26.11-1 Internal Pressure Coefficients for Buildings, GCpi

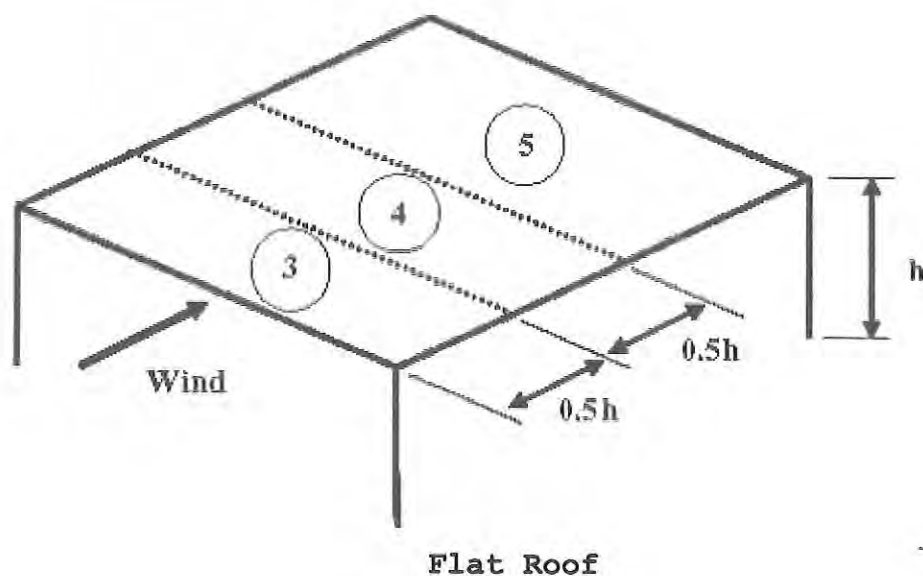
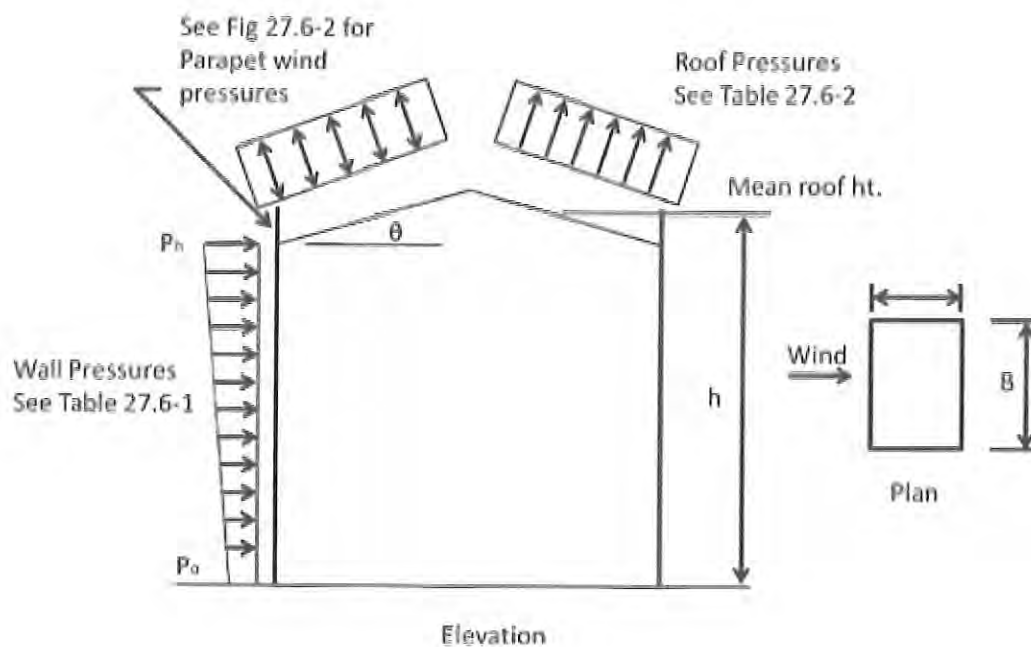
GCpi : Internal Pressure Coefficient = +/-0.18

Topographic Adjustment

$0.33 * z$ = 1.00
 Kzt ($0.33 * z$): Topographic factor at elevation $0.33 * z$ = 1.00
 Vtopo: Adjust V per Para 27.5.2: $V * [Kzt(0.33 * z)]^{0.5}$ = 110.00 mph

MWFRS Diaphragm Building Wind Pressures per Ch 27 Pt 2

All pressures shown are based upon ASD Design, with a Load Factor of .6



MWFRS Pressures for Wind Normal to 280 ft wall (Normal to Ridge)

WALL PRESSURES PER TABLE 27.6-1		
L/B: Bldg Dim in Wind Dir / Bldg Dim Normal to Wind Dir	=	1.32
h: Height to top of Windward Wall	=	44.00 ft
ph: Net Pressure at top of wall (windward + leeward)	=	18.16 psf
p0: Net Pressure at bottom of wall (windward + leeward)	=	16.05 psf
ps: Side wall pressure acting away from wall = $.57 * ph$	=	-10.39 psf
pl: Leeward wall pressure acting away from wall = $.34 * ph$	=	-6.26 psf
pwh: Windward wall press @ top acting toward wall = $ph - pl$	=	11.90 psf
pw0: Windward wall press @ bot acting toward wall = $p0 - pl$	=	9.80 psf
ROOF PRESSURES PER TABLE 27.6-2		
h: Mean Roof Height	=	44.000 ft
Lambda: Exposure Adjustment Factor	=	1.000
Slope: Roof Slope	=	.00 Deg

Any slope less than 9.46 Deg is treated as a 'Flat' roof per Table 27.6-2

Zone	Load Case1 psf	Load Case2 psf
1	.00	.00
2	.00	.00
3	-17.80	.00
4	-15.89	.00
5	-13.02	.00

Note: A value of '0' indicates that the zone/load case is not applicable.

Normal to Ridge - Base Reactions - Walls+Roof +GCpi

Description	Press psf	Area ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Roof (0 to h/2)	-17.80	6160	.00	.00	109.62	19074.5	.0	.0
Roof (h/2 to h)	-15.89	6160	.00	.00	97.87	14876.3	.0	.0
Roof (h to 2h)	-13.02	12320	.00	.00	160.41	19088.4	.0	.0
Roof (>2h)	-13.02	78960	.00	.00	1028.06	45234.6	.0	.0
Windward Wall	11.90	2800	.00	33.33	.00	1299.7	.0	.0
Windward Wall	11.42	2800	.00	31.99	.00	927.6	.0	.0
Windward Wall	10.94	2800	.00	30.64	.00	582.2	.0	.0
Windward Wall	10.47	2800	.00	29.30	.00	263.7	.0	.0
Windward Wall	9.99	1120	.00	11.18	.00	22.4	.0	.0
Leeward Wall	-6.26	12320	.00	77.11	.00	1696.5	.0	.0
Side Wall	-10.39	16280	-169.17	.00	.00	.0	3721.6	.0
Side Wall	-10.39	16280	169.17	.00	.00	.0	-3721.6	.0
Total	.00	160800	.00	213.56	1395.96	12596.6	.0	.0

Normal to Ridge - Base Reactions - Walls Only +GCpi

Description	Press psf	Area ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Windward Wall	11.90	2800	.00	33.33	.00	1299.7	.0	.0
Windward Wall	11.42	2800	.00	31.99	.00	927.6	.0	.0
Windward Wall	10.94	2800	.00	30.64	.00	582.2	.0	.0
Windward Wall	10.47	2800	.00	29.30	.00	263.7	.0	.0
Windward Wall	9.99	1120	.00	11.18	.00	22.4	.0	.0
Leeward Wall	-6.26	12320	.00	77.11	.00	1696.5	.0	.0
Side Wall	-10.39	16280	-169.17	.00	.00	.0	3721.6	.0
Side Wall	-10.39	16280	169.17	.00	.00	.0	-3721.6	.0
Total	.00	57200	.00	213.56	.00	4792.2	.0	.0

Normal to Ridge - Base Reactions - Walls+Roof -GCpi

Description	Press psf	Area ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Windward Wall	11.90	2800	.00	33.33	.00	1299.7	.0	.0
Windward Wall	11.42	2800	.00	31.99	.00	927.6	.0	.0
Windward Wall	10.94	2800	.00	30.64	.00	582.2	.0	.0
Windward Wall	10.47	2800	.00	29.30	.00	263.7	.0	.0
Windward Wall	9.99	1120	.00	11.18	.00	22.4	.0	.0
Leeward Wall	-6.26	12320	.00	77.11	.00	1696.5	.0	.0
Side Wall	-10.39	16280	-169.17	.00	.00	.0	3721.6	.0
Side Wall	-10.39	16280	169.17	.00	.00	.0	-3721.6	.0
Total	.00	57200	.00	213.56	.00	4792.2	.0	.0

Normal to Ridge - Base Reactions - Walls Only -GCpi

Description	Press psf	Area ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Windward Wall	11.90	2800	.00	33.33	.00	1299.7	.0	.0
Windward Wall	11.42	2800	.00	31.99	.00	927.6	.0	.0
Windward Wall	10.94	2800	.00	30.64	.00	582.2	.0	.0
Windward Wall	10.47	2800	.00	29.30	.00	263.7	.0	.0
Windward Wall	9.99	1120	.00	11.18	.00	22.4	.0	.0

Leeward Wall	-6.26	12320	.00	77.11	.00	1696.5	.0	.0
Side Wall	-10.39	16280	-169.17	.00	.00	.0	3721.6	.0
Side Wall	-10.39	16280	169.17	.00	.00	.0	-3721.6	.0
Total	.00	57200	.00	213.56	.00	4792.2	.0	.0

Normal to Ridge - Base Reactions - Walls+Roof MIN

Description	Press psf	Area* ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Total	.00	0	.00	.00	.00	.0	.0	.0

Notes - Normal to Ridge

- Note (1) X= Along Building ridge, Y = Normal to Building Ridge, Z = Vertical
 Note (2) MIN = Minimum pressures on Walls = 9.6 psf and Roof = 4.8 psf
 Note (3) Area* = Area of the surface projected onto a vertical plane normal to wind.

MWFRS Pressures for Wind Normal to 370 ft wall (Along Ridge)

WALL PRESSURES PER TABLE 27.6-1

L/B: Bldg Dim in Wind Dir / Bldg Dim Normal to Wind Dir	=	0.76
h: Height to top of Windward Wall	=	44.00 ft
ph: Net Pressure at top of wall (windward + leeward)	=	18.96 psf
p0: Net Pressure at bottom of wall (windward + leeward)	=	16.88 psf

ps: Side wall pressure acting away from wall = .54 * ph	=	-10.24 psf
pl: Leeward wall pressure acting away from wall = .38 * ph	=	-7.20 psf
pwh: Windward wall press @ top acting toward wall = ph-pl	=	11.76 psf
pw0: Windward wall press @ bot acting toward wall = p0-pl	=	9.68 psf

ROOF PRESSURES PER TABLE 27.6-2

h: Mean Roof Height	=	44.000 ft
Lambda: Exposure Adjustment Factor	=	1.000
Slope: Roof Slope	=	.00 Deg

Any slope less than 9.46 Deg is treated as a 'Flat' roof per Table 27.6-2

Zone	Load Case1 psf	Load Case2 psf
----	-----	-----
1	.00	.00
2	.00	.00
3	-17.80	.00
4	-15.89	.00
5	-13.02	.00

Note: A value of '0' indicates that the zone/load case is not applicable.

Along Ridge - Base Reactions - Walls+Roof +GCpi

Description	Press psf	Area ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Roof (0 to h/2)	-17.80	8140	.00	.00	144.86	.0	-18686.9	.0
Roof (h/2 to h)	-15.89	8140	.00	.00	129.33	.0	-13838.1	.0
Roof (h to 2h)	-13.02	16280	.00	.00	211.97	.0	-15685.5	.0
Roof (>2h)	-13.02	71040	.00	.00	924.94	.0	40697.4	.0
Windward Wall	11.76	3700	43.49	.00	.00	.0	-1696.3	.0
Windward Wall	11.28	3700	41.75	.00	.00	.0	-1210.7	.0
Windward Wall	10.81	3700	40.00	.00	.00	.0	-760.0	.0
Windward Wall	10.34	3700	38.26	.00	.00	.0	-344.3	.0
Windward Wall	9.87	1480	14.60	.00	.00	.0	-29.2	.0
Leeward Wall	-7.20	16280	117.29	.00	.00	.0	-2580.5	.0
Side Wall	-10.24	12320	.00	126.14	.00	2775.0	.0	.0
Side Wall	-10.24	12320	.00	-126.14	.00	-2775.0	.0	.0
Total	.00	160800	295.40	.00	1411.09	.0	-14134.1	.0

Along Ridge - Base Reactions - Walls Only +GCpi

Description	Press psf	Area ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
-------------	--------------	--------------	-----------	-----------	-----------	------------	------------	------------

Windward Wall	11.76	3700	43.49	.00	.00	.0	-1696.3	.0
Windward Wall	11.28	3700	41.75	.00	.00	.0	-1210.7	.0
Windward Wall	10.81	3700	40.00	.00	.00	.0	-760.0	.0
Windward Wall	10.34	3700	38.26	.00	.00	.0	-344.3	.0
Windward Wall	9.87	1480	14.60	.00	.00	.0	-29.2	.0
Leeward Wall	-7.20	16280	117.29	.00	.00	.0	-2580.5	.0
Side Wall	-10.24	12320	.00	126.14	.00	2775.0	.0	.0
Side Wall	-10.24	12320	.00	-126.14	.00	-2775.0	.0	.0
Total	.00	57200	295.40	.00	.00	.0	-6621.0	.0

Along Ridge - Base Reactions - Walls+Roof -GCpi

Description	Press psf	Area ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Windward Wall	11.76	3700	43.49	.00	.00	.0	-1696.3	.0
Windward Wall	11.28	3700	41.75	.00	.00	.0	-1210.7	.0
Windward Wall	10.81	3700	40.00	.00	.00	.0	-760.0	.0
Windward Wall	10.34	3700	38.26	.00	.00	.0	-344.3	.0
Windward Wall	9.87	1480	14.60	.00	.00	.0	-29.2	.0
Leeward Wall	-7.20	16280	117.29	.00	.00	.0	-2580.5	.0
Side Wall	-10.24	12320	.00	126.14	.00	2775.0	.0	.0
Side Wall	-10.24	12320	.00	-126.14	.00	-2775.0	.0	.0
Total	.00	57200	295.40	.00	.00	.0	-6621.0	.0

Along Ridge - Base Reactions - Walls Only -GCpi

Description	Press psf	Area ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Windward Wall	11.76	3700	43.49	.00	.00	.0	-1696.3	.0
Windward Wall	11.28	3700	41.75	.00	.00	.0	-1210.7	.0
Windward Wall	10.81	3700	40.00	.00	.00	.0	-760.0	.0
Windward Wall	10.34	3700	38.26	.00	.00	.0	-344.3	.0
Windward Wall	9.87	1480	14.60	.00	.00	.0	-29.2	.0
Leeward Wall	-7.20	16280	117.29	.00	.00	.0	-2580.5	.0
Side Wall	-10.24	12320	.00	126.14	.00	2775.0	.0	.0
Side Wall	-10.24	12320	.00	-126.14	.00	-2775.0	.0	.0
Total	.00	57200	295.40	.00	.00	.0	-6621.0	.0

Along Ridge - Base Reactions - Walls+Roof MIN

Description	Press psf	Area* ft^2	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Total	.00	0	.00	.00	.00	.0	.0	.0

Notes - Along Ridge

- Note (1) X= Along Building ridge, Y = Normal to Building Ridge, Z = Vertical
 Note (2) MIN = Minimum pressures on Walls = 9.6 psf and Roof = 4.8 psf
 Note (3) Area* = Area of the surface projected onto a vertical plane normal to wind.

Total Base Reaction Summary

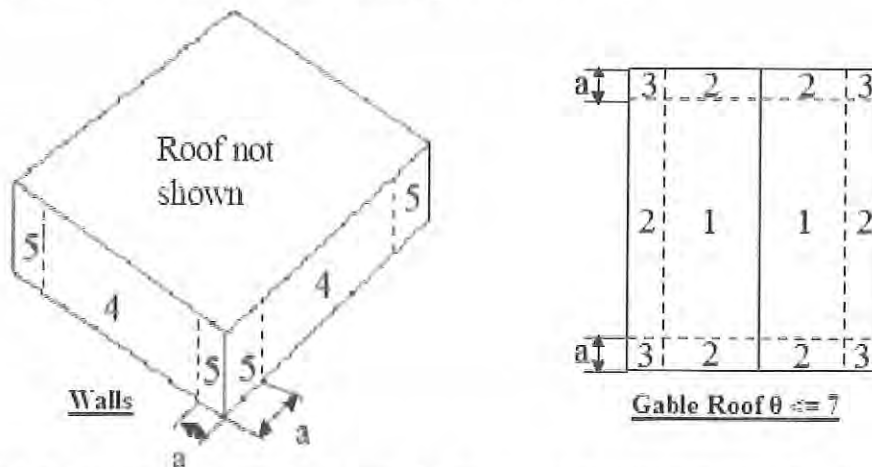
Description	Fx Kip	Fy Kip	Fz Kip	Mx K-ft	My K-ft	Mz K-ft
Normal to Ridge Walls+Roof +GCpi	.0	213.6	1396.0	12596.6	.0	.0
Normal to Ridge Walls Only +GCpi	.0	213.6	.0	4792.2	.0	.0
Normal to Ridge Walls+Roof -GCpi	.0	213.6	.0	4792.2	.0	.0
Normal to Ridge Walls Only -GCpi	.0	213.6	.0	4792.2	.0	.0
Normal to Ridge Walls+Roof MIN	.0	.0	.0	.0	.0	.0
Along Ridge Walls+Roof +GCpi	295.4	.0	1411.1	.0	-14134.1	.0
Along Ridge Walls Only +GCpi	295.4	.0	.0	.0	-6621.0	.0
Along Ridge Walls+Roof -GCpi	295.4	.0	.0	.0	-6621.0	.0
Along Ridge Walls Only -GCpi	295.4	.0	.0	.0	-6621.0	.0
Along Ridge Walls+Roof MIN	.0	.0	.0	.0	.0	.0

Notes Applying to MWFRS Reactions:

- Note (1) Per Fig 27.4-1, Note 9, Use greater of Shear calculated with or without roof.

- Note (2) X= Along Building ridge, Y = Normal to Building Ridge, Z = Vertical
 Note (3) MIN = Minimum pressures on Walls = 9.6 psf and Roof = 4.8 psf
 Note (4) MIN area is the area of the surface onto a vertical plane normal to wind.
 Note (5) Total Roof Area (incl OH Top) = 103600 sq. ft
 Note (6) LC = Load Case (Some pressures can be zero, ref ASCE 7-10 Ch 27 Pt 2)

Wind Pressure on Components and Cladding (Ch 30 Part 1)



All pressures shown are based upon ASD Design, with a Load Factor of .6

Width of Pressure Coefficient Zone "a" = 17.60 ft

Description	Width ft	Span ft	Area ft^2	Zone	Max GCp	Min GCp	Max P psf	Min P psf
Zone 4	10.00	1.00	10.0	4	0.90	-0.99	18.17	-19.68
Zone 4	20.00	1.00	20.0	4	0.85	-0.94	17.36	-18.88
Zone 4	50.00	1.00	50.0	4	0.79	-0.88	16.30	-17.81
Zone 4	100.00	1.00	100.0	4	0.74	-0.83	15.49	-17.01
Zone 5	10.00	1.00	10.0	5	0.90	-1.26	18.17	-24.22
Zone 5	20.00	1.00	20.0	5	0.85	-1.16	17.36	-22.61
Zone 5	50.00	1.00	50.0	5	0.79	-1.04	16.30	-20.48
Zone 5	100.00	1.00	100.0	5	0.74	-0.94	15.49	-18.87

Khcc:Comp. & Clad. Table 6-3 Case 1

= 1.06

Qhcc:.00256*V^2*Khcc*Kht*Kd

= 16.82 psf

Project: Joist

Location: J24 - 11.875 I-Joist - 24" OC - MAX SPAN = 14.5'

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 14.5 FT @ 24 O.C.

Deflection Adequate By: 4.9%

Controlling Factor: Deflection



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DEFLECTIONS

Center

Live Load 0.27 IN L/652

Dead Load 0.19 in

Total Load 0.46 IN L/378

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

A

B

Live Load 580 lb 580 lb

Dead Load 421 lb 421 lb

Total Load 1001 lb 1001 lb

Bearing Length 1.75 in 1.75 in

Web Stiffeners No No

SUPPORT LOADS

A

B

Live Load 290 plf 290 plf

Dead Load 211 plf 211 plf

Total Load 501 plf 501 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

Base Values

Adjusted

Moment Cap: Mcap = 4215 ft-lb Mcap' = 4215 ft-lb

Cd = 1.00

Shear Stress: Vcap = 1655 lb Vcap' = 1655 lb

Cd = 1.00

End Reaction: Rcap = 1060 lb Rcap' = 1060 lb

Cd = 1.00

w/ web stiffeners: RcapWS = 0 lb RcapWS' = 0 lb

Cd = 1.00

Prior Reaction: IRcap = 2410 lb IRcap' = 2410 lb

Cd = 1.00

w/ web stiffeners: IRcapWS = 2765 lb IRcapWS' = 2765 lb

Cd = 1.00

E.I.: EI = 347 lb-in² EI' = 347 lb-in²

Controlling Moment: 3627 ft-lb

7.25 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: -1001 lb

14.0 Ft from left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:

Req'd

Provided

E.I.: 331 in²-lb E6 347 in²-lb xE6

Moment: 3627 ft-lb 4215 ft-lb

Shear: -1001 lb 1655 lb

LOADING DIAGRAM**JOIST DATA**

Center

Span Length 14.5 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.00

JOIST LOADING

Uniform Floor Loading

Center

Live Load LL = 40 psf

Dead Load DL = 29 psf

Total Load TL = 69 psf

TL Adj. For Joist Spacing wT = 138 plf

NOTES

Project: Joist

Location: J19 - 11.875 I-Joist - 19" OC - MAX SPAN = 15.75

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 15.75 FT @ 19.2 O.C.

Section Adequate By: 4.6%

Controlling Factor: Deflection



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DEFLECTIONS	Center
Live Load	0.29 IN L/649
Dead Load	0.21 in
Total Load	0.50 IN L/377
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360	

REACTIONS	A	B
Live Load	504 lb	504 lb
Dead Load	365 lb	365 lb
Total Load	869 lb	869 lb
Bearing Length	1.75 in	1.75 in
Web Stiffeners	No	No

SUPPORT LOADS	A	B
Live Load	315 plf	315 plf
Dead Load	228 plf	228 plf
Total Load	543 plf	543 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

	Base Values	Adjusted
Moment Cap:	Mcap = 4215 ft-lb Cd = 1.00	Mcap' = 4215 ft-lb
Shear Stress:	Vcap = 1655 lb Cd = 1.00	Vcap' = 1655 lb
End Reaction:	Rcap = 1060 lb Cd = 1.00	Rcap' = 1060 lb
w/ web stiffeners:	RcapWS = 0 lb Cd = 1.00	RcapWS' = 0 lb
Interior Reaction:	IRcap = 2410 lb Cd = 1.00	IRcap' = 2410 lb
w/ web stiffeners:	IRcapWS = 2765 lb Cd = 1.00	IRcapWS' = 2765 lb
E.I.:	EI = 347 lb-in ²	EI' = 347 lb-in ²

Controlling Moment 3423 ft-lb

7.88 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: 869 lb

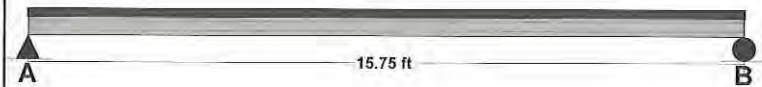
At left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:

	Req'd	Provided
E.I.:	332 in ² -lb E6	347 in ² -lb xE6
Moment:	3423 ft-lb	4215 ft-lb
Shear:	869 lb	1655 lb

LOADING DIAGRAM



JOIST DATA

	Center
Span Length	15.75 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING

Uniform Floor Loading	Center
Live Load	LL = 40 psf
Dead Load	DL = 29 psf
Total Load	TL = 69 psf
TL Adj. For Joist Spacing wT	= 110.4 plf

NOTES

Project: Joist

Location: J16 - 11.875 I-Joist -16" OC - MAX SPAN = 16.5'

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 16.5 FT @ 16 O.C.

Deflection Adequate By: 10.4%

Controlling Factor: Deflection



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DEFLECTIONS**Center**

Live Load 0.29 IN L/685

Dead Load 0.21 in

Total Load 0.50 IN L/397

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS**A****B**

Live Load 440 lb 440 lb

Dead Load 319 lb 319 lb

Total Load 759 lb 759 lb

Bearing Length 1.75 in 1.75 in

Web Stiffeners No No

SUPPORT LOADS**A****B**

Live Load 330 plf 330 plf

Dead Load 239 plf 239 plf

Total Load 569 plf 569 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

Base Values**Adjusted**

Moment Cap: Mcap = 4215 ft-lb Mcap' = 4215 ft-lb

Cd = 1.00

Shear Stress: Vcap = 1655 lb Vcap' = 1655 lb

Cd = 1.00

End Reaction: Rcap = 1060 lb Rcap' = 1060 lb

Cd = 1.00

w/ web stiffeners: RcapWS = 0 lb RcapWS' = 0 lb

Cd = 1.00

Interior Reaction: IRcap = 2410 lb IRcap' = 2410 lb

Cd = 1.00

w/ web stiffeners: IRcapWS = 2765 lb IRcapWS' = 2765 lb

Cd = 1.00

E.I.: EI = 347 lb-in² EI' = 347 lb-in²**Controlling Moment** 3131 ft-lb

8.25 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: 759 lb

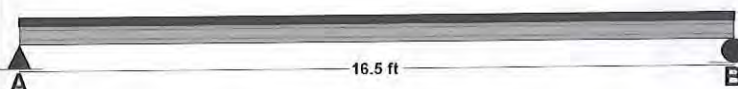
At left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:**Req'd****Provided**E.I.: 314 in²-lb E6 347 in²-lb xE6

Moment: 3131 ft-lb 4215 ft-lb

Shear: 759 lb 1655 lb

LOADING DIAGRAM**JOIST DATA****Center**

Span Length 16.5 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.00

JOIST LOADING**Uniform Floor Loading****Center**

Live Load LL = 40 psf

Dead Load DL = 29 psf

Total Load TL = 69 psf

TL Adj. For Joist Spacing wT = 92 plf

NOTES

Project: Joist

Location: J12 - 11.875 I-Joist - 12" OC - MAX SPAN = 18.5'

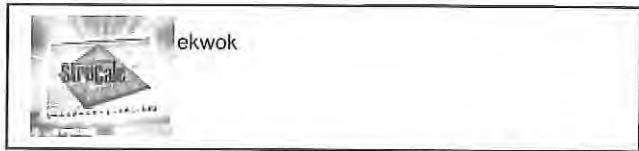
Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 18.5 FT @ 12 O.C.

Section Adequate By: 6.9%

Controlling Factor: Deflection



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DEFLECTIONS	Center
Live Load	0.33 IN L/664
Dead Load	0.24 in
Total Load	0.58 IN L/385
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360	

REACTIONS	A	B
Live Load	370 lb	370 lb
Dead Load	268 lb	268 lb
Total Load	638 lb	638 lb
Bearing Length	1.75 in	1.75 in
Web Stiffeners	No	No

SUPPORT LOADS	A	B
Live Load	370 plf	370 plf
Dead Load	268 plf	268 plf
Total Load	638 plf	638 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

	Base Values	Adjusted
Moment Cap:	Mcap = 4215 ft-lb Cd = 1.00	Mcap' = 4215 ft-lb
Shear Stress:	Vcap = 1655 lb Cd = 1.00	Vcap' = 1655 lb
End Reaction:	Rcap = 1060 lb Cd = 1.00	Rcap' = 1060 lb
w/ web stiffeners:	RcapWS = 0 lb Cd = 1.00	RcapWS' = 0 lb
Interior Reaction:	IRcap = 2410 lb Cd = 1.00	IRcap' = 2410 lb
w/ web stiffeners:	IRcapWS = 2765 lb Cd = 1.00	IRcapWS' = 2765 lb
E.I.:	EI = 347 lb-in ²	EI' = 347 lb-in ²

Controlling Moment: 2952 ft-lb

9.25 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: -638 lb

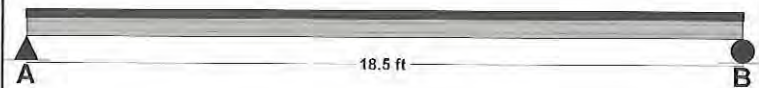
18.0 Ft from left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:

	Req'd	Provided
E.I.:	325 in ² -lb E6	347 in ² -lb xE6
Moment:	2952 ft-lb	4215 ft-lb
Shear:	-638 lb	1655 lb

LOADING DIAGRAM



JOIST DATA

	Center
Span Length	18.5 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING

Uniform Floor Loading	Center
Live Load	LL = 40 psf
Dead Load	DL = 29 psf
Total Load	TL = 69 psf
TL Adj. For Joist Spacing wT	= 69 plf

NOTES

Project: Joist

Location: J8 - 11.875 I-Joist - 8" OC - MAX SPAN = 21.5'

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 21.5 FT @ 8 O.C.

Deflection Adequate By: 4.6%

Controlling Factor: Deflection



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DEFLECTIONS**Center**

Live Load 0.40 IN L/650

Dead Load 0.29 in

Total Load 0.69 IN L/377

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS**A****B**

Live Load 287 lb 287 lb

Dead Load 208 lb 208 lb

Total Load 495 lb 495 lb

Bearing Length 1.75 in 1.75 in

Web Stiffeners No No

SUPPORT LOADS**A****B**

Live Load 431 plf 431 plf

Dead Load 312 plf 312 plf

Total Load 743 plf 743 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

Base Values**Adjusted**

Moment Cap: Mcap = 4215 ft-lb Mcap' = 4215 ft-lb

Cd = 1.00

Shear Stress: Vcap = 1655 lb Vcap' = 1655 lb

Cd = 1.00

End Reaction: Rcap = 1060 lb Rcap' = 1060 lb

Cd = 1.00

w/ web stiffeners: RcapWS = 0 lb RcapWS' = 0 lb

Cd = 1.00

Prior Reaction: IRcap = 2410 lb IRcap' = 2410 lb

Cd = 1.00

w/ web stiffeners: IRcapWS = 2765 lb IRcapWS' = 2765 lb

Cd = 1.00

E.I.: EI = 347 lb-in² EI' = 347 lb-in²

Controlling Moment: 2658 ft-lb

10.75 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: -495 lb

22.0 Ft from left support of span 2 (Center Span)

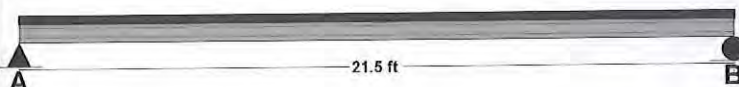
Created by combining all dead and live loads.

Comparisons with required sections:

Req'd**Provided**E.I.: 332 in²-lb E6 347 in²-lb xE6

Moment: 2658 ft-lb 4215 ft-lb

Shear: -495 lb 1655 lb

LOADING DIAGRAM**JOIST DATA****Center**

Span Length 21.5 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.00

JOIST LOADING**Uniform Floor Loading****Center**

Live Load LL = 40 psf

Dead Load DL = 29 psf

Total Load TL = 69 psf

TL Adj. For Joist Spacing wT = 46 plf

NOTES

Project: Joist

Location: J6 - 11.875 I-Joist -6" OC - MAX SPAN = 23.5'

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 23.5 FT @ 6 O.C.

Section Adequate By: 8.1%

Controlling Factor: Deflection



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DEFLECTIONS	Center
Live Load	0.42 IN L/671
Dead Load	0.30 in
Total Load	0.72 IN L/389
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360	

REACTIONS	A	B
Live Load	235 lb	235 lb
Dead Load	170 lb	170 lb
Total Load	405 lb	405 lb
Bearing Length	1.75 in	1.75 in
Web Stiffeners	No	No

SUPPORT LOADS	A	B
Live Load	470 plf	470 plf
Dead Load	340 plf	340 plf
Total Load	810 plf	810 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

	Base Values	Adjusted
Moment Cap:	Mcap = 4215 ft-lb Cd = 1.00	Mcap' = 4215 ft-lb
Shear Stress:	Vcap = 1655 lb Cd = 1.00	Vcap' = 1655 lb
End Reaction:	Rcap = 1060 lb Cd = 1.00	Rcap' = 1060 lb
w/ web stiffeners:	RcapWS = 0 lb Cd = 1.00	RcapWS' = 0 lb
Interior Reaction:	IRcap = 2410 lb Cd = 1.00	IRcap' = 2410 lb
w/ web stiffeners:	IRcapWS = 2765 lb Cd = 1.00	IRcapWS' = 2765 lb
E.I.:	EI = 347 lb-in ²	EI' = 347 lb-in ²

Controlling Moment: 2382 ft-lb

11.75 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: -405 lb

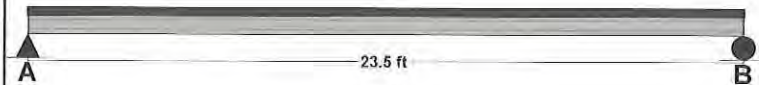
24.0 Ft from left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:

	Req'd	Provided
E.I.:	321 in ² -lb E6	347 in ² -lb xE6
Moment:	2382 ft-lb	4215 ft-lb
Shear:	-405 lb	1655 lb

LOADING DIAGRAM



JOIST DATA

	Center
Span Length	23.5 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING

Uniform Floor Loading	Center
Live Load	LL = 40 psf
Dead Load	DL = 29 psf
Total Load	TL = 69 psf
TL Adj. For Joist Spacing wT	= 34.5 plf

NOTES

Project: Joist

Location: C16 (MAX SPAN = 9.5')

Floor Joist

[2015 International Building Code(2012 NDS)]

1" x 9.25 IN x 9.5 FT @ 16 O.C.

Douglas-Fir-Larch - Dry Use

Section Adequate By: 3.8%

Controlling Factor: Moment



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DEFLECTIONS

	Center
Live Load	0.15 IN L/739
Dead Load	0.05 in
Total Load	0.20 IN L/568

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

	A	B
Live Load	633 lb	633 lb
Dead Load	190 lb	190 lb
Total Load	823 lb	823 lb
Bearing Length	0.88 in	0.88 in

SUPPORT LOADS

	A	B
Live Load	475 plf	475 plf
Dead Load	143 plf	143 plf
Total Load	617 plf	617 plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi Cd=1.00 CF=1.10 Cr=1.15	Fb' = 1139 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. ⊥ to Grain:	Fc ⊥ = 625 psi	Fc ⊥' = 625 psi

Controlling Moment:

1955 ft-lb

7.5 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear:

-823 lb

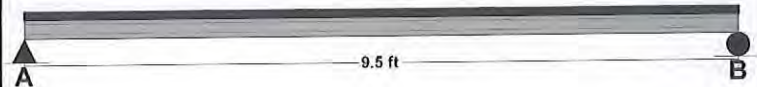
10.0 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	20.61 in ³	21.39 in ³
Area (Shear):	6.86 in ²	13.88 in ²
Moment of Inertia (deflection):	64.29 in ⁴	98.93 in ⁴
Moment:	1955 ft-lb	2029 ft-lb
Shear:	-823 lb	1665 lb

LOADING DIAGRAM



JOIST DATA

	Center
Span Length	9.5 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING

Uniform Floor Loading	Center
Live Load	LL = 100 psf
Dead Load	DL = 30 psf
Total Load	TL = 130 psf
TL Adj. For Joist Spacing wT =	173.3 plf

NOTES

Project: Joist

Location: C12 (MAX SPAN = 11')

Floor Joist

[2015 International Building Code(2012 NDS)]

1.5 IN x 9.25 IN x 11.0 FT @ 12 O.C.

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 3.2%

Controlling Factor: Moment



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DEFLECTIONS	Center
Live Load	0.21 IN L/634
Dead Load	0.06 in
Total Load	0.27 IN L/488
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360	

REACTIONS	A	B
Live Load	550 lb	550 lb
Dead Load	165 lb	165 lb
Total Load	715 lb	715 lb
Bearing Length	0.76 in	0.76 in

SUPPORT LOADS	A	B
Live Load	550 plf	550 plf
Dead Load	165 plf	165 plf
Total Load	715 plf	715 plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 1139 psi
	Cd=1.00 CF=1.10 Cr=1.15	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ = 625 psi

Controlling Moment: 1966 ft-lb
5.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 715 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	20.72 in ³	21.39 in ³
Area (Shear):	5.96 in ²	13.88 in ²
Moment of Inertia (deflection):	74.86 in ⁴	98.93 in ⁴
Moment:	1966 ft-lb	2029 ft-lb
Shear:	715 lb	1665 lb

LOADING DIAGRAM



JOIST DATA

	Center
Span Length	11 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING

Uniform Floor Loading	Center
Live Load	LL = 100 psf
Dead Load	DL = 30 psf
Total Load	TL = 130 psf
TL Adj. For Joist Spacing wT	= 130 plf

NOTES

Project: Joist

Location: C8 (MAX SPAN = 13')

Floor Joist

[2015 International Building Code(2012 NDS)]

1" IN x 9.25 IN x 13.0 FT @ 8 O.C.

Douglas-Fir-Larch - Dry Use

Section Adequate By: 10.8%

Controlling Factor: Moment



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DEFLECTIONS

Center

Live Load 0.27 IN L/576

Dead Load 0.08 in

Total Load 0.35 IN L/443

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

A

B

Live Load 433 lb 433 lb

Dead Load 130 lb 130 lb

Total Load 563 lb 563 lb

Bearing Length 0.60 in 0.60 in

SUPPORT LOADS

A

B

Live Load 650 plf 650 plf

Dead Load 195 plf 195 plf

Total Load 845 plf 845 plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

Base Values

Adjusted

Bending Stress: $F_b = 900$ psi $F_b' = 1139$ psi $C_d = 1.00$ $C_F = 1.10$ $C_r = 1.15$ Shear Stress: $F_v = 180$ psi $F_v' = 180$ psi $C_d = 1.00$ Modulus of Elasticity: $E = 1600$ ksi $E' = 1600$ ksiComp. $\perp$ to Grain: $F_c \perp = 625$ psi $F_c \perp' = 625$ psi

Controlling Moment: 1831 ft-lb

5 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 563 lb

At left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

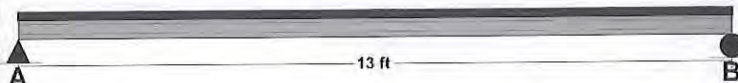
Req'd

Provided

Section Modulus: 19.3 in³ 21.39 in³Area (Shear): 4.69 in² 13.88 in²Moment of Inertia (deflection): 82.37 in⁴ 98.93 in⁴

Moment: 1831 ft-lb 2029 ft-lb

Shear: 563 lb 1665 lb

LOADING DIAGRAM**JOIST DATA**

Center

Span Length 13 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.00

JOIST LOADING

Uniform Floor Loading

Center

Live Load LL = 100 psf

Dead Load DL = 30 psf

Total Load TL = 130 psf

TL Adj. For Joist Spacing wT = 86.7 plf

NOTES

Project: Joist

Location: C6 (MAX SPAN = 15')

Floor Joist

[2015 International Building Code(2012 NDS)]

1.5 IN x 9.25 IN x 15.0 FT @ 6 O.C.

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 4.2%

Controlling Factor: Deflection



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DEFLECTIONS		Center
Live Load	0.36	IN L/500
Dead Load	0.11	in
Total Load	0.47	IN L/385
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

REACTIONS		A	B
Live Load	375	lb	375 lb
Dead Load	113	lb	113 lb
Total Load	488	lb	488 lb
Bearing Length	0.52	in	0.52 in

SUPPORT LOADS		A	B
Live Load	750	plf	750 plf
Dead Load	226	plf	226 plf
Total Load	976	plf	976 plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

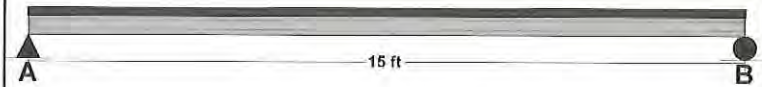
	Base Values		Adjusted	
Bending Stress:	Fb =	900 psi	Fb' =	1139 psi
	Cd=1.00 CF=1.10 Cr=1.15			
Shear Stress:	Fv =	180 psi	Fv' =	180 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1600 ksi	E' =	1600 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ =	625 psi	Fc $\perp$ ' =	625 psi

Controlling Moment: 1828 ft-lb
7.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 488 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	19.27 in ³	21.39 in ³
Area (Shear):	4.06 in ²	13.88 in ²
Moment of Inertia (deflection):	94.91 in ⁴	98.93 in ⁴
Moment:	1828 ft-lb	2029 ft-lb
Shear:	488 lb	1665 lb

LOADING DIAGRAM



JOIST DATA		Center
Span Length	15	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Floor sheathing applied to top of joists-top of joists fully braced.		
Floor Duration Factor	1.00	

JOIST LOADING		Center
Uniform Floor Loading		
Live Load	LL =	100 psf
Dead Load	DL =	30 psf
Total Load	TL =	130 psf
TL Adj. For Joist Spacing wT =	65	plf

NOTES

Project: Joist

Location: R24 - 11.875 I-Joist - 24" OC - MAX SPAN = 19.5'

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 19.5 FT @ 24 O.C.

Deflection Adequate By: 3.6%

Controlling Factor: Deflection



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DEFLECTIONS**Center**

Live Load 0.41 IN L/572

Dead Load 0.53 in

Total Load 0.94 IN L/249

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS**A****B**

Live Load 390 lb 390 lb

Dead Load 507 lb 507 lb

Total Load 897 lb 897 lb

Bearing Length 1.75 in 1.75 in

Web Stiffeners No No

SUPPORT LOADS**A****B**

Live Load 195 plf 195 plf

Dead Load 254 plf 254 plf

Total Load 449 plf 449 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

Base Values**Adjusted**

Moment Cap: Mcap = 4215 ft-lb Mcap' = 5269 ft-lb

Cd = 1.25

Shear Stress: Vcap = 1655 lb Vcap' = 2069 lb

Cd = 1.25

End Reaction: Rcap = 1060 lb Rcap' = 1325 lb

Cd = 1.25

w/ web stiffeners: RcapWS = 0 lb RcapWS' = 0 lb

Cd = 1.25

Prior Reaction: IRcap = 2410 lb IRcap' = 3013 lb

Cd = 1.25

w/ web stiffeners: IRcapWS = 2765 lb IRcapWS' = 3456 lb

Cd = 1.25

E.I.: EI = 347 lb-in² EI' = 347 lb-in²

Controlling Moment: 4373 ft-lb

9.75 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: -897 lb

19.0 Ft from left support of span 2 (Center Span)

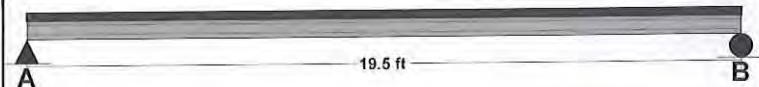
Created by combining all dead and live loads.

Comparisons with required sections:

Req'd**Provided**E.I.: 335 in²-lb E6 347 in²-lb xE6

Moment: 4373 ft-lb 5269 ft-lb

Shear: -897 lb 2069 lb

LOADING DIAGRAM**JOIST DATA****Center**

Span Length 19.5 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.25

JOIST LOADING**Uniform Floor Loading****Center**

Live Load LL = 20 psf

Dead Load DL = 26 psf

Total Load TL = 46 psf

TL Adj. For Joist Spacing wT = 92 plf

NOTES

Project: Joist

Location: R19 - 11.875 I-Joist - 19" OC - MAX SPAN = 21'

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 21.0 FT @ 19.2 O.C.

Section Adequate By: 4.9%

Controlling Factor: Deflection



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DEFLECTIONS		Center
Live Load	0.44	IN L/579
Dead Load	0.57	in
Total Load	1.00	IN L/252
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

REACTIONS		A	B
Live Load	336 lb	336 lb	
Dead Load	437 lb	437 lb	
Total Load	773 lb	773 lb	
Bearing Length	1.75 in	1.75 in	
Web Stiffeners	No	No	

SUPPORT LOADS		A	B
Live Load	210 plf	210 plf	
Dead Load	273 plf	273 plf	
Total Load	483 plf	483 plf	

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

	Base Values		Adjusted	
Moment Cap:	Mcap =	4215 ft-lb	Mcap' =	5269 ft-lb
	Cd = 1.25			
Shear Stress:	Vcap =	1655 lb	Vcap' =	2069 lb
	Cd = 1.25			
End Reaction:	Rcap =	1060 lb	Rcap' =	1325 lb
	Cd = 1.25			
w/ web stiffeners:	RcapWS =	0 lb	RcapWS' =	0 lb
	Cd = 1.25			
Interior Reaction:	IRcap =	2410 lb	IRcap' =	3013 lb
	Cd = 1.25			
w/ web stiffeners:	IRcapWS =	2765 lb	IRcapWS' =	3456 lb
	Cd = 1.25			
E.I.:	EI =	347 lb-in ²	EI' =	347 lb-in ²

Controlling Moment: 4057 ft-lb

10.5 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: 773 lb

At left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
E.I.:	331 in ² -lb E6	347 in ² -lb xE6
Moment:	4057 ft-lb	5269 ft-lb
Shear:	773 lb	2069 lb

LOADING DIAGRAM



JOIST DATA

	Center
Span Length	21 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.25

JOIST LOADING

Uniform Floor Loading		Center
Live Load	LL =	20 psf
Dead Load	DL =	26 psf
Total Load	TL =	46 psf
TL Adj. For Joist Spacing wT =	73.6	plf

NOTES

Project: Joist

Location: R16 - 11.875 I-Joist -16" OC - MAX SPAN = 22.5'

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 22.5 FT @ 16 O.C.

Deflection Adequate By: 3.3%

Controlling Factor: Deflection



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DEFLECTIONS**Center**

Live Load 0.47 IN L/570

Dead Load 0.62 in

Total Load 1.09 IN L/248

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS**A****B**

Live Load 300 lb 300 lb

Dead Load 390 lb 390 lb

Total Load 690 lb 690 lb

Bearing Length 1.75 in 1.75 in

Web Stiffeners No No

SUPPORT LOADS**A****B**

Live Load 225 plf 225 plf

Dead Load 293 plf 293 plf

Total Load 518 plf 518 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

Base Values**Adjusted**

Moment Cap: Mcap = 4215 ft-lb Mcap' = 5269 ft-lb

Cd = 1.25

Shear Stress: Vcap = 1655 lb Vcap' = 2069 lb

Cd = 1.25

End Reaction: Rcap = 1060 lb Rcap' = 1325 lb

Cd = 1.25

w/ web stiffeners: RcapWS = 0 lb RcapWS' = 0 lb

Cd = 1.25

Prior Reaction: IRcap = 2410 lb IRcap' = 3013 lb

Cd = 1.25

w/ web stiffeners: IRcapWS = 2765 lb IRcapWS' = 3456 lb

Cd = 1.25

E.I.: EI = 347 lb-in² EI' = 347 lb-in²

Controlling Moment 3881 ft-lb

11.25 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: 690 lb

At left support of span 2 (Center Span)

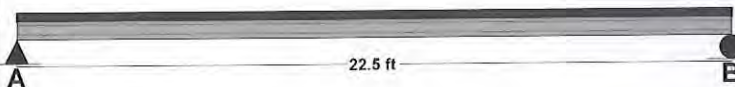
Created by combining all dead and live loads.

Comparisons with required sections:

Req'd**Provided**E.I.: 336 in²-lb E6 347 in²-lb xE6

Moment: 3881 ft-lb 5269 ft-lb

Shear: 690 lb 2069 lb

LOADING DIAGRAM**JOIST DATA****Center**

Span Length 22.5 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.25

JOIST LOADING**Uniform Floor Loading****Center**

Live Load LL = 20 psf

Dead Load DL = 26 psf

Total Load TL = 46 psf

TL Adj. For Joist Spacing wT = 61.3 plf

NOTES

Project: Joist

Location: R12 - 11.875 I-Joist - 12" OC - MAX SPAN = 19.0'

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 24.5 FT @ 12 O.C.

Section Adequate By: 7.8%

Controlling Factor: Deflection



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DEFLECTIONS		Center
Live Load	0.49	IN L/595
Dead Load	0.64	in
Total Load	1.14	IN L/259
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

REACTIONS		A	B
Live Load	245 lb	245 lb	
Dead Load	319 lb	319 lb	
Total Load	564 lb	564 lb	
Bearing Length	1.75 in	1.75 in	
Web Stiffeners	No	No	

SUPPORT LOADS		A	B
Live Load	245 plf	245 plf	
Dead Load	319 plf	319 plf	
Total Load	564 plf	564 plf	

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

	Base Values		Adjusted	
Moment Cap:	Mcap =	4215 ft-lb	Mcap' =	5269 ft-lb
	Cd = 1.25			
Shear Stress:	Vcap =	1655 lb	Vcap' =	2069 lb
	Cd = 1.25			
End Reaction:	Rcap =	1060 lb	Rcap' =	1325 lb
	Cd = 1.25			
w/ web stiffeners:	RcapWS =	0 lb	RcapWS' =	0 lb
	Cd = 1.25			
Interior Reaction:	IRcap =	2410 lb	IRcap' =	3013 lb
	Cd = 1.25			
w/ web stiffeners:	IRcapWS =	2765 lb	IRcapWS' =	3456 lb
	Cd = 1.25			
E.I.:	EI =	347 lb-in ²	EI' =	347 lb-in ²

Controlling Moment: 3451 ft-lb

12.25 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: 564 lb

At left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:

	Req'd	Provided
E.I.:	322 in ² -lb E6	347 in ² -lb xE6
Moment:	3451 ft-lb	5269 ft-lb
Shear:	564 lb	2069 lb

NOTES

LOADING DIAGRAM



JOIST DATA

		Center
Span Length	24.5	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Floor sheathing applied to top of joists-top of joists fully braced.		
Floor Duration Factor	1.25	

JOIST LOADING

Uniform Floor Loading		Center
Live Load	LL =	20 psf
Dead Load	DL =	26 psf
Total Load	TL =	46 psf
TL Adj. For Joist Spacing wT =	46	plf

Project: Joist

Location: D16R - 2x12 Ripped (Min Depth = 9")

Floor Joist

[2015 International Building Code(2012 NDS)]

1.5 IN x 8.0 IN x 8.5 FT Pressure Treated @ 16 O.C.

Douglas-Fir-Larch - Dry Use

Section Adequate By: 29.4%

Controlling Factor: Moment



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DEFLECTIONS		Center
Live Load	0.10	IN L/1056
Dead Load	0.04	in
Total Load	0.14	IN L/746
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

REACTIONS		A	B
Live Load	340 lb	340 lb	
Dead Load	142 lb	142 lb	
Total Load	482 lb	482 lb	
Bearing Length	0.51 in	0.51 in	

SUPPORT LOADS		A	B
Live Load	255 plf	255 plf	
Dead Load	107 plf	107 plf	
Total Load	362 plf	362 plf	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi Cd=1.00 CF=1.20 Cr=1.15 Ci=0.80	Fb' = 994 psi
Shear Stress:	Fv = 180 psi Cd=1.00 Ci=0.80	Fv' = 144 psi
Modulus of Elasticity:	E = 1600 ksi Ci=0.95	E' = 1520 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ = 625 psi

Controlling Moment: 1024 ft-lb

15 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 482 lb

At left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	12.36 in ³	16 in ³
Area (Shear):	5.02 in ²	12 in ²
Moment of Inertia (deflection):	30.9 in ⁴	64 in ⁴
Moment:	1024 ft-lb	1325 ft-lb
Shear:	482 lb	1152 lb

LOADING DIAGRAM



JOIST DATA

	Center
Span Length	8.5 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING

Uniform Floor Loading		Center
Live Load	LL =	60 psf
Dead Load	DL =	25 psf
Total Load	TL =	85 psf
TL Adj. For Joist Spacing wT = 113.3 plf		

NOTES

Project: Joist

Location: D12R - 2x12 Ripped (Min Depth = 7.75")

Floor Joist

[2015 International Building Code(2012 NDS)]

1.5 IN x 7.75 IN x 9.5 FT Pressure Treated @ 12 O.C.

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 29.7%

Controlling Factor: Moment



StruCalc Version 9.0.3.0

2/6/2019 11:08:42 AM

DEFLECTIONS	Center
Live Load	0.12 IN L/917
Dead Load	0.05 in
Total Load	0.18 IN L/647
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360	

REACTIONS	A	B
Live Load	285 lb	285 lb
Dead Load	119 lb	119 lb
Total Load	404 lb	404 lb
Bearing Length	0.43 in	0.43 in

SUPPORT LOADS	A	B
Live Load	285 plf	285 plf
Dead Load	119 plf	119 plf
Total Load	404 plf	404 plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi Cd=1.00 CF=1.20 Cr=1.15 Ci=0.80	Fb' = 994 psi
Shear Stress:	Fv = 180 psi Cd=1.00 Ci=0.80	Fv' = 144 psi
Modulus of Elasticity:	E = 1600 ksi Ci=0.95	E' = 1520 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ = 625 psi

Controlling Moment: 959 ft-lb
4.75 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -404 lb
10.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	11.58 in3	15.02 in3
Area (Shear):	4.21 in2	11.63 in2
Moment of Inertia (deflection):	32.36 in4	58.19 in4
Moment:	959 ft-lb	1243 ft-lb
Shear:	-404 lb	1116 lb

LOADING DIAGRAM



JOIST DATA	Center
Span Length	9.5 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING	Center
Uniform Floor Loading	
Live Load	LL = 60 psf
Dead Load	DL = 25 psf
Total Load	TL = 85 psf
TL Adj. For Joist Spacing wT =	85 plf

NOTES

Project: Joist

Location: D8R - 2x12 Ripped (Min Depth = 7.25")

Floor Joist

[2015 International Building Code(2012 NDS)]

1.5 IN x 7.25 IN x 11.0 FT Pressure Treated @ 8 O.C.

Douglas-Fir-Larch - Dry Use

Section Adequate By: 26.9%

Controlling Factor: Moment



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StruCalc Version 9.0.3.0

2/6/2019 11:08:43 AM

DEFLECTIONS Center

Live Load 0.18 IN L/725

Dead Load 0.08 in

Total Load 0.26 IN L/512

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS A B

Live Load 220 lb 220 lb

Dead Load 92 lb 92 lb

Total Load 312 lb 312 lb

Bearing Length 0.33 in 0.33 in

SUPPORT LOADS A B

Live Load 330 plf 330 plf

Dead Load 138 plf 138 plf

Total Load 468 plf 468 plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

Base Values

Adjusted

Bending Stress: $F_b = 900$ psi $F_b' = 994$ psi $C_d = 1.00$ $C_F = 1.20$ $C_r = 1.15$ $C_i = 0.80$ Shear Stress: $F_v = 180$ psi $F_v' = 144$ psi $C_d = 1.00$ $C_i = 0.80$ Modulus of Elasticity: $E = 1600$ ksi $E' = 1520$ ksi $C_i = 0.95$ Comp. $\perp$ to Grain: $F_c - \perp = 625$ psi $F_c - \perp' = 625$ psi

Controlling Moment: 857 ft-lb

Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -312 lb

At right support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

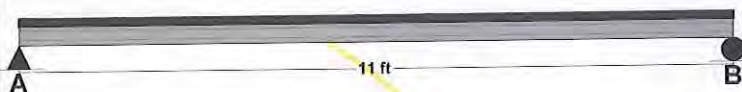
Req'd

Provided

Section Modulus: 10.35 in³ 13.14 in³Area (Shear): 3.25 in² 10.88 in²Moment of Inertia (deflection): 33.49 in⁴ 47.63 in⁴

Moment: 857 ft-lb 1088 ft-lb

Shear: -312 lb 1044 lb

LOADING DIAGRAM**JOIST DATA**

Center

Span Length 11 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.00

JOIST LOADING

Uniform Floor Loading

Center

Live Load LL = 60 psf

Dead Load DL = 25 psf

Total Load TL = 85 psf

TL Adj. For Joist Spacing wT = 56.7 plf

NOTES

Project: Joist

Location: D6R - 2x12 Ripped (Min Depth = 7")

Floor Joist

[2015 International Building Code(2012 NDS)]

1.5 IN x 7.0 IN x 12.25 FT Pressure Treated @ 6 O.C.

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 23.6%

Controlling Factor: Deflection



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2/6/2019 11:08:42 AM

DEFLECTIONS	Center
Live Load	0.23 IN L/630
Dead Load	0.10 in
Total Load	0.33 IN L/445
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360	

REACTIONS	A	B
Live Load	184 lb	184 lb
Dead Load	77 lb	77 lb
Total Load	261 lb	261 lb
Bearing Length	0.28 in	0.28 in

SUPPORT LOADS	A	B
Live Load	368 plf	368 plf
Dead Load	154 plf	154 plf
Total Load	522 plf	522 plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 994 psi
	Cd=1.00 CF=1.20 Cr=1.15 Ci=0.80	
Shear Stress:	Fv = 180 psi	Fv' = 144 psi
	Cd=1.00 Ci=0.80	
Modulus of Elasticity:	E = 1600 ksi	E' = 1520 ksi
	Ci=0.95	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ = 625 psi

Controlling Moment: 797 ft-lb
6.12 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -260 lb
12.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	9.63 in ³	12.25 in ³
Area (Shear):	2.71 in ²	10.5 in ²
Moment of Inertia (deflection):	34.69 in ⁴	42.88 in ⁴
Moment:	797 ft-lb	1014 ft-lb
Shear:	-260 lb	1008 lb

LOADING DIAGRAM



JOIST DATA	Center
Span Length	12.25 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING	Center
Uniform Floor Loading	
Live Load	LL = 60 psf
Dead Load	DL = 25 psf
Total Load	TL = 85 psf
TL Adj. For Joist Spacing wT =	42.5 plf

NOTES

Project: Joist

Location: J24 @ Boiler Room

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 9.5 FT @ 24 O.C.

on Adequate By: 4.3%

Controlling Factor: End Reaction



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StruCalc Version 9.0.3.0

2/6/2019 10:50:32 AM

DEFLECTIONS Center

Live Load 0.06 IN L/1950

Dead Load 0.10 in

Total Load 0.16 IN L/729

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

Live Load 380 lb 380 lb

Dead Load 637 lb 637 lb

Total Load 1017 lb 1017 lb

Bearing Length 1.75 in 1.75 in

Web Stiffeners No No

SUPPORT LOADS

Live Load 190 plf 190 plf

Dead Load 319 plf 319 plf

Total Load 509 plf 509 plf

I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

	Base Values	Adjusted
Moment Cap:	Mcap = 4215 ft-lb Cd = 1.00	Mcap' = 4215 ft-lb
Shear Stress:	Vcap = 1655 lb Cd = 1.00	Vcap' = 1655 lb
End Reaction:	Rcap = 1060 lb Cd = 1.00	Rcap' = 1060 lb
w/ web stiffeners:	RcapWS = 0 lb Cd = 1.00	RcapWS' = 0 lb
Interior Reaction:	IRcap = 2410 lb Cd = 1.00	IRcap' = 2410 lb
w/ web stiffeners:	IRcapWS = 2765 lb Cd = 1.00	IRcapWS' = 2765 lb
E.I.:	EI = 347 lb-in ²	EI' = 347 lb-in ²

Controlling Moment 2414 ft-lb

4.75 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

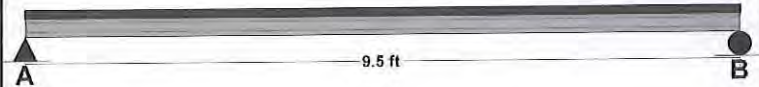
Controlling Shear: -1017 lb

10.0 Ft from left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:

	Req'd	Provided
E.I.:	171 in ² -lb E6	347 in ² -lb xE6
Moment:	2414 ft-lb	4215 ft-lb
Shear:	-1017 lb	1655 lb

LOADING DIAGRAM**JOIST DATA**

Span Length 9.5 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 0 ft

Floor sheathing applied to top of joists-top of joists fully braced.

Floor Duration Factor 1.00

JOIST LOADING

Uniform Floor Loading	Center
Live Load	LL = 40 psf
Dead Load	DL = 67 psf
Total Load	TL = 107 psf
TL Adj. For Joist Spacing wT =	214 plf

NOTES

Project: Joist

Location: J16 @ Boiler Room

Floor Joist

[2015 International Building Code(2012 NDS)]

TJI 230 / 11.875 - iLevel Trus Joist x 14.0 FT @ 16 O.C.

Section Adequate By: 6.1%

Controlling Factor: End Reaction



StruCalc Version 9.0.3.0

2/6/2019 10:50:31 AM

DEFLECTIONS		Center
Live Load	0.16	IN L/1075
Dead Load	0.26	in
Total Load	0.42	IN L/402
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

REACTIONS		A	B
Live Load	373 lb	373 lb	
Dead Load	625 lb	625 lb	
Total Load	998 lb	998 lb	
Bearing Length	1.75 in	1.75 in	
Web Stiffeners	No	No	

SUPPORT LOADS		A	B
Live Load	280 plf	280 plf	
Dead Load	469 plf	469 plf	
Total Load	749 plf	749 plf	

LOADING DIAGRAM



I-JOIST PROPERTIES

TJI 230 / 11.875 - iLevel Trus Joist

	Base Values		Adjusted	
Moment Cap:	Mcap =	4215 ft-lb	Mcap' =	4215 ft-lb
	Cd =	1.00		
Shear Stress:	Vcap =	1655 lb	Vcap' =	1655 lb
	Cd =	1.00		
End Reaction:	Rcap =	1060 lb	Rcap' =	1060 lb
	Cd =	1.00		
w/ web stiffeners:	RcapWS =	0 lb	RcapWS' =	0 lb
	Cd =	1.00		
Interior Reaction:	IRcap =	2410 lb	IRcap' =	2410 lb
	Cd =	1.00		
w/ web stiffeners:	IRcapWS =	2765 lb	IRcapWS' =	2765 lb
	Cd =	1.00		
E.I.:	EI =	347 lb-in ²	EI' =	347 lb-in ²

JOIST DATA

	Center
Span Length	14 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

JOIST LOADING

Uniform Floor Loading		Center
Live Load	LL =	40 psf
Dead Load	DL =	67 psf
Total Load	TL =	107 psf
TL Adj. For Joist Spacing wT =		142.7 plf

Controlling Moment: 3495 ft-lb

7.0 Ft from left support of span 3 (Right Span)

Created by combining all dead and live loads.

Controlling Shear: 999 lb

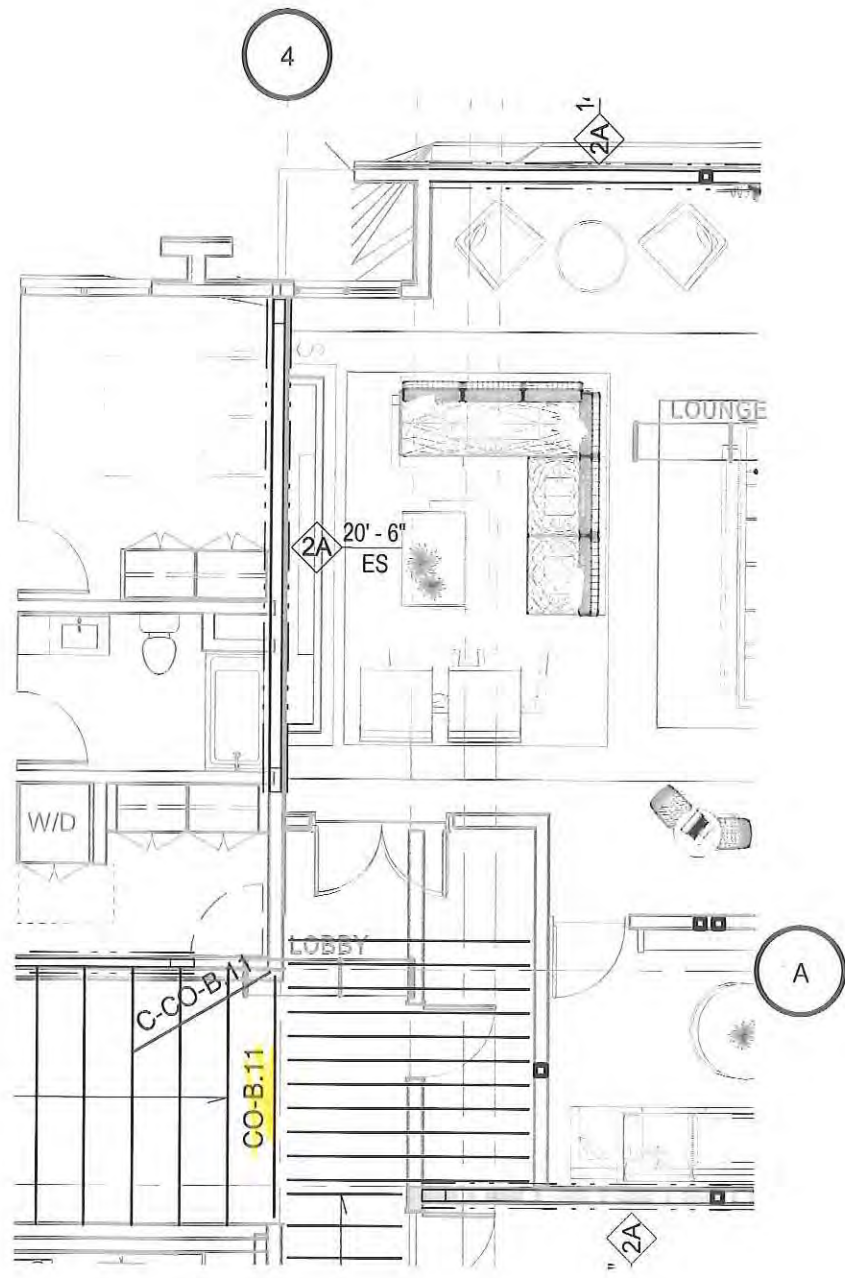
At left support of span 2 (Center Span)

Created by combining all dead and live loads.

Comparisons with required sections:

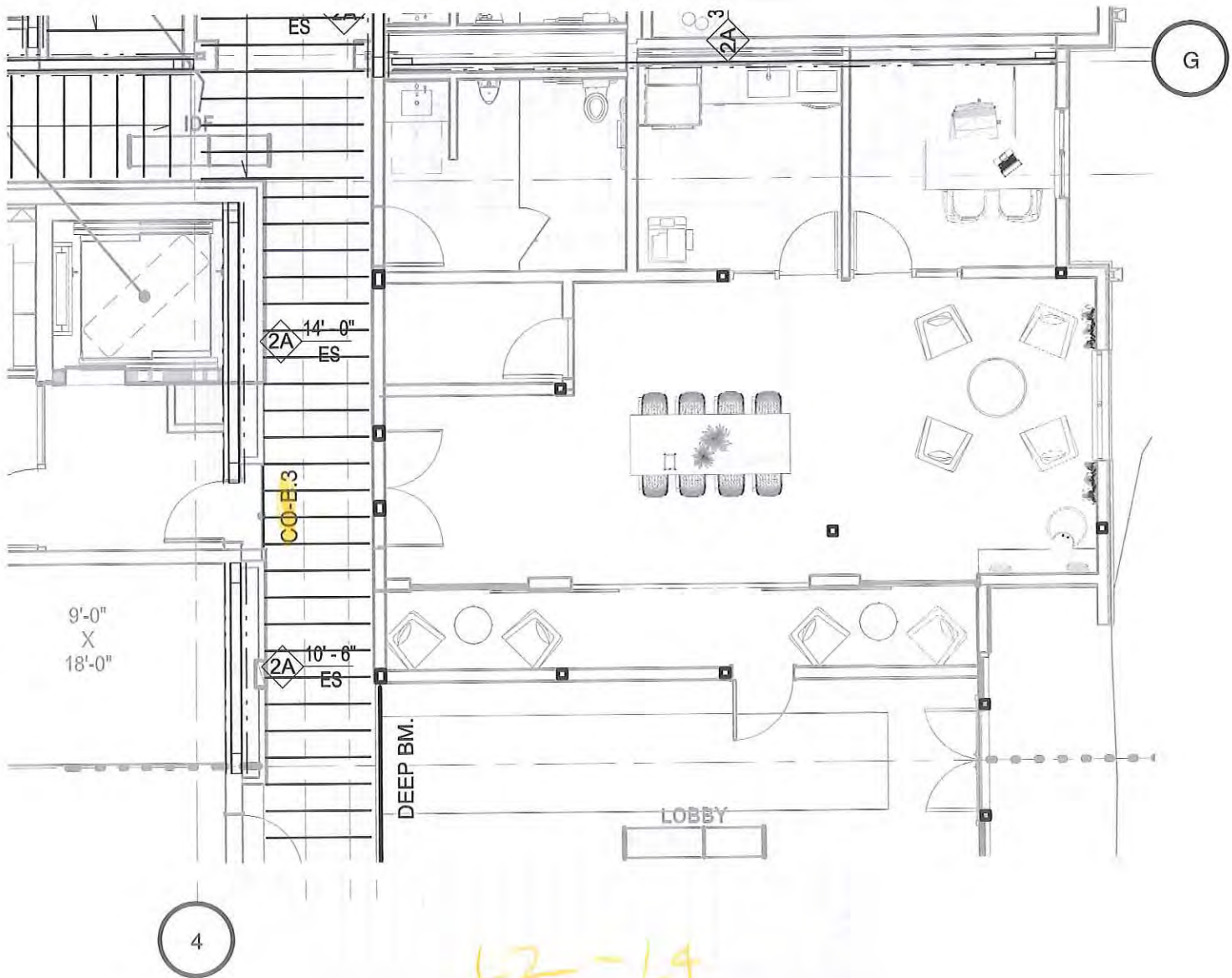
	Req'd	Provided
E.I.:	311 in ² -lb E6	347 in ² -lb xE6
Moment:	3495 ft-lb	4215 ft-lb
Shear:	999 lb	1655 lb

NOTES

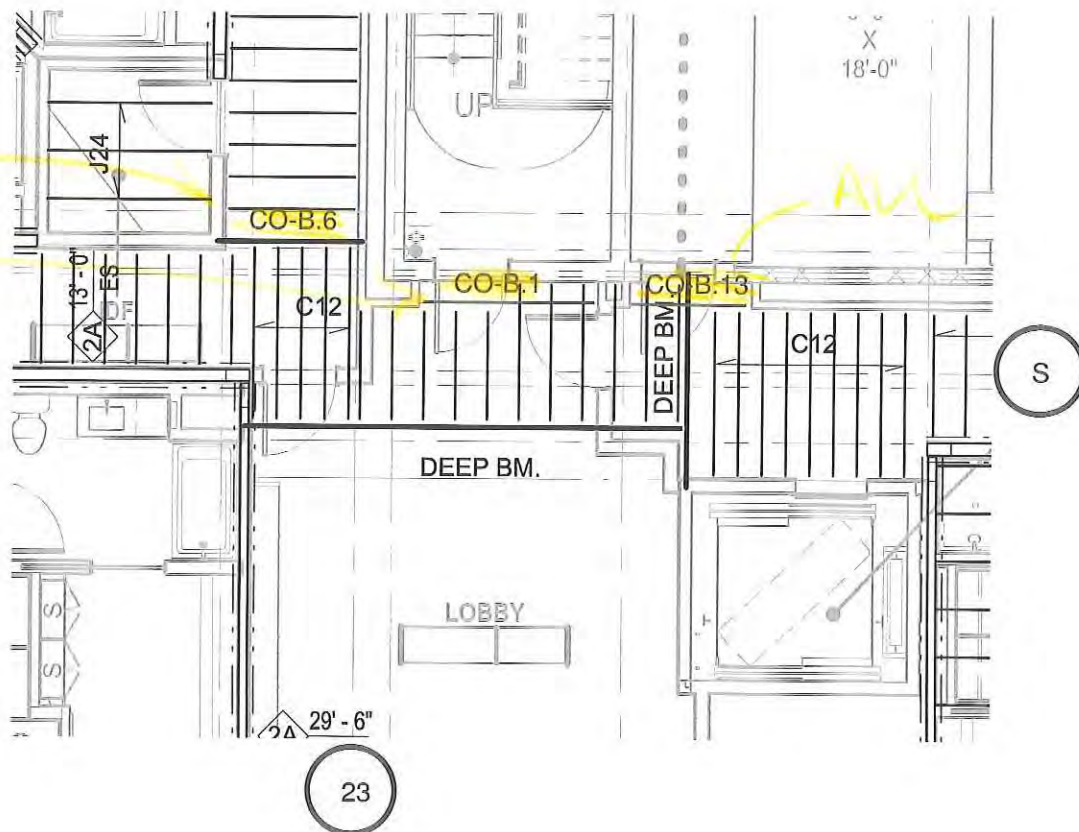


Area D
12 0009

CORRIDOR BEAM
KEY PLAN

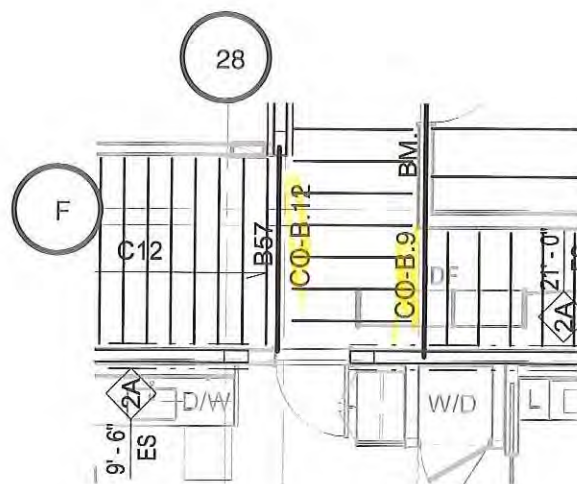


CORRIDOR BEAM
KEY PLAN

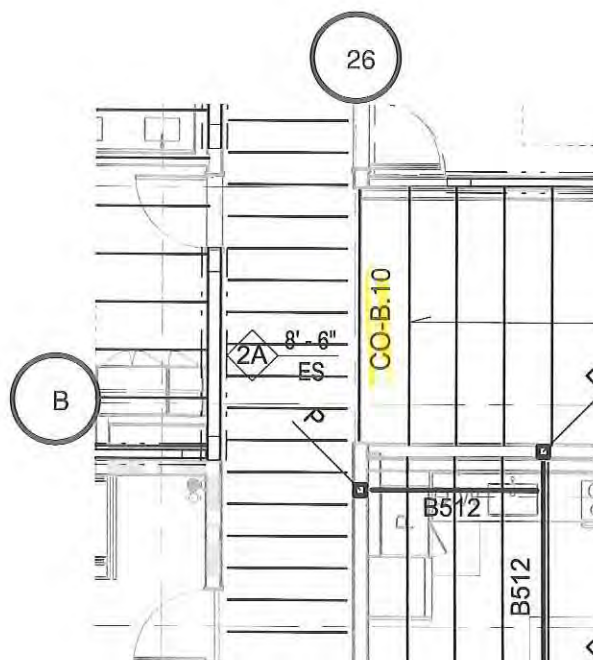


CORRIDOR BEAM
KEY PLAN

Area
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V2 ONLY
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CORRIDOR BEAM
KEY PLAN

Maximum Forces & Stresses for Load Combinations

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.1

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.463	0.337	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.77	999.99	2160.00	2.47	80.29	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.798	0.580	1.00	1.000	1.00	1.00	1.00	1.00	1.00	11.04	1,914.63	2400.00	4.73	153.73	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.354	0.257	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.12	1,060.97	3000.00	2.62	85.19	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.362	0.263	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.77	999.99	2760.00	2.47	80.29	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.577	0.420	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.98	1,731.70	3000.00	4.28	139.04	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.611	0.444	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.72	1,685.97	2760.00	4.16	135.37	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.260	0.189	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.77	999.99	3840.00	2.47	80.29	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.260	0.189	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.77	999.99	3840.00	2.47	80.29	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.451	0.328	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.98	1,731.70	3840.00	4.28	139.04	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.439	0.319	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.72	1,685.97	3840.00	4.16	135.37	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.439	0.319	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.72	1,685.97	3840.00	4.16	135.37	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.156	0.114	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.46	600.00	3840.00	1.48	48.17	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.156	0.114	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.46	600.00	3840.00	1.48	48.17	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2006	3.777		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.887	5.887
Overall MINimum	2.813	2.813
+D+H	3.075	3.075
+D+L+H	5.887	5.887
+D+Lr+H	3.262	3.262
+D+S+H	3.075	3.075
+D+0.750Lr+0.750L+H	5.325	5.325
+D+0.750L+0.750S+H	5.184	5.184
+D+0.60W+H	3.075	3.075
+D+0.70E+H	3.075	3.075
+D+0.750Lr+0.750L+0.450W+H	5.325	5.325
+D+0.750L+0.750S+0.450W+H	5.184	5.184
+D+0.750L+0.750S+0.5250E+H	5.184	5.184
+0.60D+0.60W+0.60H	1.845	1.845
+0.60D+0.70E+0.60H	1.845	1.845
D Only	3.075	3.075
Lr Only	0.188	0.188
L Only	2.813	2.813
S Only		
W Only		
E Only		
H Only		

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

Project Title:
 Engineer:
 Project Descr:

Project ID:

43

Printed: 4 FEB 2019, 11:33AM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

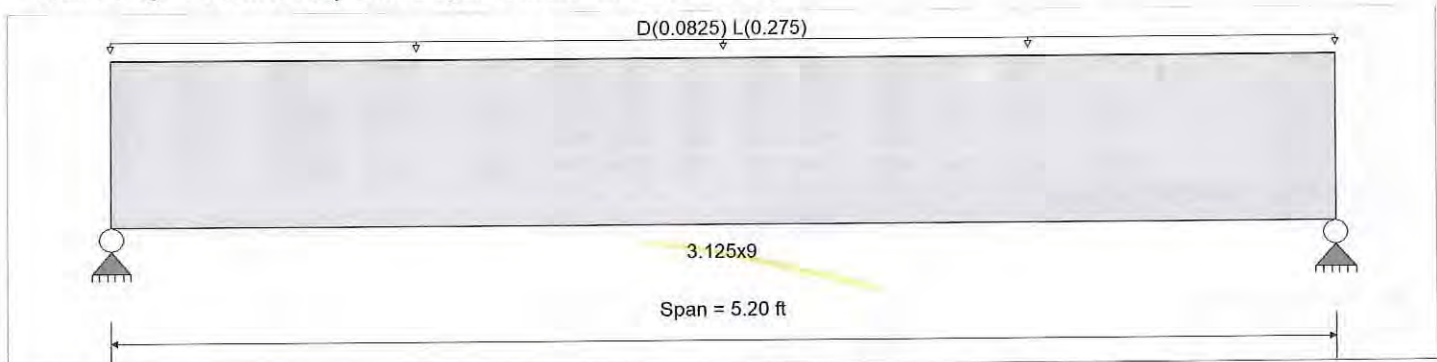
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-10

Wood Species : DF/DF
 Wood Grade : 24F - V4

Fb +	2400 psi	E : Modulus of Elasticity	
Fb -	1850 psi	Ebend- xx	1800ksi
Fc - Pll	1650 psi	Eminbend - xx	950ksi
Fc - Perp	650 psi	Ebend- yy	1600ksi
Fv	265 psi	Eminbend - yy	850ksi
Ft	1100 psi	Density	31.2pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 2.750 ft, (Corridor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.146 : 1	Maximum Shear Stress Ratio	=	0.136 : 1
Section used for this span		3.125x9	Section used for this span		3.125x9
fb : Actual	=	349.57 psi	fv : Actual	=	36.07 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.600ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.013 in	Ratio =		4685 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.018 in	Ratio =		3544 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v	
+D+H													0.00	0.00	0.00	0.00	
Length = 5.20 ft	1	0.039	0.037	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.30	85.18	2160.00	0.16	8.79	238.50	
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 5.20 ft	1	0.146	0.136	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.23	349.57	2400.00	0.68	36.07	265.00	
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 5.20 ft	1	0.028	0.027	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.30	85.18	3000.00	0.16	8.79	331.25	
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 5.20 ft	1	0.031	0.029	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.30	85.18	2760.00	0.16	8.79	304.75	
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	

ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Description : CO-B.2

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 5.20 ft	1	0.094	0.088	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	283.47	3000.00	0.55	29.25	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.20 ft	1	0.103	0.096	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	283.47	2760.00	0.55	29.25	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.20 ft	1	0.022	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.30	85.18	3840.00	0.16	8.79	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.20 ft	1	0.022	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.30	85.18	3840.00	0.16	8.79	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.20 ft	1	0.074	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	283.47	3840.00	0.55	29.25	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.20 ft	1	0.074	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	283.47	3840.00	0.55	29.25	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.20 ft	1	0.074	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	283.47	3840.00	0.55	29.25	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.20 ft	1	0.013	0.012	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.18	51.11	3840.00	0.10	5.27	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.20 ft	1	0.013	0.012	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.18	51.11	3840.00	0.10	5.27	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0176	2.619		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.945	0.945
Overall MINimum	0.715	0.715
+D+H	0.230	0.230
+D+L+H	0.945	0.945
+D+Lr+H	0.230	0.230
+D+S+H	0.230	0.230
+D+0.750Lr+0.750L+H	0.767	0.767
+D+0.750L+0.750S+H	0.767	0.767
+D+0.60W+H	0.230	0.230
+D+0.70E+H	0.230	0.230
+D+0.750Lr+0.750L+0.450W+H	0.767	0.767
+D+0.750L+0.750S+0.450W+H	0.767	0.767
+D+0.750L+0.750S+0.5250E+H	0.767	0.767
+0.60D+0.60W+0.60H	0.138	0.138
+0.60D+0.70E+0.60H	0.138	0.138
D Only	0.230	0.230
Lr Only		
L Only	0.715	0.715
S Only		
W Only		
E Only		
H Only		

Licensee : Peoples Associates Structural Engineers

Description : CO-B.3

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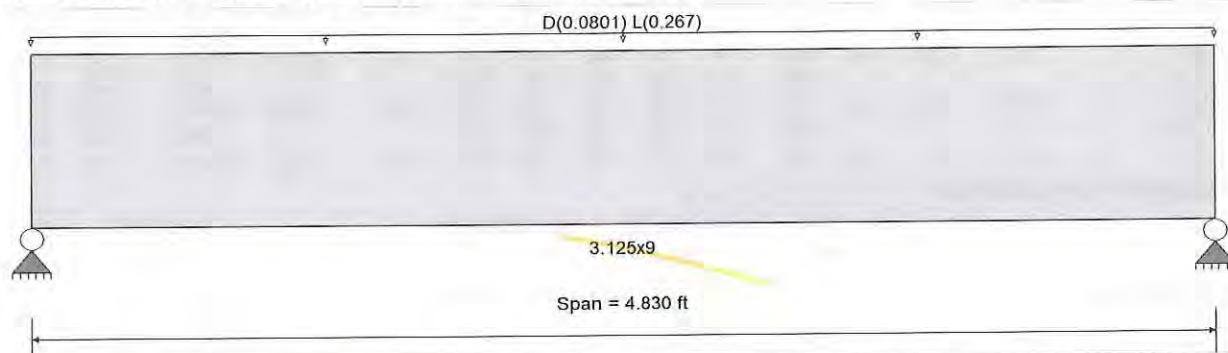
Load Combination Set : ASCE 7-10

Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-10

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2400 psi	<i>E</i> : Modulus of Elasticity	
Fb -	1850 psi	Ebend- xx	1800 ksi
Fc - Pril	1650 psi	Eminbend - xx	950 ksi
Fc - Perp	650 psi	Ebend- yy	1600 ksi
Fv	265 psi	Eminbend - yy	850 ksi
Ft	1100 psi	Density	31.2 pcf



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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 2.670 ft, (Corridor Load)

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.122	1
Section used for this span		3.125x9	
fb : Actual	=	292.96psi	
FB : Allowable	=	2,400.00psi	
Load Combination		+D+L+H	
Location of maximum on span	=	2.415ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection		0.010 in	Ratio = 6022 >=480
Max Upward Transient Deflection		0.000 in	Ratio = 0 <480
Max Downward Total Deflection		0.013 in	Ratio = 4552 >=360
Max Upward Total Deflection		0.000 in	Ratio = 0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _T	C _m	C _L	C _L	M	f _b	F ^b	V	f _v	F ^v
+D+H													0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.033	0.032	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.25	71.50	2160.00	0.14	7.70	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.122	0.119	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.03	292.96	2400.00	0.59	31.55	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.024	0.023	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.25	71.50	3000.00	0.14	7.70	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.026	0.025	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.25	71.50	2760.00	0.14	7.70	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

Lic. # : KW-06009713

Description : CO-B.3

Licensee : Peoples Associates Structural Engineers

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/N}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 4.830 ft	1	0.079	0.077	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.84	237.60	3000.00	0.48	25.58	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.086	0.084	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.84	237.60	2760.00	0.48	25.58	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.019	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.25	71.50	3840.00	0.14	7.70	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.019	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.25	71.50	3840.00	0.14	7.70	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.062	0.060	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.84	237.60	3840.00	0.48	25.58	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.062	0.060	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.84	237.60	3840.00	0.48	25.58	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.062	0.060	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.84	237.60	3840.00	0.48	25.58	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.011	0.011	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.15	42.90	3840.00	0.09	4.62	424.00
+0.80D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.830 ft	1	0.011	0.011	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.15	42.90	3840.00	0.09	4.62	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0127	2.433		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.853	0.853
Overall MINimum	0.645	0.645
+D+H	0.208	0.208
+D+L+H	0.853	0.853
+D+Lr+H	0.208	0.208
+D+S+H	0.208	0.208
+D+0.750Lr+0.750L+H	0.692	0.692
+D+0.750L+0.750S+H	0.692	0.692
+D+0.60W+H	0.208	0.208
+D+0.70E+H	0.208	0.208
+D+0.750Lr+0.750L+0.450W+H	0.692	0.692
+D+0.750L+0.750S+0.450W+H	0.692	0.692
+D+0.750L+0.750S+0.5250E+H	0.692	0.692
+0.60D+0.60W+0.60H	0.125	0.125
+0.60D+0.70E+0.60H	0.125	0.125
D Only	0.208	0.208
Lr Only		
L Only	0.645	0.645
S Only		
W Only		
E Only		
H Only		

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

Project Title:
 Engineer:
 Project Descr:

Project ID:

47

Printed: 4 FEB 2019, 6:07PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\18-234 Legacy at Livermore - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: CO-B.4

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

Material Properties

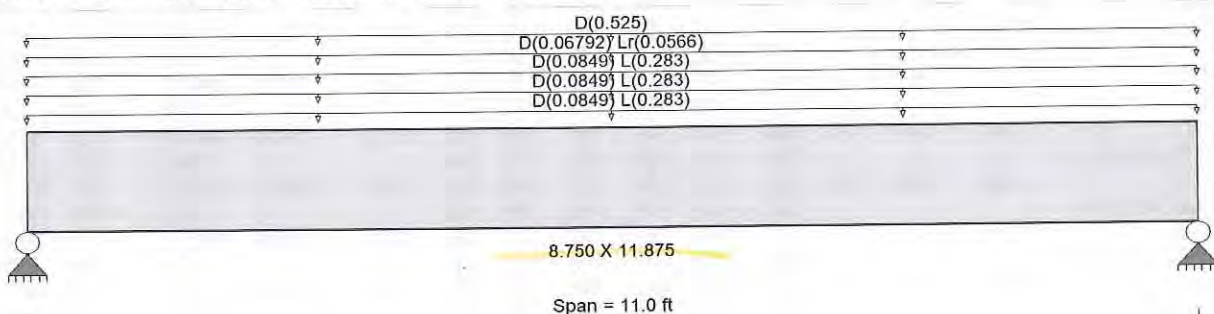
Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-10

Wood Species: DF/DF
 Wood Grade: 24F - V4

Fb + 2,400.0 psi
 Fb - 1,850.0 psi
 Fc - Prll 1,650.0 psi
 Fc - Perp 650.0 psi
 Fv 265.0 psi
 Ft 1,100.0 psi

E: Modulus of Elasticity
 Ebend-xx 1,800.0 ksi
 Eminbend-xx 950.0 ksi
 Ebend-yy 1,600.0 ksi
 Eminbend-yy 850.0 ksi
 Density 31.20 pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 2.830 ft, (2nd Flr Corridor Load)

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 2.830 ft, (3rd Flr Corridor Load)

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 2.830 ft, (4th Flr Corridor Load)

Uniform Load: D = 0.0240, Lr = 0.020 ksf, Tributary Width = 2.830 ft

Uniform Load: D = 0.0140 ksf, Tributary Width = 37.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.632	1	Maximum Shear Stress Ratio	=	0.425	1
Section used for this span		8.750 X 11.875		Section used for this span		8.750 X 11.875	
fb: Actual	=	1,517.27 psi		fv: Actual	=	112.58 psi	
FB: Allowable	=	2,400.00 psi		Fv: Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	5.500 ft		Location of maximum on span	=	10.036 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.128 in	Ratio = 1031 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.259 in	Ratio = 509 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Maximum Forces & Stresses for Load Combinations

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

48

Printed: 4 FEB 2019, 6:07PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.4

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.356	0.239	0.90	1.000	1.00	1.00	1.00	1.00	1.00	13.16	767.96	2160.00	3.95	56.98	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.632	0.425	1.00	1.000	1.00	1.00	1.00	1.00	1.00	26.00	1,517.27	2400.00	7.80	112.58	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.273	0.183	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.02	817.91	3000.00	4.20	60.69	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.278	0.187	1.15	1.000	1.00	1.00	1.00	1.00	1.00	13.16	767.96	2760.00	3.95	56.98	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.456	0.306	1.25	1.000	1.00	1.00	1.00	1.00	1.00	23.43	1,367.41	3000.00	7.03	101.46	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.482	0.324	1.15	1.000	1.00	1.00	1.00	1.00	1.00	22.79	1,329.94	2760.00	6.84	98.68	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.200	0.134	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.16	767.96	3840.00	3.95	56.98	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.200	0.134	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.16	767.96	3840.00	3.95	56.98	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.356	0.239	1.60	1.000	1.00	1.00	1.00	1.00	1.00	23.43	1,367.41	3840.00	7.03	101.46	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.346	0.233	1.60	1.000	1.00	1.00	1.00	1.00	1.00	22.79	1,329.94	3840.00	6.84	98.68	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.346	0.233	1.60	1.000	1.00	1.00	1.00	1.00	1.00	22.79	1,329.94	3840.00	6.84	98.68	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.120	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.90	460.78	3840.00	2.37	34.19	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.120	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.90	460.78	3840.00	2.37	34.19	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2592	5.540		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.455	9.455
Overall MINimum	4.670	4.670
+D+H	4.786	4.786
+D+L+H	9.455	9.455
+D+Lr+H	5.097	5.097
+D+S+H	4.786	4.786
+D+0.750Lr+0.750L+H	8.521	8.521
+D+0.750L+0.750S+H	8.288	8.288
+D+0.60W+H	4.786	4.786
+D+0.70E+H	4.786	4.786
+D+0.750Lr+0.750L+0.450W+H	8.521	8.521
+D+0.750L+0.750S+0.450W+H	8.288	8.288
+D+0.750L+0.750S+0.5250E+H	8.288	8.288
+0.60D+0.60W+0.60H	2.871	2.871
+0.60D+0.70E+0.60H	2.871	2.871
D Only	4.786	4.786
Lr Only	0.311	0.311
L Only	4.670	4.670
S Only		
W Only		
E Only		
H Only		

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

Project Title:
Engineer:
Project Descr:

Project ID:

49

Printed: 4 FEB 2019, 11:36AM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: CO-B.5

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

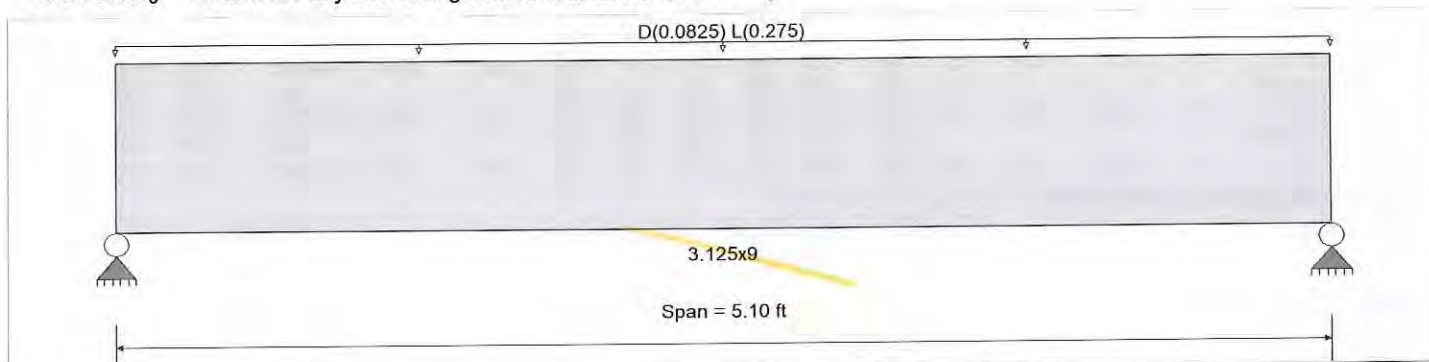
Material Properties

Analysis Method: Allowable Stress Design
Load Combination: ASCE 7-10

Wood Species: DF/DF
Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb + 2,400.0 psi
Fb - 1,850.0 psi
Fc - Prll 1,650.0 psi
Fc - Perp 650.0 psi
Fv 265.0 psi
Ft 1,100.0 psi
E: Modulus of Elasticity
Ebend-xx 1,800.0 ksi
Eminbend-xx 950.0 ksi
Ebend-yy 1,600.0 ksi
Eminbend-yy 850.0 ksi
Density 31.20 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 2.750 ft, (Corridor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.140 : 1	Maximum Shear Stress Ratio	=	0.132 : 1
Section used for this span	=	3.125x9	Section used for this span	=	3.125x9
fb : Actual	=	336.25 psi	fv : Actual	=	35.01 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination	=	+D+L+H	Load Combination	=	+D+L+H
Location of maximum on span	=	2.550 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.012 in	Ratio =		4967 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.016 in	Ratio =		3756 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+H	Length = 5.10 ft	1	0.038	0.036	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.29	81.93	2160.00	0.16	8.53	238.50
+D+L+H	Length = 5.10 ft	1	0.140	0.132	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.18	336.25	2400.00	0.66	35.01	265.00
+D+L+H	Length = 5.10 ft	1	0.027	0.026	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.29	81.93	3000.00	0.16	8.53	331.25
+D+S+H	Length = 5.10 ft	1	0.030	0.028	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.29	81.93	2760.00	0.16	8.53	304.75
+D+0.750L+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

Project Title:
Engineer:
Project Descr:

Project ID:

50

Printed: 4 FEB 2019, 11:36AM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Licensee : Peoples Associates Structural Engineers

Lic. #: KW-06009713

Description : CO-B.5

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FD}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 5.10 ft	1	0.091	0.086	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.96	272.67	3000.00	0.53	28.39	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.10 ft	1	0.099	0.093	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.96	272.67	2760.00	0.53	28.39	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.10 ft	1	0.021	0.020	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.29	81.93	3840.00	0.16	8.53	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.10 ft	1	0.021	0.020	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.29	81.93	3840.00	0.16	8.53	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.10 ft	1	0.071	0.067	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.96	272.67	3840.00	0.53	28.39	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.10 ft	1	0.071	0.067	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.96	272.67	3840.00	0.53	28.39	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.10 ft	1	0.071	0.067	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.96	272.67	3840.00	0.53	28.39	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.10 ft	1	0.013	0.012	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.17	49.16	3840.00	0.10	5.12	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.10 ft	1	0.013	0.012	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.17	49.16	3840.00	0.10	5.12	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0163	2.569		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.927	0.927
Overall MINimum	0.701	0.701
+D+H	0.226	0.226
+D+L+H	0.927	0.927
+D+Lr+H	0.226	0.226
+D+S+H	0.226	0.226
+D+0.750Lr+0.750L+H	0.752	0.752
+D+0.750L+0.750S+H	0.752	0.752
+D+0.60W+H	0.226	0.226
+D+0.70E+H	0.226	0.226
+D+0.750Lr+0.750L+0.450W+H	0.752	0.752
+D+0.750L+0.750S+0.450W+H	0.752	0.752
+D+0.750L+0.750S+0.5250E+H	0.752	0.752
+0.60D+0.60W+0.60H	0.136	0.136
+0.60D+0.70E+0.60H	0.136	0.136
D Only	0.226	0.226
Lr Only		
L Only	0.701	0.701
S Only		
W Only		
E Only		
H Only		

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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 4 FEB 2019, 11:42AM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. # : KW-06009713

Description : CO-B.6

Licensee : Peoples Associates Structural Engineers

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design

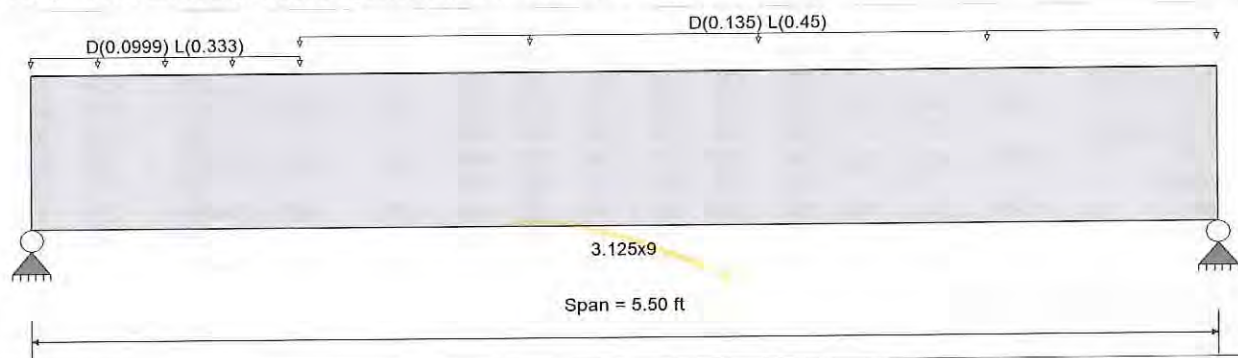
Load Combination ASCE 7-10

Wood Species : DF/DF

Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.20 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Extent = 0.0 --> 1.250 ft, Tributary Width = 3.330 ft, (Corridor Load)

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Extent = 1.250 --> 5.50 ft, Tributary Width = 4.50 ft

DESIGN SUMMARY

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.258	1
Section used for this span		3.125x9	
fb : Actual	=	618.97 psi	
FB : Allowable	=	2,400.00 psi	
Load Combination		+D+L+H	
Location of maximum on span	=	2.790 ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection	0.026 in	Ratio =	2497 >=480
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480
Max Downward Total Deflection	0.035 in	Ratio =	1901 >=360
Max Upward Total Deflection	0.000 in	Ratio =	0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v
+D+H													0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.068	0.062	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.52	147.88	2160.00	0.28	14.84	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.258	0.234	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.18	618.97	2400.00	1.16	62.13	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.6

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 5.50 ft	1	0.049	0.045	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.52	147.88	3000.00	0.28	14.84	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.054	0.049	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.52	147.88	2760.00	0.28	14.84	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.167	0.152	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.76	501.19	3000.00	0.94	50.31	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.182	0.165	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.76	501.19	2760.00	0.94	50.31	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.039	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.52	147.88	3840.00	0.28	14.84	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.039	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.52	147.88	3840.00	0.28	14.84	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.131	0.119	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.76	501.19	3840.00	0.94	50.31	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.131	0.119	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.76	501.19	3840.00	0.94	50.31	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.131	0.119	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.76	501.19	3840.00	0.94	50.31	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.023	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.31	88.73	3840.00	0.17	8.90	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.023	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.31	88.73	3840.00	0.17	8.90	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0347	2.770		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.457	1.604
Overall MINimum	1.108	1.221
+D+H	0.349	0.383
+D+L+H	1.457	1.604
+D+Lr+H	0.349	0.383
+D+S+H	0.349	0.383
+D+0.750Lr+0.750L+H	1.180	1.299
+D+0.750L+0.750S+H	1.180	1.299
+D+0.60W+H	0.349	0.383
+D+0.70E+H	0.349	0.383
+D+0.750Lr+0.750L+0.450W+H	1.180	1.299
+D+0.750L+0.750S+0.450W+H	1.180	1.299
+D+0.750L+0.750S+0.5250E+H	1.180	1.299
+0.60D+0.60W+0.60H	0.209	0.230
+0.60D+0.70E+0.60H	0.209	0.230
D Only	0.349	0.383
Lr Only		
L Only	1.108	1.221
S Only		
W Only		
E Only		
H Only		

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.7

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
Length = 5.330 ft	1	0.196	0.181	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.07	589.48	3000.00	1.12	59.94	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.214	0.197	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.07	589.48	2760.00	1.12	59.94	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.045	0.041	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.61	172.82	3840.00	0.33	17.57	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.045	0.041	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.61	172.82	3840.00	0.33	17.57	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.154	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.07	589.48	3840.00	1.12	59.94	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.154	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.07	589.48	3840.00	1.12	59.94	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.154	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.07	589.48	3840.00	1.12	59.94	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.027	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.69	3840.00	0.20	10.54	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.027	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.69	3840.00	0.20	10.54	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0385	2.684		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.922	1.922
Overall MINimum	1.466	1.466
+D+H	0.456	0.456
+D+L+H	1.922	1.922
+D+Lr+H	0.456	0.456
+D+S+H	0.456	0.456
+D+0.750Lr+0.750L+H	1.555	1.555
+D+0.750L+0.750S+H	1.555	1.555
+D+0.60W+H	0.456	0.456
+D+0.70E+H	0.456	0.456
+D+0.750Lr+0.750L+0.450W+H	1.555	1.555
+D+0.750L+0.750S+0.450W+H	1.555	1.555
+D+0.750L+0.750S+0.5250E+H	1.555	1.555
+0.60D+0.60W+0.60H	0.274	0.274
+0.60D+0.70E+0.60H	0.274	0.274
D Only	0.456	0.456
Lr Only		
L Only	1.466	1.466
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

55

Printed: 4 FEB 2019, 11:46AM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\18-234 Legacy at Livermore - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: CO-B.8

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

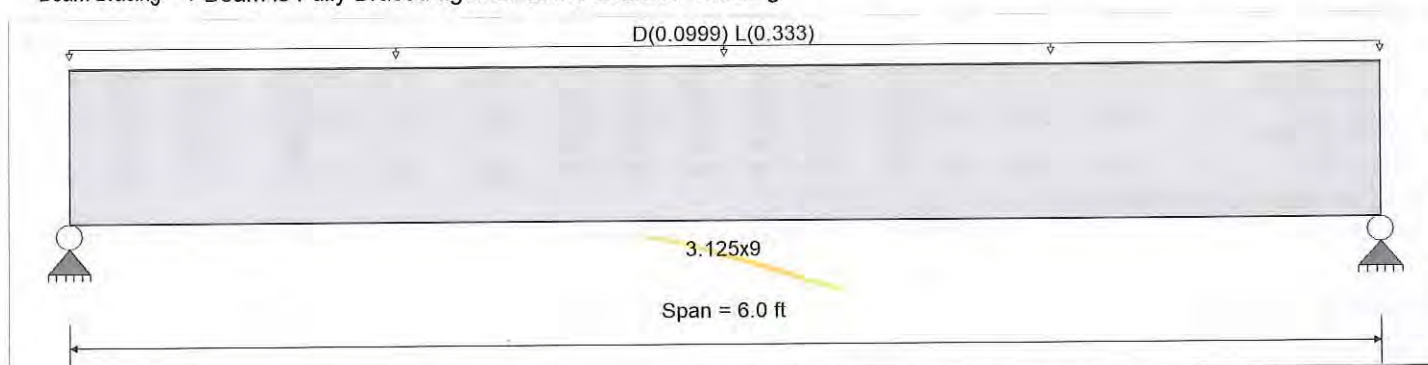
Material Properties

Analysis Method: Allowable Stress Design
Load Combination: ASCE 7-10

Wood Species: DF/DF
Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E: Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0ksi
Fv	265.0 psi	Eminbend-yy	850.0ksi
Ft	1,100.0 psi	Density	31.20pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 3.330 ft, (Corridor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.234	1	Maximum Shear Stress Ratio	=	0.199	1
Section used for this span		3.125x9		Section used for this span		3.125x9	
fb: Actual	=	561.91 psi		fv: Actual	=	52.81 psi	
FB: Allowable	=	2,400.00 psi		Fv: Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	3.000 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.029 in	Ratio = 2519 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.038 in	Ratio = 1910 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00			
Length = 6.0 ft	1	0.063	0.053	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.48	135.67	2160.00	0.24	12.75	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.234	0.199	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.98	561.91	2400.00	0.99	52.81	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.045	0.038	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.48	135.67	3000.00	0.24	12.75	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.049	0.042	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.48	135.67	2760.00	0.24	12.75	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Licensee : Peoples Associates Structural Engineers

Description : CO-B.8

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 6.0 ft	1	0.152	0.129	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.60	455.35	3000.00	0.80	42.79	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 6.0 ft	1	0.165	0.140	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.60	455.35	2760.00	0.80	42.79	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 6.0 ft	1	0.035	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.48	135.67	3840.00	0.24	12.75	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 6.0 ft	1	0.035	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.48	135.67	3840.00	0.24	12.75	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 6.0 ft	1	0.119	0.101	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.60	455.35	3840.00	0.80	42.79	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 6.0 ft	1	0.119	0.101	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.60	455.35	3840.00	0.80	42.79	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 6.0 ft	1	0.119	0.101	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.60	455.35	3840.00	0.80	42.79	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 6.0 ft	1	0.021	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.29	81.40	3840.00	0.14	7.65	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 6.0 ft	1	0.021	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.29	81.40	3840.00	0.14	7.65	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0377	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.317	1.317
Overall MINimum	0.999	0.999
+D+H	0.318	0.318
+D+L+H	1.317	1.317
+D+Lr+H	0.318	0.318
+D+S+H	0.318	0.318
+D+0.750Lr+0.750L+H	1.067	1.067
+D+0.750L+0.750S+H	1.067	1.067
+D+0.60W+H	0.318	0.318
+D+0.70E+H	0.318	0.318
+D+0.750Lr+0.750L+0.450W+H	1.067	1.067
+D+0.750L+0.750S+0.450W+H	1.067	1.067
+D+0.750L+0.750S+0.5250E+H	1.067	1.067
+0.60D+0.60W+0.60H	0.191	0.191
+0.60D+0.70E+0.60H	0.191	0.191
D Only	0.318	0.318
Lr Only		
L Only	0.999	0.999
S Only		
W Only		
E Only		
H Only		

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Wood Beam

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ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.9

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _I	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 5.50 ft	1	0.119	0.107	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.25	356.65	3000.00	0.67	35.50	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.129	0.116	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.25	356.65	2760.00	0.67	35.50	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.028	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.37	106.58	3840.00	0.20	10.61	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.028	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.37	106.58	3840.00	0.20	10.61	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.093	0.084	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	356.65	3840.00	0.67	35.50	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.093	0.084	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	356.65	3840.00	0.67	35.50	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.093	0.084	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	356.65	3840.00	0.67	35.50	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.017	0.015	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.22	63.95	3840.00	0.12	6.37	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.50 ft	1	0.017	0.015	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.22	63.95	3840.00	0.12	6.37	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0248	2.770		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.125	1.125
Overall MINimum	0.853	0.853
+D+H	0.273	0.273
+D+L+H	1.125	1.125
+D+Lr+H	0.273	0.273
+D+S+H	0.273	0.273
+D+0.750Lr+0.750L+H	0.912	0.912
+D+0.750L+0.750S+H	0.912	0.912
+D+0.60W+H	0.273	0.273
+D+0.70E+H	0.273	0.273
+D+0.750Lr+0.750L+0.450W+H	0.912	0.912
+D+0.750L+0.750S+0.450W+H	0.912	0.912
+D+0.750L+0.750S+0.5250E+H	0.912	0.912
+0.60D+0.60W+0.60H	0.164	0.164
+0.60D+0.70E+0.60H	0.164	0.164
D Only	0.273	0.273
Lr Only		
L Only	0.853	0.853
S Only		
W Only		
E Only		
H Only		

Licensee : Peoples Associates Structural Engineers

Description : CO-B.10

Page 13

Load Combination Set : ASCE 7-10

Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-10

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity	
Ebend- xx	1,800.0ksi
Eminbend - xx	950.0ksi
Ebend- yy	1,600.0ksi
Eminbend - yy	850.0ksi
Density	31.20pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Beam self weight calculated and added to loads

Uniform Load : $P = 0.030$, $L = 0.10$ ksf, Tributary Width = 2.750 ft, (2nd Flr Corridor Load)

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 2.750 ft, (3rd Flr Corridor Load)

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 2.750 ft, (4th Flr Corridor Load)

Uniform Load : $D = 0.0240$, $L_r = 0.020$ ksf, Tributary Width = 21.170 ft, (Roof Load)

Uniform Load : $D = 0.0140$ ksf. Tributary Width = 37.50 ft, (Wall Load)

Design OK

DESIGN SUMMARY					
Maximum Bending Stress Ratio	=	0.721 : 1	Maximum Shear Stress Ratio	=	0.500 : 1
Section used for this span		8.75x12	Section used for this span		8.75x12
fb : Actual	=	1,730.77 psi	f _v : Actual	=	132.61 psi
FB : Allowable	=	2,400.00 psi	F _v : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.335ft	Location of maximum on span	=	9.696 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.107 in	Ratio =		1199 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.290 in	Ratio =		442 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Maximum Forces & Stresses for Load Combinations

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.10

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
		M	V								M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.491	0.340	0.90	1.000	1.00	1.00	1.00	1.00	1.00	18.55	1,059.88	2160.00	5.68	81.21	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.721	0.500	1.00	1.000	1.00	1.00	1.00	1.00	1.00	30.29	1,730.77	2400.00	9.28	132.61	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.468	0.325	1.25	1.000	1.00	1.00	1.00	1.00	1.00	24.57	1,404.19	3000.00	7.53	107.59	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.384	0.266	1.15	1.000	1.00	1.00	1.00	1.00	1.00	18.55	1,059.88	2760.00	5.68	81.21	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.607	0.421	1.25	1.000	1.00	1.00	1.00	1.00	1.00	31.87	1,821.28	3000.00	9.77	139.54	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.566	0.393	1.15	1.000	1.00	1.00	1.00	1.00	1.00	27.35	1,563.05	2760.00	8.38	119.76	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.276	0.192	1.60	1.000	1.00	1.00	1.00	1.00	1.00	18.55	1,059.88	3840.00	5.68	81.21	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.276	0.192	1.60	1.000	1.00	1.00	1.00	1.00	1.00	18.55	1,059.88	3840.00	5.68	81.21	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.474	0.329	1.60	1.000	1.00	1.00	1.00	1.00	1.00	31.87	1,821.28	3840.00	9.77	139.54	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.407	0.282	1.60	1.000	1.00	1.00	1.00	1.00	1.00	27.35	1,563.05	3840.00	8.38	119.76	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.407	0.282	1.60	1.000	1.00	1.00	1.00	1.00	1.00	27.35	1,563.05	3840.00	8.38	119.76	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.166	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.13	635.93	3840.00	3.41	48.72	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.166	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.13	635.93	3840.00	3.41	48.72	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L+0.450W+H	1	0.2897	5.374		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	11.948	11.948
Overall MINimum	4.401	4.401
+D+H	6.953	6.953
+D+L+H	11.355	11.355
+D+Lr+H	9.212	9.212
+D+S+H	6.953	6.953
+D+0.750Lr+0.750L+H	11.948	11.948
+D+0.750L+0.750S+H	10.254	10.254
+D+0.60W+H	6.953	6.953
+D+0.70E+H	6.953	6.953
+D+0.750Lr+0.750L+0.450W+H	11.948	11.948
+D+0.750L+0.750S+0.450W+H	10.254	10.254
+D+0.750L+0.750S+0.5250E+H	10.254	10.254
+0.60D+0.60W+0.60H	4.172	4.172
+0.60D+0.70E+0.60H	4.172	4.172
D Only	6.953	6.953
Lr Only	2.259	2.259
L Only	4.401	4.401
S Only		
W Only		
E Only		
H Only		

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\(\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.11

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.528	0.363	0.90	1.000	1.00	1.00	1.00	1.00	1.00	19.54	1,140.41	2160.00	5.99	86.47	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.842	0.578	1.00	1.000	1.00	1.00	1.00	1.00	1.00	34.61	2,019.82	2400.00	10.61	153.14	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.497	0.342	1.25	1.000	1.00	1.00	1.00	1.00	1.00	25.57	1,492.00	3000.00	7.84	113.12	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.413	0.284	1.15	1.000	1.00	1.00	1.00	1.00	1.00	19.54	1,140.41	2760.00	5.99	86.47	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.688	0.472	1.25	1.000	1.00	1.00	1.00	1.00	1.00	35.37	2,063.66	3000.00	10.84	156.47	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.652	0.448	1.15	1.000	1.00	1.00	1.00	1.00	1.00	30.85	1,799.96	2760.00	9.45	136.47	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.297	0.204	1.60	1.000	1.00	1.00	1.00	1.00	1.00	19.54	1,140.41	3840.00	5.99	86.47	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.297	0.204	1.60	1.000	1.00	1.00	1.00	1.00	1.00	19.54	1,140.41	3840.00	5.99	86.47	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.537	0.369	1.60	1.000	1.00	1.00	1.00	1.00	1.00	35.37	2,063.66	3840.00	10.84	156.47	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.469	0.322	1.60	1.000	1.00	1.00	1.00	1.00	1.00	30.85	1,799.96	3840.00	9.45	136.47	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.469	0.322	1.60	1.000	1.00	1.00	1.00	1.00	1.00	30.85	1,799.96	3840.00	9.45	136.47	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.178	0.122	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.73	684.24	3840.00	3.59	51.88	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.178	0.122	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.73	684.24	3840.00	3.59	51.88	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L+0.450W+H	1	0.3317	5.374		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	13.258	13.258
Overall MINimum	5.650	5.650
+D+H	7.327	7.327
+D+L+H	12.976	12.976
+D+Lr+H	9.585	9.585
+D+S+H	7.327	7.327
+D+0.750Lr+0.750L+H	13.258	13.258
+D+0.750L+0.750S+H	11.564	11.564
+D+0.60W+H	7.327	7.327
+D+0.70E+H	7.327	7.327
+D+0.750Lr+0.750L+0.450W+H	13.258	13.258
+D+0.750L+0.750S+0.450W+H	11.564	11.564
+D+0.750L+0.750S+0.5250E+H	11.564	11.564
+0.60D+0.60W+0.60H	4.396	4.396
+0.60D+0.70E+0.60H	4.396	4.396
D Only	7.327	7.327
Lr Only	2.259	2.259
L Only	5.650	5.650
S Only		
W Only		
E Only		
H Only		

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios				Moment Values							Shear Values			
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v	F ^v
+D+H													0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.110	0.074	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.83	236.91	2160.00	0.33	17.71	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.408	0.276	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.44	978.04	2400.00	1.37	73.13	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.079	0.053	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.83	236.91	3000.00	0.33	17.71	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.086	0.058	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.83	236.91	2760.00	0.33	17.71	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 6

Project ID:

64

Printed: 4 FEB 2019, 4:52PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.12

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v	
Length = 8.20 ft	1	0.264	0.179	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.79	792.76	3000.00	1.11	59.28	331.25	
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 8.20 ft	1	0.287	0.195	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.79	792.76	2760.00	1.11	59.28	304.75	
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 8.20 ft	1	0.062	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.83	236.91	3840.00	0.33	17.71	424.00	
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 8.20 ft	1	0.062	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.83	236.91	3840.00	0.33	17.71	424.00	
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 8.20 ft	1	0.206	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	792.76	3840.00	1.11	59.28	424.00	
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 8.20 ft	1	0.206	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	792.76	3840.00	1.11	59.28	424.00	
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 8.20 ft	1	0.206	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	792.76	3840.00	1.11	59.28	424.00	
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 8.20 ft	1	0.037	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.50	142.15	3840.00	0.20	10.63	424.00	
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 8.20 ft	1	0.037	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.50	142.15	3840.00	0.20	10.63	424.00	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1225	4.130		0.0000	0.000

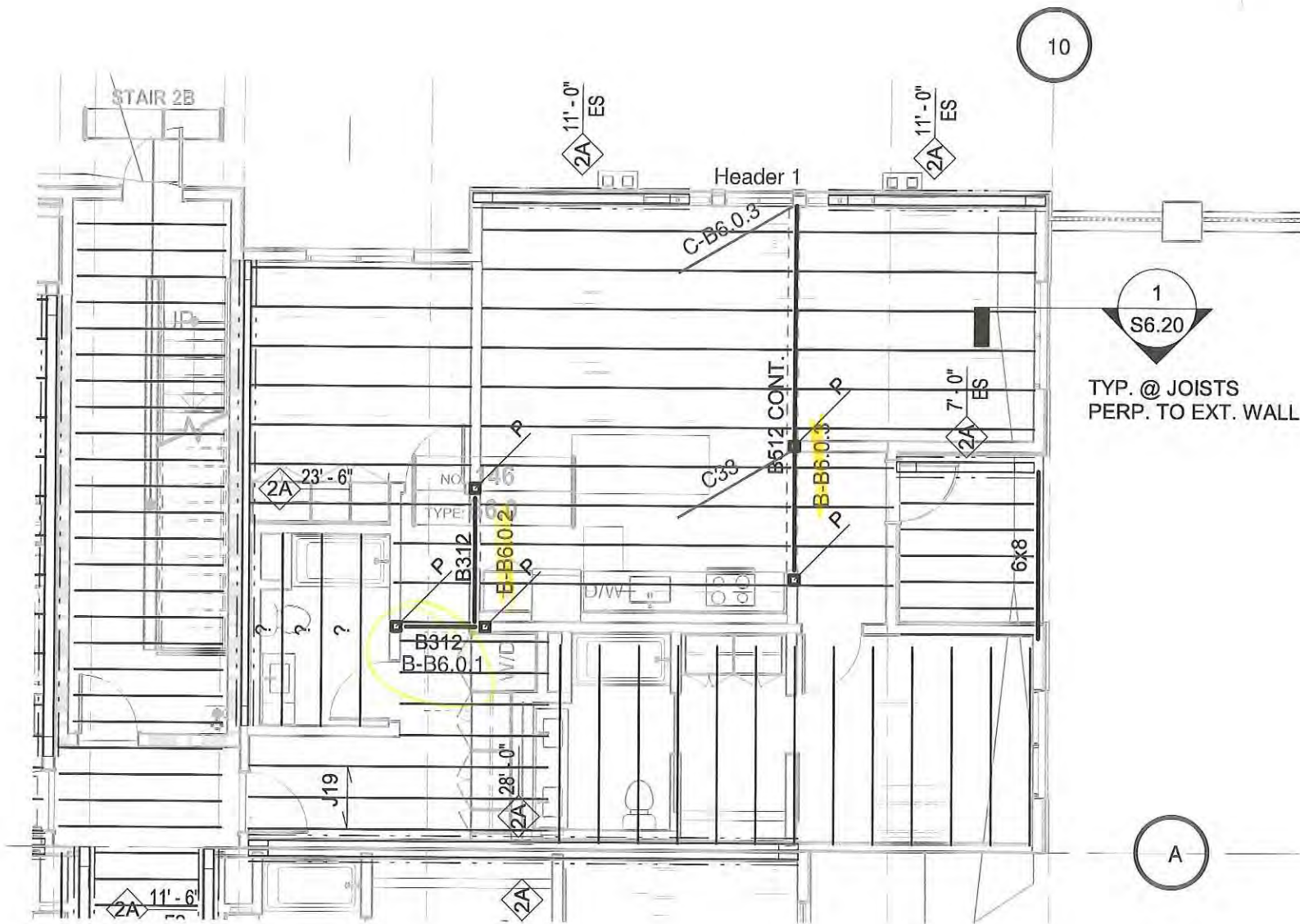
Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.677	1.677
Overall MINimum	1.271	1.271
+D+H	0.406	0.406
+D+L+H	1.677	1.677
+D+Lr+H	0.406	0.406
+D+S+H	0.406	0.406
+D+0.750Lr+0.750L+H	1.360	1.360
+D+0.750L+0.750S+H	1.360	1.360
+D+0.60W+H	0.406	0.406
+D+0.70E+H	0.406	0.406
+D+0.750Lr+0.750L+0.450W+H	1.360	1.360
+D+0.750L+0.750S+0.450W+H	1.360	1.360
+D+0.750L+0.750S+0.5250E+H	1.360	1.360
+0.60D+0.60W+0.60H	0.244	0.244
+0.60D+0.70E+0.60H	0.244	0.244
D Only	0.406	0.406
Lr Only		
L Only	1.271	1.271
S Only		
W Only		
E Only		
H Only		

Load Combination	Support 1	Support 2
Overall MAXimum	4.209	4.452
Overall MINimum	2.065	2.229
+D+H	2.144	2.223
+D+L+H	4.209	4.452
+D+Lr+H	2.285	2.390
+D+S+H	2.144	2.223
+D+0.750Lr+0.750L+H	3.799	4.020
+D+0.750L+0.750S+H	3.693	3.895
+D+0.60W+H	2.144	2.223

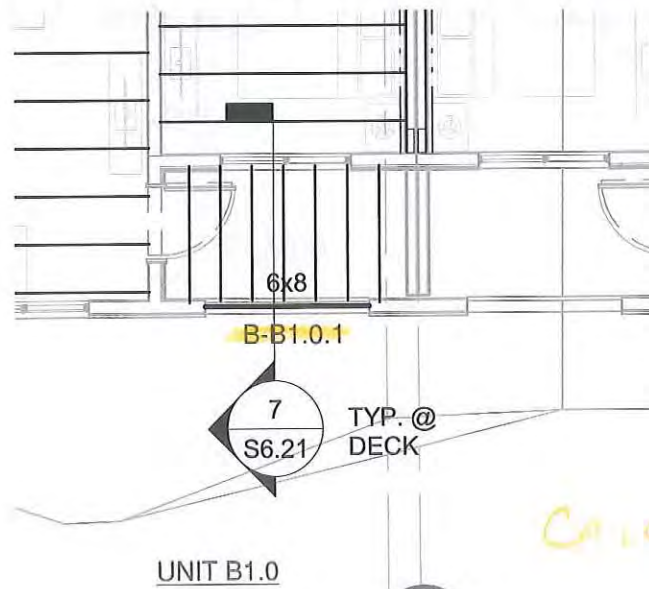
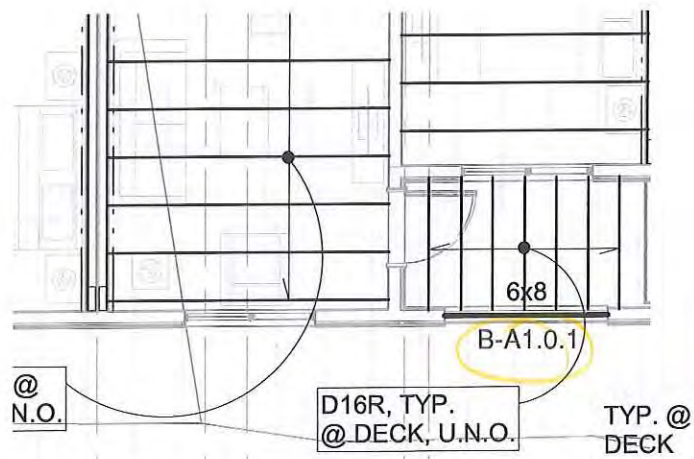


UNIT B6.0

Area D

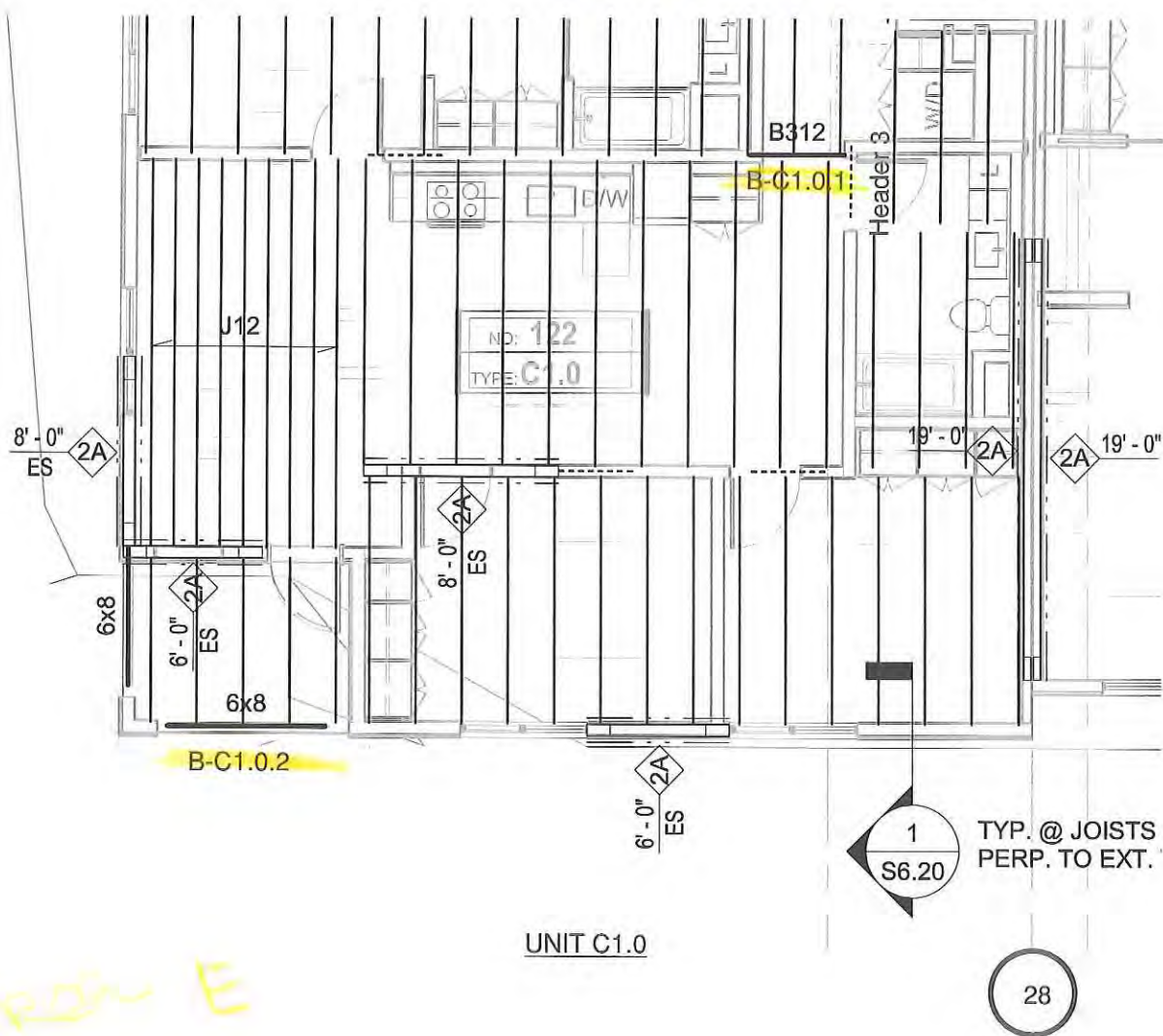
COULD P. 75

STACKED BEAM
KEY PLAN



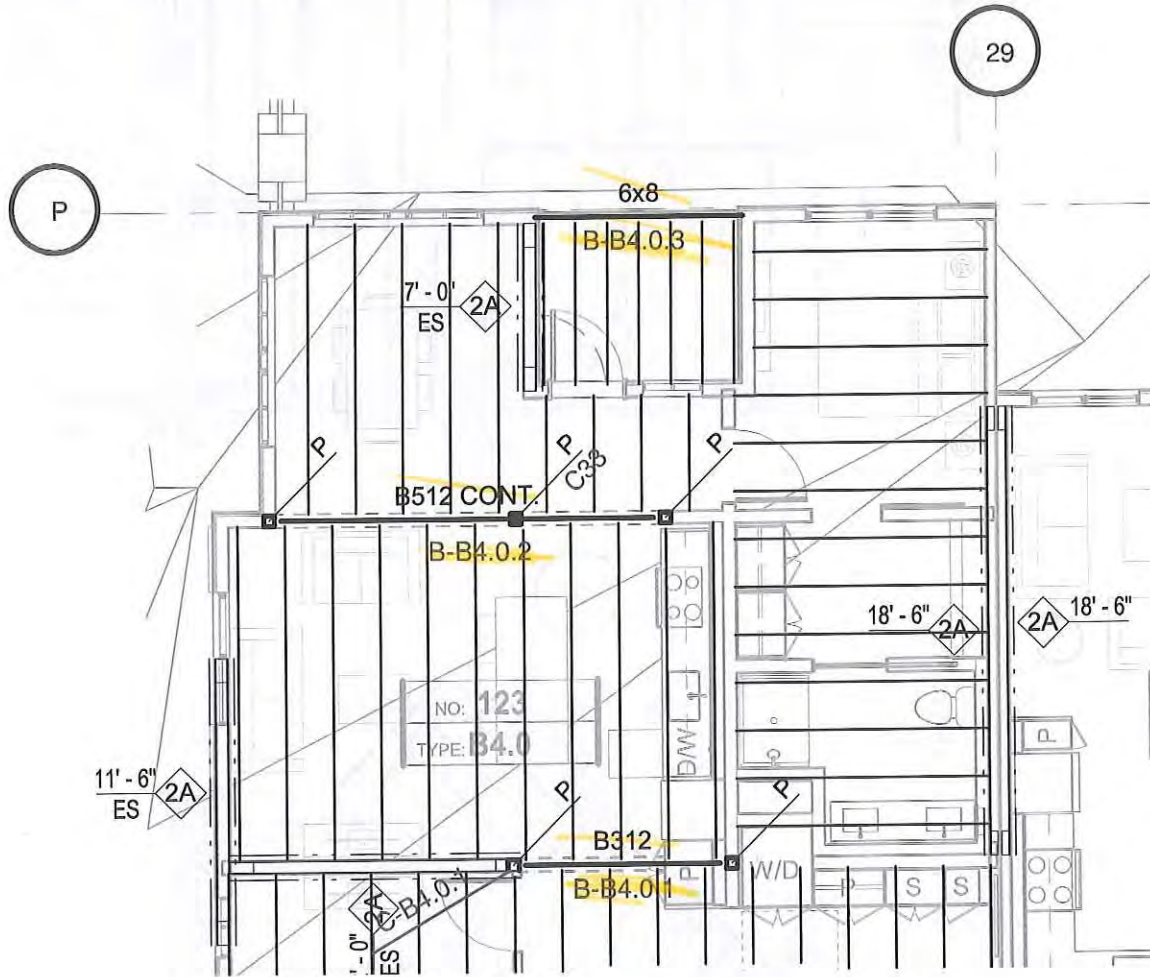
STACKED BEAM
KEY PLAN

CALL P 108



ARON E

STACKED BEAM
KEY PLAN

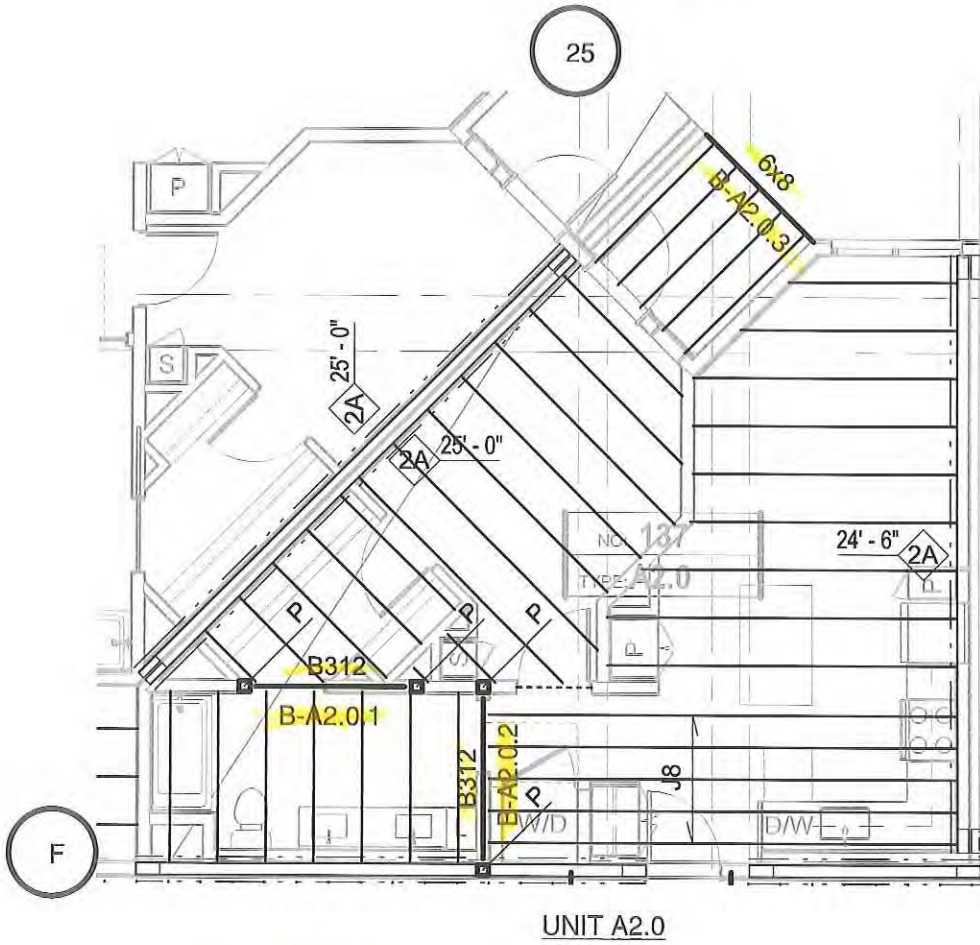
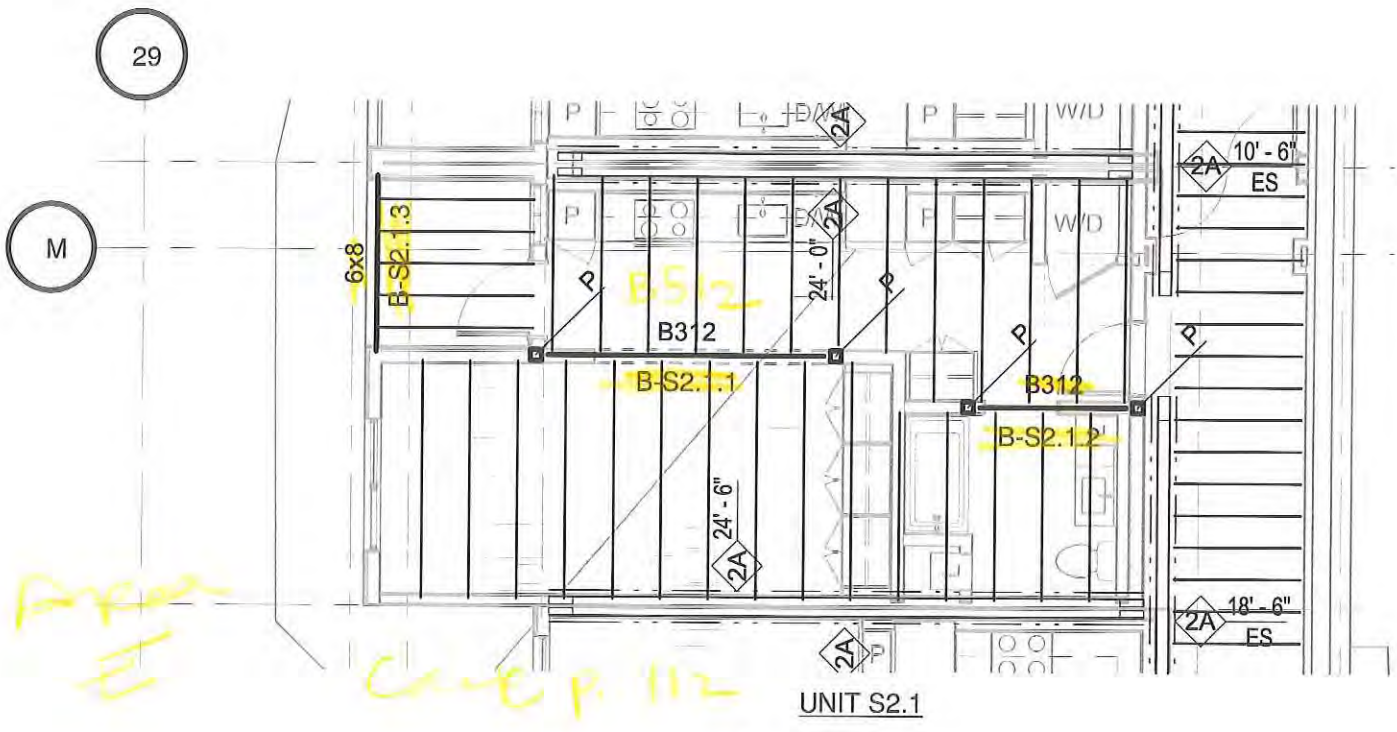


UNIT B4.0

Area
E

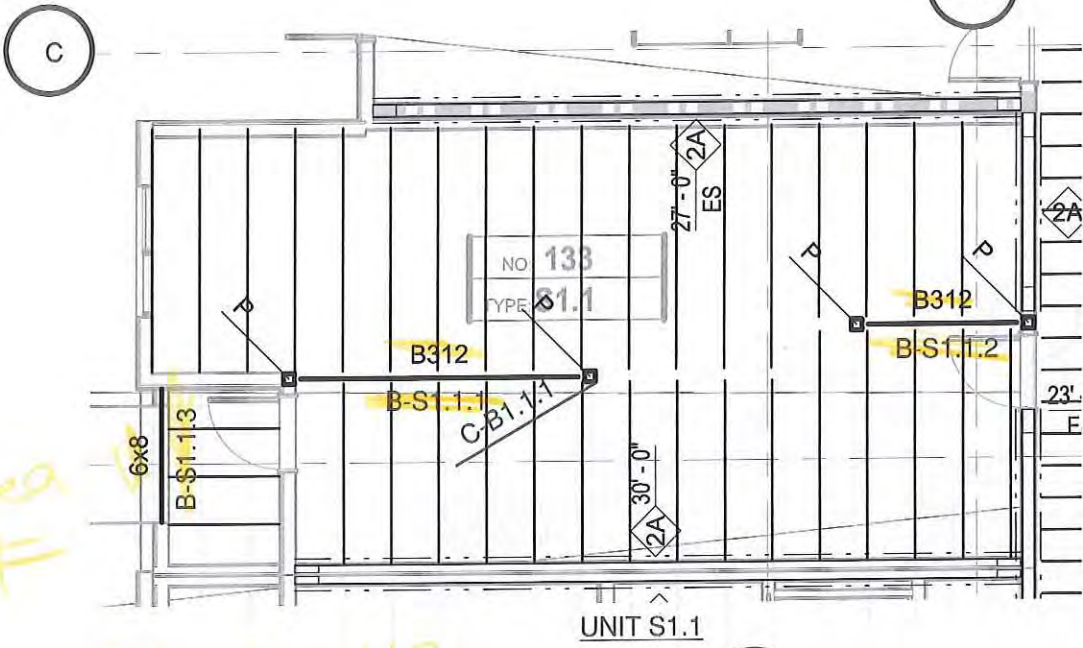
Calc p. 86

STACKED BEAM
KEY PLAN



Case P. 124

STACKED BEAM
KEY PLAN

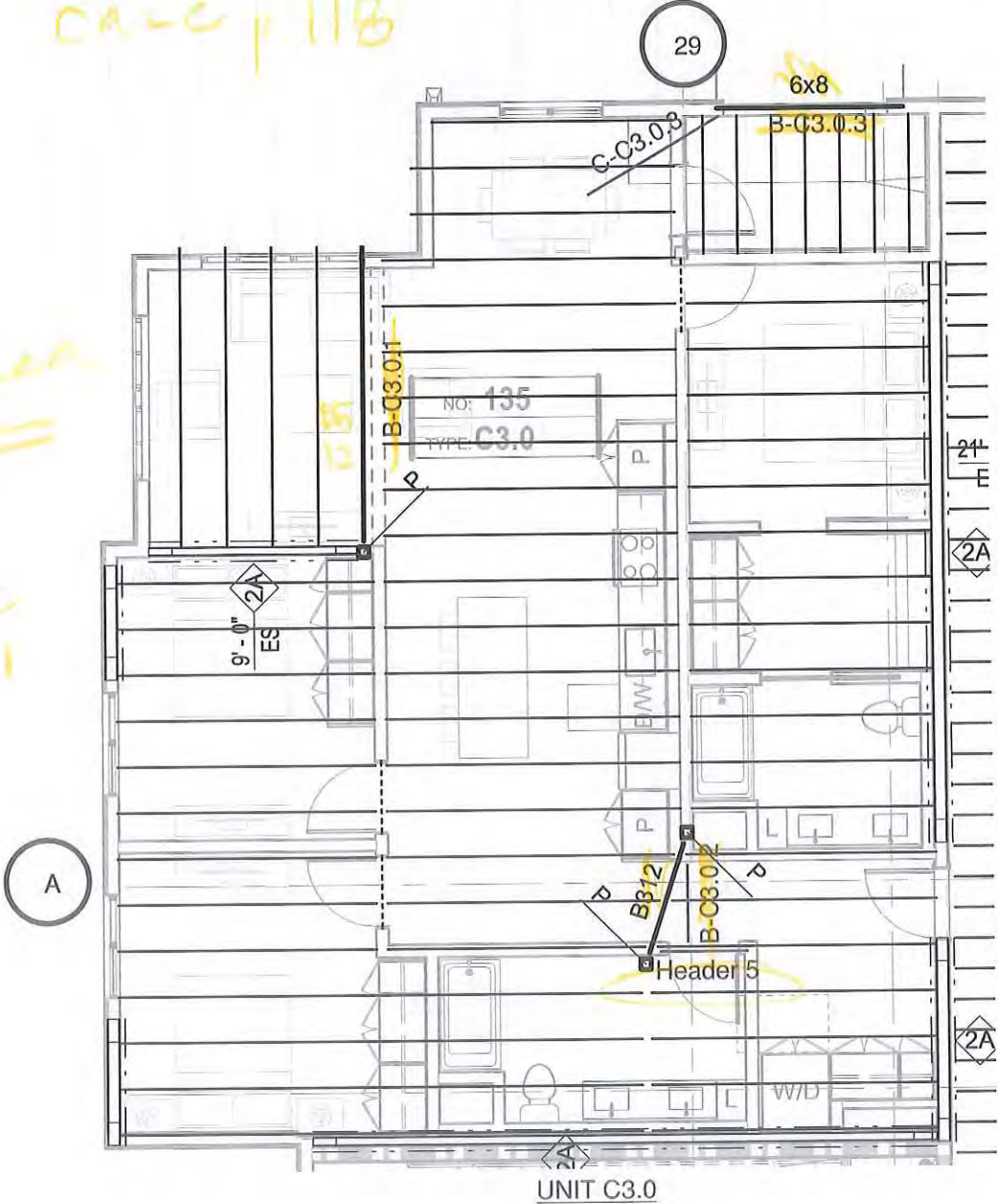


Area F

CALC p. 118

Area F

CALC p. 101



UNIT C3.0

STACKED BEAM
KEY PLAN



Area
D

calc p 95

UNIT C5.0

STACKED BEAM
KEY PLAN

Load Combination	Support 1	Support 2
Overall MAXimum	0.355	2.499
Overall MINimum	0.195	1.421
+D+H	0.160	1.078
+D+L+H	0.355	2.499
+D+Lr+H	0.160	1.078
+D+S+H	0.160	1.078
+D+0.750Lr+0.750L+H	0.306	2.144
+D+0.750L+0.750S+H	0.306	2.144
+D+0.60W+H	0.160	1.078
+D+0.70E+H	0.160	1.078
+D+0.750Lr+0.750L+0.450W+H	0.306	2.144
+D+0.750L+0.750S+0.450W+H	0.306	2.144
+D+0.750L+0.750S+0.5250E+H	0.306	2.144
+0.60D+0.60W+0.60H	0.096	0.647
+0.60D+0.70E+0.60H	0.096	0.647
D Only	0.160	1.078
Lr Only		
L Only	0.195	1.421
S Only		
W Only		
E Only		
H Only		

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v	F ^v	
+D+H													0.00	0.00	0.00	0.00	
Length = 6.725 ft	1	0.132	0.124	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.75	285.43	2160.00	0.73	29.63	238.50	
Length = 0.02464 ft	1	0.002	0.124	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.03	4.15	2160.00	0.73	29.63	238.50	
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.725 ft	1	0.279	0.262	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.09	668.81	2400.00	1.72	69.42	265.00	
Length = 0.02464 ft	1	0.004	0.262	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.06	9.73	2400.00	1.72	69.42	265.00	
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.725 ft	1	0.095	0.089	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.75	285.43	3000.00	0.73	29.63	331.25	
Length = 0.02464 ft	1	0.001	0.089	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.03	4.15	3000.00	0.73	29.63	331.25	

Title Block Line 1
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and then using the "Printing &
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

78

Printed: 4 FEB 2019, 10:05AM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-B6.0.2

Load Combination Segment Length	Span #	Max Stress Ratios		C_d	C_{FN}	C_i	C_r	C_m	C_t	C_L	Moment Values			Shear Values		
		M	V								M	fb	F'b	V	fv	F'v
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.103	0.097	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.75	285.43	2760.00	0.73	29.63	304.75
Length = 0.02464 ft	1	0.002	0.097	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.03	4.15	2760.00	0.73	29.63	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.191	0.180	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.51	572.97	3000.00	1.47	59.47	331.25
Length = 0.02464 ft	1	0.003	0.180	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.05	8.33	3000.00	1.47	59.47	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.208	0.195	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.51	572.97	2760.00	1.47	59.47	304.75
Length = 0.02464 ft	1	0.003	0.195	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.05	8.33	2760.00	1.47	59.47	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.074	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.75	285.43	3840.00	0.73	29.63	424.00
Length = 0.02464 ft	1	0.001	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.03	4.15	3840.00	0.73	29.63	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.074	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.75	285.43	3840.00	0.73	29.63	424.00
Length = 0.02464 ft	1	0.001	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.03	4.15	3840.00	0.73	29.63	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.149	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.51	572.97	3840.00	1.47	59.47	424.00
Length = 0.02464 ft	1	0.002	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.05	8.33	3840.00	1.47	59.47	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.149	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.51	572.97	3840.00	1.47	59.47	424.00
Length = 0.02464 ft	1	0.002	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.05	8.33	3840.00	1.47	59.47	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.149	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.51	572.97	3840.00	1.47	59.47	424.00
Length = 0.02464 ft	1	0.002	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.05	8.33	3840.00	1.47	59.47	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.045	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.05	171.26	3840.00	0.44	17.78	424.00
Length = 0.02464 ft	1	0.001	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.02	2.49	3840.00	0.44	17.78	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.725 ft	1	0.045	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.05	171.26	3840.00	0.44	17.78	424.00
Length = 0.02464 ft	1	0.001	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.02	2.49	3840.00	0.44	17.78	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0430	3.400		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.426	2.426
Overall MINimum	1.391	1.391
+D+H	1.035	1.035
+D+L+H	2.426	2.426
+D+Lr+H	1.035	1.035
+D+S+H	1.035	1.035
+D+0.750Lr+0.750L+H	2.078	2.078
+D+0.750L+0.750S+H	2.078	2.078
+D+0.60W+H	1.035	1.035
+D+0.70E+H	1.035	1.035
+D+0.750Lr+0.750L+0.450W+H	2.078	2.078
+D+0.750L+0.750S+0.450W+H	2.078	2.078
+D+0.750L+0.750S+0.5250E+H	2.078	2.078
+0.60D+0.60W+0.60H	0.621	0.621
+0.60D+0.70E+0.60H	0.621	0.621
D Only	1.035	1.035
Lr Only		
L Only	1.391	1.391
S Only		
W Only		
E Only		
H Only		

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v
+D+H													0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.397	0.297	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	1665.00	2.87	70.77	238.50
Length = 5.750 ft	2	0.397	0.297	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	1665.00	1.77	70.77	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-B6.0.3

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Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 13.0 ft Length = 5.750 ft +D+Lr+H	1	0.835	0.624	1.00	1.000	1.00	1.00	1.00	1.00	1.00	15.50	1,543.84	1850.00	6.71	165.35	265.00
	2	0.835	0.624	1.00	1.000	1.00	1.00	1.00	1.00	1.00	15.50	1,543.84	1850.00	4.13	165.35	265.00
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +D+S+H	1	0.286	0.214	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	2312.50	2.87	70.77	331.25
	2	0.286	0.214	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	2312.50	1.77	70.77	331.25
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +D+0.750Lr+0.750L+H	1	0.311	0.232	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	2127.50	2.87	70.77	304.75
	2	0.311	0.232	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	2127.50	1.77	70.77	304.75
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +D+0.750L+0.750S+H	1	0.572	0.428	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.28	1,323.12	2312.50	5.75	141.71	331.25
	2	0.572	0.428	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.28	1,323.12	2312.50	3.54	141.71	331.25
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +D+0.60W+H	1	0.622	0.465	1.15	1.000	1.00	1.00	1.00	1.00	1.00	13.28	1,323.12	2127.50	5.75	141.71	304.75
	2	0.622	0.465	1.15	1.000	1.00	1.00	1.00	1.00	1.00	13.28	1,323.12	2127.50	3.54	141.71	304.75
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +D+0.70E+H	1	0.223	0.167	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	2960.00	2.87	70.77	424.00
	2	0.223	0.167	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	2960.00	1.77	70.77	424.00
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +D+0.750Lr+0.750L+0.450W+H	1	0.223	0.167	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	2960.00	2.87	70.77	424.00
	2	0.223	0.167	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.63	660.98	2960.00	1.77	70.77	424.00
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +D+0.750L+0.750S+0.450W+H	1	0.447	0.334	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.28	1,323.12	2960.00	5.75	141.71	424.00
	2	0.447	0.334	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.28	1,323.12	2960.00	3.54	141.71	424.00
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +D+0.750L+0.750S+0.5250E+H	1	0.447	0.334	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.28	1,323.12	2960.00	5.75	141.71	424.00
	2	0.447	0.334	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.28	1,323.12	2960.00	3.54	141.71	424.00
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +0.60D+0.60W+0.60H	1	0.134	0.100	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.98	396.59	2960.00	1.72	42.46	424.00
	2	0.134	0.100	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.98	396.59	2960.00	1.06	42.46	424.00
					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft Length = 5.750 ft +0.60D+0.70E+0.60H	1	0.134	0.100	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.98	396.59	2960.00	1.72	42.46	424.00
	2	0.134	0.100	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.98	396.59	2960.00	1.06	42.46	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2823	5.883	+D+L+H	0.0000	0.000
	2	0.0000	5.883		-0.0309	2.216

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	5.262	12.502	-0.534
Overall MINimum	3.010	7.145	-0.224
+D+H	2.252	5.357	-0.224
+D+L+H	5.262	12.502	-0.534
+D+Lr+H	2.252	5.357	-0.224
+D+S+H	2.252	5.357	-0.224
+D+0.750Lr+0.750L+H	4.510	10.716	-0.457
+D+0.750L+0.750S+H	4.510	10.716	-0.457
+D+0.60W+H	2.252	5.357	-0.224
+D+0.70E+H	2.252	5.357	-0.224
+D+0.750Lr+0.750L+0.450W+H	4.510	10.716	-0.457
+D+0.750L+0.750S+0.450W+H	4.510	10.716	-0.457
+D+0.750L+0.750S+0.5250E+H	4.510	10.716	-0.457
+0.60D+0.60W+0.60H	1.351	3.214	-0.134
+0.60D+0.70E+0.60H	1.351	3.214	-0.134
D Only	2.252	5.357	-0.224
Lr Only			

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ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. # : KW-06009713
Description : B-B6.0.3

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
L Only	3.010	7.145	-0.311
S Only			
W Only			
E Only			
H Only			

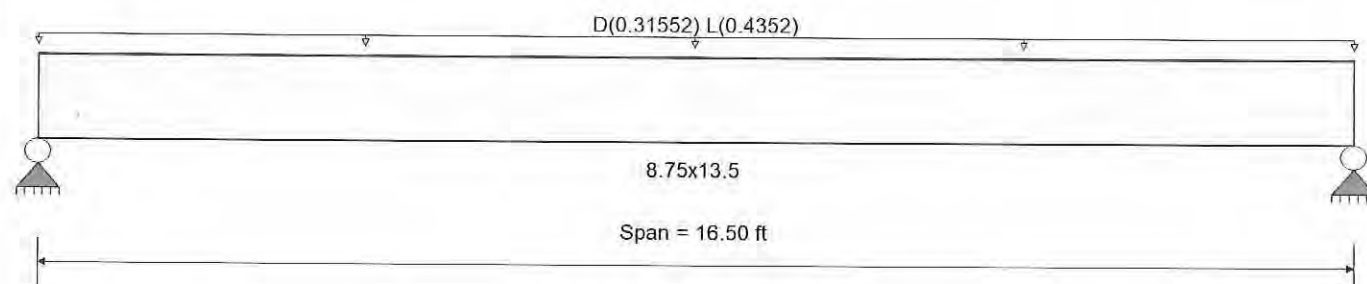
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Material Properties

Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.20 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 10.880 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.518	1	Maximum Shear Stress Ratio	=	0.267	1
Section used for this span		8.75x13.5		Section used for this span		8.75x13.5	
fb : Actual	=	1,192.81	psi	f _v : Actual	=	70.64	psi
FB : Allowable	=	2,303.23	psi	F _v : Allowable	=	265.00	psi
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	8.250	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.226	in	Ratio =		875	>=480
Max Upward Transient Deflection		0.000	in	Ratio =		0	<480
Max Downward Total Deflection		0.403	in	Ratio =		490	>=360
Max Upward Total Deflection		0.000	in	Ratio =		0	<360

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	
Length = 16.50 ft	1	0.253	0.130	0.90	0.960	1.00	1.00	1.00	1.00	1.00	11.61	524.12	2072.91	2.44	31.04	238.50
+D+L+H					0.960	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	
Length = 16.50 ft	1	0.518	0.267	1.00	0.960	1.00	1.00	1.00	1.00	1.00	26.42	1,192.81	2303.23	5.56	70.64	265.00
+D+Lr+H					0.960	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	
Length = 16.50 ft	1	0.182	0.094	1.25	0.960	1.00	1.00	1.00	1.00	1.00	11.61	524.12	2879.04	2.44	31.04	331.25
+D+S+H					0.960	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	
Length = 16.50 ft	1	0.198	0.102	1.15	0.960	1.00	1.00	1.00	1.00	1.00	11.61	524.12	2648.72	2.44	31.04	304.75
+D+0.750Lr+0.750L+H					0.960	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	

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Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	0.00
Length = 12.20 ft	1	0.379	0.233	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.01	817.83	2160.00	1.38	55.68	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.20 ft	1	0.797	0.491	1.00	1.000	1.00	1.00	1.00	1.00	1.00	11.70	1,912.16	2400.00	3.22	130.19	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.20 ft	1	0.273	0.168	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.01	817.83	3000.00	1.38	55.68	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.20 ft	1	0.296	0.183	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.01	817.83	2760.00	1.38	55.68	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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Project Title:
Engineer:
Project Descr:

Project ID:

86

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Wood Beam

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Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-B4.0.1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

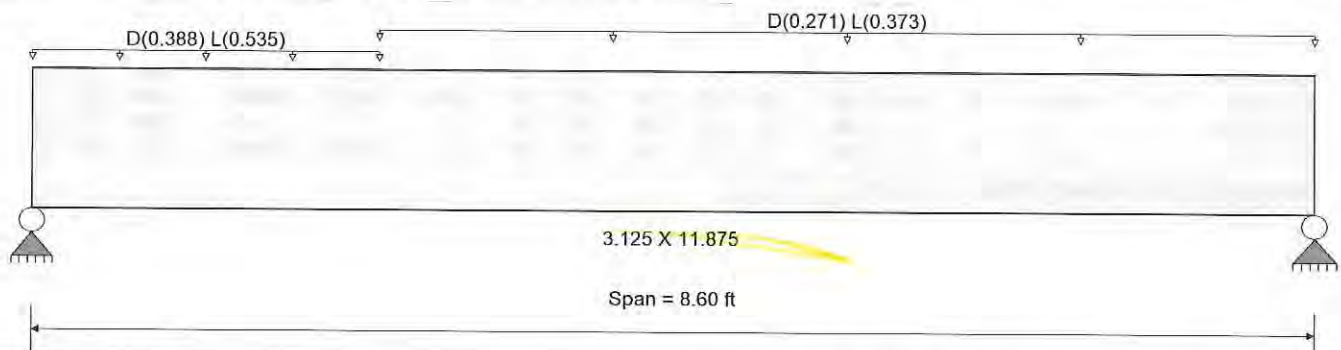
Material Properties

Analysis Method: Allowable Stress Design
Load Combination: ASCE 7-10

Wood Species: DF/DF
Wood Grade: 24F - V4

Fb +	2400 psi	E: Modulus of Elasticity	
Fb -	1850 psi	Ebend-xx	1800 ksi
Fc - Prll	1650 psi	Eminbend-xx	950 ksi
Fc - Perp	650 psi	Ebend-yy	1600 ksi
Fv	265 psi	Eminbend-yy	850 ksi
Ft	1100 psi	Density	31.2 pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load: D = 0.3880, L = 0.5350 k/ft, Extent = 0.0 --> 2.330 ft, Tributary Width = 1.0 ft, (Floor Load)

Uniform Load: D = 0.2710, L = 0.3730 k/ft, Extent = 2.330 --> 8.60 ft, Tributary Width = 1.0 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.437: 1	Maximum Shear Stress Ratio	=	0.375: 1
Section used for this span	=	3.125 X 11.875	Section used for this span	=	3.125 X 11.875
fb: Actual	=	1,047.75 psi	fv: Actual	=	99.43 psi
FB: Allowable	=	2,400.00 psi	Fv: Allowable	=	265.00 psi
Load Combination	=	+D+L+H	Load Combination	=	+D+L+H
Location of maximum on span	=	4.174 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.063 in Ratio = 1634 >= 480			
Max Upward Transient Deflection		0.000 in Ratio = 0 < 480			
Max Downward Total Deflection		0.110 in Ratio = 936 >= 360			
Max Upward Total Deflection		0.000 in Ratio = 0 < 360			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+H	Length = 8.60 ft	1	0.207	0.178	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.74	447.84	2160.00	0.00	0.00	0.00
+D+L+H	Length = 8.60 ft	1	0.437	0.375	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.41	1,047.75	2400.00	2.46	99.43	265.00
+D+Lr+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017 Build: 10.17.12.10 Ver: 10.17.12.10

Lic. # : KW-06009713

Description : B-B4.0.2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design

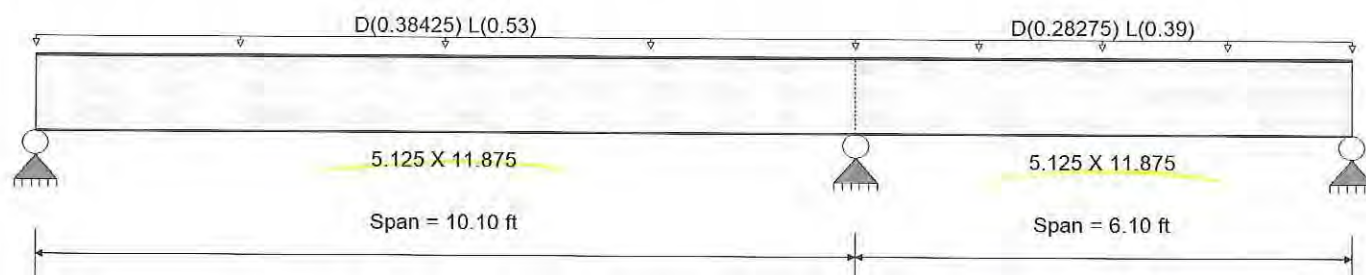
Load Combination ASCE 7-10

Wood Species : DF/DF

Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2400 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1850 psi	Ebend- xx	1800 ksi
Fc - Prll	1650 psi	Eminbend - xx	950 ksi
Fc - Perp	650 psi	Ebend- yy	1600 ksi
Fv	265 psi	Eminbend - yy	850 ksi
Ft	1100 psi	Density	31.2pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 13.250 ft, (Floor Load)

Load for Span Number 2

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 9.750 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.462	1	Maximum Shear Stress Ratio	=	0.432	1
Section used for this span		5.125 X 11.875		Section used for this span		5.125 X 11.875	
fb : Actual	=	854.22	psi	f _v : Actual	=	114.43	psi
FB : Allowable	=	1,850.00	psi	F _v : Allowable	=	265.00	psi
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	10.100	ft	Location of maximum on span	=	9.141	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.056	in	Ratio =		2176	>=480
Max Upward Transient Deflection		0.000	in	Ratio =		0	<480
Max Downward Total Deflection		0.097	in	Ratio =		1244	>=360
Max Upward Total Deflection		0.000	in	Ratio =		0	<360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H														0.00	0.00	0.00	0.00
Length = 10.10 ft	1		0.220	0.206	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	1665.00	1.99	49.05	238.51
Length = 6.10 ft	2		0.220	0.206	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	1665.00	1.21	49.05	238.50
+D+L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 4 FEB 2019, 10:40AM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-B4.0.2

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+Lr+H	Length = 10.10 ft	1	0.462	0.432	1.00	1.000	1.00	1.00	1.00	1.00	1.00	8.57	854.22	1850.00	4.64	114.43	265.00
	Length = 6.10 ft	2	0.462	0.432	1.00	1.000	1.00	1.00	1.00	1.00	1.00	8.57	854.22	1850.00	2.82	114.43	265.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+S+H	Length = 10.10 ft	1	0.158	0.148	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	2312.50	1.99	49.05	331.25
	Length = 6.10 ft	2	0.158	0.148	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	2312.50	1.21	49.05	331.25
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+H	Length = 10.10 ft	1	0.172	0.161	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	2127.50	1.99	49.05	304.75
	Length = 6.10 ft	2	0.172	0.161	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	2127.50	1.21	49.05	304.75
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750L+0.750S+H	Length = 10.10 ft	1	0.317	0.296	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2312.50	3.98	98.09	331.25
	Length = 6.10 ft	2	0.317	0.296	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2312.50	2.42	98.09	331.25
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.60W+H	Length = 10.10 ft	1	0.344	0.322	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2127.50	3.98	98.09	304.75
	Length = 6.10 ft	2	0.344	0.322	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2127.50	2.42	98.09	304.75
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.70E+H	Length = 10.10 ft	1	0.124	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	2960.00	1.99	49.05	424.00
	Length = 6.10 ft	2	0.124	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	2960.00	1.21	49.05	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+0.450W+H	Length = 10.10 ft	1	0.124	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	2960.00	1.99	49.05	424.00
	Length = 6.10 ft	2	0.124	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.68	366.41	2960.00	1.21	49.05	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750L+0.750S+0.450W+H	Length = 10.10 ft	1	0.247	0.231	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2960.00	3.98	98.09	424.00
	Length = 6.10 ft	2	0.247	0.231	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2960.00	2.42	98.09	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750L+0.750S+0.5250E+H	Length = 10.10 ft	1	0.247	0.231	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2960.00	3.98	98.09	424.00
	Length = 6.10 ft	2	0.247	0.231	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2960.00	2.42	98.09	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+0.60D+0.60W+0.60H	Length = 10.10 ft	1	0.247	0.231	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2960.00	3.98	98.09	424.00
	Length = 6.10 ft	2	0.247	0.231	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.35	732.27	2960.00	2.42	98.09	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+0.60D+0.70E+0.60H	Length = 10.10 ft	1	0.074	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.21	219.85	2960.00	1.19	29.43	424.00
	Length = 6.10 ft	2	0.074	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.21	219.85	2960.00	0.73	29.43	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0974	4.627		0.0000	0.000
	2	0.0000	4.627	+D+L+H	-0.0123	1.977

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	3.835	9.030	0.686
Overall MINimum	2.192	5.153	0.387
+D+H	1.643	3.877	0.300
+D+L+H	3.835	9.030	0.686
+D+Lr+H	1.643	3.877	0.300
+D+S+H	1.643	3.877	0.300
+D+0.750Lr+0.750L+H	3.287	7.742	0.590
+D+0.750L+0.750S+H	3.287	7.742	0.590
+D+0.60W+H	1.643	3.877	0.300
+D+0.70E+H	1.643	3.877	0.300
+D+0.750Lr+0.750L+0.450W+H	3.287	7.742	0.590
+D+0.750L+0.750S+0.450W+H	3.287	7.742	0.590
+D+0.750L+0.750S+0.5250E+H	3.287	7.742	0.590
+0.60D+0.60W+0.60H	0.986	2.326	0.180
+0.60D+0.70E+0.60H	0.986	2.326	0.180
D Only	1.643	3.877	0.300
Lr Only			

Title Block Line 1
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Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

90

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-B4.0.2

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
L Only	2.192	5.153	0.387
S Only			
W Only			
E Only			
H Only			

Title Block Line 1
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 using the "Settings" menu item
 and then using the "Printing &
 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

91

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-B4.0.3

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

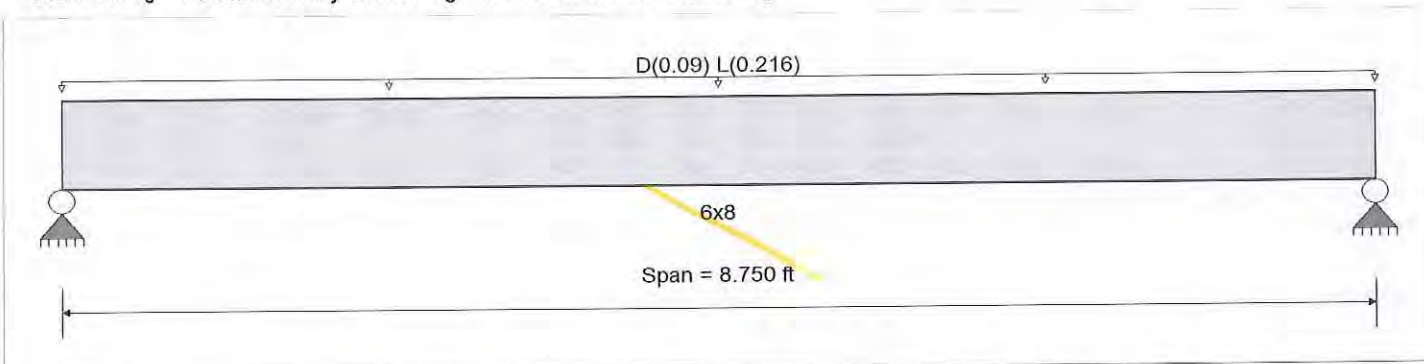
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-10

Wood Species : Douglas Fir - Larch
 Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

F_b + 875 psi E : Modulus of Elasticity
 F_b - 875 psi E_{bend-xx} 1300ksi
 F_c - P_{rl} 600 psi E_{minbend-xx} 470ksi
 F_c - P_{erp} 625 psi
 F_v 170 psi
 F_t 425 psi Density 31.2pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 3.60 ft, (Deck Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.802 : 1	Maximum Shear Stress Ratio	=	0.254 : 1
Section used for this span		6x8	Section used for this span		6x8
fb : Actual	=	701.45psi	fv : Actual	=	43.16 psi
FB : Allowable	=	875.00psi	Fv : Allowable	=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	4.375ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.114 in Ratio = 921 >=480			
Max Upward Transient Deflection		0.000 in Ratio = 0 <480			
Max Downward Total Deflection		0.166 in Ratio = 631 >=360			
Max Upward Total Deflection		0.000 in Ratio = 0 <360			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.280	0.089	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.95	220.36	787.50	0.37	13.56	153.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.802	0.254	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.01	701.45	875.00	1.19	43.16	170.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.201	0.064	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.95	220.36	1093.75	0.37	13.56	212.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.219	0.069	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.95	220.36	1006.25	0.37	13.56	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ecb
ENERCAL C, INC. 1983-2017 Build:10 17 12 10 Ver:10 17 12 10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-B4.0.3

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 8.750 ft	1	0.531	0.168	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.50	581.18	1093.75	0.98	35.76	212.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.578	0.183	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.50	581.18	1006.25	0.98	35.76	195.50
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.157	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.95	220.36	1400.00	0.37	13.56	272.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.157	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.95	220.36	1400.00	0.37	13.56	272.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.415	0.131	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.50	581.18	1400.00	0.98	35.76	272.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.415	0.131	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.50	581.18	1400.00	0.98	35.76	272.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.415	0.131	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.50	581.18	1400.00	0.98	35.76	272.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.094	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.57	132.22	1400.00	0.22	8.13	272.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.750 ft	1	0.094	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.57	132.22	1400.00	0.22	8.13	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1662	4.407		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.378	1.378
Overall MINimum	0.945	0.945
+D+H	0.433	0.433
+D+L+H	1.378	1.378
+D+Lr+H	0.433	0.433
+D+S+H	0.433	0.433
+D+0.750Lr+0.750L+H	1.142	1.142
+D+0.750L+0.750S+H	1.142	1.142
+D+0.60W+H	0.433	0.433
+D+0.70E+H	0.433	0.433
+D+0.750Lr+0.750L+0.450W+H	1.142	1.142
+D+0.750L+0.750S+0.450W+H	1.142	1.142
+D+0.750L+0.750S+0.5250E+H	1.142	1.142
+0.60D+0.60W+0.60H	0.260	0.260
+0.60D+0.70E+0.60H	0.260	0.260
D Only	0.433	0.433
Lr Only		
L Only	0.945	0.945
S Only		
W Only		
E Only		
H Only		

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.511	0.194	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.73	402.67	787.50	0.82	29.65	153.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.639	0.242	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.40	559.47	875.00	1.13	41.20	170.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.368	0.140	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.73	402.67	1093.75	0.82	29.65	212.50

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

94

Printed: 4 FEB 2019, 1:24PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-B1.0.1

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.400	0.152	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.73	402.67	1006.25	0.82	29.65	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.476	0.180	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.24	520.27	1093.75	1.05	38.32	212.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.517	0.196	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.24	520.27	1006.25	1.05	38.32	195.50
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.288	0.109	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.73	402.67	1400.00	0.82	29.65	272.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.288	0.109	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.73	402.67	1400.00	0.82	29.65	272.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.372	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.24	520.27	1400.00	1.05	38.32	272.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.372	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.24	520.27	1400.00	1.05	38.32	272.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.372	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.24	520.27	1400.00	1.05	38.32	272.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.173	0.065	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.04	241.60	1400.00	0.49	17.79	272.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.173	0.065	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.04	241.60	1400.00	0.49	17.79	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0848	3.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.374	1.374
Overall MINimum	0.385	0.385
+D+H	0.989	0.989
+D+L+H	1.374	1.374
+D+Lr+H	0.989	0.989
+D+S+H	0.989	0.989
+D+0.750Lr+0.750L+H	1.277	1.277
+D+0.750L+0.750S+H	1.277	1.277
+D+0.60W+H	0.989	0.989
+D+0.70E+H	0.989	0.989
+D+0.750Lr+0.750L+0.450W+H	1.277	1.277
+D+0.750L+0.750S+0.450W+H	1.277	1.277
+D+0.750L+0.750S+0.5250E+H	1.277	1.277
+0.60D+0.60W+0.60H	0.593	0.593
+0.60D+0.70E+0.60H	0.593	0.593
D Only	0.989	0.989
Lr Only		
L Only	0.385	0.385
S Only		
W Only		
E Only		
H Only		

Title Block Line 6

Project ID:

96

Printed: 4 FEB 2019, 1:34PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-C5.0.1

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 3.750 ft	1	0.068	0.077	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.25	203.53	3000.00	0.63	25.48	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 3.750 ft	1	0.074	0.084	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.25	203.53	2760.00	0.63	25.48	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 3.750 ft	1	0.026	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.62	101.21	3840.00	0.31	12.67	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 3.750 ft	1	0.026	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.62	101.21	3840.00	0.31	12.67	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 3.750 ft	1	0.053	0.060	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	203.53	3840.00	0.63	25.48	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 3.750 ft	1	0.053	0.060	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	203.53	3840.00	0.63	25.48	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 3.750 ft	1	0.053	0.060	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	203.53	3840.00	0.63	25.48	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 3.750 ft	1	0.016	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.37	60.73	3840.00	0.19	7.60	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 3.750 ft	1	0.016	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.37	60.73	3840.00	0.19	7.60	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0047	1.889		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.551	1.551
Overall MINimum	0.891	0.891
+D+H	0.661	0.661
+D+L+H	1.551	1.551
+D+Lr+H	0.661	0.661
+D+S+H	0.661	0.661
+D+0.750Lr+0.750L+H	1.329	1.329
+D+0.750L+0.750S+H	1.329	1.329
+D+0.60W+H	0.661	0.661
+D+0.70E+H	0.661	0.661
+D+0.750Lr+0.750L+0.450W+H	1.329	1.329
+D+0.750L+0.750S+0.450W+H	1.329	1.329
+D+0.750L+0.750S+0.5250E+H	1.329	1.329
+0.60D+0.60W+0.60H	0.396	0.396
+0.60D+0.70E+0.60H	0.396	0.396
D Only	0.661	0.661
Lr Only		
L Only	0.891	0.891
S Only		
W Only		
E Only		
H Only		

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v	F ^v
+D+H													0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.052	0.060	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.69	112.55	2160.00	0.35	14.23	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.110	0.126	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.62	264.18	2400.00	0.83	33.39	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.038	0.043	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.69	112.55	3000.00	0.35	14.23	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.041	0.047	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.69	112.55	2760.00	0.35	14.23	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 6

Project ID:

98

Printed: 4 FEB 2019 1:37PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCAL C. INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-C5.0.2

Overall Maximum Deflections

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.617	1.617
Overall MINimum	0.928	0.928
+D+H	0.689	0.689
+D+L+H	1.617	1.617
+D+Lr+H	0.689	0.689
+D+S+H	0.689	0.689
+D+0.750Lr+0.750L+H	1.385	1.385
+D+0.750L+0.750S+H	1.385	1.385
+D+0.60W+H	0.689	0.689
+D+0.70E+H	0.689	0.689
+D+0.750Lr+0.750L+0.450W+H	1.385	1.385
+D+0.750L+0.750S+0.450W+H	1.385	1.385
+D+0.750L+0.750S+0.5250E+H	1.385	1.385
+0.60D+0.60W+0.60H	0.413	0.413
+0.60D+0.70E+0.60H	0.413	0.413
D Only	0.689	0.689
Lr Only		
L Only	0.928	0.928
S Only		
W Only		
E Only		
H Only		

100

Description : B-C5.0.3

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.123	0.123	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.08	339.42	2760.00	0.92	37.38	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.191	0.190	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.50	571.97	3000.00	1.56	62.99	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.207	0.207	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.50	571.97	2760.00	1.56	62.99	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.088	0.088	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.08	339.42	3840.00	0.92	37.38	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.088	0.088	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.08	339.42	3840.00	0.92	37.38	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.149	0.149	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.50	571.97	3840.00	1.56	62.99	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.149	0.149	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.50	571.97	3840.00	1.56	62.99	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.149	0.149	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.50	571.97	3840.00	1.56	62.99	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.053	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	203.65	3840.00	0.55	22.43	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.10 ft	1	0.053	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	203.65	3840.00	0.55	22.43	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0341	3.072		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.607	2.607
Overall MINimum	1.244	1.244
+D+H	1.362	1.362
+D+L+H	2.607	2.607
+D+Lr+H	1.362	1.362
+D+S+H	1.362	1.362
+D+0.750Lr+0.750L+H	2.296	2.296
+D+0.750L+0.750S+H	2.296	2.296
+D+0.60W+H	1.362	1.362
+D+0.70E+H	1.362	1.362
+D+0.750Lr+0.750L+0.450W+H	2.296	2.296
+D+0.750L+0.750S+0.450W+H	2.296	2.296
+D+0.750L+0.750S+0.5250E+H	2.296	2.296
+0.60D+0.60W+0.60H	0.817	0.817
+0.60D+0.70E+0.60H	0.817	0.817
D Only	1.362	1.362
Lr Only		
L Only	1.244	1.244
S Only		
W Only		
E Only		
H Only		

Maximum Forces & Stresses for Load Combinations											Moment Values			Shear Values			
Load Combination	Max Stress Ratios				C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
Segment Length	Span #	M	V														
+D+H														0.00	0.00	0.00	0.00
Length = 12.20 ft	1	0.310	0.191	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.10	670.61	2160.00	1.13	45.66	238.50	
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 12.20 ft	1	0.651	0.401	1.00	1.000	1.00	1.00	1.00	1.00	1.00	9.56	1,561.88	2400.00	2.63	106.35	265.00	
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 12.20 ft	1	0.224	0.138	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.10	670.61	3000.00	1.13	45.66	331.25	
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 12.20 ft	1	0.243	0.150	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.10	670.61	2760.00	1.13	45.66	304.75	
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

102

Printed: 4 FEB 2019, 1:52PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-C3.0.1

Load Combination		Max Stress Ratios													Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v				
Length = 12.20 ft	1	0.446	0.275	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.20	1,339.06	3000.00	2.26	91.17	331.25				
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00				
Length = 12.20 ft	1	0.485	0.299	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.20	1,339.06	2760.00	2.26	91.17	304.75				
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00				
Length = 12.20 ft	1	0.175	0.108	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.10	670.61	3840.00	1.13	45.66	424.00				
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00				
Length = 12.20 ft	1	0.175	0.108	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.10	670.61	3840.00	1.13	45.66	424.00				
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00				
Length = 12.20 ft	1	0.349	0.215	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.20	1,339.06	3840.00	2.26	91.17	424.00				
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00				
Length = 12.20 ft	1	0.349	0.215	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.20	1,339.06	3840.00	2.26	91.17	424.00				
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00				
Length = 12.20 ft	1	0.349	0.215	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.20	1,339.06	3840.00	2.26	91.17	424.00				
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00				
Length = 12.20 ft	1	0.105	0.065	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.46	402.37	3840.00	0.68	27.40	424.00				
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00				
Length = 12.20 ft	1	0.105	0.065	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.46	402.37	3840.00	0.68	27.40	424.00				

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3282	6.145		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.134	3.134
Overall MINimum	1.789	1.789
+D+H	1.346	1.346
+D+L+H	3.134	3.134
+D+Lr+H	1.346	1.346
+D+S+H	1.346	1.346
+D+0.750Lr+0.750L+H	2.687	2.687
+D+0.750L+0.750S+H	2.687	2.687
+D+0.60W+H	1.346	1.346
+D+0.70E+H	1.346	1.346
+D+0.750Lr+0.750L+0.450W+H	2.687	2.687
+D+0.750L+0.750S+0.450W+H	2.687	2.687
+D+0.750L+0.750S+0.5250E+H	2.687	2.687
+0.60D+0.60W+0.60H	0.807	0.807
+0.60D+0.70E+0.60H	0.807	0.807
D Only	1.346	1.346
Lr Only		
L Only	1.789	1.789
S Only		
W Only		
E Only		
H Only		

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\(\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Description : B-C3.0.2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10

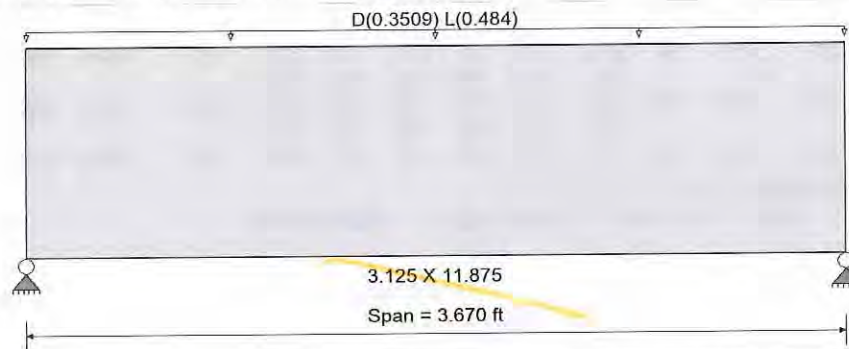
Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0ksi
Eminbend - xx	950.0ksi
Ebend- yy	1,600.0ksi
Eminbend - yy	850.0ksi
Density	31.20pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 12.10 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.097 : 1	Maximum Shear Stress Ratio	=	0.110 : 1
Section used for this span		3.125 X 11.875	Section used for this span		3.125 X 11.875
fb : Actual	=	231.88 psi	fv : Actual	=	29.21 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	1.835 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.003 in	Ratio = 17396 >=480			
Max Upward Transient Deflection	0.000 in	Ratio = 0 <480			
Max Downward Total Deflection	0.004 in	Ratio = 9988 >=360			
Max Upward Total Deflection	0.000 in	Ratio = 0 <360			

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.046	0.052	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.60	98.74	2160.00	0.31	12.44	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.097	0.110	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.42	231.88	2400.00	0.72	29.21	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.033	0.038	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.60	98.74	3000.00	0.31	12.44	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.036	0.041	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.60	98.74	2760.00	0.31	12.44	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 1
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 using the "Settings" menu item
 and then using the "Printing &
 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

104

Printed: 4 FEB 2019, 1:53PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-C3.0.2

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	fb	F'b	V	fv	F'v
Length = 3.670 ft	1		0.066	0.076	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.22	198.59	3000.00	0.62	25.02	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1		0.072	0.082	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.22	198.59	2760.00	0.62	25.02	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1		0.026	0.029	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.60	98.74	3840.00	0.31	12.44	424.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1		0.026	0.029	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.60	98.74	3840.00	0.31	12.44	424.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1		0.052	0.059	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.22	198.59	3840.00	0.62	25.02	424.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1		0.052	0.059	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.22	198.59	3840.00	0.62	25.02	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1		0.052	0.059	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.22	198.59	3840.00	0.62	25.02	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1		0.015	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.36	59.24	3840.00	0.18	7.46	424.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1		0.015	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.36	59.24	3840.00	0.18	7.46	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0044	1.848		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.547	1.547
Overall MINimum	0.888	0.888
+D+H	0.659	0.659
+D+L+H	1.547	1.547
+D+Lr+H	0.659	0.659
+D+S+H	0.659	0.659
+D+0.750Lr+0.750L+H	1.325	1.325
+D+0.750L+0.750S+H	1.325	1.325
+D+0.60W+H	0.659	0.659
+D+0.70E+H	0.659	0.659
+D+0.750Lr+0.750L+0.450W+H	1.325	1.325
+D+0.750L+0.750S+0.450W+H	1.325	1.325
+D+0.750L+0.750S+0.5250E+H	1.325	1.325
+0.60D+0.60W+0.60H	0.395	0.395
+0.60D+0.70E+0.60H	0.395	0.395
D Only	0.659	0.659
Lr Only		
L Only	0.888	0.888
S Only		
W Only		
E Only		
H Only		

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

Project Title:
 Engineer:
 Project Descr:

Project ID:

105

Printed: 4 FEB 2019, 1:55PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-C3.0.3

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

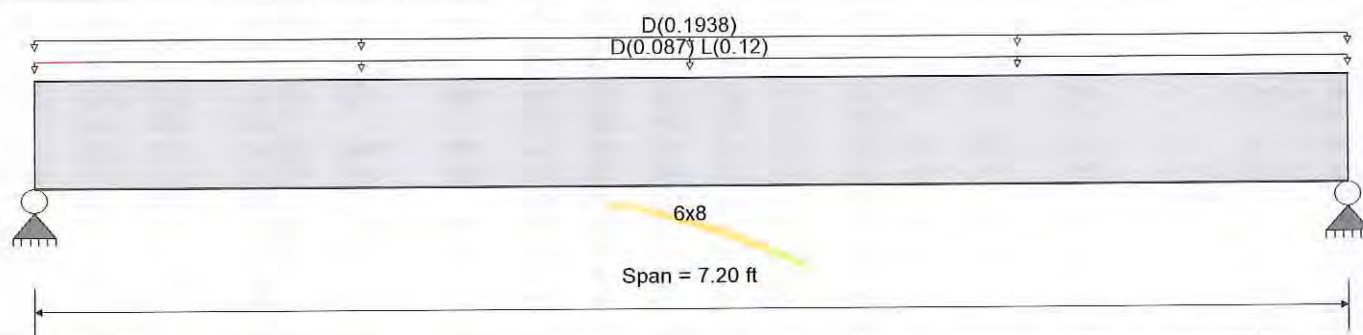
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-10

Wood Species: Douglas Fir - Larch
 Wood Grade: No.2

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb + 875 psi E: Modulus of Elasticity
 Fb - 875 psi Ebend-xx 1300ksi
 Fc - Prll 600 psi Eminbend - xx 470ksi
 Fc - Perp 625 psi
 Fv 170 psi
 Ft 425 psi Density 31.2pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 3.0 ft, (Floor Load)

Uniform Load: D = 0.0190 ksf, Tributary Width = 10.20 ft, (Wall Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.706	1	Maximum Shear Stress Ratio	=	0.263	1
Section used for this span		6x8		Section used for this span		6x8	
fb: Actual	=	617.91	psi	fv: Actual	=	44.63	psi
FB: Allowable	=	875.00	psi	Fv: Allowable	=	170.00	psi
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	3.600	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.029	in	Ratio =		2975	>=480
Max Upward Transient Deflection		0.000	in	Ratio =		0	<480
Max Downward Total Deflection		0.099	in	Ratio =		871	>=360
Max Upward Total Deflection		0.000	in	Ratio =		0	<360

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length		Max Stress Ratios									Moment Values			Shear Values			
		Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H														0.00	0.00	0.00	0.00
Length = 7.174 ft	1	0.555	0.206	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.88	436.95	787.50	0.87	31.56	153.00	
Length = 0.02628 ft	1	0.008	0.206	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.03	6.36	787.50	0.87	31.56	153.00	
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 7.174 ft	1	0.706	0.263	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.66	617.91	875.00	1.23	44.63	170.00	
Length = 0.02628 ft	1	0.010	0.263	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.04	8.99	875.00	1.23	44.63	170.00	

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Licensee : Peoples Associates Structural Engineers

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment	Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+Lr+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 7.174 ft	1	0.399	0.149	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.88	436.95	1093.75	0.87	31.56	212.50
	Length = 0.02628 ft	1	0.006	0.149	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.03	6.36	1093.75	0.87	31.56	212.50
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 7.174 ft	1	0.434	0.161	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.88	436.95	1006.25	0.87	31.56	195.50
	Length = 0.02628 ft	1	0.006	0.161	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.03	6.36	1006.25	0.87	31.56	195.50
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 7.174 ft	1	0.524	0.195	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.46	572.67	1093.75	1.14	41.37	212.50
	Length = 0.02628 ft	1	0.008	0.195	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.04	8.33	1093.75	1.14	41.37	212.50
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 7.174 ft	1	0.569	0.212	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.46	572.67	1006.25	1.14	41.37	195.50
	Length = 0.02628 ft	1	0.008	0.212	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.04	8.33	1006.25	1.14	41.37	195.50
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 7.174 ft	1	0.312	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.88	436.95	1400.00	0.87	31.56	272.00
	Length = 0.02628 ft	1	0.005	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.03	6.36	1400.00	0.87	31.56	272.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 7.174 ft	1	0.312	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.88	436.95	1400.00	0.87	31.56	272.00
	Length = 0.02628 ft	1	0.005	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.03	6.36	1400.00	0.87	31.56	272.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 7.174 ft	1	0.409	0.152	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.46	572.67	1400.00	1.14	41.37	272.00
	Length = 0.02628 ft	1	0.006	0.152	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.04	8.33	1400.00	1.14	41.37	272.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 7.174 ft	1	0.409	0.152	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.46	572.67	1400.00	1.14	41.37	272.00
	Length = 0.02628 ft	1	0.006	0.152	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.04	8.33	1400.00	1.14	41.37	272.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1									

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0991	3.626		0.0000	0.000

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.475	1.475
Overall MINimum	0.432	0.432
+D+H	1.043	1.043
+D+L+H	1.475	1.475
+D+Lr+H	1.043	1.043
+D+S+H	1.043	1.043
+D+0.750Lr+0.750L+H	1.367	1.367
+D+0.750L+0.750S+H	1.367	1.367
+D+0.60W+H	1.043	1.043
+D+0.70E+H	1.043	1.043
+D+0.750Lr+0.750L+0.450W+H	1.367	1.367
+D+0.750L+0.750S+0.450W+H	1.367	1.367
+D+0.750L+0.750S+0.5250E+H	1.367	1.367
+0.60D+0.60W+0.60H	0.626	0.626
+0.60D+0.70E+0.60H	0.626	0.626
D Only	1.043	1.043
Lr Only		
L Only	0.432	0.432
S Only		
W Only		

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 4 FEB 2019, 1:55PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. # : KW-06009713

Description : B-C3.0.3

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination

Support 1	Support 2
-----------	-----------

E Only

H Only

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
		M	V								M	f _b	F'b	V	f _v	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.042	0.047	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.55	90.53	2160.00	0.28	11.21	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.089	0.099	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.30	212.62	2400.00	0.65	26.33	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.030	0.034	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.55	90.53	3000.00	0.28	11.21	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.033	0.037	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.55	90.53	2760.00	0.28	11.21	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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

Project Title:
 Engineer:
 Project Descr:

Project ID:

Printed: 4 FEB 2019, 2:01PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-C1.0.1

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
		M	V								M	f _b	F' _b	V	f _v	F' _v
Length = 3.50 ft	1	0.061	0.068	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.11	182.09	3000.00	0.56	22.55	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.066	0.074	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.11	182.09	2760.00	0.56	22.55	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.024	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.55	90.53	3840.00	0.28	11.21	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.024	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.55	90.53	3840.00	0.28	11.21	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.047	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.11	182.09	3840.00	0.56	22.55	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.047	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.11	182.09	3840.00	0.56	22.55	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.047	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.11	182.09	3840.00	0.56	22.55	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.014	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.33	54.32	3840.00	0.17	6.73	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.50 ft	1	0.014	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.33	54.32	3840.00	0.17	6.73	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0037	1.763		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.487	1.487
Overall MINimum	0.854	0.854
+D+H	0.633	0.633
+D+L+H	1.487	1.487
+D+Lr+H	0.633	0.633
+D+S+H	0.633	0.633
+D+0.750Lr+0.750L+H	1.274	1.274
+D+0.750L+0.750S+H	1.274	1.274
+D+0.60W+H	0.633	0.633
+D+0.70E+H	0.633	0.633
+D+0.750Lr+0.750L+0.450W+H	1.274	1.274
+D+0.750L+0.750S+0.450W+H	1.274	1.274
+D+0.750L+0.750S+0.5250E+H	1.274	1.274
+0.60D+0.60W+0.60H	0.380	0.380
+0.60D+0.70E+0.60H	0.380	0.380
D Only	0.633	0.633
Lr Only		
L Only	0.854	0.854
S Only		
W Only		
E Only		
H Only		

Printed: 4 FEB 2019, 2:33PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Licensee : Peoples Associates Structural Engineers

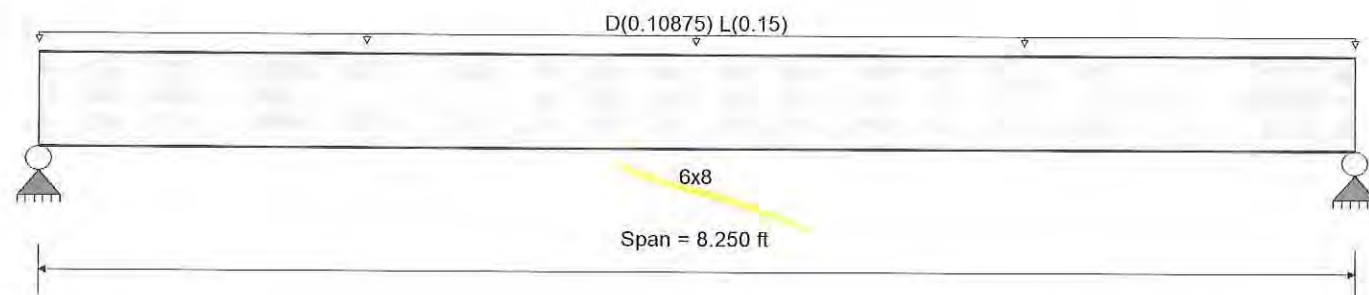
CODE REFERENCES

Load Combination Set : ASCE 7-10

Material Properties

Fb +	875 psi	<i>E</i> : Modulus of Elasticity	
Fb -	875 psi	Ebend- xx	1300 ksi
Fc - Prll	600 psi	Eminbend - xx	470 ksi
Fc - Perp	625 psi		
Fv	170 psi		
Ft	425 psi	Density	31.2pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 3.750 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.606 : 1	Maximum Shear Stress Ratio	=	0.202 : 1
Section used for this span		6x8	Section used for this span		6x8
fb : Actual	=	530.02psi	fv : Actual	=	34.29 psi
FB : Allowable	=	875.00psi	Fv : Allowable	=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	4.125ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.063 in	Ratio =		1582 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.112 in	Ratio =		886 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
		M	V								M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00
Length = 8.250 ft	1	0.296	0.099	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.00	233.02	787.50	0.41	15.08	153.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.250 ft	1	0.606	0.202	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.28	530.02	875.00	0.94	34.29	170.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.250 ft	1	0.213	0.071	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	233.02	1093.75	0.41	15.08	212.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.250 ft	1	0.232	0.077	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	233.02	1006.25	0.41	15.08	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 4 FEB 2019, 2:33PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-C1.0.2

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v
Length = 8.250 ft +D+0.750L+0.750S+H	1	0.417	0.139	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.96	455.77	1093.75	0.81	29.49	212.50
					1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00		
Length = 8.250 ft +D+0.60W+H	1	0.453	0.151	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.96	455.77	1006.25	0.81	29.49	195.50
					1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00		
Length = 8.250 ft +D+0.70E+H	1	0.166	0.055	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	233.02	1400.00	0.41	15.08	272.00
					1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00		
Length = 8.250 ft +D+0.750Lr+0.750L+0.450W+H	1	0.166	0.055	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	233.02	1400.00	0.41	15.08	272.00
					1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00		
Length = 8.250 ft +D+0.750L+0.750S+0.450W+H	1	0.326	0.108	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.96	455.77	1400.00	0.81	29.49	272.00
					1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00		
Length = 8.250 ft +D+0.750L+0.750S+0.5250E+H	1	0.326	0.108	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.96	455.77	1400.00	0.81	29.49	272.00
					1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00		
Length = 8.250 ft +0.60D+0.60W+0.60H	1	0.326	0.108	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.96	455.77	1400.00	0.81	29.49	272.00
					1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00		
Length = 8.250 ft +0.60D+0.70E+0.60H	1	0.100	0.033	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.60	139.81	1400.00	0.25	9.05	272.00
					1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00		
Length = 8.250 ft	1	0.100	0.033	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.60	139.81	1400.00	0.25	9.05	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1116	4.155		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.104	1.104
Overall MINimum	0.619	0.619
+D+H	0.485	0.485
+D+L+H	1.104	1.104
+D+Lr+H	0.485	0.485
+D+S+H	0.485	0.485
+D+0.750Lr+0.750L+H	0.950	0.950
+D+0.750L+0.750S+H	0.950	0.950
+D+0.60W+H	0.485	0.485
+D+0.70E+H	0.485	0.485
+D+0.750Lr+0.750L+0.450W+H	0.950	0.950
+D+0.750L+0.750S+0.450W+H	0.950	0.950
+D+0.750L+0.750S+0.5250E+H	0.950	0.950
+0.60D+0.60W+0.60H	0.291	0.291
+0.60D+0.70E+0.60H	0.291	0.291
D Only	0.485	0.485
Lr Only		
L Only	0.619	0.619
S Only		
W Only		
E Only		
H Only		

Printed: 4 FEB 2019, 2:40PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\(\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Licensee : Peoples Associates Structural Engineers

Description : B-S2.1.1

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

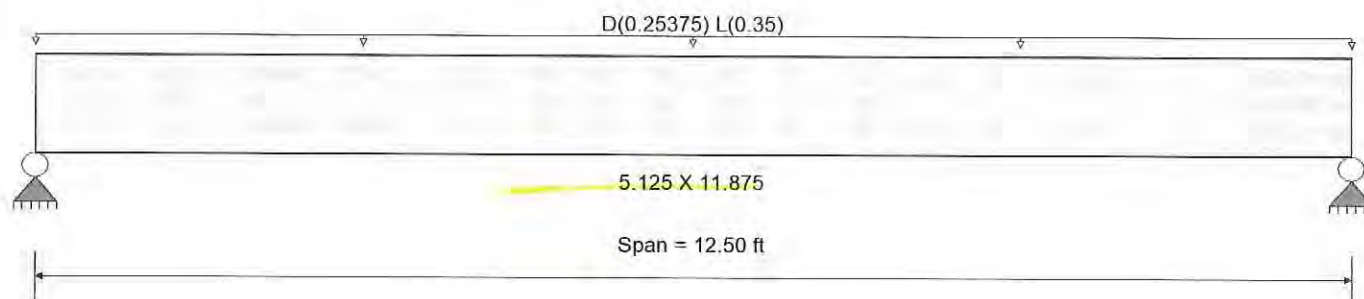
Material Properties

Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-10

Fb +	2400 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1850 psi	Ebend- xx	1800 ksi
Fc - Prll	1650 psi	Eminbend - xx	950 ksi
Fc - Perp	650 psi	Ebend- yy	1600 ksi
Fv	265 psi	Eminbend - yy	850 ksi
Ft	1100 psi	Density	31.2 pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 8.750 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.500 : 1	Maximum Shear Stress Ratio	=	0.304 : 1
Section used for this span		5.125 X 11.875	Section used for this span		5.125 X 11.875
fb : Actual	=	1,200.44psi	fv : Actual	=	80.47 psi
FB : Allowable	=	2,400.00psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.250ft	Location of maximum on span	=	11.542 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.150 in	Ratio =		998 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.265 in	Ratio =		566 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	0.00
Length = 12.50 ft	1	0.240	0.146	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.21	519.41	2160.00	1.41	34.82	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.50 ft	1	0.500	0.304	1.00	1.000	1.00	1.00	1.00	1.00	1.00	12.05	1,200.44	2400.00	3.26	80.47	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.50 ft	1	0.173	0.105	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.21	519.41	3000.00	1.41	34.82	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.50 ft	1	0.188	0.114	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.21	519.41	2760.00	1.41	34.82	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v
+D+H														0.00	0.00	0.00
Length = 6.20 ft	1	0.095	0.094	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.26	205.52	2160.00	0.56	22.51	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.200	0.198	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.94	480.30	2400.00	1.30	52.60	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.069	0.068	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.26	205.52	3000.00	0.56	22.51	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.074	0.074	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.26	205.52	2760.00	0.56	22.51	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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

Project Title:
 Engineer:
 Project Descr:

Project ID:

115

Printed: 4 FEB 2019, 2:42PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-S2.1.2

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
		M	V								M	f _b	F' _b	V	f _v	F' _v
Length = 6.20 ft	1	0.137	0.136	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.52	411.60	3000.00	1.12	45.08	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.149	0.148	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.52	411.60	2760.00	1.12	45.08	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.054	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.26	205.52	3840.00	0.56	22.51	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.054	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.26	205.52	3840.00	0.56	22.51	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.107	0.106	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.52	411.60	3840.00	1.12	45.08	424.00
+D+0.750Lr+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.107	0.106	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.52	411.60	3840.00	1.12	45.08	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.107	0.106	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.52	411.60	3840.00	1.12	45.08	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.032	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.75	123.31	3840.00	0.33	13.50	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.20 ft	1	0.032	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.75	123.31	3840.00	0.33	13.50	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0261	3.123		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.897	1.897
Overall MINimum	1.085	1.085
+D+H	0.812	0.812
+D+L+H	1.897	1.897
+D+Lr+H	0.812	0.812
+D+S+H	0.812	0.812
+D+0.750Lr+0.750L+H	1.625	1.625
+D+0.750L+0.750S+H	1.625	1.625
+D+0.60W+H	0.812	0.812
+D+0.70E+H	0.812	0.812
+D+0.750Lr+0.750L+0.450W+H	1.625	1.625
+D+0.750L+0.750S+0.450W+H	1.625	1.625
+D+0.750L+0.750S+0.5250E+H	1.625	1.625
+0.60D+0.60W+0.60H	0.487	0.487
+0.60D+0.70E+0.60H	0.487	0.487
D Only	0.812	0.812
Lr Only		
L Only	1.085	1.085
S Only		
W Only		
E Only		
H Only		

Printed: 4 FEB 2019, 2:45PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Licensee : Peoples Associates Structural Engineers

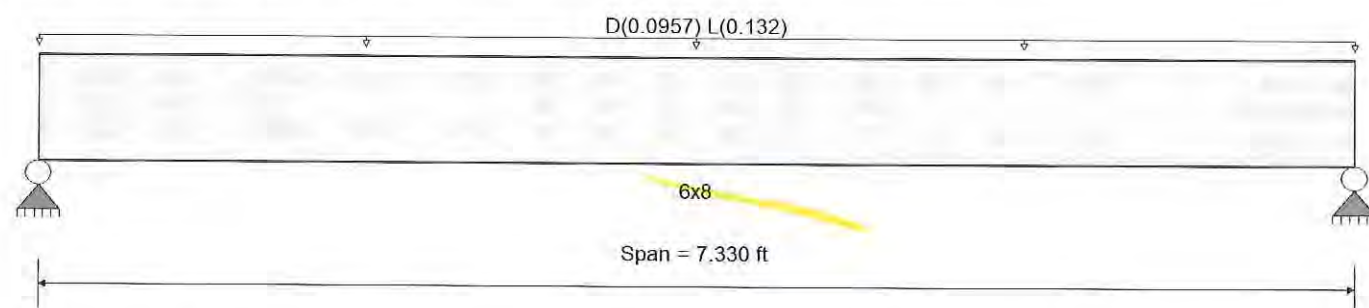
CODE REFERENCES

Load Combination Set : ASCE 7-10

Material Properties

Fb +	875 psi	E : Modulus of Elasticity	
Fb -	875 psi	Ebend- xx	1300 ksi
Fc - Prll	600 psi	Eminbend - xx	470 ksi
Fc - Perp	625 psi		
Fv	170 psi		
Ft	425 psi	Density	31.2 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 3.30 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.423	1	Maximum Shear Stress Ratio	=	0.154	1
Section used for this span		6x8		Section used for this span		6x8	
fb : Actual	=	369.87	psi	f _v : Actual	=	26.24	psi
FB : Allowable	=	875.00	psi	F _v : Allowable	=	170.00	psi
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	3.665	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.034	in	Ratio =	2563	>=480	
Max Upward Transient Deflection		0.000	in	Ratio =	0	<480	
Max Downward Total Deflection		0.062	in	Ratio =	1430	>=360	
Max Upward Total Deflection		0.000	in	Ratio =	0	<360	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00		
Length = 7.330 ft	1	0.208	0.076	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.70	163.55	787.50	0.32	11.60	153.00	
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00		
Length = 7.330 ft	1	0.423	0.154	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.59	369.87	875.00	0.72	26.24	170.00	
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00		
Length = 7.330 ft	1	0.150	0.055	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.70	163.55	1093.75	0.32	11.60	212.50	
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00		
Length = 7.330 ft	1	0.163	0.059	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.70	163.55	1006.25	0.32	11.60	195.50	
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00		

Title Block Line 1
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and then using the "Printing &
Title Block" selection.

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 4 FEB 2019, 2:45PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-S2.1.3

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
Length = 7.330 ft	1		0.291	0.106	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.37	318.29	1093.75	0.62	22.58	212.50
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.330 ft	1		0.316	0.116	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.37	318.29	1006.25	0.62	22.58	195.50
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.330 ft	1		0.117	0.043	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.70	163.55	1400.00	0.32	11.60	272.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.330 ft	1		0.117	0.043	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.70	163.55	1400.00	0.32	11.60	272.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.330 ft	1		0.227	0.083	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.37	318.29	1400.00	0.62	22.58	272.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.330 ft	1		0.227	0.083	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.37	318.29	1400.00	0.62	22.58	272.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.330 ft	1		0.227	0.083	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.37	318.29	1400.00	0.62	22.58	272.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.330 ft	1		0.070	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.42	98.13	1400.00	0.19	6.96	272.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.330 ft	1		0.070	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.42	98.13	1400.00	0.19	6.96	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0615	3.692		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.867	0.867
Overall MINimum	0.484	0.484
+D+H	0.383	0.383
+D+L+H	0.867	0.867
+D+Lr+H	0.383	0.383
+D+S+H	0.383	0.383
+D+0.750Lr+0.750L+H	0.746	0.746
+D+0.750L+0.750S+H	0.746	0.746
+D+0.60W+H	0.383	0.383
+D+0.70E+H	0.383	0.383
+D+0.750Lr+0.750L+0.450W+H	0.746	0.746
+D+0.750L+0.750S+0.450W+H	0.746	0.746
+D+0.750L+0.750S+0.5250E+H	0.746	0.746
+0.60D+0.60W+0.60H	0.230	0.230
+0.60D+0.70E+0.60H	0.230	0.230
D Only	0.383	0.383
Lr Only		
L Only	0.484	0.484
S Only		
W Only		
E Only		
H Only		

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\ (C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-S1.1.1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

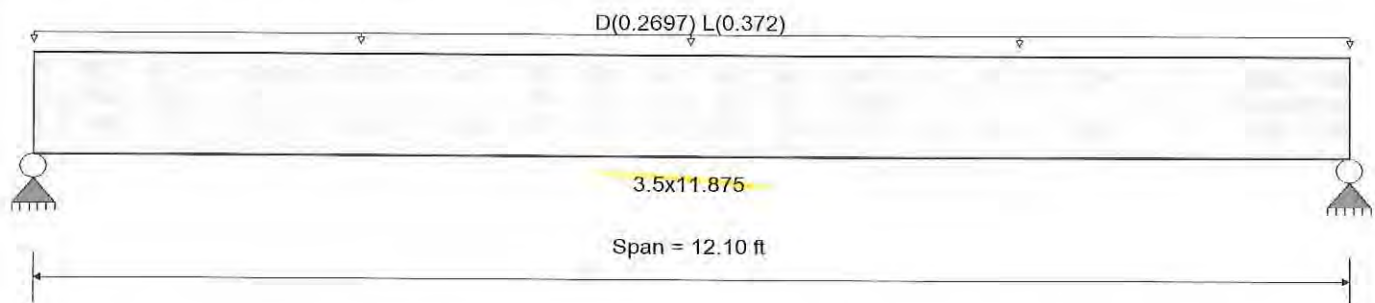
Material Properties

Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-10

Fb +	2400 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1850 psi	Ebend- xx	1800ksi
Fc - Prll	1650 psi	Eminbend - xx	950ksi
Fc - Perp	650 psi	Ebend- yy	1600ksi
Fv	265 psi	Eminbend - yy	850ksi
Ft	1100 psi	Density	31.2pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 9.30 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.724 : 1	Maximum Shear Stress Ratio	=	0.450 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
fb : Actual	=	1,737.25psi	fv : Actual	=	119.26 psi
FB : Allowable	=	2,400.00psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.050 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.205 in	Ratio =		707 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.359 in	Ratio =		404 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v
+D+H													0.00	0.00	0.00	0.00
Length = 12.10 ft	1	0.344	0.214	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.10	744.09	2160.00	1.42	51.08	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.10 ft	1	0.724	0.450	1.00	1.000	1.00	1.00	1.00	1.00	1.00	11.91	1,737.25	2400.00	3.30	119.26	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.10 ft	1	0.248	0.154	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.10	744.09	3000.00	1.42	51.08	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.10 ft	1	0.270	0.168	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.10	744.09	2760.00	1.42	51.08	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Load Combination	Segment Length	Span #	Max Stress Ratios			Moment Values						Shear Values					
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H																	
Length = 6.670 ft	1	0.117	0.111	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.54	252.36	0.00	0.00	0.00	0.00	0.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.246	0.234	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.61	590.36	2400.00	1.53	62.01	265.00	0.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.084	0.080	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.54	252.36	3000.00	0.66	26.51	331.25	0.00
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.091	0.087	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.54	252.36	2760.00	0.66	26.51	304.75	0.00
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\ (C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-S1.1.3

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

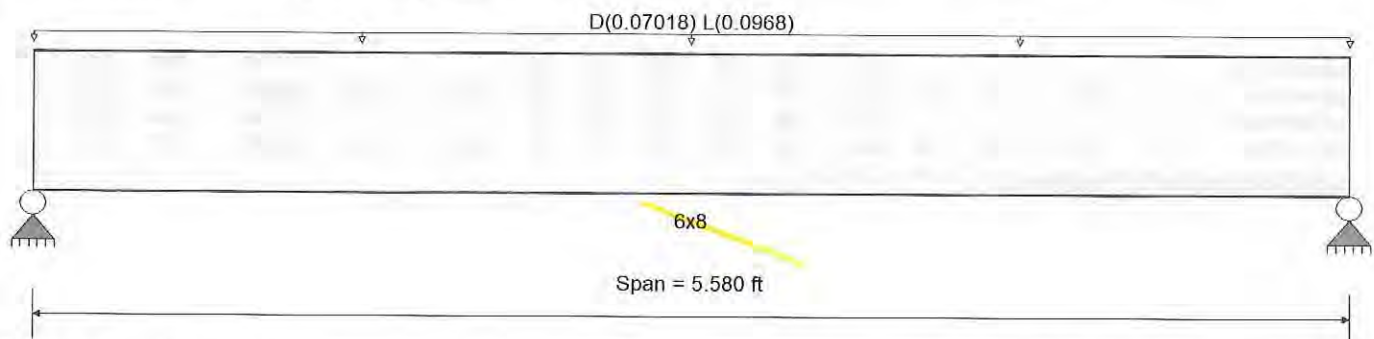
Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10

Fb +	875 psi	E : Modulus of Elasticity	
Fb -	875 psi	Ebend- xx	1300ksi
Fc - Prll	600 psi	Eminbend - xx	470ksi
Fc - Perp	625 psi		
Fv	170 psi		
Ft	425 psi	Density	31.2pcf

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 2.420 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.182 : 1	Maximum Shear Stress Ratio	=	0.082 : 1
Section used for this span		6x8	Section used for this span		6x8
fb : Actual	=	159.34 psi	fv : Actual	=	13.94 psi
FB : Allowable	=	875.00 psi	Fv : Allowable	=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.790 ft	Location of maximum on span	=	4.969 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.008 in	Ratio =		7925 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.015 in	Ratio =		4360 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H																
Length = 5.580 ft	1	0.091	0.041	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.31	71.66	787.50	0.00	0.00	0.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.580 ft	1	0.182	0.082	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.68	159.34	875.00	0.38	13.94	170.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.580 ft	1	0.066	0.030	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.31	71.66	1093.75	0.17	6.27	212.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.580 ft	1	0.071	0.032	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.31	71.66	1006.25	0.17	6.27	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ['] b	V	f _v	F ['] v
+D+H	Length = 6.670 ft	1	0.093	0.088	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.23	200.45	0.00	0.00	0.00	0.00
+D+L+H	Length = 6.670 ft	1	0.195	0.185	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.86	466.85	2400.00	0.00	0.00	0.00
+D+Lr+H	Length = 6.670 ft	1	0.067	0.064	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.23	200.45	3000.00	0.00	0.00	0.00
+D+S+H	Length = 6.670 ft	1	0.073	0.069	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.23	200.45	2760.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv
+D+H													0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.165	0.145	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.18	355.72	2160.00	0.86	34.60	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.347	0.306	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.10	833.62	2400.00	2.01	81.09	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.119	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.18	355.72	3000.00	0.86	34.60	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1	0.129	0.114	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.18	355.72	2760.00	0.86	34.60	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 1
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 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

Printed: 4 FEB 2019, 3:01PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-A2.0.2

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
Length = 7.50 ft	1		0.238	0.210	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.37	714.15	3000.00	1.72	69.47	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1		0.259	0.228	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.37	714.15	2760.00	1.72	69.47	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1		0.093	0.082	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.18	355.72	3840.00	0.86	34.60	424.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1		0.093	0.082	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.18	355.72	3840.00	0.86	34.60	424.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1		0.186	0.164	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.37	714.15	3840.00	1.72	69.47	424.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1		0.186	0.164	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.37	714.15	3840.00	1.72	69.47	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1		0.186	0.164	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.37	714.15	3840.00	1.72	69.47	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1		0.056	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.31	213.43	3840.00	0.51	20.76	424.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.50 ft	1		0.056	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.31	213.43	3840.00	0.51	20.76	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0662	3.777		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.721	2.721
Overall MINimum	1.560	1.560
+D+H	1.161	1.161
+D+L+H	2.721	2.721
+D+Lr+H	1.161	1.161
+D+S+H	1.161	1.161
+D+0.750Lr+0.750L+H	2.331	2.331
+D+0.750L+0.750S+H	2.331	2.331
+D+0.60W+H	1.161	1.161
+D+0.70E+H	1.161	1.161
+D+0.750Lr+0.750L+0.450W+H	2.331	2.331
+D+0.750L+0.750S+0.450W+H	2.331	2.331
+D+0.750L+0.750S+0.5250E+H	2.331	2.331
+0.60D+0.60W+0.60H	0.697	0.697
+0.60D+0.70E+0.60H	0.697	0.697
D Only	1.161	1.161
Lr Only		
L Only	1.560	1.560
S Only		
W Only		
E Only		
H Only		

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v
+D+H													0.00	0.00	0.00	0.00
Length = 6.250 ft	1	0.159	0.066	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.54	125.50	787.50	0.28	10.08	153.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.250 ft	1	0.325	0.134	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.22	284.59	875.00	0.63	22.85	170.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.250 ft	1	0.115	0.047	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.54	125.50	1093.75	0.28	10.08	212.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.250 ft	1	0.125	0.052	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.54	125.50	1006.25	0.28	10.08	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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Engineer:
Project Descr:

Project ID:

130

Printed: 4 FEB 2019, 3:11PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-A1.0.1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

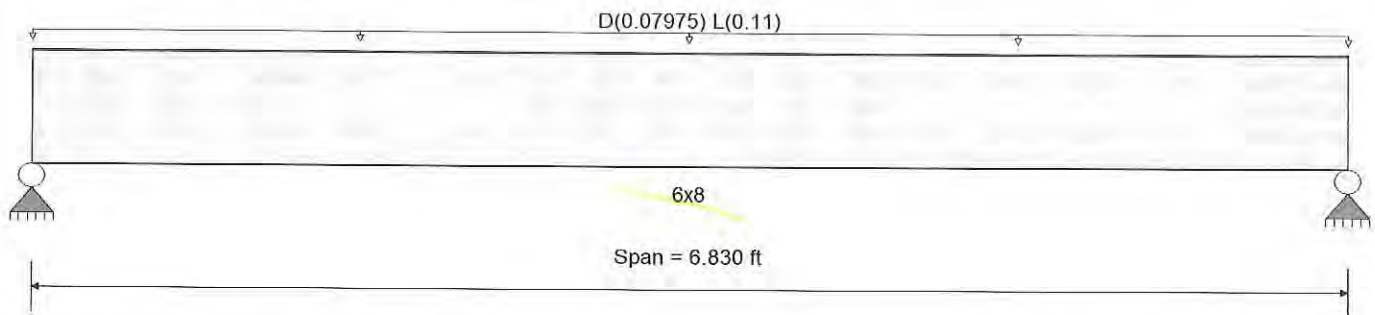
Material Properties

Analysis Method: Allowable Stress Design
Load Combination ASCE 7-10

Wood Species: Douglas Fir - Larch
Wood Grade: No.2

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	875 psi	E: Modulus of Elasticity	
Fb -	875 psi	Ebend- xx	1300 ksi
Fc - Prll	600 psi	Eminbend - xx	470 ksi
Fc - Perp	625 psi		
Fv	170 psi		
Ft	425 psi	Density	31.2pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 2.750 ft, (Floor Load)

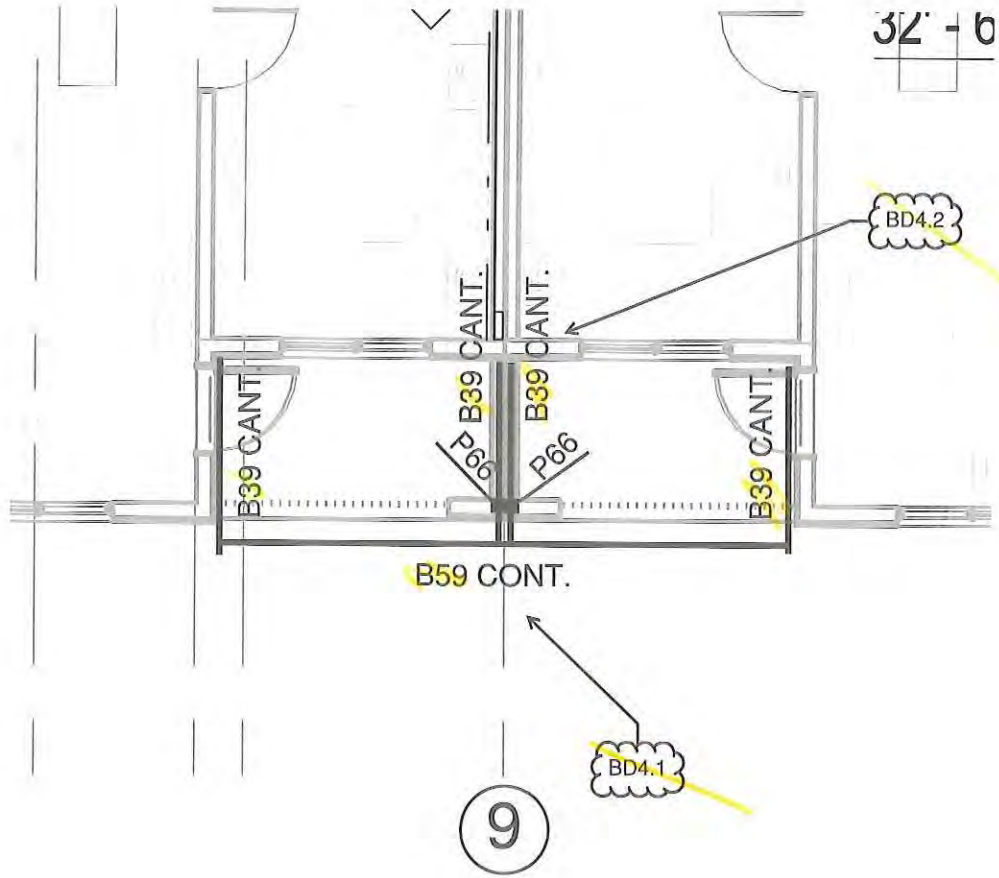
DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.308	1	Maximum Shear Stress Ratio	=	0.119	1
Section used for this span		6x8		Section used for this span		6x8	
fb: Actual	=	269.63 psi		fv: Actual	=	20.17 psi	
FB: Allowable	=	875.00 psi		Fv: Allowable	=	170.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	3.415 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.022 in	Ratio = 3802				
Max Upward Transient Deflection		0.000 in	Ratio = 0				
Max Downward Total Deflection		0.039 in	Ratio = 2105				
Max Upward Total Deflection		0.000 in	Ratio = 0				

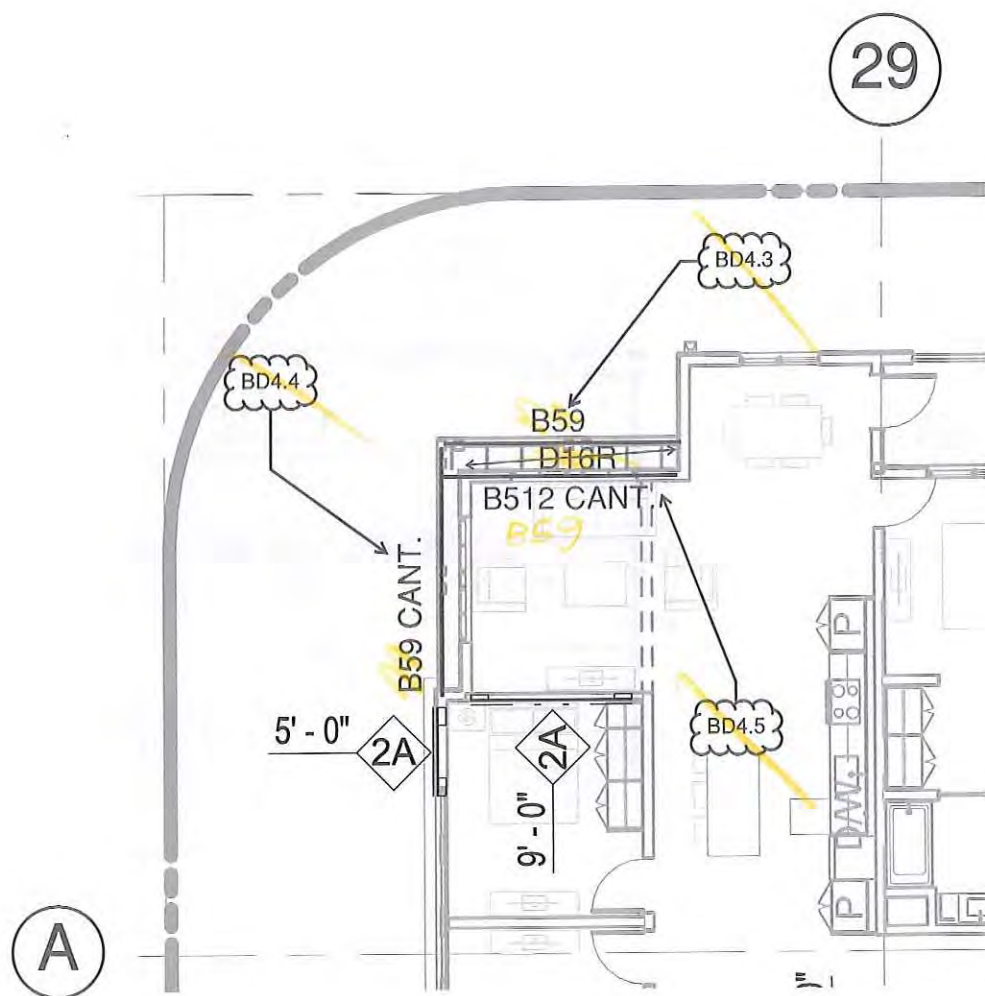
Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+H	Length = 6.830 ft	1	0.153	0.059	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.52	120.35	787.50	0.00	0.00	0.00
+D+L+H	Length = 6.830 ft	1	0.308	0.119	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.16	269.63	875.00	0.00	0.00	0.00
+D+Lr+H	Length = 6.830 ft	1	0.110	0.042	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.52	120.35	1093.75	0.00	0.00	0.00
+D+S+H	Length = 6.830 ft	1	0.120	0.046	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.52	120.35	1006.25	0.00	0.00	0.00
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00



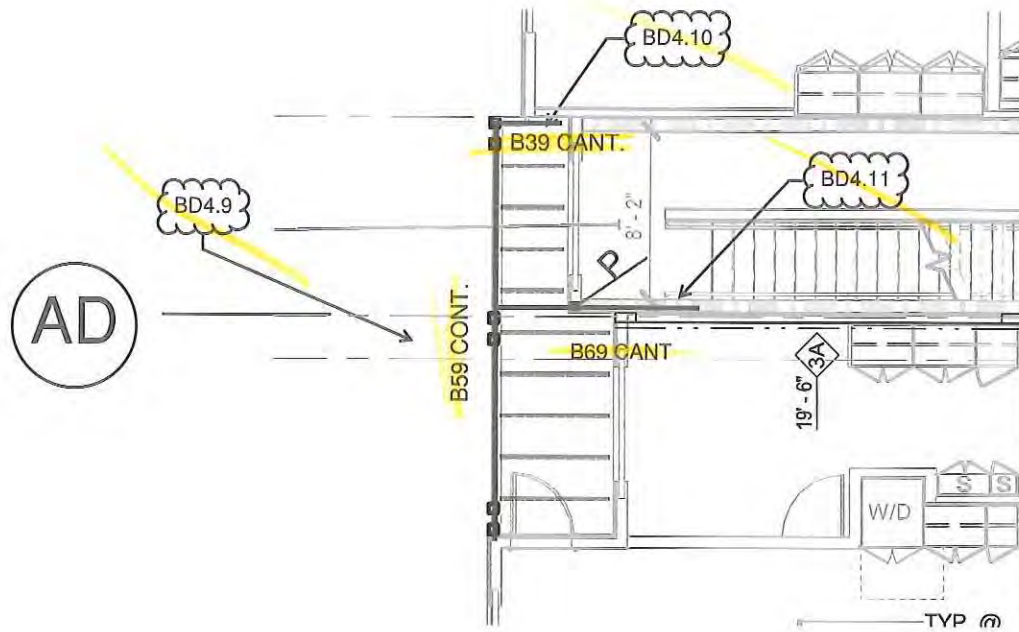
LEGACY @ LIVERMORE
DECK BEAM KEY
UNIT A1.0 (@ BUILDING B)
4TH FLOOR FRAMING

WLT
Area-D



Area F

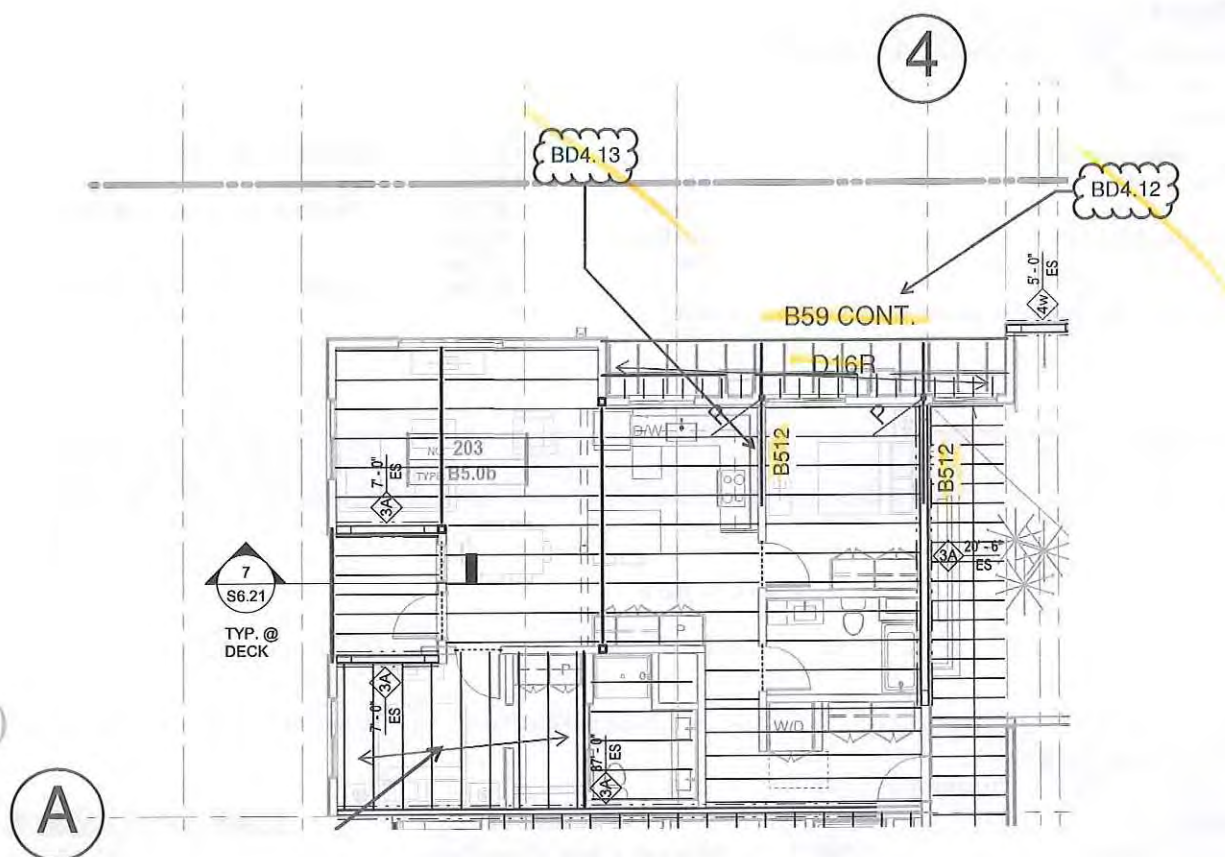
LEGACY @ LIVERMORE
DECK BEAM KEY
UNIT C3.0 (@ BUILDING B)
4TH FLOOR FRAMING



Cont P 163

LEGACY @ LIVERMORE
DECK BEAM KEY
UNIT B1.0 (@ BUILDING A)
3RD FLOOR FRAMING

Area B



LEGACY @ LIVERMORE
 DECK BEAM KEY
 UNIT B5.0b (@ BUILDING B)
 3RD FLOOR FRAMING

Area D

Wood Beam

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 Licensee : Peoples Associates Structural Engineers

Lic. #: KW-06009713

Description : Typical Deck Beam

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

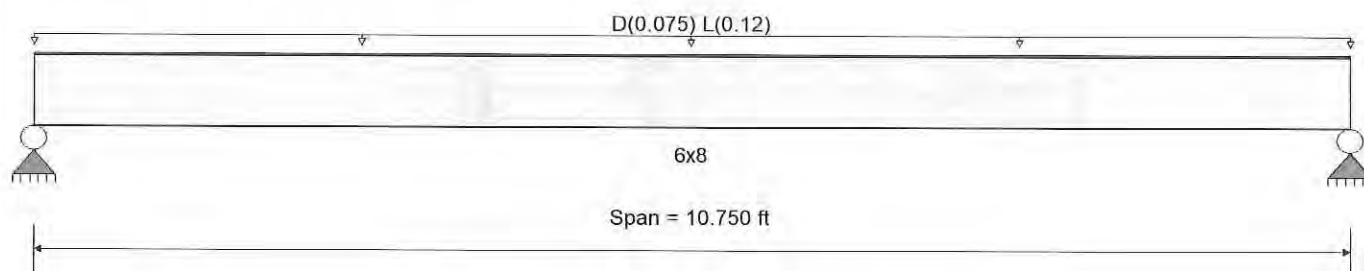
Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	1350 psi	E : Modulus of Elasticity	
Fb -	1350 psi	Ebend- xx	1600 ksi
Fc - Prll	925 psi	Eminbend - xx	580 ksi
Fc - Perp	625 psi		
Fv	170 psi		
Ft	675 psi	Density	31.21 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.0250, L = 0.040 ksf, Tributary Width = 3.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.508 : 1	Maximum Shear Stress Ratio	=	0.209 : 1
Section used for this span		6x8	Section used for this span		6x8
fb : Actual	=	685.61 psi	fv : Actual	=	35.50 psi
FB : Allowable	=	1,350.00 psi	Fv : Allowable	=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.375 ft	Location of maximum on span	=	10.161 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.117 in Ratio = 1100 >= 480			
Max Upward Transient Deflection		0.000 in Ratio = 0 < 480			
Max Downward Total Deflection		0.199 in Ratio = 647 >= 360			
Max Upward Total Deflection		0.000 in Ratio = 0 < 360			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv
+D+H																
Length = 10.750 ft	1	0.232	0.095	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.21	282.19	1215.00	0.00	0.00	0.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.508	0.209	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.95	685.61	1350.00	0.00	0.00	0.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.167	0.069	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.21	282.19	1687.50	0.40	14.61	212.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.182	0.075	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.21	282.19	1552.50	0.40	14.61	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.347	0.142	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.51	584.76	1687.50	0.83	30.28	212.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

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Licensee: Peoples Associates Structural Engineers

Description: Typical Deck Beam

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
Length = 10.750 ft	1	0.377	0.155	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.51	584.76	1552.50	0.83	30.28	195.50
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.131	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.21	282.19	2160.00	0.40	14.61	272.00
+D+0.750Lr+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.131	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.21	282.19	2160.00	0.40	14.61	272.00
+D+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.131	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.21	282.19	2160.00	0.40	14.61	272.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.078	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.73	169.32	2160.00	0.24	8.77	272.00
+D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.131	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.21	282.19	2160.00	0.40	14.61	272.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.271	0.111	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.51	584.76	2160.00	0.83	30.28	272.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.078	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.73	169.32	2160.00	0.24	8.77	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1992	5.414		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	1	0.0820 in	5.414 ft	0.0000 in	0.000 ft
+D+L+H	1	0.1992 in	5.414 ft	0.0000 in	0.000 ft
+D+Lr+H	1	0.0820 in	5.414 ft	0.0000 in	0.000 ft
+D+S+H	1	0.0820 in	5.414 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H	1	0.1699 in	5.414 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H	1	0.1699 in	5.414 ft	0.0000 in	0.000 ft
+D+0.60W+H	1	0.0820 in	5.414 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H	1	0.0820 in	5.414 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W+H	1	0.0820 in	5.414 ft	0.0000 in	0.000 ft
+0.60D+0.60W+0.60H	1	0.0492 in	5.414 ft	0.0000 in	0.000 ft
+D+0.70E+0.60H	1	0.0820 in	5.414 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	1	0.1699 in	5.414 ft	0.0000 in	0.000 ft
+0.60D+0.70E+H	1	0.0492 in	5.414 ft	0.0000 in	0.000 ft
D Only	1	0.0820 in	5.414 ft	0.0000 in	0.000 ft
L Only	1	0.1172 in	5.414 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.096	1.096
Overall MINimum	0.645	0.645
+D+H	0.451	0.451
+D+L+H	1.096	1.096
+D+Lr+H	0.451	0.451
+D+S+H	0.451	0.451
+D+0.750Lr+0.750L+H	0.935	0.935
+D+0.750L+0.750S+H	0.935	0.935
+D+0.60W+H	0.451	0.451
+D+0.750Lr+0.450W+H	0.451	0.451
+D+0.750S+0.450W+H	0.451	0.451
+0.60D+0.60W+0.60H	0.271	0.271
+D+0.70E+0.60H	0.451	0.451
+D+0.750L+0.750S+0.5250E+H	0.935	0.935
+0.60D+0.70E+H	0.271	0.271
D Only	0.451	0.451
Lr Only		
L Only	0.645	0.645
S Only		
W Only		
E Only		

Wood Beam

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Lic. #: KW-06009713

Description : BD4.1

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

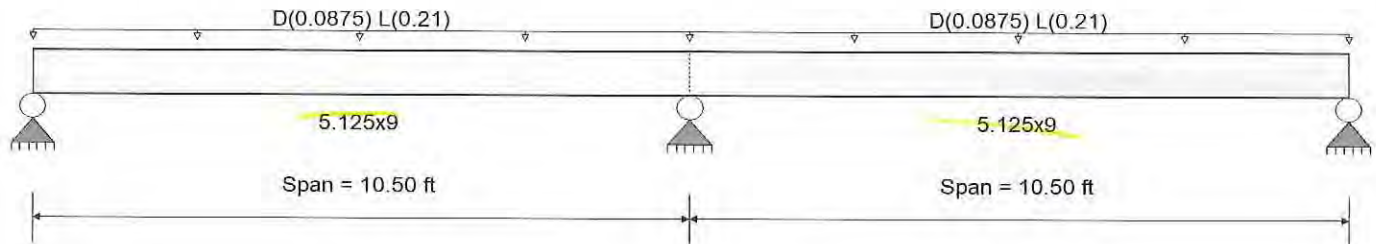
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F-V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 2,400.0 psi E : Modulus of Elasticity
 Fb - 1,850.0 psi Ebend-xx 1,800.0 ksi
 Fc - Prll 1,650.0 psi Eminbend-xx 950.0 ksi
 Fc - Perp 650.0 psi Ebend-yy 1,600.0 ksi
 Fv 265.0 psi Eminbend-yy 850.0 ksi
 Ft 1,100.0 psi Density 31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 3.50 ft

Load for Span Number 2

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 3.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.397 : 1	Maximum Shear Stress Ratio	=	0.221 : 1
Section used for this span		5.125x9	Section used for this span		5.125x9
fb : Actual	=	734.99 psi	fv : Actual	=	58.59 psi
FB : Allowable	=	1,850.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H, LL Comb Run (LL)	Load Combination		+D+L+H, LL Comb Run (LL)
Location of maximum on span	=	10.500 ft	Location of maximum on span	=	9.796 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.073 in Ratio = 1732 >=480			
Max Upward Transient Deflection		-0.032 in Ratio = 3935 >=480			
Max Downward Total Deflection		0.092 in Ratio = 1362 >=360			
Max Upward Total Deflection		-0.018 in Ratio = 6824 >=360			

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
+D+H																	
Length = 10.50 ft	1	0.140	0.078	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	1665.00	0.57	18.58	238.50	
Length = 10.50 ft	2	0.140	0.078	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	1665.00	0.57	18.58	238.50	
+D+L+H, LL Comb Run (*L)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 10.50 ft	1	0.262	0.204	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.79	484.02	1850.00	1.66	54.10	265.00	
Length = 10.50 ft	2	0.214	0.204	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.96	512.90	2400.00	1.66	54.10	265.00	
+D+L+H, LL Comb Run (L*)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	

Wood Beam

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Description: BD4.1

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 10.50 ft	1	0.214	0.204	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.96	512.90	2400.00	1.66	54.10	265.00
Length = 10.50 ft	2	0.262	0.204	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.79	484.02	1850.00	0.71	54.10	265.00
+D+L+H, LL Comb Run (LL)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.397	0.221	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.24	734.99	1850.00	1.80	58.59	265.00
Length = 10.50 ft	2	0.397	0.221	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.24	734.99	1850.00	1.80	58.59	265.00
+D+Lr+H, LL Comb Run (*L)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.101	0.056	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2312.50	0.57	18.58	331.25
Length = 10.50 ft	2	0.101	0.056	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2312.50	0.57	18.58	331.25
+D+Lr+H, LL Comb Run (L*)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.101	0.056	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2312.50	0.57	18.58	331.25
Length = 10.50 ft	2	0.101	0.056	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2312.50	0.57	18.58	331.25
+D+Lr+H, LL Comb Run (LL)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.101	0.056	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2312.50	0.57	18.58	331.25
Length = 10.50 ft	2	0.101	0.056	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2312.50	0.57	18.58	331.25
+D+S+H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.110	0.061	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2127.50	0.57	18.58	304.75
Length = 10.50 ft	2	0.110	0.061	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2127.50	0.57	18.58	304.75
+D+0.750Lr+0.750L+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.182	0.137	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2312.50	1.39	45.22	331.25
Length = 10.50 ft	2	0.182	0.137	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2312.50	1.39	45.22	331.25
+D+0.750Lr+0.750L+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.182	0.137	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2312.50	1.39	45.22	331.25
Length = 10.50 ft	2	0.182	0.137	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2312.50	0.67	45.22	331.25
+D+0.750Lr+0.750L+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.264	0.147	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.51	609.50	2312.50	1.49	48.58	331.25
Length = 10.50 ft	2	0.264	0.147	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.51	609.50	2312.50	1.49	48.58	331.25
+D+0.750Lr+0.750S+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.198	0.148	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2127.50	1.39	45.22	304.75
Length = 10.50 ft	2	0.198	0.148	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2127.50	1.39	45.22	304.75
+D+0.750Lr+0.750S+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.198	0.148	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2127.50	1.39	45.22	304.75
Length = 10.50 ft	2	0.198	0.148	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2127.50	0.67	45.22	304.75
+D+0.750Lr+0.750S+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.286	0.159	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.51	609.50	2127.50	1.49	48.58	304.75
Length = 10.50 ft	2	0.286	0.159	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.51	609.50	2127.50	1.49	48.58	304.75
+D+0.60W+H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
Length = 10.50 ft	2	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
+D+0.750Lr+0.450W+H, LL Comb F				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
Length = 10.50 ft	2	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
+D+0.750Lr+0.450W+H, LL Comb F				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
Length = 10.50 ft	2	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
+D+0.750Lr+0.450W+H, LL Comb F				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
Length = 10.50 ft	2	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
+D+0.750Lr+0.450W+H, LL Comb F				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
Length = 10.50 ft	2	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
+D+0.750S+0.450W+H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
Length = 10.50 ft	2	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
+0.60D+0.60W+0.60H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.047	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.81	139.82	2960.00	0.34	11.15	424.00
Length = 10.50 ft	2	0.047	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.81	139.82	2960.00	0.34	11.15	424.00
+D+0.70E+0.60H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
Length = 10.50 ft	2	0.079	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	233.04	2960.00	0.57	18.58	424.00
+D+0.750L+0.750S+0.5250E+H, LL				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.142	0.107	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2960.00	1.39	45.22	424.00
Length = 10.50 ft	2	0.142	0.107	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2960.00	1.39	45.22	424.00
+D+0.750L+0.750S+0.5250E+H, LL				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

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Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 10.50 ft	1		0.142	0.107	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2960.00	1.39	45.22	424.00
Length = 10.50 ft	2		0.142	0.107	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.43	421.27	2960.00	0.67	45.22	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.206	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.51	609.50	2960.00	1.49	48.58	424.00
Length = 10.50 ft	2		0.206	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.51	609.50	2960.00	1.49	48.58	424.00
+0.60D+0.70E+H					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.047	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.81	139.82	2960.00	0.34	11.15	424.00
Length = 10.50 ft	2		0.047	0.026	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.81	139.82	2960.00	0.34	11.15	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H, LL Comb Run (L*)	1	0.0925	4.869		0.0000	0.000
+D+L+H, LL Comb Run (L*)	2	0.0920	5.690	L Only, LL Comb Run (L*)	-0.0009	0.059

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	1	0.0200	in	0.0000	in
+D+H	2	0.0198	in	0.0000	in
+D+L+H, LL Comb Run (L*)	2	0.0920	in	0.0000	in
+D+L+H, LL Comb Run (L*)	1	0.0925	in	0.0000	in
+D+L+H, LL Comb Run (LL)	1	0.0631	in	0.0000	in
+D+L+H, LL Comb Run (LL)	2	0.0624	in	0.0000	in
+D+Lr+H, LL Comb Run (L*)	1	0.0200	in	0.0000	in
+D+Lr+H, LL Comb Run (L*)	2	0.0198	in	0.0000	in
+D+Lr+H, LL Comb Run (L*)	1	0.0200	in	0.0000	in
+D+Lr+H, LL Comb Run (L*)	2	0.0198	in	0.0000	in
+D+Lr+H, LL Comb Run (LL)	1	0.0200	in	0.0000	in
+D+Lr+H, LL Comb Run (LL)	2	0.0198	in	0.0000	in
+D+S+H	1	0.0200	in	0.0000	in
+D+S+H	2	0.0198	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	1	0.0019	in	-0.0114	in
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.0739	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	1	0.0743	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.0015	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	1	0.0523	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.0518	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (L*)	1	0.0019	in	-0.0114	in
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.0739	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (L*)	1	0.0743	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.0015	in	-0.0118	in
+D+0.750L+0.750S+H, LL Comb Run (LL)	1	0.0523	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.0518	in	0.0000	in
+D+0.60W+H	1	0.0200	in	0.0000	in
+D+0.60W+H	2	0.0198	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	1	0.0200	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.0198	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	1	0.0200	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.0198	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	1	0.0200	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	2	0.0198	in	0.0000	in
+D+0.750S+0.450W+H	1	0.0200	in	0.0000	in
+D+0.750S+0.450W+H	2	0.0198	in	0.0000	in
+0.60D+0.60W+0.60H	1	0.0120	in	0.0000	in
+0.60D+0.60W+0.60H	2	0.0119	in	0.0000	in
+D+0.70E+0.60H	1	0.0200	in	0.0000	in
+D+0.70E+0.60H	2	0.0198	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	1	0.0019	in	-0.0114	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2	0.0739	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	1	0.0743	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2	0.0015	in	-0.0118	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	1	0.0523	in	0.0000	in

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: BD4.1

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span		Max. Upward Defl		Location in Span	
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2	0.0518	in	6.101	ft	0.0000	in	0.000	ft
+0.60D+0.70E+H	1	0.0120	in	4.458	ft	0.0000	in	0.000	ft
+0.60D+0.70E+H	2	0.0119	in	6.101	ft	0.0000	in	0.000	ft
D Only	1	0.0200	in	4.458	ft	0.0000	in	0.000	ft
D Only	2	0.0198	in	6.101	ft	0.0000	in	0.000	ft
L Only, LL Comb Run (*L)	2	0.0725	in	5.573	ft	0.0000	in	0.000	ft
L Only, LL Comb Run (L*)	1	0.0727	in	4.986	ft	0.0000	in	0.000	ft
L Only, LL Comb Run (LL)	1	0.0431	in	4.458	ft	0.0000	in	0.000	ft
L Only, LL Comb Run (LL)	2	0.0426	in	6.101	ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.349	4.036	1.349
Overall MINimum	0.827	2.756	0.827
+D+H	0.384	1.280	0.384
+D+L+H, LL Comb Run (*L)	0.246	2.658	1.349
+D+L+H, LL Comb Run (L*)	1.349	2.658	0.246
+D+L+H, LL Comb Run (LL)	1.211	4.036	1.211
+D+Lr+H, LL Comb Run (*L)	0.384	1.280	0.384
+D+Lr+H, LL Comb Run (L*)	0.384	1.280	0.384
+D+Lr+H, LL Comb Run (LL)	0.384	1.280	0.384
+D+S+H	0.384	1.280	0.384
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.281	2.313	1.107
+D+0.750Lr+0.750L+H, LL Comb Run (L)	1.107	2.313	0.281
+D+0.750Lr+0.750L+H, LL Comb Run (L)	1.004	3.347	1.004
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.281	2.313	1.107
+D+0.750L+0.750S+H, LL Comb Run (L*)	1.107	2.313	0.281
+D+0.750L+0.750S+H, LL Comb Run (LL)	1.004	3.347	1.004
+D+0.60W+H	0.384	1.280	0.384
+D+0.750Lr+0.450W+H, LL Comb Run (*)	0.384	1.280	0.384
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.384	1.280	0.384
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.384	1.280	0.384
+D+0.750S+0.450W+H	0.384	1.280	0.384
+0.60D+0.60W+0.60H	0.230	0.768	0.230
+D+0.70E+0.60H	0.384	1.280	0.384
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.281	2.313	1.107
+D+0.750L+0.750S+0.5250E+H, LL Comb	1.107	2.313	0.281
+D+0.750L+0.750S+0.5250E+H, LL Comb	1.004	3.347	1.004
+0.60D+0.70E+H	0.230	0.768	0.230
D Only	0.384	1.280	0.384
Lr Only, LL Comb Run (*L)			
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)			
L Only, LL Comb Run (*L)	-0.138	1.378	0.965
L Only, LL Comb Run (L*)	0.965	1.378	-0.138
L Only, LL Comb Run (LL)	0.827	2.756	0.827
S Only			
W Only			
E Only			
H Only			

Wood Beam

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Licensee: Peoples Associates Structural Engineers

Description: BD4.2 (Double B39)

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

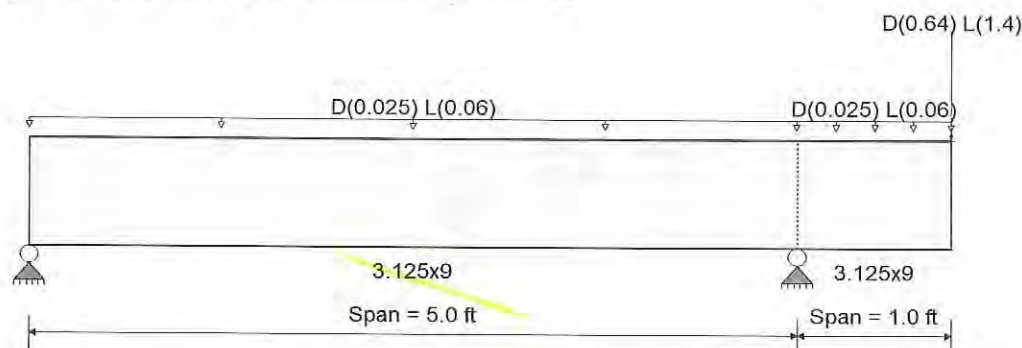
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F-V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft

Load for Span Number 2

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft

Point Load: D = 0.640, L = 1.40 k @ 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.321: 1	Maximum Shear Stress Ratio	=	0.415: 1
Section used for this span	=	3.125x9	Section used for this span	=	3.125x9
fb : Actual	=	593.22psi	fv : Actual	=	110.02 psi
FB : Allowable	=	1,850.00psi	Fv : Allowable	=	265.00 psi
Load Combination	=	+D+L+H, LL Comb Run (LL)	Load Combination	=	+D+L+H, LL Comb Run (*L)
Location of maximum on span	=	5.000ft	Location of maximum on span	=	5.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.014 in Ratio = 1662 >= 480			
Max Upward Transient Deflection		-0.012 in Ratio = 5136 >= 480			
Max Downward Total Deflection		0.020 in Ratio = 1184 >= 360			
Max Upward Total Deflection		-0.016 in Ratio = 3801 >= 360			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H														0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.112	0.145	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	1665.00	0.65	34.55	238.50
Length = 1.0 ft	2		0.112	0.145	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	1665.00	0.65	34.55	238.50
+D+L+H, LL Comb Run (*L)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.321	0.415	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.09	593.22	1850.00	2.06	110.02	265.00
Length = 1.0 ft	2		0.321	0.415	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.09	593.22	1850.00	2.06	110.02	265.00

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

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Description: BD4.2 (Double B39)

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
+D+L+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.101	0.130	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	1850.00	0.65	34.55	265.00
Length = 1.0 ft	2		0.101	0.130	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	1850.00	0.65	34.55	265.00
+D+L+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.321	0.415	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.09	593.22	1850.00	2.06	110.02	265.00
Length = 1.0 ft	2		0.321	0.415	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.09	593.22	1850.00	2.06	110.02	265.00
+D+Lr+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.081	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2312.50	0.65	34.55	331.25
Length = 1.0 ft	2		0.081	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2312.50	0.65	34.55	331.25
+D+Lr+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.081	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2312.50	0.65	34.55	331.25
Length = 1.0 ft	2		0.081	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2312.50	0.65	34.55	331.25
+D+Lr+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.081	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2312.50	0.65	34.55	331.25
Length = 1.0 ft	2		0.081	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2312.50	0.65	34.55	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.088	0.113	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2127.50	0.65	34.55	304.75
Length = 1.0 ft	2		0.088	0.113	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2127.50	0.65	34.55	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.213	0.275	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2312.50	1.71	91.15	331.25
Length = 1.0 ft	2		0.213	0.275	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2312.50	1.71	91.15	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.081	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2312.50	0.65	34.55	331.25
Length = 1.0 ft	2		0.081	0.104	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2312.50	0.65	34.55	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.213	0.275	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2312.50	1.71	91.15	331.25
Length = 1.0 ft	2		0.213	0.275	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2312.50	1.71	91.15	331.25
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.231	0.299	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2127.50	1.71	91.15	304.75
Length = 1.0 ft	2		0.231	0.299	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2127.50	1.71	91.15	304.75
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.088	0.113	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2127.50	0.65	34.55	304.75
Length = 1.0 ft	2		0.088	0.113	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2127.50	0.65	34.55	304.75
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.231	0.299	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2127.50	1.71	91.15	304.75
Length = 1.0 ft	2		0.231	0.299	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2127.50	1.71	91.15	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
Length = 1.0 ft	2		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
Length = 1.0 ft	2		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
Length = 1.0 ft	2		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
Length = 1.0 ft	2		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
+D+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
Length = 1.0 ft	2		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.038	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.39	111.88	2960.00	0.39	20.73	424.00
Length = 1.0 ft	2		0.038	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.39	111.88	2960.00	0.39	20.73	424.00
+D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
Length = 1.0 ft	2		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
+D+0.750L+0.750S+0.5250E+H, LL						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.166	0.215	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2960.00	1.71	91.15	424.00
Length = 1.0 ft	2		0.166	0.215	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2960.00	1.71	91.15	424.00

Wood Beam

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Description: BD4.2 (Double B39)

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
Length = 1.0 ft	2		0.063	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	186.47	2960.00	0.65	34.55	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.166	0.215	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2960.00	1.71	91.15	424.00
Length = 1.0 ft	2		0.166	0.215	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.73	491.53	2960.00	1.71	91.15	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.038	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.39	111.88	2960.00	0.39	20.73	424.00
Length = 1.0 ft	2		0.038	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.39	111.88	2960.00	0.39	20.73	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H, LL Comb Run (*L)	1	0.0000	0.000	+D+L+H, LL Comb Run (*L)	-0.0158	2.933
	2	0.0202	1.000		0.0000	2.933

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	2	0.0058	in	0.0000	in
+D+L+H, LL Comb Run (*L)	2	0.0202	in	0.0000	in
+D+L+H, LL Comb Run (L*)	2	0.0042	in	0.0000	in
+D+L+H, LL Comb Run (LL)	2	0.0187	in	0.0000	in
+D+Lr+H, LL Comb Run (*L)	2	0.0058	in	0.0000	in
+D+Lr+H, LL Comb Run (L*)	2	0.0058	in	0.0000	in
+D+Lr+H, LL Comb Run (LL)	2	0.0058	in	0.0000	in
+D+S+H	2	0.0058	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.0166	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.0046	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.0154	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.0166	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.0046	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.0154	in	0.0000	in
+D+0.60W+H	2	0.0058	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	2	0.0058	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.0058	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	2	0.0058	in	0.0000	in
+D+0.750S+0.450W+H	2	0.0058	in	0.0000	in
+0.60D+0.60W+0.60H	2	0.0035	in	0.0000	in
+D+0.70E+0.60H	2	0.0058	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	2	0.0166	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2	0.0046	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2	0.0154	in	0.0000	in
+0.60D+0.70E+H	2	0.0035	in	0.0000	in
D Only	2	0.0058	in	0.0000	in
L Only, LL Comb Run (*L)	2	0.0144	in	0.0000	in
L Only, LL Comb Run (L*)	1	0.0025	in	0.0000	in
L Only, LL Comb Run (LL)	2	0.0129	in	0.0000	in

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.339	2.776	
Overall MINimum	-0.136	1.896	
+D+H	-0.053	0.880	
+D+L+H, LL Comb Run (*L)	-0.339	2.626	
+D+L+H, LL Comb Run (L*)	0.097	1.030	
+D+L+H, LL Comb Run (LL)	-0.189	2.776	
+D+Lr+H, LL Comb Run (*L)	-0.053	0.880	
+D+Lr+H, LL Comb Run (L*)	-0.053	0.880	
+D+Lr+H, LL Comb Run (LL)	-0.053	0.880	
+D+S+H	-0.053	0.880	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-0.268	2.189	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.059	0.992	

Wood Beam

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Description: BD4.2 (Double B39)

Load Combination	Support notation: Far left is #1			Values in KIPS
	Support 1	Support 2	Support 3	
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.155	2.302		
+D+0.750L+0.750S+H, LL Comb Run (*L	-0.268	2.189		
+D+0.750L+0.750S+H, LL Comb Run (L*	0.059	0.992		
+D+0.750L+0.750S+H, LL Comb Run (LL	-0.155	2.302		
+D+0.60W+H	-0.053	0.880		
+D+0.750Lr+0.450W+H, LL Comb Run (*	-0.053	0.880		
+D+0.750Lr+0.450W+H, LL Comb Run (L	-0.053	0.880		
+D+0.750Lr+0.450W+H, LL Comb Run (L	-0.053	0.880		
+D+0.750S+0.450W+H	-0.053	0.880		
+0.60D+0.60W+0.60H	-0.032	0.528		
+D+0.70E+0.60H	-0.053	0.880		
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.268	2.189		
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.059	0.992		
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.155	2.302		
+0.60D+0.70E+H	-0.032	0.528		
D Only	-0.053	0.880		
Lr Only, LL Comb Run (*L)				
Lr Only, LL Comb Run (L*)				
Lr Only, LL Comb Run (LL)				
L Only, LL Comb Run (*L)	-0.286	1.746		
L Only, LL Comb Run (L*)	0.150	0.150		
L Only, LL Comb Run (LL)	-0.136	1.896		
S Only				
W Only				
E Only				
H Only				

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Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H																
Length = 5.0 ft	1	0.221	0.288	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	1665.00	1.29	68.68	238.50
Length = 1.0 ft	2	0.221	0.288	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	1665.00	1.29	68.68	238.50
+D+L+H, LL Comb Run (*L)																
Length = 5.0 ft	1	0.634	0.826	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.13	1,173.49	1850.00	4.10	218.82	265.00
Length = 1.0 ft	2	0.634	0.826	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.13	1,173.49	1850.00	4.10	218.82	265.00

Wood Beam

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Description: BD4.2 (Single B59)

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FN}	C _I	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
+D+L+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.199	0.259	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	1850.00	1.29	68.68	265.00
Length = 1.0 ft	2		0.199	0.259	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	1850.00	1.29	68.68	265.00
+D+L+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.634	0.826	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.13	1,173.49	1850.00	4.10	218.82	265.00
Length = 1.0 ft	2		0.634	0.826	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.13	1,173.49	1850.00	4.10	218.82	265.00
+D+Lr+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.159	0.207	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2312.50	1.29	68.68	331.25
Length = 1.0 ft	2		0.159	0.207	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2312.50	1.29	68.68	331.25
+D+Lr+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.159	0.207	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2312.50	1.29	68.68	331.25
Length = 1.0 ft	2		0.159	0.207	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2312.50	1.29	68.68	331.25
+D+Lr+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.159	0.207	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2312.50	1.29	68.68	331.25
Length = 1.0 ft	2		0.159	0.207	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2312.50	1.29	68.68	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.173	0.225	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2127.50	1.29	68.68	304.75
Length = 1.0 ft	2		0.173	0.225	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2127.50	1.29	68.68	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.420	0.547	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2312.50	3.40	181.29	331.25
Length = 1.0 ft	2		0.420	0.547	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2312.50	3.40	181.29	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.159	0.207	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2312.50	1.29	68.68	331.25
Length = 1.0 ft	2		0.159	0.207	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2312.50	1.29	68.68	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.420	0.547	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2312.50	3.40	181.29	331.25
Length = 1.0 ft	2		0.420	0.547	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2312.50	3.40	181.29	331.25
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.457	0.595	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2127.50	3.40	181.29	304.75
Length = 1.0 ft	2		0.457	0.595	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2127.50	3.40	181.29	304.75
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.173	0.225	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2127.50	1.29	68.68	304.75
Length = 1.0 ft	2		0.173	0.225	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2127.50	1.29	68.68	304.75
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.457	0.595	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2127.50	3.40	181.29	304.75
Length = 1.0 ft	2		0.457	0.595	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2127.50	3.40	181.29	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
Length = 1.0 ft	2		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
Length = 1.0 ft	2		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
Length = 1.0 ft	2		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
Length = 1.0 ft	2		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
+D+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
Length = 1.0 ft	2		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.075	0.097	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.78	221.11	2960.00	0.77	41.21	424.00
Length = 1.0 ft	2		0.075	0.097	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.78	221.11	2960.00	0.77	41.21	424.00
+D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
Length = 1.0 ft	2		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
+D+0.750L+0.750S+0.5250E+H, LL						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.328	0.428	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2960.00	3.40	181.29	424.00
Length = 1.0 ft	2		0.328	0.428	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2960.00	3.40	181.29	424.00

Wood Beam

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Description : BD4.2 (Single B59)

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
Length = 1.0 ft	2		0.124	0.162	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	368.51	2960.00	1.29	68.68	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.328	0.428	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2960.00	3.40	181.29	424.00
Length = 1.0 ft	2		0.328	0.428	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.42	972.24	2960.00	3.40	181.29	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1		0.075	0.097	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.78	221.11	2960.00	0.77	41.21	424.00
Length = 1.0 ft	2		0.075	0.097	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.78	221.11	2960.00	0.77	41.21	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H, LL Comb Run (*L)	1	0.0000	0.000	+D+L+H, LL Comb Run (*L)	-0.0324	2.905
	2	0.0409	1.000		0.0000	2.905

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	2	0.0123	in	0.0000	in
+D+L+H, LL Comb Run (*L)	2	0.0409	in	0.0000	in
+D+L+H, LL Comb Run (L*)	2	0.0107	in	0.0000	in
+D+L+H, LL Comb Run (LL)	2	0.0393	in	0.0000	in
+D+Lr+H, LL Comb Run (*L)	2	0.0123	in	0.0000	in
+D+Lr+H, LL Comb Run (L*)	2	0.0123	in	0.0000	in
+D+Lr+H, LL Comb Run (LL)	2	0.0123	in	0.0000	in
+D+S+H	2	0.0123	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.0337	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.0111	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.0325	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.0337	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.0111	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.0325	in	0.0000	in
+D+0.60W+H	2	0.0123	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	2	0.0123	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.0123	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	2	0.0123	in	0.0000	in
+D+0.750S+0.450W+H	2	0.0123	in	0.0000	in
+0.60D+0.60W+0.60H	2	0.0074	in	0.0000	in
+D+0.70E+0.60H	2	0.0123	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	2	0.0337	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2	0.0111	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2	0.0325	in	0.0000	in
+0.60D+0.70E+H	2	0.0074	in	0.0000	in
D Only	2	0.0123	in	0.0000	in
L Only, LL Comb Run (*L)	2	0.0286	in	0.0000	in
L Only, LL Comb Run (L*)	1	0.0025	in	0.0000	in
L Only, LL Comb Run (LL)	2	0.0270	in	0.0000	in

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.747	5.224	
Overall MINimum	-0.181	3.576	
+D+H	-0.181	1.648	
+D+L+H, LL Comb Run (*L)	-0.747	5.074	
+D+L+H, LL Comb Run (L*)	-0.031	1.798	
+D+L+H, LL Comb Run (LL)	-0.597	5.224	
+D+Lr+H, LL Comb Run (*L)	-0.181	1.648	
+D+Lr+H, LL Comb Run (L*)	-0.181	1.648	
+D+Lr+H, LL Comb Run (LL)	-0.181	1.648	
+D+S+H	-0.181	1.648	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-0.606	4.217	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	-0.069	1.760	

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : BD4.2 (Single B59)

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.493	4.330	
+D+0.750L+0.750S+H, LL Comb Run (*L	-0.606	4.217	
+D+0.750L+0.750S+H, LL Comb Run (L*	-0.069	1.760	
+D+0.750L+0.750S+H, LL Comb Run (LL	-0.493	4.330	
+D+0.60W+H	-0.181	1.648	
+D+0.750Lr+0.450W+H, LL Comb Run (*	-0.181	1.648	
+D+0.750Lr+0.450W+H, LL Comb Run (L	-0.181	1.648	
+D+0.750Lr+0.450W+H, LL Comb Run (L	-0.181	1.648	
+D+0.750S+0.450W+H	-0.181	1.648	
+0.60D+0.60W+0.60H	-0.109	0.989	
+D+0.70E+0.60H	-0.181	1.648	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.606	4.217	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.069	1.760	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.493	4.330	
+0.60D+0.70E+H	-0.109	0.989	
D Only	-0.181	1.648	
Lr Only, LL Comb Run (*L)			
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)			
L Only, LL Comb Run (*L)	-0.566	3.426	
L Only, LL Comb Run (L*)	0.150	0.150	
L Only, LL Comb Run (LL)	-0.416	3.576	
S Only			
W Only			
E Only			
H Only			

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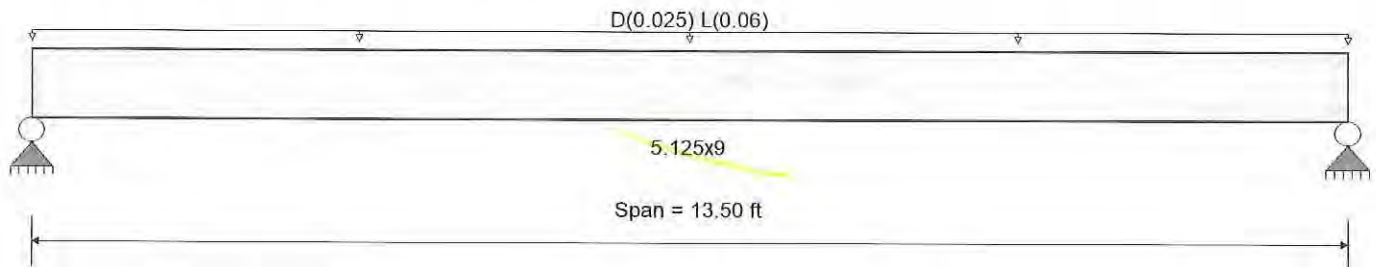
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CODE REFERENCES

Load Combination Set : ASCE 7-16

Density 31.210pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Uniform Load : $D = 0.0250$, $L = 0.060$ ksf, Tributary Width = 1.0 ft

Design OK

Maximum Bending Stress Ratio	=	0.156 : 1	Maximum Shear Stress Ratio	=	0.070 : 1
Section used for this span		5.125x9	Section used for this span		5.125x9
fb : Actual	=	375.35psi	fv : Actual	=	18.57 psi
FB : Allowable	=	2,400.00psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.750ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.080 in	Ratio =		2012 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.127 in	Ratio =		1271 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+H													0.00	0.00	0.00	0.00	
Length = 13.451 ft	1		0.064	0.029	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.80	138.28	2160.00	0.21	6.84	238.50
Length = 0.04927 ft	1		0.001	0.029	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.01	2.01	2160.00	0.21	6.84	238.50
+D+L+H						1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	
Length = 13.451 ft	1		0.156	0.070	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.16	375.35	2400.00	0.57	18.57	265.00
Length = 0.04927 ft	1		0.002	0.070	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.03	5.46	2400.00	0.57	18.57	265.00
+D+Lr+H						1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	
Length = 13.451 ft	1		0.046	0.021	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.80	138.28	3000.00	0.21	6.84	331.25
Length = 0.04927 ft	1		0.001	0.021	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.01	2.01	3000.00	0.21	6.84	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	
Length = 13.451 ft	1		0.050	0.022	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.80	138.28	2760.00	0.21	6.84	304.75

Wood Beam

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Licensee: Peoples Associates Structural Engineers

Description: BD4.3

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
Length = 0.04927 ft	1	0.001	0.022	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.01	2.01	2760.00	0.21	6.84	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.105	0.047	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.82	316.09	3000.00	0.48	15.64	331.25
Length = 0.04927 ft	1	0.002	0.047	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.03	4.60	3000.00	0.48	15.64	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.115	0.051	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.82	316.09	2760.00	0.48	15.64	304.75
Length = 0.04927 ft	1	0.002	0.051	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.03	4.60	2760.00	0.48	15.64	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.036	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	138.28	3840.00	0.21	6.84	424.00
Length = 0.04927 ft	1	0.001	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.01	2.01	3840.00	0.21	6.84	424.00
+D+0.750Lr+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.036	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	138.28	3840.00	0.21	6.84	424.00
Length = 0.04927 ft	1	0.001	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.01	2.01	3840.00	0.21	6.84	424.00
+D+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.036	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	138.28	3840.00	0.21	6.84	424.00
Length = 0.04927 ft	1	0.001	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.01	2.01	3840.00	0.21	6.84	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.022	0.010	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.48	82.97	3840.00	0.13	4.10	424.00
Length = 0.04927 ft	1	0.000	0.010	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.01	1.21	3840.00	0.13	4.10	424.00
+D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.036	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	138.28	3840.00	0.21	6.84	424.00
Length = 0.04927 ft	1	0.001	0.016	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.01	2.01	3840.00	0.21	6.84	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.082	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.82	316.09	3840.00	0.48	15.64	424.00
Length = 0.04927 ft	1	0.001	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.03	4.60	3840.00	0.48	15.64	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.022	0.010	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.48	82.97	3840.00	0.13	4.10	424.00
Length = 0.04927 ft	1	0.000	0.010	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.01	1.21	3840.00	0.13	4.10	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1274	6.799		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	1	0.0469 in	6.799 ft	0.0000 in	0.000 ft
+D+L+H	1	0.1274 in	6.799 ft	0.0000 in	0.000 ft
+D+Lr+H	1	0.0469 in	6.799 ft	0.0000 in	0.000 ft
+D+S+H	1	0.0469 in	6.799 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H	1	0.1073 in	6.799 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H	1	0.1073 in	6.799 ft	0.0000 in	0.000 ft
+D+0.60W+H	1	0.0469 in	6.799 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H	1	0.0469 in	6.799 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W+H	1	0.0469 in	6.799 ft	0.0000 in	0.000 ft
+0.60D+0.60W+0.60H	1	0.0282 in	6.799 ft	0.0000 in	0.000 ft
+D+0.70E+0.60H	1	0.0469 in	6.799 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	1	0.1073 in	6.799 ft	0.0000 in	0.000 ft
+0.60D+0.70E+H	1	0.0282 in	6.799 ft	0.0000 in	0.000 ft
D Only	1	0.0469 in	6.799 ft	0.0000 in	0.000 ft
L Only	1	0.0805 in	6.799 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.641	0.641
Overall MINimum	0.405	0.405
+D+H	0.236	0.236
+D+L+H	0.641	0.641
+D+Lr+H	0.236	0.236
+D+S+H	0.236	0.236
+D+0.750Lr+0.750L+H	0.540	0.540
+D+0.750L+0.750S+H	0.540	0.540

Wood Beam

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Description : BD4.3

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.60W+H	0.236	0.236
+D+0.750Lr+0.450W+H	0.236	0.236
+D+0.750S+0.450W+H	0.236	0.236
+0.60D+0.60W+0.60H	0.142	0.142
+D+0.70E+0.60H	0.236	0.236
+D+0.750L+0.750S+0.5250E+H	0.540	0.540
+0.60D+0.70E+H	0.142	0.142
D Only	0.236	0.236
Lr Only		
L Only	0.405	0.405
S Only		
W Only		
E Only		
H Only		

Wood Beam

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Lic. # : KW-06009713

Description : BD4.4

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

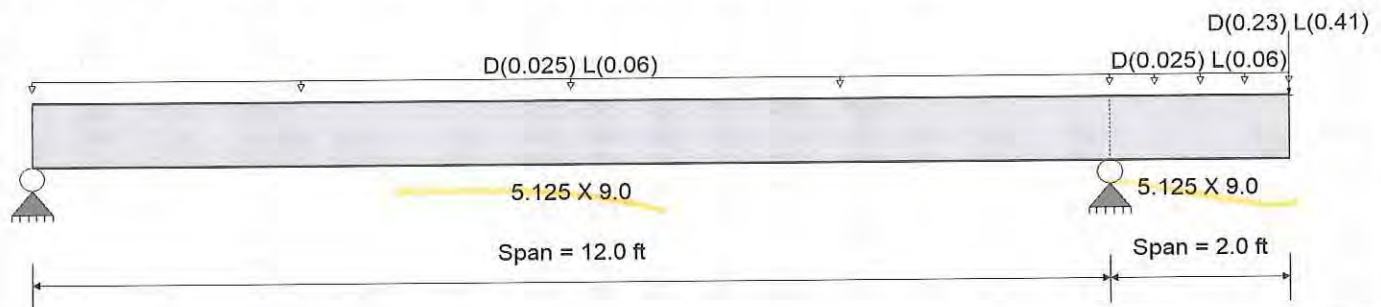
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F-V8

Fb +	2400 psi	E : Modulus of Elasticity	
Fb -	2400 psi	Ebend- xx	1800 ksi
Fc - Prll	1650 psi	Eminbend - xx	950 ksi
Fc - Perp	650 psi	Ebend- yy	1600 ksi
Fv	265 psi	Eminbend - yy	850 ksi
Ft	1100 psi	Density	31.21 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft

Load for Span Number 2

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft

Point Load : D = 0.230, L = 0.410 k @ 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.106	1	Maximum Shear Stress Ratio	=	0.093	1
Section used for this span		5.125 X 9.0		Section used for this span		5.125 X 9.0	
fb : Actual	=	254.96 psi		fv : Actual	=	24.68 psi	
FB : Allowable	=	2,400.00 psi		Fv : Allowable	=	265.00 psi	
Load Combination	+D+L+H, LL Comb Run (LL)			Load Combination	+D+L+H, LL Comb Run (LL)		
Location of maximum on span	=	12.000 ft		Location of maximum on span	=	12.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.027 in	Ratio =	1782	>=	360	
Max Upward Transient Deflection		-0.027 in	Ratio =	1800	>=	360	
Max Downward Total Deflection		0.027 in	Ratio =	1808	>=	240	
Max Upward Total Deflection		-0.027 in	Ratio =	1776	>=	240	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+H														0.00			
Length = 12.0 ft	1		0.043	0.037	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	2160.00	0.27	8.90	238.50
Length = 2.0 ft	2		0.043	0.037	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	2160.00	0.27	8.90	238.50
+D+L+H, LL Comb Run (*L)														0.00			
Length = 12.0 ft	1		0.106	0.093	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.47	254.96	2400.00	0.76	24.68	265.00
Length = 2.0 ft	2		0.106	0.093	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.47	254.96	2400.00	0.76	24.68	265.00

Wood Beam

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Description: BD4.4

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+L+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.105	0.067	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.46	252.39	2400.00	0.54	17.69	265.00
Length = 2.0 ft	2		0.038	0.067	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	2400.00	0.27	17.69	265.00
+D+L+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.106	0.093	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.47	254.96	2400.00	0.76	24.68	265.00
Length = 2.0 ft	2		0.106	0.093	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.47	254.96	2400.00	0.76	24.68	265.00
+D+Lr+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.031	0.027	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3000.00	0.27	8.90	331.25
Length = 2.0 ft	2		0.031	0.027	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3000.00	0.27	8.90	331.25
+D+Lr+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.031	0.027	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3000.00	0.27	8.90	331.25
Length = 2.0 ft	2		0.031	0.027	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3000.00	0.27	8.90	331.25
+D+Lr+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.031	0.027	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3000.00	0.27	8.90	331.25
Length = 2.0 ft	2		0.031	0.027	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3000.00	0.27	8.90	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.033	0.029	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	2760.00	0.27	8.90	304.75
Length = 2.0 ft	2		0.033	0.029	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	2760.00	0.27	8.90	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.071	0.063	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	3000.00	0.64	20.74	331.25
Length = 2.0 ft	2		0.071	0.063	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	3000.00	0.64	20.74	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.069	0.046	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.19	205.90	3000.00	0.47	15.13	331.25
Length = 2.0 ft	2		0.031	0.046	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3000.00	0.27	15.13	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.071	0.063	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	3000.00	0.64	20.74	331.25
Length = 2.0 ft	2		0.071	0.063	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	3000.00	0.64	20.74	331.25
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.078	0.068	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	2760.00	0.64	20.74	304.75
Length = 2.0 ft	2		0.078	0.068	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	2760.00	0.64	20.74	304.75
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.075	0.050	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.19	205.90	2760.00	0.47	15.13	304.75
Length = 2.0 ft	2		0.033	0.050	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	2760.00	0.27	15.13	304.75
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.078	0.068	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	2760.00	0.64	20.74	304.75
Length = 2.0 ft	2		0.078	0.068	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	2760.00	0.64	20.74	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
Length = 2.0 ft	2		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
Length = 2.0 ft	2		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
Length = 2.0 ft	2		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
Length = 2.0 ft	2		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
+D+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
Length = 2.0 ft	2		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.014	0.013	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.32	55.15	3840.00	0.16	5.34	424.00
Length = 2.0 ft	2		0.014	0.013	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.32	55.15	3840.00	0.16	5.34	424.00
+D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
Length = 2.0 ft	2		0.024	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	8.90	424.00
+D+0.750L+0.750S+0.5250E+H, LL						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.056	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	3840.00	0.64	20.74	424.00
Length = 2.0 ft	2		0.056	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	3840.00	0.64	20.74	424.00

Wood Beam

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Description : BD4.4

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/N}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.054	0.036	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.19	205.90	3840.00	0.47	15.13	424.00
Length = 2.0 ft	2		0.024	0.036	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	91.92	3840.00	0.27	15.13	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.056	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	3840.00	0.64	20.74	424.00
Length = 2.0 ft	2		0.056	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.23	214.20	3840.00	0.64	20.74	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1		0.014	0.013	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.32	55.15	3840.00	0.16	5.34	424.00
Length = 2.0 ft	2		0.014	0.013	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.32	55.15	3840.00	0.16	5.34	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H, LL Comb Run (L*)	1	0.0651	5.832		0.0000	0.000
	2	0.0000	5.832	+D+L+H, LL Comb Run (L*)	-0.0270	2.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (*L)	2	0.0265 in	2.000 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (L*)	1	0.0651 in	5.832 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (LL)	1	0.0395 in	5.296 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (*L)	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (L*)	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (LL)	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+S+H	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	1	0.0001 in	1.073 ft	-0.0092 in	9.117 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.0198 in	2.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	1	0.0525 in	5.832 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	1	0.0334 in	5.296 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (*L)	1	0.0001 in	1.073 ft	-0.0092 in	9.117 ft
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.0198 in	2.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (L*)	1	0.0525 in	5.832 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (LL)	1	0.0334 in	5.296 ft	0.0000 in	0.000 ft
+D+0.60W+H	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W+H	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+0.60D+0.60W+0.60H	1	0.0089 in	5.363 ft	0.0000 in	0.000 ft
+D+0.70E+0.60H	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	1	0.0001 in	1.073 ft	-0.0092 in	9.117 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	2	0.0198 in	2.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	1	0.0525 in	5.832 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	1	0.0334 in	5.296 ft	0.0000 in	0.000 ft
+0.60D+0.70E+H	1	0.0089 in	5.363 ft	0.0000 in	0.000 ft
D Only	1	0.0149 in	5.363 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (*L)	2	0.0269 in	2.000 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (L*)	1	0.0504 in	6.034 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (LL)	1	0.0247 in	5.296 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (LL)	2	0.0003 in	2.000 ft	-0.0006 in	0.760 ft

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.526	1.522	
Overall MINimum	0.282	0.968	
+D+H	0.166	0.554	
+D+L+H, LL Comb Run (*L)	0.087	1.162	
+D+L+H, LL Comb Run (L*)	0.526	0.914	
+D+L+H, LL Comb Run (LL)	0.447	1.522	
+D+Lr+H, LL Comb Run (*L)	0.166	0.554	
+D+Lr+H, LL Comb Run (L*)	0.166	0.554	

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : BD4.4

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (LL)	0.166	0.554	
+D+S+H	0.166	0.554	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.107	1.010	
+D+0.750Lr+0.750L+H, LL Comb Run (L	0.436	0.824	
+D+0.750Lr+0.750L+H, LL Comb Run (L	0.377	1.280	
+D+0.750L+0.750S+H, LL Comb Run (*)	0.107	1.010	
+D+0.750L+0.750S+H, LL Comb Run (L*	0.436	0.824	
+D+0.750L+0.750S+H, LL Comb Run (LL	0.377	1.280	
+D+0.60W+H	0.166	0.554	
+D+0.750Lr+0.450W+H, LL Comb Run (*)	0.166	0.554	
+D+0.750Lr+0.450W+H, LL Comb Run (L	0.166	0.554	
+D+0.750Lr+0.450W+H, LL Comb Run (L	0.166	0.554	
+D+0.750S+0.450W+H	0.166	0.554	
+0.60D+0.60W+0.60H	0.099	0.332	
+D+0.70E+0.60H	0.166	0.554	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.107	1.010	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.436	0.824	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.377	1.280	
+0.60D+0.70E+H	0.099	0.332	
D Only	0.166	0.554	
Lr Only, LL Comb Run (*)			
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)			
L Only, LL Comb Run (*)	-0.078	0.608	
L Only, LL Comb Run (L*)	0.360	0.360	
L Only, LL Comb Run (LL)	0.282	0.968	
S Only			
W Only			
E Only			
H Only			

Wood Beam

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Description: BD4.5

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

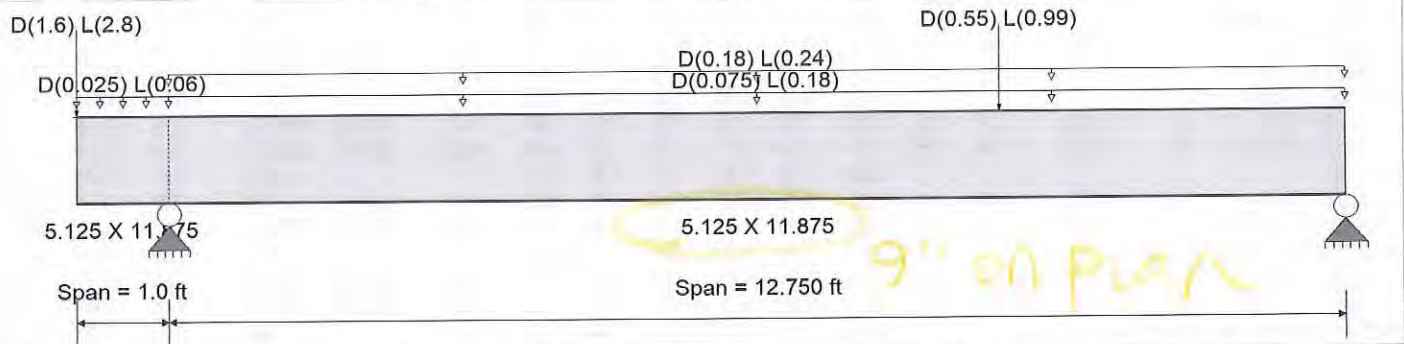
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F-V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E: Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft

Point Load: D = 1.60, L = 2.80 k @ 0.0 ft

Load for Span Number 2

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 3.0 ft

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 6.0 ft

Point Load: D = 0.550, L = 0.990 k @ 9.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.677: 1	Maximum Shear Stress Ratio	=	0.438: 1
Section used for this span	=	5.125 X 11.875	Section used for this span	=	5.125 X 11.875
fb: Actual	=	1,624.53 psi	fv: Actual	=	116.09 psi
FB: Allowable	=	2,400.00 psi	Fv: Allowable	=	265.00 psi
Load Combination	=	+D+L+H, LL Comb Run (*L)	Load Combination	=	+D+L+H, LL Comb Run (*L)
Location of maximum on span	=	7.194 ft	Location of maximum on span	=	11.824 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 2
Maximum Deflection					
Max Downward Transient Deflection		0.241 in	Ratio =		634 >= 360
Max Upward Transient Deflection		-0.058 in	Ratio =		410 >= 360
Max Downward Total Deflection		0.369 in	Ratio =		414 >= 240
Max Upward Total Deflection		-0.085 in	Ratio =		282 >= 240

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																	
Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+H														0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.097	0.181	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	1665.00	1.75	43.14	238.50
Length = 12.75 ft	2		0.269	0.181	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	2160.00	1.75	43.14	238.50
+D+L+H, LL Comb Run (*L)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

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Description: BD4.5

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 1.0 ft	1		0.087	0.403	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	1850.00	4.33	106.72	265.00
Length = 12.750 ft	2		0.677	0.438	1.00	1.000	1.00	1.00	1.00	1.00	1.00	16.31	1,624.53	2400.00	4.71	116.09	265.00
+D+L+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.240	0.418	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.45	443.24	1850.00	4.50	110.85	265.00
Length = 12.750 ft	2		0.197	0.418	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.74	472.49	2400.00	1.97	110.85	265.00
+D+L+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.240	0.423	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.45	443.24	1850.00	4.55	112.19	265.00
Length = 12.750 ft	2		0.627	0.423	1.00	1.000	1.00	1.00	1.00	1.00	1.00	15.11	1,505.78	2400.00	4.55	112.19	265.00
+D+Lr+H, LL Comb Run (L)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.070	0.130	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2312.50	1.75	43.14	331.25
Length = 12.750 ft	2		0.193	0.130	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3000.00	1.75	43.14	331.25
+D+Lr+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.070	0.130	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2312.50	1.75	43.14	331.25
Length = 12.750 ft	2		0.193	0.130	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3000.00	1.75	43.14	331.25
+D+Lr+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.070	0.130	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2312.50	1.75	43.14	331.25
Length = 12.750 ft	2		0.193	0.130	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3000.00	1.75	43.14	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.076	0.142	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2127.50	1.75	43.14	304.75
Length = 12.750 ft	2		0.210	0.142	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	2760.00	1.75	43.14	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.070	0.274	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2312.50	3.68	90.82	331.25
Length = 12.750 ft	2		0.454	0.295	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.68	1,363.37	3000.00	3.96	97.68	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.161	0.281	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.74	372.76	2312.50	3.78	93.23	331.25
Length = 12.750 ft	2		0.166	0.281	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.00	497.77	3000.00	1.92	93.23	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.161	0.287	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.74	372.76	2312.50	3.85	94.93	331.25
Length = 12.750 ft	2		0.425	0.287	1.25	1.000	1.00	1.00	1.00	1.00	1.00	12.79	1,274.43	3000.00	3.85	94.93	331.25
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.076	0.298	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2127.50	3.68	90.82	304.75
Length = 12.750 ft	2		0.494	0.321	1.15	1.000	1.00	1.00	1.00	1.00	1.00	13.68	1,363.37	2760.00	3.96	97.68	304.75
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.175	0.306	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.74	372.76	2127.50	3.78	93.23	304.75
Length = 12.750 ft	2		0.180	0.306	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.00	497.77	2760.00	1.92	93.23	304.75
+D+0.750L+0.750S+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.175	0.311	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.74	372.76	2127.50	3.85	94.93	304.75
Length = 12.750 ft	2		0.462	0.311	1.15	1.000	1.00	1.00	1.00	1.00	1.00	12.79	1,274.43	2760.00	3.85	94.93	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.054	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2960.00	1.75	43.14	424.00
Length = 12.750 ft	2		0.151	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3840.00	1.75	43.14	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.054	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2960.00	1.75	43.14	424.00
Length = 12.750 ft	2		0.151	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3840.00	1.75	43.14	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.054	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2960.00	1.75	43.14	424.00
Length = 12.750 ft	2		0.151	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3840.00	1.75	43.14	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.054	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2960.00	1.75	43.14	424.00
Length = 12.750 ft	2		0.151	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3840.00	1.75	43.14	424.00
+D+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.054	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2960.00	1.75	43.14	424.00
Length = 12.750 ft	2		0.151	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3840.00	1.75	43.14	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.033	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.97	96.78	2960.00	1.05	25.88	424.00
Length = 12.750 ft	2		0.091	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.50	348.30	3840.00	1.05	25.88	424.00
+D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.054	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2960.00	1.75	43.14	424.00
Length = 12.750 ft	2		0.151	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.83	580.50	3840.00	1.75	43.14	424.00
+D+0.750L+0.750S+0.5250E+H, LL						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

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Description: BD4.5

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 1.0 ft	1		0.054	0.214	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.62	161.30	2960.00	3.68	90.82	424.00
Length = 12.750 ft	2		0.355	0.230	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.68	1,363.37	3840.00	3.96	97.68	424.00
+D+0.750L+0.750S+0.5250E+H, LL						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.126	0.220	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.74	372.76	2960.00	3.78	93.23	424.00
Length = 12.750 ft	2		0.130	0.220	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.00	497.77	3840.00	1.92	93.23	424.00
+D+0.750L+0.750S+0.5250E+H, LL						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.126	0.224	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.74	372.76	2960.00	3.85	94.93	424.00
Length = 12.750 ft	2		0.332	0.224	1.60	1.000	1.00	1.00	1.00	1.00	1.00	12.79	1,274.43	3840.00	3.85	94.93	424.00
+0.60D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1		0.033	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.97	96.78	2960.00	1.05	25.88	424.00
Length = 12.750 ft	2		0.091	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.50	348.30	3840.00	1.05	25.88	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000			
+D+L+H, LL Comb Run (*L)	2	0.3689	6.553	+D+L+H, LL Comb Run (*L)	-0.0849	0.000
					0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (*L)	2	0.3689 in	6.553 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (L*)	2	0.0899 in	7.123 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (LL)	2	0.3302 in	6.696 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (*L)	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (L*)	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (LL)	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+S+H	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.3086 in	6.624 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.0993 in	6.980 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.2797 in	6.696 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.3086 in	6.624 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.0993 in	6.980 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.2797 in	6.696 ft	0.0000 in	0.000 ft
+D+0.60W+H	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W+H	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+0.60D+0.60W+0.60H	2	0.0768 in	6.696 ft	0.0000 in	0.000 ft
+D+0.70E+0.60H	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	2	0.3086 in	6.624 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2	0.0993 in	6.980 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2	0.2797 in	6.696 ft	0.0000 in	0.000 ft
+0.60D+0.70E+H	2	0.0768 in	6.696 ft	0.0000 in	0.000 ft
D Only	2	0.1279 in	6.696 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (*L)	2	0.2410 in	6.553 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (L*)	1	0.0174 in	0.000 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (LL)	2	0.2023 in	6.696 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum		9.687	5.347
Overall MINimum		6.051	3.154
+D+H		3.637	1.971
+D+L+H, LL Comb Run (*L)		6.605	5.347
+D+L+H, LL Comb Run (L*)		6.719	1.749
+D+L+H, LL Comb Run (LL)		9.687	5.125
+D+Lr+H, LL Comb Run (*L)		3.637	1.971
+D+Lr+H, LL Comb Run (L*)		3.637	1.971
+D+Lr+H, LL Comb Run (LL)		3.637	1.971
+D+S+H		3.637	1.971

Wood Beam

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Description: BD4.5

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750Lr+0.750L+H, LL Comb Run (*)		5.863	4.503
+D+0.750Lr+0.750L+H, LL Comb Run (L		5.948	1.804
+D+0.750Lr+0.750L+H, LL Comb Run (L		8.175	4.337
+D+0.750L+0.750S+H, LL Comb Run (*)		5.863	4.503
+D+0.750L+0.750S+H, LL Comb Run (L*		5.948	1.804
+D+0.750L+0.750S+H, LL Comb Run (LL		8.175	4.337
+D+0.60W+H		3.637	1.971
+D+0.750Lr+0.450W+H, LL Comb Run (*)		3.637	1.971
+D+0.750Lr+0.450W+H, LL Comb Run (L		3.637	1.971
+D+0.750Lr+0.450W+H, LL Comb Run (L		3.637	1.971
+D+0.750S+0.450W+H		3.637	1.971
+0.60D+0.60W+0.60H		2.182	1.183
+D+0.70E+0.60H		3.637	1.971
+D+0.750L+0.750S+0.5250E+H, LL Comb		5.863	4.503
+D+0.750L+0.750S+0.5250E+H, LL Comb		5.948	1.804
+D+0.750L+0.750S+0.5250E+H, LL Comb		8.175	4.337
+0.60D+0.70E+H		2.182	1.183
D Only		3.637	1.971
Lr Only, LL Comb Run (*)			
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)			
L Only, LL Comb Run (*)		2.969	3.376
L Only, LL Comb Run (L*)		3.082	-0.222
L Only, LL Comb Run (LL)		6.051	3.154
S Only			
W Only			
E Only			
H Only			

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: BD4.6

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

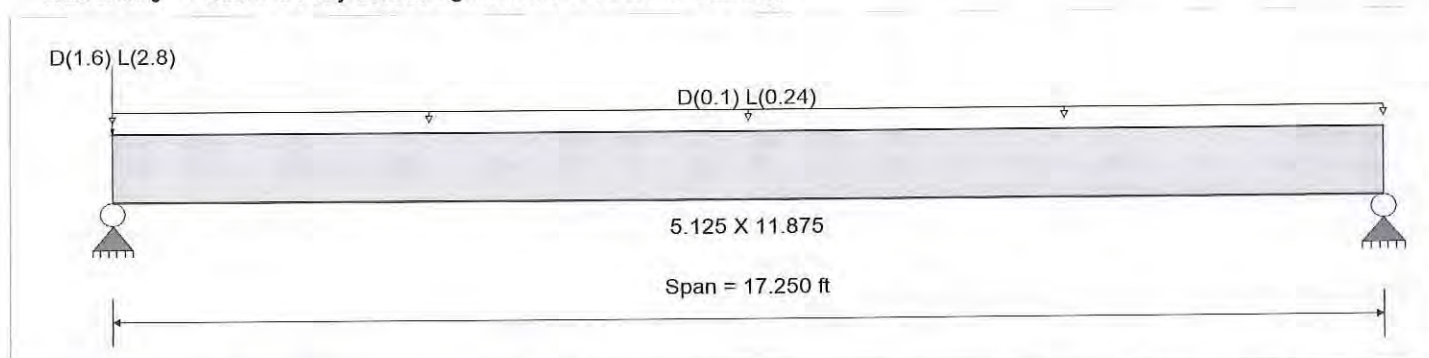
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F-V4

F_b + 2,400.0 psi
 F_b - 1,850.0 psi
 F_c - Prll 1,650.0 psi
 F_c - Perp 650.0 psi
 F_v 265.0 psi
 F_t 1,100.0 psi
 E: Modulus of Elasticity
 E_{bend-xx} 1,800.0 ksi
 E_{minbend-xx} 950.0 ksi
 E_{bend-yy} 1,600.0 ksi
 E_{minbend-yy} 850.0 ksi
 Density 31.210 pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 4.0 ft

Point Load: D = 1.60, L = 2.80 k @ 0.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.545 : 1	Maximum Shear Stress Ratio	=	0.252 : 1
Section used for this span		5.125 X 11.875	Section used for this span		5.125 X 11.875
fb : Actual	=	1,308.79 psi	fv : Actual	=	66.86 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.625 ft	Location of maximum on span	=	16.306 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.374 in	Ratio =		554 >= 360
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 360
Max Downward Total Deflection		0.550 in	Ratio =		376 >= 240
Max Upward Total Deflection		0.000 in	Ratio =		0 < 240

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																	
Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v	F ^v	
+D+H													0.00	0.00	0.00	0.00	
Length = 17.250 ft	1	0.194	0.090	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.21	419.44	2160.00	0.87	21.43	238.50	
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 17.250 ft	1	0.545	0.252	1.00	1.000	1.00	1.00	1.00	1.00	1.00	13.14	1,308.79	2400.00	2.71	66.86	265.00	
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 17.250 ft	1	0.140	0.065	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.21	419.44	3000.00	0.87	21.43	331.25	
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 17.250 ft	1	0.152	0.070	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.21	419.44	2760.00	0.87	21.43	304.75	
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	

Wood Beam

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Description: BD4.6

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
Length = 17.250 ft	1		0.362	0.168	1.25	1.000	1.00	1.00	1.00	1.00	1.00	10.91	1,086.45	3000.00	2.25	55.50	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.250 ft	1		0.394	0.182	1.15	1.000	1.00	1.00	1.00	1.00	1.00	10.91	1,086.45	2760.00	2.25	55.50	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.250 ft	1		0.109	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.21	419.44	3840.00	0.87	21.43	424.00
+D+0.750Lr+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.250 ft	1		0.109	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.21	419.44	3840.00	0.87	21.43	424.00
+D+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.250 ft	1		0.109	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.21	419.44	3840.00	0.87	21.43	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.250 ft	1		0.066	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.53	251.66	3840.00	0.52	12.86	424.00
+D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.250 ft	1		0.109	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.21	419.44	3840.00	0.87	21.43	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.250 ft	1		0.283	0.131	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.91	1,086.45	3840.00	2.25	55.50	424.00
+0.60D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.250 ft	1		0.066	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.53	251.66	3840.00	0.52	12.86	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.5498	8.688		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	1	0.1762 in	8.688 ft	0.0000 in	0.000 ft
+D+L+H	1	0.5498 in	8.688 ft	0.0000 in	0.000 ft
+D+Lr+H	1	0.1762 in	8.688 ft	0.0000 in	0.000 ft
+D+S+H	1	0.1762 in	8.688 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H	1	0.4564 in	8.688 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H	1	0.4564 in	8.688 ft	0.0000 in	0.000 ft
+D+0.60W+H	1	0.1762 in	8.688 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H	1	0.1762 in	8.688 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W+H	1	0.1762 in	8.688 ft	0.0000 in	0.000 ft
+0.60D+0.60W+0.60H	1	0.1057 in	8.688 ft	0.0000 in	0.000 ft
+D+0.70E+0.60H	1	0.1762 in	8.688 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	1	0.4564 in	8.688 ft	0.0000 in	0.000 ft
+0.60D+0.70E+H	1	0.1057 in	8.688 ft	0.0000 in	0.000 ft
D Only	1	0.1762 in	8.688 ft	0.0000 in	0.000 ft
L Only	1	0.3736 in	8.688 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.446	3.046
Overall MINimum	4.870	2.070
+D+H	2.576	0.976
+D+L+H	7.446	3.046
+D+Lr+H	2.576	0.976
+D+S+H	2.576	0.976
+D+0.750Lr+0.750L+H	6.229	2.529
+D+0.750L+0.750S+H	6.229	2.529
+D+0.60W+H	2.576	0.976
+D+0.750Lr+0.450W+H	2.576	0.976
+D+0.750S+0.450W+H	2.576	0.976
+0.60D+0.60W+0.60H	1.546	0.586
+D+0.70E+0.60H	2.576	0.976
+D+0.750L+0.750S+0.5250E+H	6.229	2.529
+0.60D+0.70E+H	1.546	0.586
D Only	2.576	0.976
Lr Only		
L Only	4.870	2.070
S Only		

Wood Beam

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Description : BD4.9

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

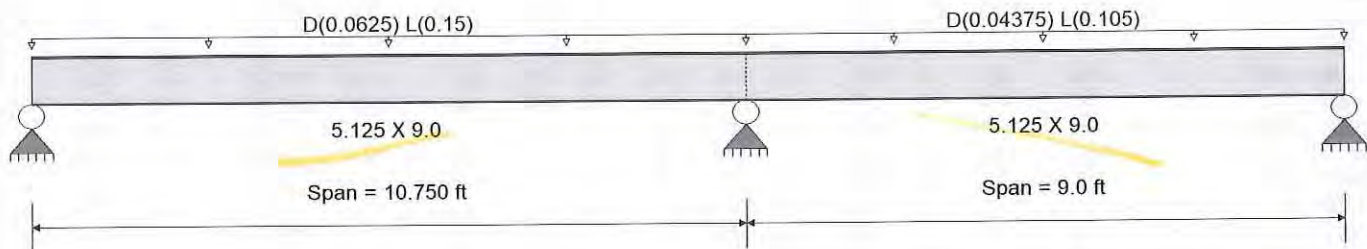
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F-V4

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 2.50 ft

Load for Span Number 2

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 1.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.233 : 1	Maximum Shear Stress Ratio	=	0.155 : 1
Section used for this span	=	5.125 X 9.0	Section used for this span	=	5.125 X 9.0
fb : Actual	=	430.46 psi	fv : Actual	=	41.19 psi
FB : Allowable	=	1,850.00 psi	Fv : Allowable	=	265.00 psi
Load Combination	=	+D+L+H, LL Comb Run (LL)	Load Combination	=	+D+L+H, LL Comb Run (LL)
Location of maximum on span	=	10.750 ft	Location of maximum on span	=	10.029 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.055 in	Ratio =		2347 >= 480
Max Upward Transient Deflection		-0.019 in	Ratio =		5633 >= 480
Max Downward Total Deflection		0.076 in	Ratio =		1695 >= 360
Max Upward Total Deflection		-0.019 in	Ratio =		5710 >= 360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																	
Load Combination		Max Stress Ratios									Moment Values			Shear Values			
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v	
+D+H														0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.085	0.056	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	1665.00	0.41	13.45	238.50	
Length = 9.0 ft	2	0.085	0.056	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	1665.00	0.29	13.45	238.50	
+D+L+H, LL Comb Run (*L)						1.000	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.122	0.092	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.30	225.90	1850.00	0.75	24.30	265.00	
Length = 9.0 ft	2	0.122	0.092	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.30	225.90	1850.00	0.75	24.30	265.00	
+D+L+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00

Wood Beam

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Description: BD4.9

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 10.750 ft	1		0.166	0.150	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.29	397.68	2400.00	1.22	39.72	265.00
Length = 9.0 ft	2		0.187	0.150	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.00	346.43	1850.00	0.43	39.72	265.00
+D+L+H, LL Comb Run (LL)					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.233	0.155	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.48	430.46	1850.00	1.27	41.19	265.00
Length = 9.0 ft	2		0.233	0.155	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.48	430.46	1850.00	0.88	41.19	265.00
+D+Lr+H, LL Comb Run (*L)					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.061	0.041	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2312.50	0.41	13.45	331.25
Length = 9.0 ft	2		0.061	0.041	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2312.50	0.29	13.45	331.25
+D+Lr+H, LL Comb Run (L*)					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.061	0.041	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2312.50	0.41	13.45	331.25
Length = 9.0 ft	2		0.061	0.041	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2312.50	0.29	13.45	331.25
+D+Lr+H, LL Comb Run (LL)					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.061	0.041	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2312.50	0.41	13.45	331.25
Length = 9.0 ft	2		0.061	0.041	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2312.50	0.29	13.45	331.25
+D+S+H					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.067	0.044	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2127.50	0.41	13.45	304.75
Length = 9.0 ft	2		0.067	0.044	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2127.50	0.29	13.45	304.75
+D+0.750Lr+0.750L+H, LL Comb R					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.089	0.062	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.18	204.90	2312.50	0.63	20.63	331.25
Length = 9.0 ft	2		0.089	0.062	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.18	204.90	2312.50	0.63	20.63	331.25
+D+0.750Lr+0.750L+H, LL Comb R					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.109	0.100	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.89	327.60	3000.00	1.02	33.15	331.25
Length = 9.0 ft	2		0.128	0.100	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.70	295.29	2312.50	0.39	33.15	331.25
+D+0.750Lr+0.750L+H, LL Comb R					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.155	0.103	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.07	358.31	2312.50	1.05	34.25	331.25
Length = 9.0 ft	2		0.155	0.103	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.07	358.31	2312.50	0.73	34.25	331.25
+D+0.750L+0.750S+H, LL Comb R					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.096	0.068	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.18	204.90	2127.50	0.63	20.63	304.75
Length = 9.0 ft	2		0.096	0.068	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.18	204.90	2127.50	0.63	20.63	304.75
+D+0.750L+0.750S+H, LL Comb R					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.119	0.109	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.89	327.60	2760.00	1.02	33.15	304.75
Length = 9.0 ft	2		0.139	0.109	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.70	295.29	2127.50	0.39	33.15	304.75
+D+0.750L+0.750S+H, LL Comb R					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.168	0.112	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.07	358.31	2127.50	1.05	34.25	304.75
Length = 9.0 ft	2		0.168	0.112	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.07	358.31	2127.50	0.73	34.25	304.75
+D+0.60W+H					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.41	13.45	424.00
Length = 9.0 ft	2		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.29	13.45	424.00
+D+0.750Lr+0.450W+H, LL Comb F					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.41	13.45	424.00
Length = 9.0 ft	2		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.29	13.45	424.00
+D+0.750Lr+0.450W+H, LL Comb F					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.41	13.45	424.00
Length = 9.0 ft	2		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.29	13.45	424.00
+D+0.750Lr+0.450W+H, LL Comb F					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.41	13.45	424.00
Length = 9.0 ft	2		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.29	13.45	424.00
+D+0.750S+0.450W+H					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.41	13.45	424.00
Length = 9.0 ft	2		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.29	13.45	424.00
+0.60D+0.60W+0.60H					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.029	0.019	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.49	85.13	2960.00	0.25	8.07	424.00
Length = 9.0 ft	2		0.029	0.019	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.49	85.13	2960.00	0.18	8.07	424.00
+D+0.70E+0.60H					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.41	13.45	424.00
Length = 9.0 ft	2		0.048	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.82	141.88	2960.00	0.29	13.45	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1		0.069	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.18	204.90	2960.00	0.63	20.63	424.00
Length = 9.0 ft	2		0.069	0.049	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.18	204.90	2960.00	0.63	20.63	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000		1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

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Description : BD4.9

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 10.750 ft	1	0.085	0.078	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.89	327.60	3840.00	1.02	33.15	424.00
Length = 9.0 ft	2	0.100	0.078	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.70	295.29	2960.00	0.39	33.15	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.121	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.07	358.31	2960.00	1.05	34.25	424.00
Length = 9.0 ft	2	0.121	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.07	358.31	2960.00	0.73	34.25	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.750 ft	1	0.029	0.019	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.49	85.13	2960.00	0.25	8.07	424.00
Length = 9.0 ft	2	0.029	0.019	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.49	85.13	2960.00	0.18	8.07	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H, LL Comb Run (L*)	1	0.0761	4.985		0.0000	0.000
+D+L+H, LL Comb Run (L)	2	0.0219	5.028	L Only, LL Comb Run (L*)	-0.0191	3.620

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	1	0.0212	in	0.0000	in
+D+H	2	0.0022	in	-0.0016	in
+D+L+H, LL Comb Run (*L)	1	0.0112	in	-0.0010	in
+D+L+H, LL Comb Run (*L)	2	0.0219	in	0.0000	in
+D+L+H, LL Comb Run (L*)	1	0.0761	in	0.0000	in
+D+L+H, LL Comb Run (LL)	1	0.0656	in	0.0000	in
+D+L+H, LL Comb Run (LL)	2	0.0056	in	-0.0054	in
+D+Lr+H, LL Comb Run (*L)	1	0.0212	in	0.0000	in
+D+Lr+H, LL Comb Run (*L)	2	0.0022	in	-0.0016	in
+D+Lr+H, LL Comb Run (L*)	1	0.0212	in	0.0000	in
+D+Lr+H, LL Comb Run (L*)	2	0.0022	in	-0.0016	in
+D+Lr+H, LL Comb Run (LL)	1	0.0212	in	0.0000	in
+D+Lr+H, LL Comb Run (LL)	2	0.0022	in	-0.0016	in
+D+S+H	1	0.0212	in	0.0000	in
+D+S+H	2	0.0022	in	-0.0016	in
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	1	0.0136	in	-0.0002	in
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.0169	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	1	0.0624	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	1	0.0545	in	0.0000	in
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.0047	in	-0.0044	in
+D+0.750L+0.750S+H, LL Comb Run (*L)	1	0.0136	in	-0.0002	in
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.0169	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (L*)	1	0.0624	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (LL)	1	0.0545	in	0.0000	in
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.0047	in	-0.0044	in
+D+0.60W+H	1	0.0212	in	0.0000	in
+D+0.60W+H	2	0.0022	in	-0.0016	in
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	1	0.0212	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	2	0.0022	in	-0.0016	in
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	1	0.0212	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.0022	in	-0.0016	in
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	1	0.0212	in	0.0000	in
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	2	0.0022	in	-0.0016	in
+D+0.750S+0.450W+H	1	0.0212	in	0.0000	in
+D+0.750S+0.450W+H	2	0.0022	in	-0.0016	in
+0.60D+0.60W+0.60H	1	0.0127	in	0.0000	in
+0.60D+0.60W+0.60H	2	0.0013	in	-0.0009	in
+D+0.70E+0.60H	1	0.0212	in	0.0000	in
+D+0.70E+0.60H	2	0.0022	in	-0.0016	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	1	0.0136	in	-0.0002	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	2	0.0169	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	1	0.0624	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	1	0.0545	in	0.0000	in
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2	0.0047	in	-0.0044	in
+0.60D+0.70E+H	1	0.0127	in	0.0000	in

Wood Beam

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Description: BD4.9

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+0.60D+0.70E+H	2	0.0013	in	-0.0009	in
D Only	1	0.0212	in	0.0000	in
D Only	2	0.0022	in	-0.0016	in
L Only, LL Comb Run (*L)	2	0.0203	in	0.0000	in
L Only, LL Comb Run (L*)	1	0.0550	in	0.0000	in
L Only, LL Comb Run (LL)	1	0.0444	in	0.0000	in
L Only, LL Comb Run (LL)	2	0.0034	in	-0.0038	in

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.010	2.417	0.570
Overall MINimum	0.651	1.618	0.288
+D+H	0.314	0.799	0.151
+D+L+H, LL Comb Run (*L)	0.269	1.370	0.570
+D+L+H, LL Comb Run (L*)	1.010	1.846	0.020
+D+L+H, LL Comb Run (LL)	0.965	2.417	0.439
+D+Lr+H, LL Comb Run (*L)	0.314	0.799	0.151
+D+Lr+H, LL Comb Run (L*)	0.314	0.799	0.151
+D+Lr+H, LL Comb Run (LL)	0.314	0.799	0.151
+D+S+H	0.314	0.799	0.151
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.280	1.227	0.465
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.836	1.584	0.053
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.802	2.012	0.367
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.280	1.227	0.465
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.836	1.584	0.053
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.802	2.012	0.367
+D+0.60W+H	0.314	0.799	0.151
+D+0.750Lr+0.450W+H, LL Comb Run (*)	0.314	0.799	0.151
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.314	0.799	0.151
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.314	0.799	0.151
+D+0.750S+0.450W+H	0.314	0.799	0.151
+0.60D+0.60W+0.60H	0.188	0.479	0.091
+D+0.70E+0.60H	0.314	0.799	0.151
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.280	1.227	0.465
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.836	1.584	0.053
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.802	2.012	0.367
+0.60D+0.70E+H	0.188	0.479	0.091
D Only	0.314	0.799	0.151
Lr Only, LL Comb Run (*L)			
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)			
L Only, LL Comb Run (*L)	-0.045	0.571	0.419
L Only, LL Comb Run (L*)	0.697	1.047	-0.131
L Only, LL Comb Run (LL)	0.651	1.618	0.288
S Only			
W Only			
E Only			
H Only			

Wood Beam

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Description: BD4.10

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

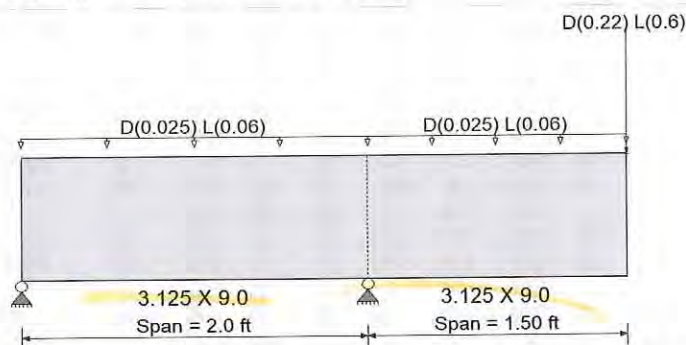
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F-V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E: Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft

Load for Span Number 2

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft

Point Load: D = 0.220, L = 0.60 k @ 1.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.205 : 1	Maximum Shear Stress Ratio	=	0.179 : 1
Section used for this span		3.125 X 9.0	Section used for this span		3.125 X 9.0
fb : Actual	=	379.02 psi	fv : Actual	=	47.40 psi
FB : Allowable	=	1,850.00 psi	Fv : Allowable	=	265.00 psi
Load Combination	+D+L+H, LL Comb Run (LL)		Load Combination	+D+L+H, LL Comb Run (LL)	
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	2.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.008 in	Ratio = 4242 >= 360			
Max Upward Transient Deflection	-0.001 in	Ratio = 18979 >= 360			
Max Downward Total Deflection	0.012 in	Ratio = 3104 >= 240			
Max Upward Total Deflection	-0.002 in	Ratio = 14039 >= 240			

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.062	0.054	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	1665.00	0.24	12.98	238.50
Length = 1.50 ft	2	0.062	0.054	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	1665.00	0.24	12.98	238.50
+D+L+H, LL Comb Run (*L)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.205	0.179	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.33	379.02	1850.00	0.89	47.40	265.00
Length = 1.50 ft	2	0.205	0.179	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.33	379.02	1850.00	0.89	47.40	265.00

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Load Combination		Max Stress Ratios									Moment Values			Shear Values			
Segment	Length	Span #	M	V	C _d	C _{FV}	C _I	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+L+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 2.0 ft	1	0.056	0.049	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	1850.00	0.24	12.98	265.00
	Length = 1.50 ft	2	0.056	0.049	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	1850.00	0.24	12.98	265.00
+D+L+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 2.0 ft	1	0.205	0.179	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.33	379.02	1850.00	0.89	47.40	265.00
	Length = 1.50 ft	2	0.205	0.179	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.33	379.02	1850.00	0.89	47.40	265.00
+D+Lr+H, LL Comb Run (*L)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 2.0 ft	1	0.045	0.039	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2312.50	0.24	12.98	331.25
	Length = 1.50 ft	2	0.045	0.039	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2312.50	0.24	12.98	331.25
+D+Lr+H, LL Comb Run (L*)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 2.0 ft	1	0.045	0.039	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2312.50	0.24	12.98	331.25
	Length = 1.50 ft	2	0.045	0.039	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2312.50	0.24	12.98	331.25
+D+Lr+H, LL Comb Run (LL)						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 2.0 ft	1	0.045	0.039	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2312.50	0.24	12.98	331.25
	Length = 1.50 ft	2	0.045	0.039	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2312.50	0.24	12.98	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 2.0 ft	1	0.049	0.043	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2127.50	0.24	12.98	304.75
	Length = 1.50 ft	2	0.049	0.043	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2127.50	0.24	12.98	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 2.0 ft	1	0.134	0.117	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.09	310.22	2312.50	0.73	38.79	331.25
	Length = 1.50 ft	2	0.134	0.117	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.09	310.22	2312.50	0.73	38.79	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 2.0 ft	1	0.045	0.039	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2312.50	0.24	12.98	331.25
	Length = 1.50 ft	2	0.045	0.039	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2312.50	0.24	12.98	331.25
+D+0.750Lr+0.750L+H, LL Comb R																	

Wood Beam

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Description: BD4.10

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1		0.035	0.031	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2960.00	0.24	12.98	424.00
Length = 1.50 ft	2		0.035	0.031	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.36	103.82	2960.00	0.24	12.98	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1		0.105	0.091	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.09	310.22	2960.00	0.73	38.79	424.00
Length = 1.50 ft	2		0.105	0.091	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.09	310.22	2960.00	0.73	38.79	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1		0.021	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.22	62.29	2960.00	0.15	7.79	424.00
Length = 1.50 ft	2		0.021	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.22	62.29	2960.00	0.15	7.79	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H, LL Comb Run (*L)	1	0.0000	0.000	+D+L+H, LL Comb Run (*L)	-0.0017	1.162
	2	0.0116	1.500		0.0000	1.162

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (*L)	2	0.0116	in 1.500 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (L*)	2	0.0030	in 1.500 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (LL)	2	0.0114	in 1.500 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (*L)	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (L*)	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (LL)	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+S+H	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.0095	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.0030	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.0094	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.0095	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.0030	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.0094	in 1.500 ft	0.0000	in 0.000 ft
+D+0.60W+H	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750S+0.450W+H	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+0.60D+0.60W+0.60H	2	0.0019	in 1.500 ft	0.0000	in 0.000 ft
+D+0.70E+0.60H	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	2	0.0095	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2	0.0030	in 1.500 ft	0.0000	in 0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2	0.0094	in 1.500 ft	0.0000	in 0.000 ft
+0.60D+0.70E+H	2	0.0019	in 1.500 ft	0.0000	in 0.000 ft
D Only	2	0.0031	in 1.500 ft	0.0000	in 0.000 ft
L Only, LL Comb Run (*L)	2	0.0085	in 1.500 ft	0.0000	in 0.000 ft
L Only, LL Comb Run (L*)	1	0.0001	in 1.006 ft	0.0000	in 0.000 ft
L Only, LL Comb Run (LL)	2	0.0083	in 1.500 ft	0.0000	in 0.000 ft

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.635	1.714	
Overall MINimum	-0.151	1.234	
+D+H	-0.151	0.480	
+D+L+H, LL Comb Run (*L)	-0.635	1.654	
+D+L+H, LL Comb Run (L*)	-0.091	0.540	
+D+L+H, LL Comb Run (LL)	-0.575	1.714	
+D+Lr+H, LL Comb Run (*L)	-0.151	0.480	
+D+Lr+H, LL Comb Run (L*)	-0.151	0.480	
+D+Lr+H, LL Comb Run (LL)	-0.151	0.480	
+D+S+H	-0.151	0.480	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-0.514	1.361	
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.106	0.525	

Wood Beam

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Description : BD4.10

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.469	1.406	
+D+0.750L+0.750S+H, LL Comb Run (*L	-0.514	1.361	
+D+0.750L+0.750S+H, LL Comb Run (L*	-0.106	0.525	
+D+0.750L+0.750S+H, LL Comb Run (LL	-0.469	1.406	
+D+0.60W+H	-0.151	0.480	
+D+0.750Lr+0.450W+H, LL Comb Run (*	-0.151	0.480	
+D+0.750Lr+0.450W+H, LL Comb Run (L	-0.151	0.480	
+D+0.750Lr+0.450W+H, LL Comb Run (L	-0.151	0.480	
+D+0.750S+0.450W+H	-0.151	0.480	
+0.60D+0.60W+0.60H	-0.091	0.288	
+D+0.70E+0.60H	-0.151	0.480	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.514	1.361	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.106	0.525	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.469	1.406	
+0.60D+0.70E+H	-0.091	0.288	
D Only	-0.151	0.480	
Lr Only, LL Comb Run (*L)			
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)			
L Only, LL Comb Run (*L)	-0.484	1.174	
L Only, LL Comb Run (L*)	0.060	0.060	
L Only, LL Comb Run (LL)	-0.424	1.234	
S Only			
W Only			
E Only			
H Only			

Wood Beam

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 Description : BD4.11

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
 Load Combination Set : ASCE 7-16

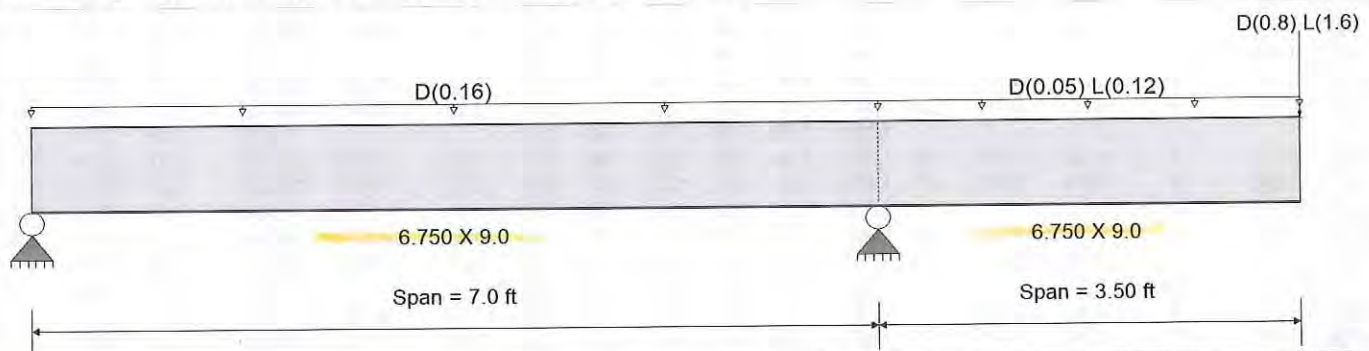
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F-V8

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2400 psi	E : Modulus of Elasticity	
Fb -	2400 psi	Ebend- xx	1800 ksi
Fc - Prll	1650 psi	Eminbend - xx	950 ksi
Fc - Perp	650 psi	Ebend- yy	1600 ksi
Fv	265 psi	Eminbend - yy	850 ksi
Ft	1100 psi	Density	31.21 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0160 ksf, Tributary Width = 10.0 ft

Load for Span Number 2

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 2.0 ft

Point Load : D = 0.80, L = 1.60 k @ 3.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.522 : 1	Maximum Shear Stress Ratio	=	0.271 : 1
Section used for this span		6.750 X 9.0	Section used for this span		6.750 X 9.0
fb : Actual	=	1,253.91 psi	fv : Actual	=	71.73 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H, LL Comb Run (*L)	Load Combination		+D+L+H, LL Comb Run (*L)
Location of maximum on span	=	7.000 ft	Location of maximum on span	=	7.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.180 in	Ratio =		466 >= 360
Max Upward Transient Deflection		-0.047 in	Ratio =		1788 >= 360
Max Downward Total Deflection		0.250 in	Ratio =		336 >= 240
Max Upward Total Deflection		-0.058 in	Ratio =		1442 >= 240

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v	
+D+H													0.00	0.00	0.00	0.00	
Length = 7.0 ft	1	0.194	0.101	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	2160.00	0.97	24.05	238.50	
Length = 3.50 ft	2	0.194	0.101	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	2160.00	0.97	24.05	238.50	
+D+L+H, LL Comb Run (*L)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 7.0 ft	1	0.522	0.271	1.00	1.000	1.00	1.00	1.00	1.00	1.00	9.52	1,253.91	2400.00	2.90	71.73	265.00	
Length = 3.50 ft	2	0.522	0.271	1.00	1.000	1.00	1.00	1.00	1.00	1.00	9.52	1,253.91	2400.00	2.90	71.73	265.00	

Wood Beam

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Description : BD4.11

Load Combination		Max Stress Ratios														Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v					
+D+L+H, LL Comb Run (L*)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.175	0.091	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	2400.00	0.97	24.05	265.00					
Length = 3.50 ft	2	0.175	0.091	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	2400.00	0.97	24.05	265.00					
+D+L+H, LL Comb Run (LL)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.522	0.271	1.00	1.000	1.00	1.00	1.00	1.00	1.00	9.52	1,253.91	2400.00	2.90	71.73	265.00					
Length = 3.50 ft	2	0.522	0.271	1.00	1.000	1.00	1.00	1.00	1.00	1.00	9.52	1,253.91	2400.00	2.90	71.73	265.00					
+D+Lr+H, LL Comb Run (*L)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.140	0.073	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3000.00	0.97	24.05	331.25					
Length = 3.50 ft	2	0.140	0.073	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3000.00	0.97	24.05	331.25					
+D+Lr+H, LL Comb Run (L*)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.140	0.073	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3000.00	0.97	24.05	331.25					
Length = 3.50 ft	2	0.140	0.073	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3000.00	0.97	24.05	331.25					
+D+Lr+H, LL Comb Run (LL)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.140	0.073	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3000.00	0.97	24.05	331.25					
Length = 3.50 ft	2	0.140	0.073	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3000.00	0.97	24.05	331.25					
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.152	0.079	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	2760.00	0.97	24.05	304.75					
Length = 3.50 ft	2	0.152	0.079	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	2760.00	0.97	24.05	304.75					
+D+0.750Lr+0.750L+H, LL Comb R					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.348	0.181	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	3000.00	2.42	59.81	331.25					
Length = 3.50 ft	2	0.348	0.181	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	3000.00	2.42	59.81	331.25					
+D+0.750Lr+0.750L+H, LL Comb R					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.140	0.073	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3000.00	0.97	24.05	331.25					
Length = 3.50 ft	2	0.140	0.073	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3000.00	0.97	24.05	331.25					
+D+0.750Lr+0.750L+H, LL Comb R					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.348	0.181	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	3000.00	2.42	59.81	331.25					
Length = 3.50 ft	2	0.348	0.181	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	3000.00	2.42	59.81	331.25					
+D+0.750L+0.750S+H, LL Comb R					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.379	0.196	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	2760.00	2.42	59.81	304.75					
Length = 3.50 ft	2	0.379	0.196	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	2760.00	2.42	59.81	304.75					
+D+0.750L+0.750S+H, LL Comb R					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.152	0.079	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	2760.00	0.97	24.05	304.75					
Length = 3.50 ft	2	0.152	0.079	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	2760.00	0.97	24.05	304.75					
+D+0.750L+0.750S+H, LL Comb R					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.379	0.196	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	2760.00	2.42	59.81	304.75					
Length = 3.50 ft	2	0.379	0.196	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	2760.00	2.42	59.81	304.75					
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
Length = 3.50 ft	2	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
+D+0.750Lr+0.450W+H, LL Comb F					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
Length = 3.50 ft	2	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
+D+0.750Lr+0.450W+H, LL Comb F					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
Length = 3.50 ft	2	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
+D+0.750Lr+0.450W+H, LL Comb F					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
Length = 3.50 ft	2	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
+D+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
Length = 3.50 ft	2	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.066	0.034	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.91	251.80	3840.00	0.58	14.43	424.00					
Length = 3.50 ft	2	0.066	0.034	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.91	251.80	3840.00	0.58	14.43	424.00					
+D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
Length = 3.50 ft	2	0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00					
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00					
Length = 7.0 ft	1	0.272	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	3840.00	2.42	59.81	424.00					
Length = 3.50 ft	2	0.272	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	3840.00	2.42	59.81	424.00					

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

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Licensee : Peoples Associates Structural Engineers

Description : BD4.11

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00
Length = 3.50 ft	2		0.109	0.057	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.19	419.67	3840.00	0.97	24.05	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.272	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	3840.00	2.42	59.81	424.00
Length = 3.50 ft	2		0.272	0.141	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.94	1,045.35	3840.00	2.42	59.81	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.066	0.034	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.91	251.80	3840.00	0.58	14.43	424.00
Length = 3.50 ft	2		0.066	0.034	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.91	251.80	3840.00	0.58	14.43	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+L+H, LL Comb Run (LL)	-0.0582	4.184
+D+L+H, LL Comb Run (LL)	2	0.2497	3.500		0.0000	4.184

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (*L)	2	0.2497 in	3.500 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (L*)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (LL)	2	0.2497 in	3.500 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (*L)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (L*)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (LL)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+S+H	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.2048 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.2048 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.2048 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.2048 in	3.500 ft	0.0000 in	0.000 ft
+D+0.60W+H	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W+H	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+0.60D+0.60W+0.60H	2	0.0420 in	3.500 ft	0.0000 in	0.000 ft
+D+0.70E+0.60H	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	2	0.2048 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2	0.2048 in	3.500 ft	0.0000 in	0.000 ft
+0.60D+0.70E+H	2	0.0420 in	3.500 ft	0.0000 in	0.000 ft
D Only	2	0.0701 in	3.500 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (*L)	2	0.1797 in	3.500 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (LL)	2	0.1797 in	3.500 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.905	5.007	
Overall MINimum	0.151	2.925	
+D+H	0.151	2.082	
+D+L+H, LL Comb Run (*L)	-0.754	5.007	
+D+L+H, LL Comb Run (L*)	0.151	2.082	
+D+L+H, LL Comb Run (LL)	-0.754	5.007	
+D+Lr+H, LL Comb Run (*L)	0.151	2.082	
+D+Lr+H, LL Comb Run (L*)	0.151	2.082	
+D+Lr+H, LL Comb Run (LL)	0.151	2.082	
+D+S+H	0.151	2.082	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-0.528	4.276	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.151	2.082	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	-0.528	4.276	

Wood Beam

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Description : BD4.11

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750L+0.750S+H, LL Comb Run (*L	-0.528	4.276	
+D+0.750L+0.750S+H, LL Comb Run (L*	0.151	2.082	
+D+0.750L+0.750S+H, LL Comb Run (LL	-0.528	4.276	
+D+0.60W+H	0.151	2.082	
+D+0.750Lr+0.450W+H, LL Comb Run (*	0.151	2.082	
+D+0.750Lr+0.450W+H, LL Comb Run (L	0.151	2.082	
+D+0.750Lr+0.450W+H, LL Comb Run (L	0.151	2.082	
+D+0.750S+0.450W+H	0.151	2.082	
+0.60D+0.60W+0.60H	0.090	1.249	
+D+0.70E+0.60H	0.151	2.082	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.528	4.276	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.151	2.082	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.528	4.276	
+0.60D+0.70E+H	0.090	1.249	
D Only	0.151	2.082	
Lr Only, LL Comb Run (*L)			
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)			
L Only, LL Comb Run (*L)	-0.905	2.925	
L Only, LL Comb Run (L*)			
L Only, LL Comb Run (LL)	-0.905	2.925	
S Only			
W Only			
E Only			
H Only			

Wood Beam

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Description: BD4.12

BCS

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

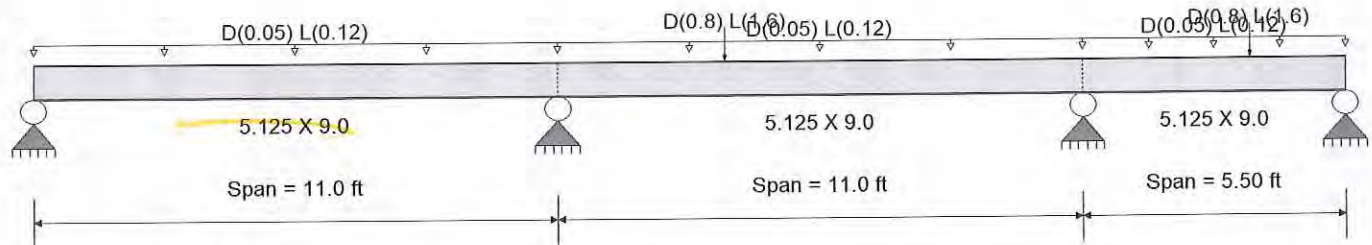
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F-V8

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	2,400.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 2.0 ft

Point Load: D = 0.80, L = 1.60 k @ 3.50 ft

Load for Span Number 3

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 2.0 ft

Point Load: D = 0.80, L = 1.60 k @ 3.50 ft

DESIGN SUMMARY

Maximum Bending Stress Ratio	=	0.339 : 1	Maximum Shear Stress Ratio	=	0.319 : 1
Section used for this span	=	5.125 X 9.0	Section used for this span	=	5.125 X 9.0
fb : Actual	=	812.47 psi	fv : Actual	=	84.44 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination	=	+D+L+H, LL Comb Run (LL*)	Load Combination	=	+D+L+H, LL Comb Run (LL*)
Location of maximum on span	=	3.513 ft	Location of maximum on span	=	11.000 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.088 in	Ratio =		1492 >= 360
Max Upward Transient Deflection		-0.047 in	Ratio =		2792 >= 360
Max Downward Total Deflection		0.119 in	Ratio =		1111 >= 240
Max Upward Total Deflection		-0.047 in	Ratio =		2813 >= 240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	Cd	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+H														0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.111	0.115	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	2160.00	0.84	27.32	238.50
Length = 11.0 ft	2		0.111	0.115	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	2160.00	0.84	27.32	238.50

Wood Beam

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Description: BD.12

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 5.50 ft	3	0.103	0.115	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	2160.00	0.65	27.32	238.50
+D+L+H, LL Comb Run (**L)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.088	0.094	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.22	211.71	2400.00	0.76	24.85	265.00
Length = 11.0 ft	2	0.142	0.195	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.96	339.60	2400.00	1.59	51.73	265.00
Length = 5.50 ft	3	0.214	0.195	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.96	512.70	2400.00	1.59	51.73	265.00
+D+L+H, LL Comb Run (*L*)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.242	0.304	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.34	579.62	2400.00	2.48	80.54	265.00
Length = 11.0 ft	2	0.339	0.304	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.68	812.47	2400.00	2.48	80.54	265.00
Length = 5.50 ft	3	0.255	0.304	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.52	611.31	2400.00	1.05	80.54	265.00
+D+L+H, LL Comb Run (*LL)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.229	0.295	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.17	550.57	2400.00	2.40	78.07	265.00
Length = 11.0 ft	2	0.331	0.295	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.58	795.14	2400.00	2.40	78.07	265.00
Length = 5.50 ft	3	0.303	0.295	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.19	727.49	2400.00	2.00	78.07	265.00
+D+L+H, LL Comb Run (L**)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.172	0.132	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.38	412.46	2400.00	1.07	34.90	265.00
Length = 11.0 ft	2	0.172	0.132	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.38	412.46	2400.00	0.96	34.90	265.00
Length = 5.50 ft	3	0.069	0.132	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.96	166.18	2400.00	0.59	34.90	265.00
+D+L+H, LL Comb Run (L*L)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.160	0.130	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.21	383.42	2400.00	1.06	34.40	265.00
Length = 11.0 ft	2	0.160	0.188	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.21	383.42	2400.00	1.53	49.78	265.00
Length = 5.50 ft	3	0.222	0.196	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.08	533.38	2400.00	1.59	51.81	265.00
+D+L+H, LL Comb Run (LL*)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.313	0.319	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.33	751.33	2400.00	2.60	84.44	265.00
Length = 11.0 ft	2	0.313	0.319	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.33	751.33	2400.00	2.60	84.44	265.00
Length = 5.50 ft	3	0.231	0.319	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.19	554.07	2400.00	0.99	84.44	265.00
+D+L+H, LL Comb Run (LLL)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.301	0.309	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.16	722.28	2400.00	2.52	81.97	265.00
Length = 11.0 ft	2	0.301	0.309	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.16	722.28	2400.00	2.52	81.97	265.00
Length = 5.50 ft	3	0.279	0.309	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.86	670.26	2400.00	1.94	81.97	265.00
+D+Lr+H, LL Comb Run (**L)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 11.0 ft	2	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 5.50 ft	3	0.074	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3000.00	0.65	27.32	331.25
+D+Lr+H, LL Comb Run (*L*)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 11.0 ft	2	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 5.50 ft	3	0.074	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3000.00	0.65	27.32	331.25
+D+Lr+H, LL Comb Run (*LL)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 11.0 ft	2	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 5.50 ft	3	0.074	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3000.00	0.65	27.32	331.25
+D+Lr+H, LL Comb Run (L**)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 11.0 ft	2	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 5.50 ft	3	0.074	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3000.00	0.65	27.32	331.25
+D+Lr+H, LL Comb Run (L*L)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 11.0 ft	2	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 5.50 ft	3	0.074	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3000.00	0.65	27.32	331.25
+D+Lr+H, LL Comb Run (LL*)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 11.0 ft	2	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 5.50 ft	3	0.074	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3000.00	0.65	27.32	331.25
+D+Lr+H, LL Comb Run (LLL)					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 11.0 ft	2	0.080	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3000.00	0.84	27.32	331.25
Length = 5.50 ft	3	0.074	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3000.00	0.65	27.32	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.087	0.090	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	2760.00	0.84	27.32	304.75
Length = 11.0 ft	2	0.087	0.090	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	2760.00	0.84	27.32	304.75

Wood Beam

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Description: BD4.12

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{FV}	C _I	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
Length = 5.50 ft	3		0.081	0.090	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	2760.00	0.65	27.32	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.073	0.077	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.26	218.97	3000.00	0.78	25.47	331.25
Length = 11.0 ft	2		0.104	0.133	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.79	310.56	3000.00	1.35	44.05	331.25
Length = 5.50 ft	3		0.139	0.133	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.41	417.29	3000.00	1.35	44.05	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.165	0.203	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.85	494.90	3000.00	2.07	67.24	331.25
Length = 11.0 ft	2		0.222	0.203	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.85	667.40	3000.00	2.07	67.24	331.25
Length = 5.50 ft	3		0.171	0.203	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.97	514.33	3000.00	0.95	67.24	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.158	0.197	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.73	473.12	3000.00	2.01	65.38	331.25
Length = 11.0 ft	2		0.218	0.197	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.77	654.40	3000.00	2.01	65.38	331.25
Length = 5.50 ft	3		0.200	0.197	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.47	601.47	3000.00	1.66	65.38	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.123	0.091	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.13	369.54	3000.00	0.93	30.25	331.25
Length = 11.0 ft	2		0.123	0.091	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.13	369.54	3000.00	0.93	30.25	331.25
Length = 5.50 ft	3		0.060	0.091	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.04	180.49	3000.00	0.60	30.25	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.116	0.088	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.01	347.75	3000.00	0.90	29.15	331.25
Length = 11.0 ft	2		0.116	0.129	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.01	347.75	3000.00	1.31	42.58	331.25
Length = 5.50 ft	3		0.144	0.129	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.50	432.81	3000.00	1.31	42.58	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.208	0.212	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.60	623.68	3000.00	2.16	70.16	331.25
Length = 11.0 ft	2		0.208	0.212	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.60	623.68	3000.00	2.16	70.16	331.25
Length = 5.50 ft	3		0.157	0.212	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.72	471.41	3000.00	0.91	70.16	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.201	0.206	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.47	601.90	3000.00	2.10	68.31	331.25
Length = 11.0 ft	2		0.201	0.206	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.47	601.90	3000.00	2.10	68.31	331.25
Length = 5.50 ft	3		0.186	0.206	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.22	558.55	3000.00	1.61	68.31	331.25
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.079	0.084	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.26	218.97	2760.00	0.78	25.47	304.75
Length = 11.0 ft	2		0.113	0.145	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.79	310.56	2760.00	1.35	44.05	304.75
Length = 5.50 ft	3		0.151	0.145	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.41	417.29	2760.00	1.35	44.05	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.179	0.221	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.85	494.90	2760.00	2.07	67.24	304.75
Length = 11.0 ft	2		0.242	0.221	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.85	667.40	2760.00	2.07	67.24	304.75
Length = 5.50 ft	3		0.186	0.221	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.97	514.33	2760.00	0.95	67.24	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.171	0.215	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.73	473.12	2760.00	2.01	65.38	304.75
Length = 11.0 ft	2		0.237	0.215	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.77	654.40	2760.00	2.01	65.38	304.75
Length = 5.50 ft	3		0.218	0.215	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.47	601.47	2760.00	1.66	65.38	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.134	0.099	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.13	369.54	2760.00	0.93	30.25	304.75
Length = 11.0 ft	2		0.134	0.099	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.13	369.54	2760.00	0.93	30.25	304.75
Length = 5.50 ft	3		0.065	0.099	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.04	180.49	2760.00	0.60	30.25	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.126	0.096	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.01	347.75	2760.00	0.90	29.15	304.75
Length = 11.0 ft	2		0.126	0.140	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.01	347.75	2760.00	1.31	42.58	304.75
Length = 5.50 ft	3		0.157	0.140	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.50	432.81	2760.00	1.31	42.58	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.226	0.230	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.60	623.68	2760.00	2.16	70.16	304.75
Length = 11.0 ft	2		0.226	0.230	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.60	623.68	2760.00	2.16	70.16	304.75
Length = 5.50 ft	3		0.171	0.230	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.72	471.41	2760.00	0.91	70.16	304.75
+D+0.750Lr+0.750L+H, LL Comb R						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.218	0.224	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.47	601.90	2760.00	2.10	68.31	304.75
Length = 11.0 ft	2		0.218	0.224	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.47	601.90	2760.00	2.10	68.31	304.75
Length = 5.50 ft	3		0.202	0.224	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.22	558.55	2760.00	1.61	68.31	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1		0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
Length = 11.0 ft	2		0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00

Wood Beam

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Description : BD4.12

Load Combination		Max Stress Ratios									Moment Values			Shear Values			
Segment	Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
+D+0.750Lr+0.450W+H, LL Comb F	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.29	223.42	3840.00	0.65	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 11.0 ft	1	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
	Length = 11.0 ft	2	0.063	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	240.76	3840.00	0.84	27.32	424.00
+D+0.750Lr+0.450W+H, LL Comb F	Length = 5.50 ft	3	0.058	0.064	1.60	1.000	1.00	1.									

Wood Beam

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Lic. #: KW-06009713

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Description : BD4.12

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
Length = 5.50 ft +D+0.750L+0.750S+0.5250E+H, LL	3	0.113	0.100	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.50	432.81	3840.00	1.31	42.58	424.00
					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 11.0 ft	1	0.162	0.165	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.60	623.68	3840.00	2.16	70.16	424.00
Length = 11.0 ft	2	0.162	0.165	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.60	623.68	3840.00	2.16	70.16	424.00
Length = 5.50 ft +D+0.750L+0.750S+0.5250E+H, LL	3	0.123	0.165	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.72	471.41	3840.00	0.91	70.16	424.00
					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 11.0 ft	1	0.157	0.161	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.47	601.90	3840.00	2.10	68.31	424.00
Length = 11.0 ft	2	0.157	0.161	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.47	601.90	3840.00	2.10	68.31	424.00
Length = 5.50 ft +0.60D+0.70E+H	3	0.145	0.161	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.22	558.55	3840.00	1.61	68.31	424.00
					1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
Length = 11.0 ft	1	0.038	0.039	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.83	144.45	3840.00	0.50	16.39	424.00
Length = 11.0 ft	2	0.038	0.039	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.83	144.45	3840.00	0.50	16.39	424.00
Length = 5.50 ft	3	0.035	0.039	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.77	134.05	3840.00	0.39	16.39	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H, LL Comb Run (L*L)	1	0.0561	4.899	+D+L+H, LL Comb Run (L*L)	-0.0469	7.025
+D+L+H, LL Comb Run (L*L)	2	0.1188	4.899		0.0000	7.025
+D+L+H, LL Comb Run (L*L)	3	0.0208	3.143	+D+L+H, LL Comb Run (L*L)	-0.0117	1.387

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	1	0.0052	in 3.420 ft	-0.0040	in 9.336 ft
+D+H	2	0.0304	in 4.899 ft	0.0000	in 0.000 ft
+D+H	3	0.0030	in 3.559 ft	-0.0007	in 0.647 ft
+D+L+H, LL Comb Run (**L)	1	0.0084	in 3.975 ft	-0.0018	in 9.891 ft
+D+L+H, LL Comb Run (**L)	2	0.0200	in 4.345 ft	-0.0017	in 10.168 ft
+D+L+H, LL Comb Run (**L)	3	0.0190	in 3.189 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (L*L)	2	0.1188	in 4.899 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (L*LL)	2	0.1080	in 4.807 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (L*LL)	3	0.0073	in 3.651 ft	-0.0031	in 0.786 ft
+D+L+H, LL Comb Run (L**)	1	0.0523	in 4.899 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (L**)	2	0.0138	in 5.361 ft	-0.0013	in 0.647 ft
+D+L+H, LL Comb Run (L**)	3	0.0047	in 3.374 ft	-0.0000	in 0.092 ft
+D+L+H, LL Comb Run (L*L)	1	0.0561	in 4.899 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (L*L)	2	0.0028	in 4.529 ft	-0.0052	in 9.336 ft
+D+L+H, LL Comb Run (L*L)	3	0.0208	in 3.143 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (LL*)	1	0.0128	in 3.235 ft	-0.0147	in 9.151 ft
+D+L+H, LL Comb Run (LL*)	2	0.1021	in 4.992 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (LLL)	1	0.0157	in 3.420 ft	-0.0121	in 9.336 ft
+D+L+H, LL Comb Run (LLL)	2	0.0911	in 4.899 ft	0.0000	in 0.000 ft
+D+L+H, LL Comb Run (LLL)	3	0.0089	in 3.559 ft	-0.0020	in 0.647 ft
+D+Lr+H, LL Comb Run (**L)	1	0.0052	in 3.420 ft	-0.0040	in 9.336 ft
+D+Lr+H, LL Comb Run (**L)	2	0.0304	in 4.899 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (**L)	3	0.0030	in 3.559 ft	-0.0007	in 0.647 ft
+D+Lr+H, LL Comb Run (L*L)	1	0.0052	in 3.420 ft	-0.0040	in 9.336 ft
+D+Lr+H, LL Comb Run (L*L)	2	0.0304	in 4.899 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (L*L)	3	0.0030	in 3.559 ft	-0.0007	in 0.647 ft
+D+Lr+H, LL Comb Run (L*LL)	1	0.0052	in 3.420 ft	-0.0040	in 9.336 ft
+D+Lr+H, LL Comb Run (L*LL)	2	0.0304	in 4.899 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (L*LL)	3	0.0030	in 3.559 ft	-0.0007	in 0.647 ft
+D+Lr+H, LL Comb Run (L**)	1	0.0052	in 3.420 ft	-0.0040	in 9.336 ft
+D+Lr+H, LL Comb Run (L**)	2	0.0304	in 4.899 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (L**)	3	0.0030	in 3.559 ft	-0.0007	in 0.647 ft
+D+Lr+H, LL Comb Run (L*L)	1	0.0052	in 3.420 ft	-0.0040	in 9.336 ft
+D+Lr+H, LL Comb Run (L*L)	2	0.0304	in 4.899 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (L*L)	3	0.0030	in 3.559 ft	-0.0007	in 0.647 ft
+D+Lr+H, LL Comb Run (LL*)	1	0.0052	in 3.420 ft	-0.0040	in 9.336 ft
+D+Lr+H, LL Comb Run (LL*)	2	0.0304	in 4.899 ft	0.0000	in 0.000 ft
+D+Lr+H, LL Comb Run (LL*)	3	0.0030	in 3.559 ft	-0.0007	in 0.647 ft
+D+Lr+H, LL Comb Run (LLL)	1	0.0052	in 3.420 ft	-0.0040	in 9.336 ft

Wood Beam

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Description : BD4.12

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+Lr+H, LL Comb Run (LLL)	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (LLL)	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+S+H	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+S+H	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+S+H	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750Lr+0.750L+H, LL Comb Run (**L)	1	0.0076 in	3.882 ft	-0.0023 in	9.706 ft
+D+0.750Lr+0.750L+H, LL Comb Run (**L)	2	0.0225 in	4.437 ft	-0.0006 in	10.445 ft
+D+0.750Lr+0.750L+H, LL Comb Run (**L)	3	0.0149 in	3.235 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*L*)	2	0.0967 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*LL)	2	0.0886 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*LL)	3	0.0062 in	3.651 ft	-0.0025 in	0.786 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L**)	1	0.0403 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L**)	2	0.0179 in	5.176 ft	-0.0003 in	0.277 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L**)	3	0.0042 in	3.420 ft	-0.0001 in	0.231 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L*L)	1	0.0431 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L*L)	2	0.0097 in	4.622 ft	-0.0023 in	9.891 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L*L)	3	0.0163 in	3.189 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LL*)	1	0.0109 in	3.235 ft	-0.0120 in	9.151 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LL*)	2	0.0841 in	4.992 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LLL)	1	0.0131 in	3.420 ft	-0.0101 in	9.336 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LLL)	2	0.0759 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LLL)	3	0.0074 in	3.559 ft	-0.0016 in	0.647 ft
+D+0.750L+0.750S+H, LL Comb Run (**L)	1	0.0076 in	3.882 ft	-0.0023 in	9.706 ft
+D+0.750L+0.750S+H, LL Comb Run (**L)	2	0.0225 in	4.437 ft	-0.0006 in	10.445 ft
+D+0.750L+0.750S+H, LL Comb Run (**L)	3	0.0149 in	3.235 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (*L*)	2	0.0967 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (*LL)	2	0.0886 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (*LL)	3	0.0062 in	3.651 ft	-0.0025 in	0.786 ft
+D+0.750L+0.750S+H, LL Comb Run (L**)	1	0.0403 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (L**)	2	0.0179 in	5.176 ft	-0.0003 in	0.277 ft
+D+0.750L+0.750S+H, LL Comb Run (L**)	3	0.0042 in	3.420 ft	-0.0001 in	0.231 ft
+D+0.750L+0.750S+H, LL Comb Run (L*L)	1	0.0431 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (L*L)	2	0.0097 in	4.622 ft	-0.0023 in	9.891 ft
+D+0.750L+0.750S+H, LL Comb Run (L*L)	3	0.0163 in	3.189 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (LL*)	1	0.0109 in	3.235 ft	-0.0120 in	9.151 ft
+D+0.750L+0.750S+H, LL Comb Run (LL*)	2	0.0841 in	4.992 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (LLL)	1	0.0131 in	3.420 ft	-0.0101 in	9.336 ft
+D+0.750L+0.750S+H, LL Comb Run (LLL)	2	0.0759 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (LLL)	3	0.0074 in	3.559 ft	-0.0016 in	0.647 ft
+D+0.60W+H	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.60W+H	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.60W+H	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750Lr+0.450W+H, LL Comb Run (**L)	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.750Lr+0.450W+H, LL Comb Run (**L)	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (**L)	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*L*)	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*L*)	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*L*)	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*LL)	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*LL)	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*LL)	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L**)	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L**)	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L**)	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L*L)	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L*L)	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L*L)	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750Lr+0.450W+H, LL Comb Run (LL*)	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.750Lr+0.450W+H, LL Comb Run (LL*)	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (LL*)	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: BD4.12

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+0.750L+0.450W+H, LL Comb Run (LLL)	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.750L+0.450W+H, LL Comb Run (LLL)	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750L+0.450W+H, LL Comb Run (LLL)	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750S+0.450W+H	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.750S+0.450W+H	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W+H	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+0.60D+0.60W+0.60H	1	0.0031 in	3.420 ft	-0.0024 in	9.336 ft
+0.60D+0.60W+0.60H	2	0.0182 in	4.899 ft	0.0000 in	0.000 ft
+0.60D+0.60W+0.60H	3	0.0018 in	3.559 ft	-0.0004 in	0.647 ft
+D+0.70E+0.60H	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
+D+0.70E+0.60H	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
+D+0.70E+0.60H	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (**L	1	0.0076 in	3.882 ft	-0.0023 in	9.706 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (**L	2	0.0225 in	4.437 ft	-0.0006 in	10.445 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (**L	3	0.0149 in	3.235 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L*	2	0.0967 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*LL	2	0.0886 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*LL	3	0.0062 in	3.651 ft	-0.0025 in	0.786 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L**	1	0.0403 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L**	2	0.0179 in	5.176 ft	-0.0003 in	0.277 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L**	3	0.0042 in	3.420 ft	-0.0001 in	0.231 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*L	1	0.0431 in	4.807 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*L	2	0.0097 in	4.622 ft	-0.0023 in	9.891 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*L	3	0.0163 in	3.189 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL*	1	0.0109 in	3.235 ft	-0.0120 in	9.151 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL*	2	0.0841 in	4.992 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LLL	1	0.0131 in	3.420 ft	-0.0101 in	9.336 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LLL	2	0.0759 in	4.899 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LLL	3	0.0074 in	3.559 ft	-0.0016 in	0.647 ft
+0.60D+0.70E+H	1	0.0031 in	3.420 ft	-0.0024 in	9.336 ft
+0.60D+0.70E+H	2	0.0182 in	4.899 ft	0.0000 in	0.000 ft
+0.60D+0.70E+H	3	0.0018 in	3.559 ft	-0.0004 in	0.647 ft
D Only	1	0.0052 in	3.420 ft	-0.0040 in	9.336 ft
D Only	2	0.0304 in	4.899 ft	0.0000 in	0.000 ft
D Only	3	0.0030 in	3.559 ft	-0.0007 in	0.647 ft
L Only, LL Comb Run (**L	1	0.0041 in	6.378 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (**L	3	0.0162 in	3.050 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (*L*	2	0.0884 in	4.899 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (*LL	2	0.0776 in	4.714 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (*LL	3	0.0043 in	3.697 ft	-0.0025 in	0.878 ft
L Only, LL Comb Run (L**	1	0.0484 in	5.176 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (L**	3	0.0020 in	2.357 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (L*L	1	0.0523 in	5.269 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (L*L	3	0.0181 in	3.004 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (LL*	1	0.0076 in	3.143 ft	-0.0107 in	9.059 ft
L Only, LL Comb Run (LL*	2	0.0717 in	5.084 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (LLL	1	0.0105 in	3.420 ft	-0.0080 in	9.336 ft
L Only, LL Comb Run (LLL	2	0.0607 in	4.899 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (LLL	3	0.0059 in	3.559 ft	-0.0013 in	0.647 ft

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	0.789	4.114	3.977	1.726
Overall MINimum	0.408	2.681	2.531	0.880
+D+H	0.204	1.341	1.266	0.440
+D+L+H, LL Comb Run (**L	0.219	1.249	2.375	1.666
+D+L+H, LL Comb Run (*L*	0.026	3.244	2.867	0.033
+D+L+H, LL Comb Run (*LL	0.041	3.152	3.977	1.260
+D+L+H, LL Comb Run (L**	0.774	2.211	1.086	0.500
+D+L+H, LL Comb Run (L*L	0.789	2.119	2.195	1.726

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : BD4.12

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
+D+L+H, LL Comb Run (LL*)	0.596	4.114	2.687	0.093
+D+L+H, LL Comb Run (LLL)	0.611	4.022	3.797	1.320
+D+Lr+H, LL Comb Run (**L)	0.204	1.341	1.266	0.440
+D+Lr+H, LL Comb Run (*L*)	0.204	1.341	1.266	0.440
+D+Lr+H, LL Comb Run (*LL)	0.204	1.341	1.266	0.440
+D+Lr+H, LL Comb Run (L**)	0.204	1.341	1.266	0.440
+D+Lr+H, LL Comb Run (L*L)	0.204	1.341	1.266	0.440
+D+Lr+H, LL Comb Run (LL*)	0.204	1.341	1.266	0.440
+D+Lr+H, LL Comb Run (LLL)	0.204	1.341	1.266	0.440
+D+S+H	0.204	1.341	1.266	0.440
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.215	1.272	2.098	1.360
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.071	2.768	2.467	0.135
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.082	2.699	3.299	1.055
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.631	1.993	1.131	0.485
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.643	1.925	1.963	1.405
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.498	3.420	2.332	0.180
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.509	3.352	3.164	1.100
+D+0.750L+0.750S+H, LL Comb Run (**)	0.215	1.272	2.098	1.360
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.071	2.768	2.467	0.135
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.082	2.699	3.299	1.055
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.631	1.993	1.131	0.485
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.643	1.925	1.963	1.405
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.498	3.420	2.332	0.180
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.509	3.352	3.164	1.100
+D+0.60W+H	0.204	1.341	1.266	0.440
+D+0.750Lr+0.450W+H, LL Comb Run (*)	0.204	1.341	1.266	0.440
+D+0.750Lr+0.450W+H, LL Comb Run (*)	0.204	1.341	1.266	0.440
+D+0.750Lr+0.450W+H, LL Comb Run (*)	0.204	1.341	1.266	0.440
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.204	1.341	1.266	0.440
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.204	1.341	1.266	0.440
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.204	1.341	1.266	0.440
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.204	1.341	1.266	0.440
+D+0.750Lr+0.450W+H, LL Comb Run (L)	0.204	1.341	1.266	0.440
+D+0.750S+0.450W+H	0.204	1.341	1.266	0.440
+0.60D+0.60W+0.60H	0.122	0.804	0.759	0.264
+D+0.70E+0.60H	0.204	1.341	1.266	0.440
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.215	1.272	2.098	1.360
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.071	2.768	2.467	0.135
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.082	2.699	3.299	1.055
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.631	1.993	1.131	0.485
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.643	1.925	1.963	1.405
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.498	3.420	2.332	0.180
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.509	3.352	3.164	1.100
+0.60D+0.70E+H	0.122	0.804	0.759	0.264
D Only	0.204	1.341	1.266	0.440
Lr Only, LL Comb Run (**L)				
Lr Only, LL Comb Run (*L*)				
Lr Only, LL Comb Run (*LL)				
Lr Only, LL Comb Run (L**)				
Lr Only, LL Comb Run (L*L)				
Lr Only, LL Comb Run (LL*)				
Lr Only, LL Comb Run (LLL)				
L Only, LL Comb Run (**L)	0.015	-0.091	1.110	1.226
L Only, LL Comb Run (*L*)	-0.178	1.903	1.601	-0.407
L Only, LL Comb Run (*LL)	-0.162	1.811	2.711	0.820
L Only, LL Comb Run (L**)	0.570	0.870	-0.180	0.060
L Only, LL Comb Run (L*L)	0.585	0.779	0.930	1.286
L Only, LL Comb Run (LL*)	0.392	2.773	1.421	-0.347
L Only, LL Comb Run (LLL)	0.408	2.681	2.531	0.880
S Only				
W Only				

Wood Beam

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 Description : BD4.13

B512

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

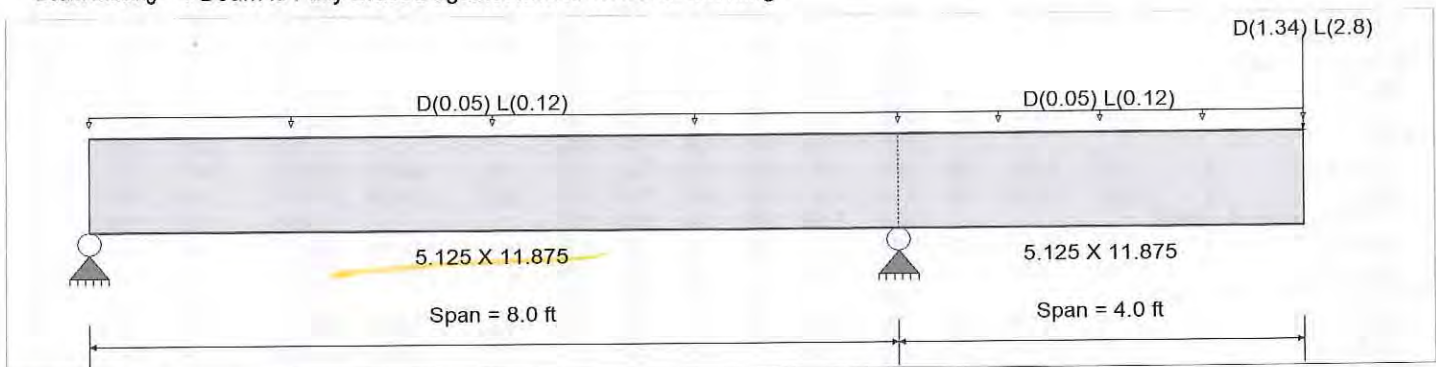
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F-V8

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 2,400.0 psi
 Fb - 2,400.0 psi
 Fc - Prll 1,650.0 psi
 Fc - Perp 650.0 psi
 Fv 265.0 psi
 Ft 1,100.0 psi
 E : Modulus of Elasticity
 Ebend- xx 1,800.0 ksi
 Eminbend - xx 950.0 ksi
 Ebend- yy 1,600.0 ksi
 Eminbend - yy 850.0 ksi
 Density 31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 2.0 ft

Point Load : D = 1.340, L = 2.80 k @ 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.748	1	Maximum Shear Stress Ratio	=	0.436	1
Section used for this span	=	5.125 X 11.875		Section used for this span	=	5.125 X 11.875	
fb : Actual	=	1,795.81 psi		fv : Actual	=	115.66 psi	
FB : Allowable	=	2,400.00 psi		Fv : Allowable	=	265.00 psi	
Load Combination	=	+D+L+H, LL Comb Run (LL)		Load Combination	=	+D+L+H, LL Comb Run (*L)	
Location of maximum on span	=	8.000 ft		Location of maximum on span	=	8.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.259 in	Ratio = 370 >= 360				
Max Upward Transient Deflection		-0.068 in	Ratio = 1422 >= 360				
Max Downward Total Deflection		0.377 in	Ratio = 254 >= 240				
Max Upward Total Deflection		-0.096 in	Ratio = 1003 >= 240				

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios				Moment Values							Shear Values			
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.271	0.158	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	2160.00	1.53	37.73	238.50
Length = 4.0 ft	2	0.271	0.158	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	2160.00	1.53	37.73	238.50
+D+L+H, LL Comb Run (*L)													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.748	0.436	1.00	1.000	1.00	1.00	1.00	1.00	1.00	18.03	1,795.81	2400.00	4.69	115.66	265.00
Length = 4.0 ft	2	0.748	0.436	1.00	1.000	1.00	1.00	1.00	1.00	1.00	18.03	1,795.81	2400.00	4.69	115.66	265.00

Wood Beam

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Description: BD4.13

Load Combination		Max Stress Ratios		Moment Values										Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+L+H, LL Comb Run (L*)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.243	0.142	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	2400.00	1.53	37.73	265.00
Length = 4.0 ft	2	0.243	0.142	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	2400.00	1.53	37.73	265.00
+D+L+H, LL Comb Run (LL)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.748	0.436	1.00	1.000	1.00	1.00	1.00	1.00	1.00	18.03	1,795.81	2400.00	4.69	115.66	265.00
Length = 4.0 ft	2	0.748	0.436	1.00	1.000	1.00	1.00	1.00	1.00	1.00	18.03	1,795.81	2400.00	4.69	115.66	265.00
+D+Lr+H, LL Comb Run (L*)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.195	0.114	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3000.00	1.53	37.73	331.25
Length = 4.0 ft	2	0.195	0.114	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3000.00	1.53	37.73	331.25
+D+Lr+H, LL Comb Run (L*)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.195	0.114	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3000.00	1.53	37.73	331.25
Length = 4.0 ft	2	0.195	0.114	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3000.00	1.53	37.73	331.25
+D+Lr+H, LL Comb Run (LL)				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.195	0.114	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3000.00	1.53	37.73	331.25
Length = 4.0 ft	2	0.195	0.114	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3000.00	1.53	37.73	331.25
+D+S+H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.212	0.124	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	2760.00	1.53	37.73	304.75
Length = 4.0 ft	2	0.212	0.124	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	2760.00	1.53	37.73	304.75
+D+0.750Lr+0.750L+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.498	0.290	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	3000.00	3.90	96.18	331.25
Length = 4.0 ft	2	0.498	0.290	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	3000.00	3.90	96.18	331.25
+D+0.750Lr+0.750L+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.195	0.114	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3000.00	1.53	37.73	331.25
Length = 4.0 ft	2	0.195	0.114	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3000.00	1.53	37.73	331.25
+D+0.750Lr+0.750L+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.498	0.290	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	3000.00	3.90	96.18	331.25
Length = 4.0 ft	2	0.498	0.290	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	3000.00	3.90	96.18	331.25
+D+0.750L+0.750S+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.541	0.316	1.15	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	2760.00	3.90	96.18	304.75
Length = 4.0 ft	2	0.541	0.316	1.15	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	2760.00	3.90	96.18	304.75
+D+0.750L+0.750S+H, LL Comb R				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.541	0.316	1.15	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	2760.00	3.90	96.18	304.75
Length = 4.0 ft	2	0.541	0.316	1.15	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	2760.00	3.90	96.18	304.75
+D+0.60W+H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
Length = 4.0 ft	2	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
+D+0.750Lr+0.450W+H, LL Comb F				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
Length = 4.0 ft	2	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
+D+0.750Lr+0.450W+H, LL Comb F				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
Length = 4.0 ft	2	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
+D+0.750Lr+0.450W+H, LL Comb F				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
Length = 4.0 ft	2	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
+D+0.750S+0.450W+H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
Length = 4.0 ft	2	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
+0.60D+0.60W+0.60H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.091	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.52	350.61	3840.00	0.92	22.64	424.00
Length = 4.0 ft	2	0.091	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.52	350.61	3840.00	0.92	22.64	424.00
+D+0.70E+0.60H				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
Length = 4.0 ft	2	0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
+D+0.750L+0.750S+0.5250E+H, LL				1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.389	0.227	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	3840.00	3.90	96.18	424.00
Length = 4.0 ft	2	0.389	0.227	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	3840.00	3.90	96.18	424.00

Wood Beam

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Description: BD4.13

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1		0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
Length = 4.0 ft	2		0.152	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.87	584.36	3840.00	1.53	37.73	424.00
+D+0.750L+0.750S+0.5250E+H, LL					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1		0.389	0.227	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	3840.00	3.90	96.18	424.00
Length = 4.0 ft	2		0.389	0.227	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.99	1,492.94	3840.00	3.90	96.18	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1		0.091	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.52	350.61	3840.00	0.92	22.64	424.00
Length = 4.0 ft	2		0.091	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.52	350.61	3840.00	0.92	22.64	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H, LL Comb Run (*L)	1	0.0000	0.000	+D+L+H, LL Comb Run (*L)	-0.0956	4.693
	2	0.3767	4.000		0.0000	4.693

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Max. Upward Defl	Location in Span
+D+H	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (*L)	2	0.3767 in	4.000 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (L*)	2	0.1039 in	4.000 ft	0.0000 in	0.000 ft
+D+L+H, LL Comb Run (LL)	2	0.3630 in	4.000 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (*L)	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (L*)	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+Lr+H, LL Comb Run (LL)	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+S+H	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.3120 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.1074 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.3017 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.3120 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.1074 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.3017 in	4.000 ft	0.0000 in	0.000 ft
+D+0.60W+H	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (*L)	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (L*)	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W+H, LL Comb Run (LL)	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W+H	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+0.60D+0.60W+0.60H	2	0.0706 in	4.000 ft	0.0000 in	0.000 ft
+D+0.70E+0.60H	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	2	0.3120 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2	0.1074 in	4.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2	0.3017 in	4.000 ft	0.0000 in	0.000 ft
+0.60D+0.70E+H	2	0.0706 in	4.000 ft	0.0000 in	0.000 ft
D Only	2	0.1177 in	4.000 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (*L)	2	0.2591 in	4.000 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (L*)	1	0.0087 in	4.022 ft	0.0000 in	0.000 ft
L Only, LL Comb Run (LL)	2	0.2453 in	4.000 ft	0.0000 in	0.000 ft

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-2.000	7.859	
Overall MINimum	-0.480	5.280	
+D+H	-0.480	2.579	
+D+L+H, LL Comb Run (*L)	-2.000	7.379	
+D+L+H, LL Comb Run (L*)	-0.000	3.059	
+D+L+H, LL Comb Run (LL)	-1.520	7.859	
+D+Lr+H, LL Comb Run (*L)	-0.480	2.579	
+D+Lr+H, LL Comb Run (L*)	-0.480	2.579	
+D+Lr+H, LL Comb Run (LL)	-0.480	2.579	
+D+S+H	-0.480	2.579	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-1.620	6.179	
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.120	2.939	

Wood Beam

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Description: BD4.13

Vertical Reactions

Support notation: Far left is #1

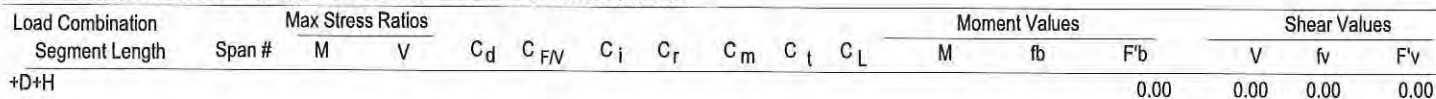
Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750Lr+0.750L+H, LL Comb Run (L	-1.260	6.539	
+D+0.750L+0.750S+H, LL Comb Run (*L	-1.620	6.179	
+D+0.750L+0.750S+H, LL Comb Run (L*	-0.120	2.939	
+D+0.750L+0.750S+H, LL Comb Run (LL	-1.260	6.539	
+D+0.60W+H	-0.480	2.579	
+D+0.750Lr+0.450W+H, LL Comb Run (*	-0.480	2.579	
+D+0.750Lr+0.450W+H, LL Comb Run (L	-0.480	2.579	
+D+0.750Lr+0.450W+H, LL Comb Run (L	-0.480	2.579	
+D+0.750S+0.450W+H	-0.480	2.579	
+0.60D+0.60W+0.60H	-0.288	1.547	
+D+0.70E+0.60H	-0.480	2.579	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-1.620	6.179	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.120	2.939	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-1.260	6.539	
+0.60D+0.70E+H	-0.288	1.547	
D Only	-0.480	2.579	
Lr Only, LL Comb Run (*L)			
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)			
L Only, LL Comb Run (*L)	-1.520	4.800	
L Only, LL Comb Run (L*)	0.480	0.480	
L Only, LL Comb Run (LL)	-1.040	5.280	
S Only			
W Only			
E Only			
H Only			

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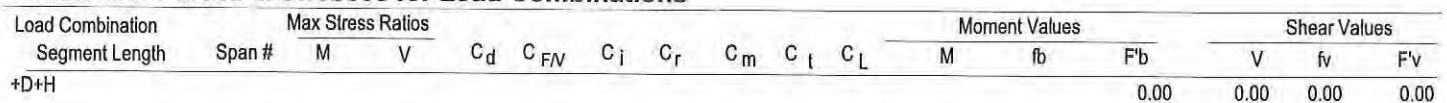
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Steel Beam

Lic. #: KW-06009713

Description : CO-B.16

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 18.85 ft		1	0.299	0.105	45.09		45.09	251.67	150.70	1.00	1.00	7.16	102.00	68.00
+D+0.750Lr+0.750L+0.450W+H														
Dsgn. L = 18.85 ft		1	0.518	0.182	78.08		78.08	251.67	150.70	1.00	1.00	12.39	102.00	68.00
+D+0.750L+0.750S+0.450W+H														
Dsgn. L = 18.85 ft		1	0.518	0.182	78.08		78.08	251.67	150.70	1.00	1.00	12.39	102.00	68.00
+D+0.750L+0.750S+0.5250E+H														
Dsgn. L = 18.85 ft		1	0.518	0.182	78.08		78.08	251.67	150.70	1.00	1.00	12.39	102.00	68.00
+0.60D+0.60W+0.60H														
Dsgn. L = 18.85 ft		1	0.180	0.063	27.06		27.06	251.67	150.70	1.00	1.00	4.29	102.00	68.00
+0.60D+0.70E+0.60H														
Dsgn. L = 18.85 ft		1	0.180	0.063	27.06		27.06	251.67	150.70	1.00	1.00	4.29	102.00	68.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.5998	10.017		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.383	14.134
Overall MINimum	2.852	4.294
+D+H	4.753	7.157
+D+L+H	9.383	14.134
+D+Lr+H	4.753	7.157
+D+S+H	4.753	7.157
+D+0.750Lr+0.750L+H	8.225	12.390
+D+0.750L+0.750S+H	8.225	12.390
+D+0.60W+H	4.753	7.157
+D+0.70E+H	4.753	7.157
+D+0.750Lr+0.750L+0.450W+H	8.225	12.390
+D+0.750L+0.750S+0.450W+H	8.225	12.390
+D+0.750L+0.750S+0.5250E+H	8.225	12.390
+0.60D+0.60W+0.60H	2.852	4.294
+0.60D+0.70E+0.60H	2.852	4.294
D Only	4.753	7.157
Lr Only		
L Only	4.630	6.976
S Only		
W Only		
E Only		
H Only		

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 and then using the "Printing &
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 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

194

Printed: 4 FEB 2019, 9:58PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: CO-B.17

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

Material Properties

Analysis Method: Allowable Stress Design
 Load Combination ASCE 7-10

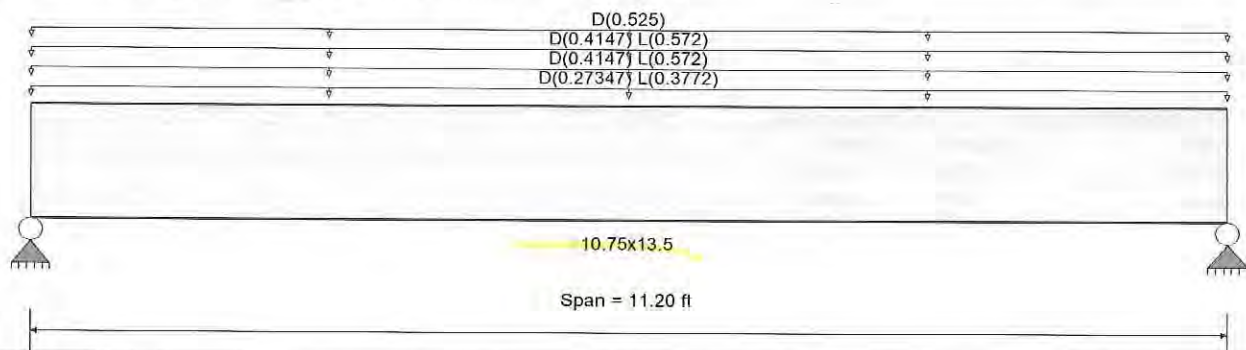
Wood Species: DF/DF
 Wood Grade: 24F - V4

Fb + 2,400.0 psi
 Fb - 1,850.0 psi
 Fc - Prll 1,650.0 psi
 Fc - Perp 650.0 psi
 Fv 265.0 psi
 Ft 1,100.0 psi

E: Modulus of Elasticity

Ebend-xx 1,800.0 ksi
 Eminbend-xx 950.0 ksi
 Ebend-yy 1,600.0 ksi
 Eminbend-yy 850.0 ksi
 Density 31.20 pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 9.430 ft, (2nd Flr Loads)

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 14.30 ft, (3rd Flr Loads)

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 14.30 ft, (4th Flr Loads)

Uniform Load: D = 0.0140 ksf, Tributary Width = 37.50 ft, (Wall Loads)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.781 : 1	Maximum Shear Stress Ratio	=	0.558 : 1
Section used for this span		10.75x13.5	Section used for this span		10.75x13.5
fb : Actual	=	1,832.74 psi	fv : Actual	=	147.81 psi
FB : Allowable	=	2,345.44 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.600 ft	Location of maximum on span	=	10.096 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.137 in	Ratio =		984 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.285 in	Ratio =		470 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00	

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	0.00	

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v
+D+H													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.089	0.089	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.17	191.41	2160.00	0.52	21.20	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.186	0.187	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.74	447.27	2400.00	1.23	49.54	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.064	0.064	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.17	191.41	3000.00	0.52	21.20	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.069	0.070	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.17	191.41	2760.00	0.52	21.20	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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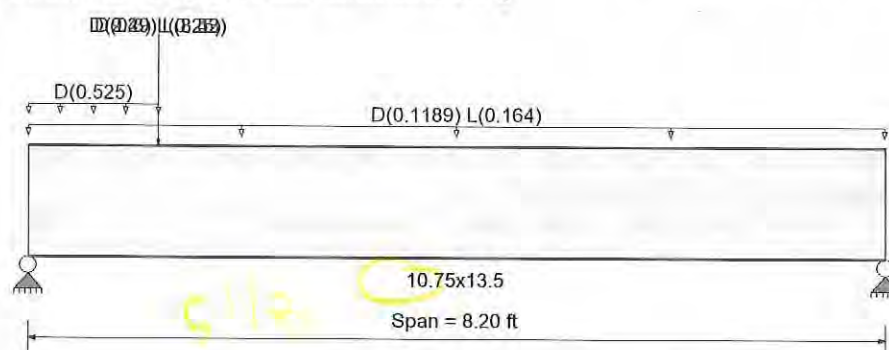
Licensee : Peoples Associates Structural Engineers

CODE REFERENCES

Load Combination Set : ASCE 7-10

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prl	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.20 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 4.10 ft, (2nd Flr Loads)

Point Load : $D = 9.290$, $L = 8.520$ k @ 1.250 ft, (CO-B.17)

Point Load : D = 2.490, L = 3.430 k @ 1.250 ft, (3rd and 4th Flr Load)

Uniform Load : D = 0.0140 ksf, Extent = 0.0 --> 1.250 ft, Tributary Width = 37.50 ft, (Wall Loads)

Point Load : $D = 0.30$, $L = 0.250 \text{ k @ } 1.250 \text{ ft}$, (B-Boiler.3)

DESIGN SUMMARY

Maximum Bending Stress Ratio	=	0.420	1	Maximum Shear Stress Ratio	=	0.840	1
Section used for this span		10.75x13.5		Section used for this span		10.75x13.5	
fb : Actual	=	1,007.56	psi	f _v : Actual	=	222.68	psi
FB : Allowable	=	2,400.00	psi	F _v : Allowable	=	265.00	psi
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	1.257	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.032	in	Ratio =		3073	>=480
Max Upward Transient Deflection		0.000	in	Ratio =		0	<480
Max Downward Total Deflection		0.064	in	Ratio =		1533	>=360
Max Upward Total Deflection		0.000	in	Ratio =		0	<360

Maximum Forces & Stresses for Load Combinations

Printed: 5 FEB 2019, 3:54PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\1(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Description : CO-B.20

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
		M	V								M	f _b	F'b	V	f _v	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.235	0.464	0.90	1.000	1.00	1.00	1.00	1.00	1.00	13.79	506.73	2160.00	10.71	110.73	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.420	0.840	1.00	1.000	1.00	1.00	1.00	1.00	1.00	27.42	1,007.56	2400.00	21.54	222.68	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.169	0.334	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.79	506.73	3000.00	10.71	110.73	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.184	0.363	1.15	1.000	1.00	1.00	1.00	1.00	1.00	13.79	506.73	2760.00	10.71	110.73	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.294	0.588	1.25	1.000	1.00	1.00	1.00	1.00	1.00	24.01	882.36	3000.00	18.84	194.69	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.320	0.639	1.15	1.000	1.00	1.00	1.00	1.00	1.00	24.01	882.36	2760.00	18.84	194.69	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.132	0.261	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.79	506.73	3840.00	10.71	110.73	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.132	0.261	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.79	506.73	3840.00	10.71	110.73	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.230	0.459	1.60	1.000	1.00	1.00	1.00	1.00	1.00	24.01	882.36	3840.00	18.84	194.69	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.230	0.459	1.60	1.000	1.00	1.00	1.00	1.00	1.00	24.01	882.36	3840.00	18.84	194.69	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.230	0.459	1.60	1.000	1.00	1.00	1.00	1.00	1.00	24.01	882.36	3840.00	18.84	194.69	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.079	0.157	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.27	304.04	3840.00	6.43	66.44	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.079	0.157	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.27	304.04	3840.00	6.43	66.44	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0642	3.621		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	22.474	5.040
Overall MINimum	11.013	2.532
+D+H	11.461	2.508
+D+L+H	22.474	5.040
+D+Lr+H	11.461	2.508
+D+S+H	11.461	2.508
+D+0.750Lr+0.750L+H	19.721	4.407
+D+0.750L+0.750S+H	19.721	4.407
+D+0.60W+H	11.461	2.508
+D+0.70E+H	11.461	2.508
+D+0.750Lr+0.750L+0.450W+H	19.721	4.407
+D+0.750L+0.750S+0.450W+H	19.721	4.407
+D+0.750L+0.750S+0.5250E+H	19.721	4.407
+0.60D+0.60W+0.60H	6.877	1.505
+0.60D+0.70E+0.60H	6.877	1.505
D Only	11.461	2.508
Lr Only		
L Only	11.013	2.532
S Only		
W Only		
E Only		
H Only		

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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

204

Printed: 5 FEB 2019, 9:15AM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10
Licensee : Peoples Associates Structural Engineers

Lic. #: KW-06009713

Description : CO-B.22

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

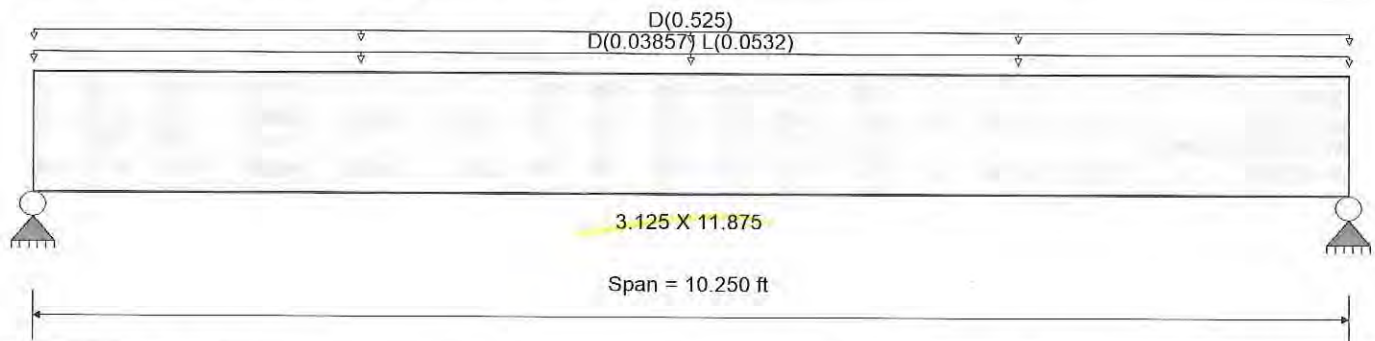
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10

Wood Species : DF/DF
Wood Grade : 24F - V4

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.20 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.0290, L = 0.040 ksf, Tributary Width = 1.330 ft, (2nd Flr Loads)

Uniform Load : D = 0.0140 ksf, Tributary Width = 37.50 ft, (Wall Loads)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.568	1	Maximum Shear Stress Ratio	=	0.402	1
Section used for this span		3.125 X 11.875		Section used for this span		3.125 X 11.875	
fb : Actual	=	1,226.52 psi		fv : Actual	=	95.94 psi	
FB : Allowable	=	2,160.00 psi		Fv : Allowable	=	238.50 psi	
Load Combination		+D+H		Load Combination		+D+H	
Location of maximum on span	=	5.125 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.017 in	Ratio = 7264			>=480	
Max Upward Transient Deflection		0.000 in	Ratio = 0			<480	
Max Downward Total Deflection		0.199 in	Ratio = 618			>=360	
Max Upward Total Deflection		0.000 in	Ratio = 0			<360	

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v	
+D+H																	
Length = 10.250 ft	1	0.568	0.402	0.90	1.000	1.00	1.00	1.00	1.00	1.00	7.51	1,226.52	2160.00	0.00	0.00	0.00	
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 10.250 ft	1	0.559	0.396	1.00	1.000	1.00	1.00	1.00	1.00	1.00	8.21	1,340.67	2400.00	2.59	104.87	265.00	
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 10.250 ft	1	0.409	0.290	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.51	1,226.52	3000.00	2.37	95.94	331.25	

Description : CO-B.22

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
		M	V								M	f _b	F' _b	V	f _v	F' _v
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.444	0.315	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.51	1,226.52	2760.00	2.37	95.94	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.437	0.310	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.03	1,312.13	3000.00	2.54	102.64	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.475	0.337	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.03	1,312.13	2760.00	2.54	102.64	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.319	0.226	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.51	1,226.52	3840.00	2.37	95.94	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.319	0.226	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.51	1,226.52	3840.00	2.37	95.94	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.342	0.242	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.03	1,312.13	3840.00	2.54	102.64	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.342	0.242	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.03	1,312.13	3840.00	2.54	102.64	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.342	0.242	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.03	1,312.13	3840.00	2.54	102.64	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.192	0.136	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.50	735.91	3840.00	1.42	57.56	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.250 ft	1	0.192	0.136	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.50	735.91	3840.00	1.42	57.56	424.00

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+I+H	1	0.1988	5.162		0.0000	0.000

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.202	3.202
Overall MINimum	0.273	0.273
+D+H	2.930	2.930
+D+L+H	3.202	3.202
+D+Lr+H	2.930	2.930
+D+S+H	2.930	2.930
+D+0.750Lr+0.750L+H	3.134	3.134
+D+0.750L+0.750S+H	3.134	3.134
+D+0.60W+H	2.930	2.930
+D+0.70E+H	2.930	2.930
+D+0.750Lr+0.750L+0.450W+H	3.134	3.134
+D+0.750L+0.750S+0.450W+H	3.134	3.134
+D+0.750L+0.750S+0.5250E+H	3.134	3.134
+0.60D+0.60W+0.60H	1.758	1.758
+0.60D+0.70E+0.60H	1.758	1.758
D Only	2.930	2.930
Lr Only		
L Only	0.273	0.273
S Only		
W Only		
E Only		
H Only		

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Licensee : Peoples Associates Structural Engineers

Description : CO-B.23

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

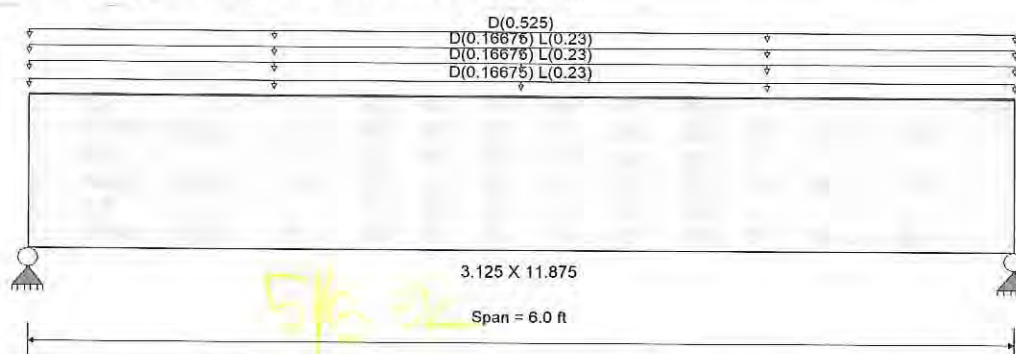
Load Combination Set : ASCE 7-10

Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-10

Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.20 pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 5.750 ft, (2nd Flr Loads)

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 5.750 ft, (3rd Flr Loads)

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 5.750 ft. (4th Flr Loads)

Uniform Load : $D = 0.0140$ ksf, Tributary Width = 37.50 ft. (Wall Loads)

Design OK

Maximum Bending Stress Ratio	=	0.528 : 1	Maximum Shear Stress Ratio	=	0.530 : 1
Section used for this span		3.125 X 11.875	Section used for this span		3.125 X 11.875
fb : Actual	=	1,267.03psi	f _v : Actual	=	140.33 psi
FB : Allowable	=	2,400.00psi	F _v : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.026 in	Ratio =		2792 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.064 in	Ratio =		1118 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00	

Title Block Line 1
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using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 5 FEB 2019, 9:19AM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : CO-B.23

Load Combination Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v	
Length = 6.0 ft	1	0.352	0.353	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.65	759.71	2160.00	2.08	84.14	238.50	
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.528	0.530	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.75	1,267.03	2400.00	3.47	140.33	265.00	
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.253	0.254	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.65	759.71	3000.00	2.08	84.14	331.25	
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.275	0.276	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.65	759.71	2760.00	2.08	84.14	304.75	
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.380	0.381	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.98	1,140.20	3000.00	3.12	126.28	331.25	
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.413	0.414	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.98	1,140.20	2760.00	3.12	126.28	304.75	
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.198	0.198	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.65	759.71	3840.00	2.08	84.14	424.00	
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.198	0.198	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.65	759.71	3840.00	2.08	84.14	424.00	
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.297	0.298	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.98	1,140.20	3840.00	3.12	126.28	424.00	
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.297	0.298	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.98	1,140.20	3840.00	3.12	126.28	424.00	
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.297	0.298	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.98	1,140.20	3840.00	3.12	126.28	424.00	
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.119	0.119	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.83	3840.00	1.25	50.49	424.00	
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 6.0 ft	1	0.119	0.119	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.83	3840.00	1.25	50.49	424.00	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0644	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.170	5.170
Overall MINimum	2.070	2.070
+D+H	3.100	3.100
+D+L+H	5.170	5.170
+D+Lr+H	3.100	3.100
+D+S+H	3.100	3.100
+D+0.750Lr+0.750L+H	4.652	4.652
+D+0.750L+0.750S+H	4.652	4.652
+D+0.60W+H	3.100	3.100
+D+0.70E+H	3.100	3.100
+D+0.750Lr+0.750L+0.450W+H	4.652	4.652
+D+0.750L+0.750S+0.450W+H	4.652	4.652
+D+0.750L+0.750S+0.5250E+H	4.652	4.652
+0.60D+0.60W+0.60H	1.860	1.860
+0.60D+0.70E+0.60H	1.860	1.860
D Only	3.100	3.100
Lr Only		
L Only	2.070	2.070
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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 using the "Settings" menu item
 and then using the "Printing &
 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

210

Printed: 4 FEB 2019, 9:39PM

Steel Column

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: Steel Column for CO-B.16

Maximum Deflections for Load Combinations

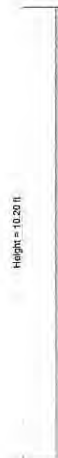
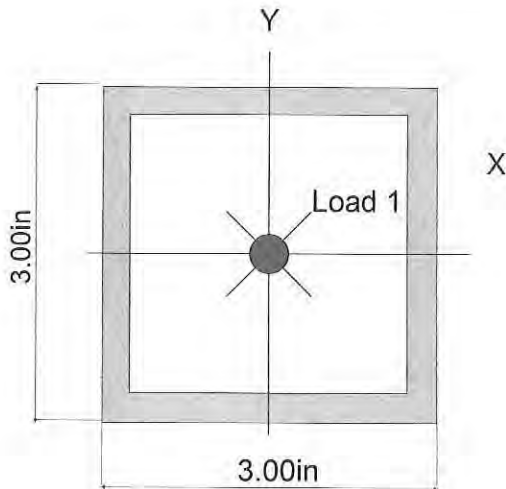
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS3x3x1/4

Depth	=	3.000 in	I xx	=	3.02 in^4	J	=	5.080 in^4
Design Thick	=	0.233 in	S xx	=	2.01 in^3			
Width	=	3.000 in	R xx	=	1.110 in			
Wall Thick	=	0.250 in	Zx	=	2.480 in^3			
Area	=	2.440 in^2	I yy	=	3.020 in^4	C	=	3.520 in^4
Weight	=	8.810 plf	S yy	=	2.010 in^3			
			R yy	=	1.110 in			

Ycg = 0.000 in

Sketches



Printed: 5 FEB 2019, 10:14AM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Description : B-A4.0.1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

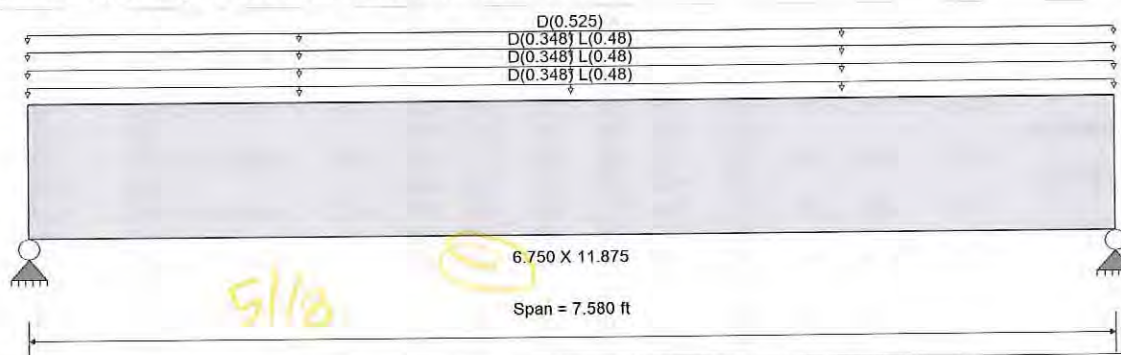
Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-10

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

<i>E: Modulus of Elasticity</i>	
Ebend- xx	1,800.0ksi
Eminbend - xx	950.0ksi
Ebend- yy	1,600.0ksi
Eminbend - yy	850.0ksi
Density	31.20pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 12.0 ft, (2nd Flr Loads)

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 12.0 ft, (3rd Flr Loads)

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 12.0 ft, (4th Flr Loads)

Uniform Load : $D = 0.0140$ ksf, Tributary Width = 37.50 ft, (Wall Loads)

DESIGN SUMMARY

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.685	1
Section used for this span	=	6.750 X 11.875	
fb : Actual	=	1,644.11 psi	
FB : Allowable	=	2,400.00 psi	
Load Combination	=	+D+L+H	
Location of maximum on span	=	3.790 ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection		0.063 in	Ratio = 1433 >=480
Max Upward Transient Deflection		0.000 in	Ratio = 0 <480
Max Downward Total Deflection		0.133 in	Ratio = 682 >=360
Max Upward Total Deflection		0.000 in	Ratio = 0 <360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																	
Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v	F ^v	
+D+H													0.00	0.00	0.00	0.00	

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

212

Printed: 5 FEB 2019, 10:14AM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-A4.0.1

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _I	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 7.580 ft	1	0.399	0.351	0.90	1.000	1.00	1.00	1.00	1.00	1.00	11.39	861.81	2160.00	4.48	83.77	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.685	0.603	1.00	1.000	1.00	1.00	1.00	1.00	1.00	21.74	1,644.11	2400.00	8.54	159.81	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.287	0.253	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.39	861.81	3000.00	4.48	83.77	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.312	0.275	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.39	861.81	2760.00	4.48	83.77	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.483	0.425	1.25	1.000	1.00	1.00	1.00	1.00	1.00	19.15	1,448.54	3000.00	7.52	140.80	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.525	0.462	1.15	1.000	1.00	1.00	1.00	1.00	1.00	19.15	1,448.54	2760.00	7.52	140.80	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.224	0.198	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.39	861.81	3840.00	4.48	83.77	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.224	0.198	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.39	861.81	3840.00	4.48	83.77	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.377	0.332	1.60	1.000	1.00	1.00	1.00	1.00	1.00	19.15	1,448.54	3840.00	7.52	140.80	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.377	0.332	1.60	1.000	1.00	1.00	1.00	1.00	1.00	19.15	1,448.54	3840.00	7.52	140.80	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.377	0.332	1.60	1.000	1.00	1.00	1.00	1.00	1.00	19.15	1,448.54	3840.00	7.52	140.80	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.135	0.119	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.84	517.09	3840.00	2.69	50.26	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00		0.00	0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.135	0.119	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.84	517.09	3840.00	2.69	50.26	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1334	3.818		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	11.470	11.470
Overall MINimum	5.458	5.458
+D+H	6.012	6.012
+D+L+H	11.470	11.470
+D+Lr+H	6.012	6.012
+D+S+H	6.012	6.012
+D+0.750Lr+0.750L+H	10.106	10.106
+D+0.750L+0.750S+H	10.106	10.106
+D+0.60W+H	6.012	6.012
+D+0.70E+H	6.012	6.012
+D+0.750Lr+0.750L+0.450W+H	10.106	10.106
+D+0.750L+0.750S+0.450W+H	10.106	10.106
+D+0.750L+0.750S+0.5250E+H	10.106	10.106
+0.60D+0.60W+0.60H	3.607	3.607
+0.60D+0.70E+0.60H	3.607	3.607
D Only	6.012	6.012
Lr Only		
L Only	5.458	5.458
S Only		
W Only		
E Only		
H Only		

Printed: 5 FEB 2019, 10:15AM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - 2nd Floor Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. # : KW-06009713

Description : B-A4.0.2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

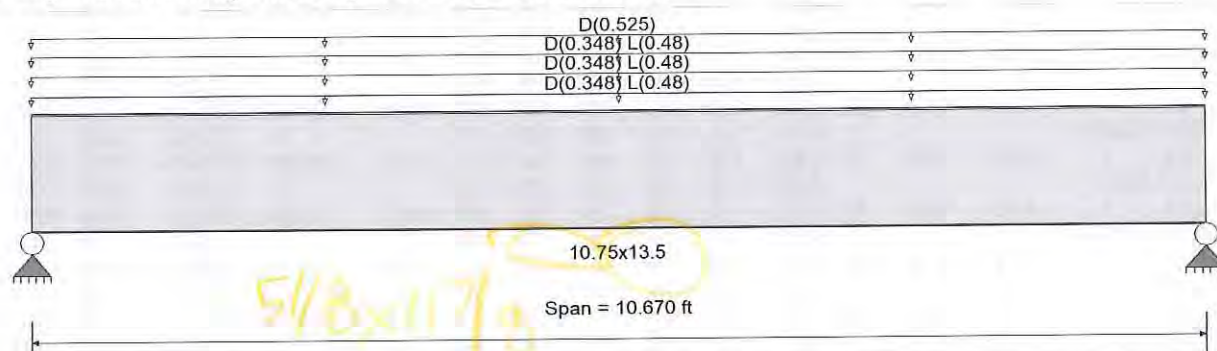
Material Properties

Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-10

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Et	1,100.0 psi	Density	31.20 pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 12.0 ft, (2nd Flr Loads)

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 12.0 ft, (3rd Flr Loads)

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 12.0 ft, (4th Flr Loads)

Uniform Load : $D = 0.0140$ ksf, Tributary Width = 37.50 ft, (Wall Loads)

DESIGN SUMMARY

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.675	1
Section used for this span		10.75x13.5	
fb : Actual	=	1,590.13 psi	
FB : Allowable	=	2,356.84 psi	
Load Combination		+D+L+H	
Location of maximum on span	=	5.335 ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection		0.106 in	Ratio = 1202 >= 480
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480
Max Downward Total Deflection		0.225 in	Ratio = 569 >= 360
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017. Build:10.17.12.10. Ver:10.17.12.10

Licensee : Peoples Associates Structural Engineers

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 10.670 ft +D+L+H	1	0.395	0.294	0.90	0.982	1.00	1.00	1.00	1.00	1.00	22.78	837.02	2121.16	6.79	70.21	238.50
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+Lr+H	1	0.675	0.503	1.00	0.982	1.00	1.00	1.00	1.00	1.00	43.27	1,590.13	2356.84	12.91	133.39	265.00
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+S+H	1	0.284	0.212	1.25	0.982	1.00	1.00	1.00	1.00	1.00	22.78	837.02	2946.05	6.79	70.21	331.25
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+0.750Lr+0.750L+H	1	0.309	0.230	1.15	0.982	1.00	1.00	1.00	1.00	1.00	22.78	837.02	2710.37	6.79	70.21	304.75
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+0.750L+0.750S+H	1	0.476	0.355	1.25	0.982	1.00	1.00	1.00	1.00	1.00	38.15	1,401.85	2946.05	11.38	117.60	331.25
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+0.60W+H	1	0.517	0.386	1.15	0.982	1.00	1.00	1.00	1.00	1.00	38.15	1,401.85	2710.37	11.38	117.60	304.75
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+0.70E+H	1	0.222	0.166	1.60	0.982	1.00	1.00	1.00	1.00	1.00	22.78	837.02	3770.94	6.79	70.21	424.00
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+0.750Lr+0.750L+0.450W+H	1	0.222	0.166	1.60	0.982	1.00	1.00	1.00	1.00	1.00	22.78	837.02	3770.94	6.79	70.21	424.00
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+0.750L+0.750S+0.450W+H	1	0.372	0.277	1.60	0.982	1.00	1.00	1.00	1.00	1.00	38.15	1,401.85	3770.94	11.38	117.60	424.00
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +D+0.750L+0.750S+0.5250E+H	1	0.372	0.277	1.60	0.982	1.00	1.00	1.00	1.00	1.00	38.15	1,401.85	3770.94	11.38	117.60	424.00
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +0.60D+0.60W+0.60H	1	0.372	0.277	1.60	0.982	1.00	1.00	1.00	1.00	1.00	38.15	1,401.85	3770.94	11.38	117.60	424.00
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft +0.60D+0.70E+0.60H	1	0.133	0.099	1.60	0.982	1.00	1.00	1.00	1.00	1.00	13.67	502.21	3770.94	4.08	42.13	424.00
					0.982	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.133	0.099	1.60	0.982	1.00	1.00	1.00	1.00	1.00	13.67	502.21				

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2248	5.374		0.0000	0.000

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	16.221	16.221
Overall MINimum	7.682	7.682
+D+H	8.538	8.538
+D+L+H	16.221	16.221
+D+Lr+H	8.538	8.538
+D+S+H	8.538	8.538
+D+0.750Lr+0.750L+H	14.300	14.300
+D+0.750L+0.750S+H	14.300	14.300
+D+0.60W+H	8.538	8.538
+D+0.70E+H	8.538	8.538
+D+0.750Lr+0.750L+0.450W+H	14.300	14.300
+D+0.750L+0.750S+0.450W+H	14.300	14.300
+D+0.750L+0.750S+0.5250E+H	14.300	14.300
+0.60D+0.60W+0.60H	5.123	5.123
+0.60D+0.70E+0.60H	5.123	5.123
D Only	8.538	8.538
Lr Only		
L Only	7.682	7.682
S Only		
W Only		
E Only		
H Only		

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

Project Title:
 Engineer:
 Project Descr:

Project ID:

215

Printed: 5 FEB 2019, 2:04PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\18-234 Legacy at Livermore - 2nd Floor Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-A4.0.3

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

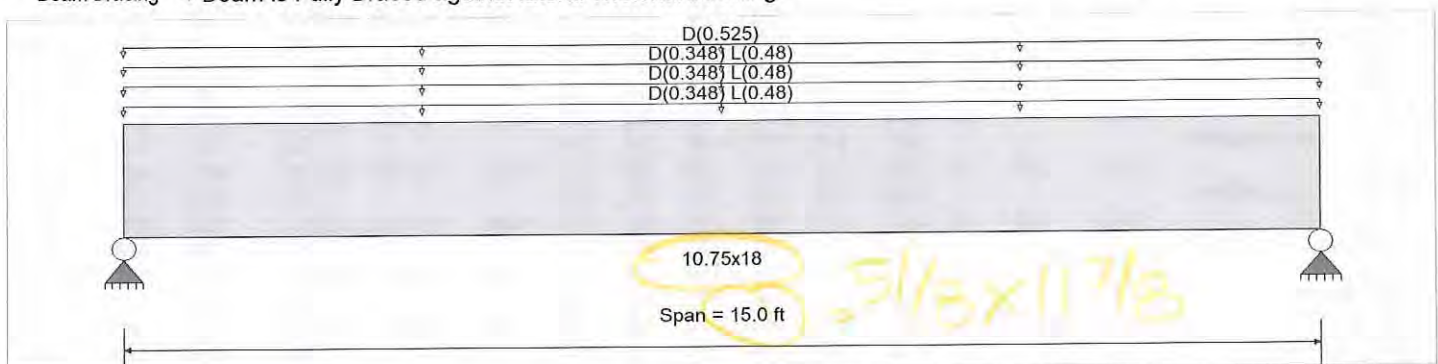
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-10

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb + 2,400.0 psi
 Fb - 1,850.0 psi
 Fc - Prll 1,650.0 psi
 Fc - Perp 650.0 psi
 Fv 265.0 psi
 Ft 1,100.0 psi
 E: Modulus of Elasticity
 Ebend-xx 1,800.0 ksi
 Eminbend-xx 950.0 ksi
 Ebend-yy 1,600.0 ksi
 Eminbend-yy 850.0 ksi
 Density 31.20 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 12.0 ft, (2nd Flr Loads)

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 12.0 ft, (3rd Flr Loads)

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 12.0 ft, (4th Flr Loads)

Uniform Load: D = 0.0140 ksf, Tributary Width = 37.50 ft, (Wall Loads)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.801: 1	Maximum Shear Stress Ratio	=	0.537: 1
Section used for this span		10.75x18	Section used for this span		10.75x18
fb: Actual	=	1,773.79psi	fv: Actual	=	142.42 psi
FB: Allowable	=	2,213.32psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	7.500ft	Location of maximum on span	=	13.522 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.175 in	Ratio =		1026 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.372 in	Ratio =		484 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																	
Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v	
+D+H													0.00	0.00	0.00	0.00	

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - 2nd Floor Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-A4.0.3

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v
Length = 15.0 ft	1	0.470	0.315	0.90	0.922	1.00	1.00	1.00	1.00	1.00	45.31	936.58	1991.98	9.70	75.20	238.50
+D+L+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.801	0.537	1.00	0.922	1.00	1.00	1.00	1.00	1.00	85.81	1,773.79	2213.32	18.37	142.42	265.00
+D+Lr+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.339	0.227	1.25	0.922	1.00	1.00	1.00	1.00	1.00	45.31	936.58	2766.65	9.70	75.20	331.25
+D+S+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.368	0.247	1.15	0.922	1.00	1.00	1.00	1.00	1.00	45.31	936.58	2545.31	9.70	75.20	304.75
+D+0.750Lr+0.750L+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.565	0.379	1.25	0.922	1.00	1.00	1.00	1.00	1.00	75.68	1,564.49	2766.65	16.20	125.62	331.25
+D+0.750L+0.750S+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.615	0.412	1.15	0.922	1.00	1.00	1.00	1.00	1.00	75.68	1,564.49	2545.31	16.20	125.62	304.75
+D+0.60W+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.264	0.177	1.60	0.922	1.00	1.00	1.00	1.00	1.00	45.31	936.58	3541.31	9.70	75.20	424.00
+D+0.70E+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.264	0.177	1.60	0.922	1.00	1.00	1.00	1.00	1.00	45.31	936.58	3541.31	9.70	75.20	424.00
+D+0.750Lr+0.750L+0.450W+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.442	0.296	1.60	0.922	1.00	1.00	1.00	1.00	1.00	75.68	1,564.49	3541.31	16.20	125.62	424.00
+D+0.750L+0.750S+0.450W+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.442	0.296	1.60	0.922	1.00	1.00	1.00	1.00	1.00	75.68	1,564.49	3541.31	16.20	125.62	424.00
+D+0.750L+0.750S+0.5250E+H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.442	0.296	1.60	0.922	1.00	1.00	1.00	1.00	1.00	75.68	1,564.49	3541.31	16.20	125.62	424.00
+0.60D+0.60W+0.60H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.159	0.106	1.60	0.922	1.00	1.00	1.00	1.00	1.00	27.18	561.95	3541.31	5.82	45.12	424.00
+0.60D+0.70E+0.60H					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.159	0.106	1.60	0.922	1.00	1.00	1.00	1.00	1.00	27.18	561.95	3541.31	5.82	45.12	424.00

Overall Maximum Deflections

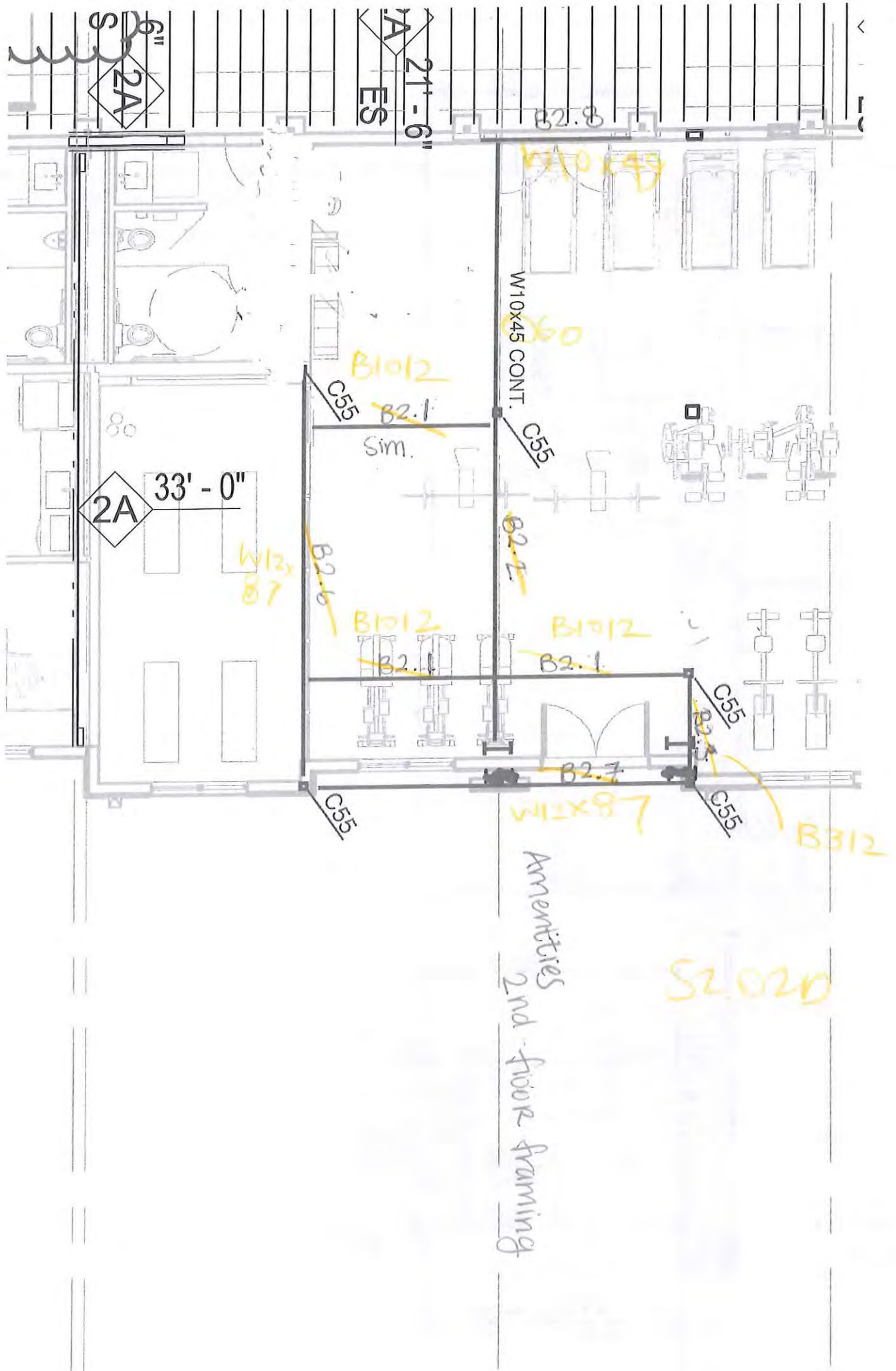
Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3717	7.555		0.0000	0.000

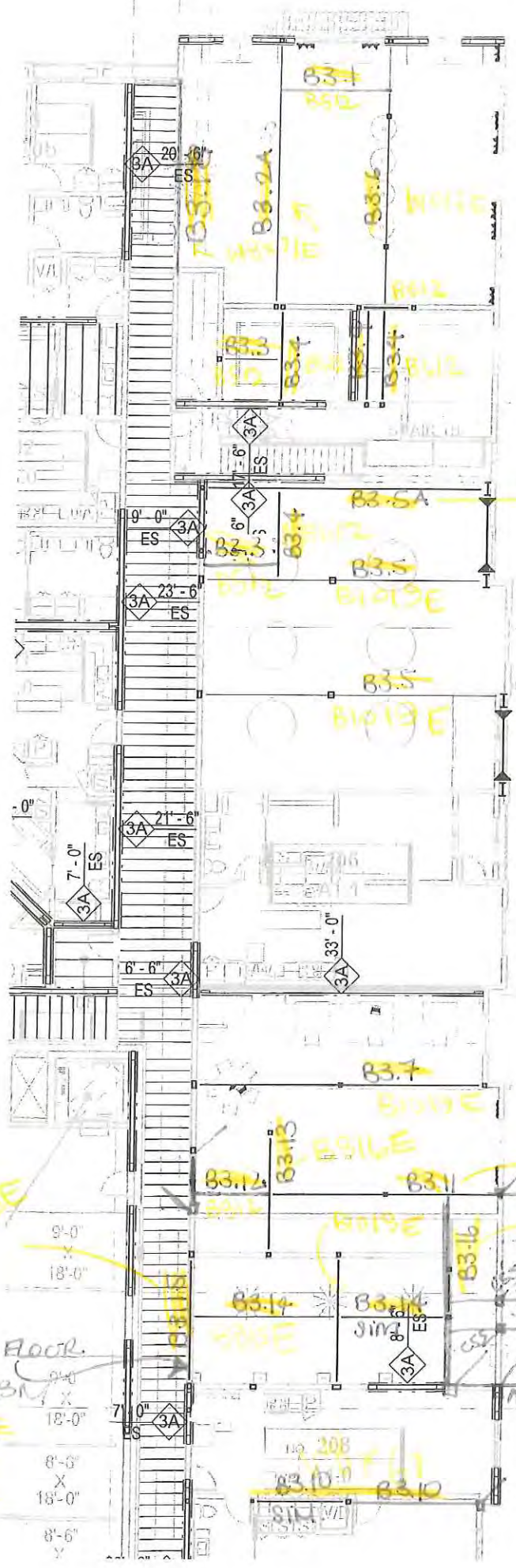
Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	22.882	22.882
Overall MINimum	10.800	10.800
+D+H	12.082	12.082
+D+L+H	22.882	22.882
+D+Lr+H	12.082	12.082
+D+S+H	12.082	12.082
+D+0.750Lr+0.750L+H	20.182	20.182
+D+0.750L+0.750S+H	20.182	20.182
+D+0.60W+H	12.082	12.082
+D+0.70E+H	12.082	12.082
+D+0.750Lr+0.750L+0.450W+H	20.182	20.182
+D+0.750L+0.750S+0.450W+H	20.182	20.182
+D+0.750L+0.750S+0.5250E+H	20.182	20.182
+0.60D+0.60W+0.60H	7.249	7.249
+0.60D+0.70E+0.60H	7.249	7.249
D Only	12.082	12.082
Lr Only		
L Only	10.800	10.800
S Only		
W Only		
E Only		
H Only		





1/7/19

AMENITIES BEAM KEY
3RD FLOOR FRAMING

S2.03D

CALL P 232

2ND FLOOR
LOBBY BAY

B3.1

8'-0"
X
18'-0"
8'-6"
Y

NO. 208

B3.10-0

B3.10

B3.17 B3.12

K

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

File = Z:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Amenities Beams.ec6
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Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B2.1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-16

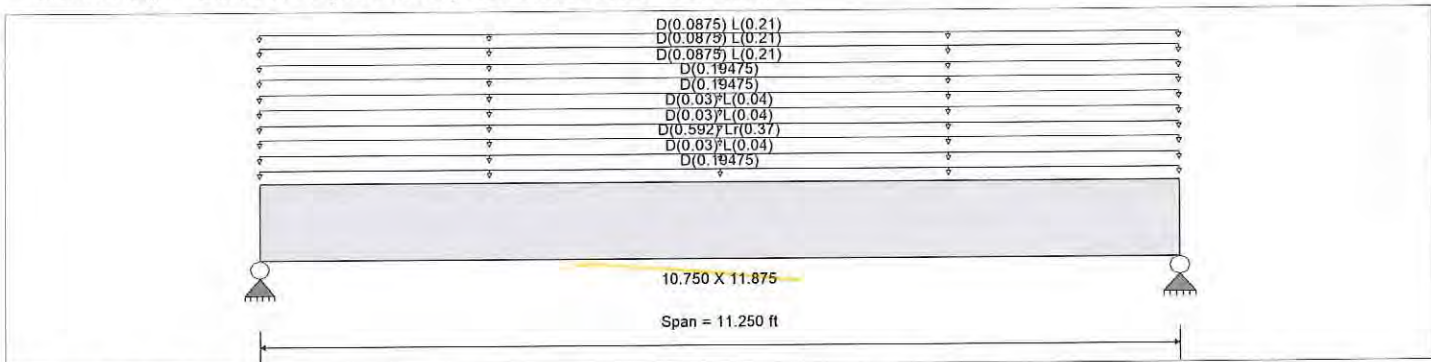
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Uniform Load : D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior wall)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)
 Uniform Load : D = 0.0320, Lr = 0.020 ksf, Tributary Width = 18.50 ft, (roof)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)
 Uniform Load : D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior wall)
 Uniform Load : D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior wall)
 Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 3.50 ft, (Deck)
 Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 3.50 ft, (Deck)
 Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 3.50 ft, (Deck)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.721 : 1	Maximum Shear Stress Ratio	=	0.469 : 1
Section used for this span		10.750 X 11.875	Section used for this span		10.750 X 11.875
fb : Actual	=	1,712.26psi	fv : Actual	=	124.23 psi
FB : Allowable	=	2,374.66psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.625ft	Location of maximum on span	=	10.265 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.101 in	Ratio =		1340 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.318 in	Ratio =		424 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	13.324	13.324
Overall MINimum	4.219	4.219
+D+H	8.599	8.599

Wood Beam

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Description : B2.1

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+L+H	12.818	12.818
+D+Lr+H	10.680	10.680
+D+S+H	8.599	8.599
+D+0.750Lr+0.750L+H	13.324	13.324
+D+0.750L+0.750S+H	11.763	11.763
+D+0.60W+H	8.599	8.599
+D+0.750Lr+0.450W+H	10.160	10.160
+D+0.750S+0.450W+H	8.599	8.599
+0.60D+0.60W+0.60H	5.160	5.160
+D+0.70E+0.60H	8.599	8.599
+D+0.750L+0.750S+0.5250E+H	11.763	11.763
+0.60D+0.70E+H	5.160	5.160
D Only	8.599	8.599
Lr Only	2.081	2.081
L Only	4.219	4.219
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description : B2.2- Option 1

CODE REFERENCES

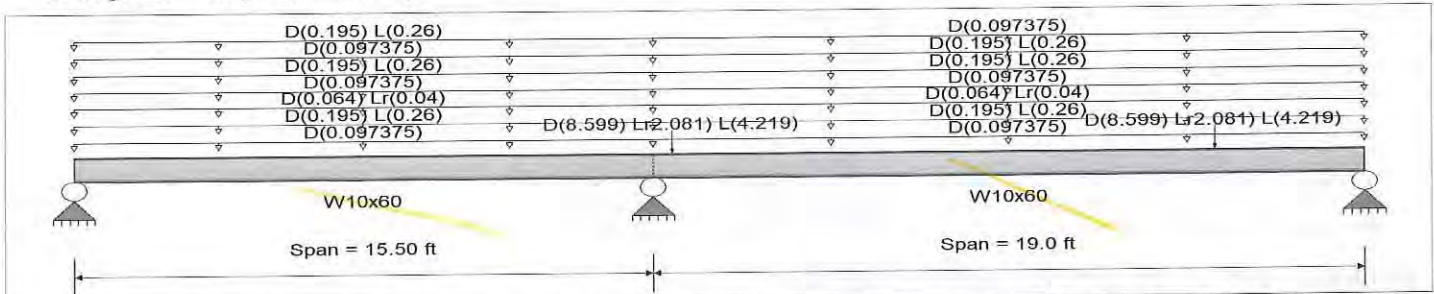
Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.50 ft, (floor)

Uniform Load : D = 0.0320, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)

Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.50 ft, (floor)

Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.50 ft, (floor)

Load for Span Number 2

Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.50 ft, (floor)

Uniform Load : D = 0.0320, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)

Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.50 ft, (floor)

Point Load : D = 8.599, Lr = 2.081, L = 4.219 k @ 15.0 ft, (B2.1)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.50 ft, (floor)

Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)

Point Load : D = 8.599, Lr = 2.081, L = 4.219 k @ 15.0 ft, (B2.1)

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Description : B2.2- Option 1

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

Point Load : $D = 8.599$, $L_r = 2.081$, $L = 4.219$ k @ 0.50 ft, (B2.1)

Design OK

Maximum Bending Stress Ratio =	0.610 : 1	Maximum Shear Stress Ratio =	0.459 : 1
Section used for this span	W10x60	Section used for this span	W10x60
Ma : Applied	113.631 k-ft	Va : Applied	39.301 k
Mn / Omega : Allowable	186.128 k-ft	Vn/Omega : Allowable	85.680 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	14.972 ft	Location of maximum on span	15.500 ft
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.215 in	Ratio =	1,061 >=480
Max Upward Transient Deflection	-0.019 in	Ratio =	9,547 >=480
Max Downward Total Deflection	0.556 in	Ratio =	410 >=360
Max Upward Total Deflection	-0.064 in	Ratio =	2912 >=360

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 15.50 ft	1	0.303	0.279	7.08	-56.46	56.46	310.83	186.13	1.00	1.00	23.91	128.52	85.68
Dsgn. L = 19.00 ft	2	0.384	0.279	71.53	-56.46	71.53	310.83	186.13	1.00	1.00	23.91	128.52	85.68
+D+L+H													
Dsgn. L = 15.50 ft	1	0.518	0.459	14.73	-96.37	96.37	310.83	186.13	1.00	1.00	39.30	128.52	85.68
Dsgn. L = 19.00 ft	2	0.610	0.459	113.63	-96.37	113.63	310.83	186.13	1.00	1.00	39.30	128.52	85.68
+D+Lr+H													
Dsgn. L = 15.50 ft	1	0.338	0.321	6.40	-62.93	62.93	310.83	186.13	1.00	1.00	27.53	128.52	85.68
Dsgn. L = 19.00 ft	2	0.455	0.321	84.70	-62.93	84.70	310.83	186.13	1.00	1.00	27.53	128.52	85.68
+D+S+H													
Dsgn. L = 15.50 ft	1	0.303	0.279	7.08	-56.46	56.46	310.83	186.13	1.00	1.00	23.91	128.52	85.68
Dsgn. L = 19.00 ft	2	0.384	0.279	71.53	-56.46	71.53	310.83	186.13	1.00	1.00	23.91	128.52	85.68
+D+0.750Lr+0.750L+H													
Dsgn. L = 15.50 ft	1	0.490	0.445	12.24	-91.24	91.24	310.83	186.13	1.00	1.00	38.17	128.52	85.68
Dsgn. L = 19.00 ft	2	0.607	0.445	112.99	-91.24	112.99	310.83	186.13	1.00	1.00	38.17	128.52	85.68
+D+0.750L+0.750S+H													
Dsgn. L = 15.50 ft	1	0.464	0.414	12.81	-86.39	86.39	310.83	186.13	1.00	1.00	35.45	128.52	85.68
Dsgn. L = 19.00 ft	2	0.554	0.414	103.10	-86.39	103.10	310.83	186.13	1.00	1.00	35.45	128.52	85.68
+D+0.60W+H													
Dsgn. L = 15.50 ft	1	0.303	0.279	7.08	-56.46	56.46	310.83	186.13	1.00	1.00	23.91	128.52	85.68
Dsgn. L = 19.00 ft	2	0.384	0.279	71.53	-56.46	71.53	310.83	186.13	1.00	1.00	23.91	128.52	85.68
+D+0.750Lr+0.450W+H													
Dsgn. L = 15.50 ft	1	0.329	0.311	6.56	-61.31	61.31	310.83	186.13	1.00	1.00	26.62	128.52	85.68
Dsgn. L = 19.00 ft	2	0.437	0.311	81.41	-61.31	81.41	310.83	186.13	1.00	1.00	26.62	128.52	85.68
+D+0.750S+0.450W+H													
Dsgn. L = 15.50 ft	1	0.303	0.279	7.08	-56.46	56.46	310.83	186.13	1.00	1.00	23.91	128.52	85.68
Dsgn. L = 19.00 ft	2	0.384	0.279	71.53	-56.46	71.53	310.83	186.13	1.00	1.00	23.91	128.52	85.68
+0.60D+0.60W+0.60H													
Dsgn. L = 15.50 ft	1	0.182	0.167	4.25	-33.88	33.88	310.83	186.13	1.00	1.00	14.34	128.52	85.68
Dsgn. L = 19.00 ft	2	0.231	0.167	42.92	-33.88	42.92	310.83	186.13	1.00	1.00	14.34	128.52	85.68
+D+0.70E+0.60H													
Dsgn. L = 15.50 ft	1	0.303	0.279	7.08	-56.46	56.46	310.83	186.13	1.00	1.00	23.91	128.52	85.68
Dsgn. L = 19.00 ft	2	0.384	0.279	71.53	-56.46	71.53	310.83	186.13	1.00	1.00	23.91	128.52	85.68
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 15.50 ft	1	0.464	0.414	12.81	-86.39	86.39	310.83	186.13	1.00	1.00	35.45	128.52	85.68
Dsgn. L = 19.00 ft	2	0.554	0.414	103.10	-86.39	103.10	310.83	186.13	1.00	1.00	35.45	128.52	85.68
+0.60D+0.70E+H													
Dsgn. L = 15.50 ft	1	0.182	0.167	4									

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
L Only	1	0.0070	2.852	+D+0.750Lr+0.750L+H	-0.0639	11.780
+D+L+H	2	0.5563	11.020		0.0000	11.780

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description : B2.2- Option 1

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	7.121	58.857	31.855
Overall MINimum	-0.107	4.350	3.380
+D+H	3.651	34.842	19.773
+D+L+H	7.121	58.857	31.855
+D+Lr+H	3.544	39.192	23.153
+D+S+H	3.651	34.842	19.773
+D+0.750Lr+0.750L+H	6.173	56.116	31.369
+D+0.750L+0.750S+H	6.254	52.853	28.834
+D+0.60W+H	3.651	34.842	19.773
+D+0.750Lr+0.450W+H	3.570	38.105	22.308
+D+0.750S+0.450W+H	3.651	34.842	19.773
+0.60D+0.60W+0.60H	2.191	20.905	11.864
+D+0.70E+0.60H	3.651	34.842	19.773
+D+0.750L+0.750S+0.5250E+H	6.254	52.853	28.834
+0.60D+0.70E+H	2.191	20.905	11.864
D Only	3.651	34.842	19.773
Lr Only	-0.107	4.350	3.380
L Only	3.470	24.014	12.082
S Only			
W Only			
E Only			
H Only			

Wood Beam

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Description: B2.3

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

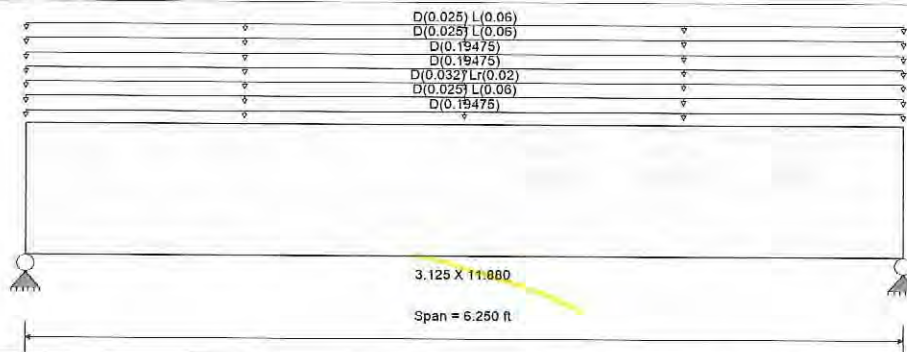
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

- Uniform Load: D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior wall)
- Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft, (deck)
- Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 1.0 ft, (roof)
- Uniform Load: D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior wall)
- Uniform Load: D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior wall)
- Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft, (deck)
- Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft, (deck)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.289	1	Maximum Shear Stress Ratio	=	0.285	1
Section used for this span		3.125 X 11.880		Section used for this span		3.125 X 11.880	
fb : Actual	=	694.48 psi		fv : Actual	=	75.48 psi	
FB : Allowable	=	2,400.00 psi		Fv : Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	3.125 ft		Location of maximum on span	=	5.269 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.008 in	Ratio = 9483 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.038 in	Ratio = 1959 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.723	2.723
Overall MINimum	0.563	0.563
+D+H	2.160	2.160
+D+L+H	2.723	2.723
+D+Lr+H	2.223	2.223
+D+S+H	2.160	2.160

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : B2.3

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+H	2.629	2.629
+D+0.750L+0.750S+H	2.582	2.582
+D+0.60W+H	2.160	2.160
+D+0.750Lr+0.450W+H	2.207	2.207
+D+0.750S+0.450W+H	2.160	2.160
+0.60D+0.60W+0.60H	1.296	1.296
+D+0.70E+0.60H	2.160	2.160
+D+0.750L+0.750S+0.5250E+H	2.582	2.582
+0.60D+0.70E+H	1.296	1.296
D Only	2.160	2.160
Lr Only	0.063	0.063
L Only	0.563	0.563
S Only		
W Only		
E Only		
H Only		

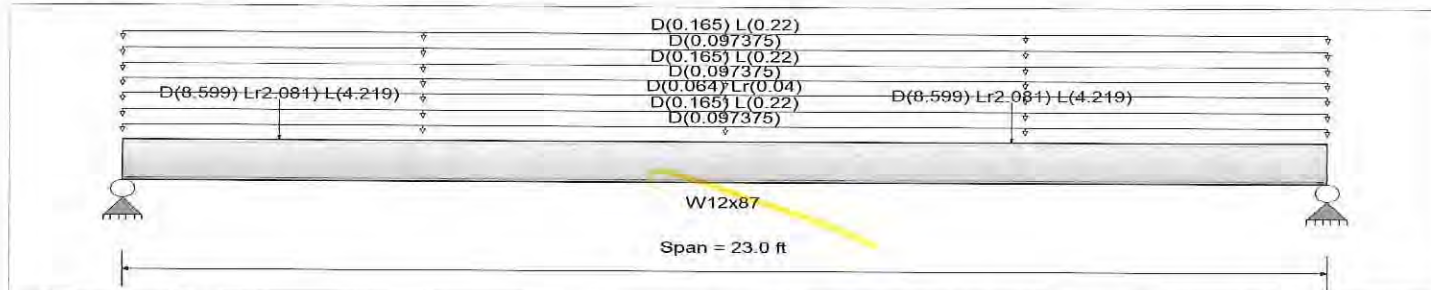
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Description : B2.6

Load Combination Set : ASCE 7-16

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



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

Uniform Load : $D = 0.00950$ ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 5.50 ft, (floor)

Uniform Load : $D = 0.0320$, $L_r = 0.020$ ksf, Tributary Width = 2.0 ft, (roof)

Uniform Load : $D = 0.00950$ ksf, Tributary Width = 10.250 ft. (interior wall)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 5.50 ft. (floor)

Uniform Load : $D = 0.00950$ ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 5.50 ft, (floor)

Point Load : $D = 8.599$, $L_r = 2.081$, $L = 4.219$ k @ 3.0 ft, (B2.1)

Point Load : $D = 8.599$, $L_r = 2.081$, $L = 4,219 \text{ k @ } 17.0 \text{ ft. (B2.1)}$

Design OK

Maximum Bending Stress Ratio =	0.481 : 1	Maximum Shear Stress Ratio =	0.248 : 1
Section used for this span	W12x87	Section used for this span	W12x87
Ma : Applied	158.529 k-ft	Va : Applied	31.868 k
Mn / Omega : Allowable	329.341 k-ft	Vn/Omega : Allowable	128.750 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	12.617 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.289 in	Ratio =	954 >=480
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480
Max Downward Total Deflection	0.733 in	Ratio =	376 >=360
Max Upward Total Deflection	0.000 in	Ratio =	0 <360

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description: B2.6

Load Combination Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
		M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 23.00 ft	1	0.291	0.152	95.72		95.72	550.00	329.34	1.00	1.00	19.51	193.13	128.75
+D+L+H													
Dsgn. L = 23.00 ft	1	0.481	0.248	158.53		158.53	550.00	329.34	1.00	1.00	31.87	193.13	128.75
+D+Lr+H													
Dsgn. L = 23.00 ft	1	0.328	0.173	108.07		108.07	550.00	329.34	1.00	1.00	22.32	193.13	128.75
+D+S+H													
Dsgn. L = 23.00 ft	1	0.291	0.152	95.72		95.72	550.00	329.34	1.00	1.00	19.51	193.13	128.75
+D+0.750Lr+0.750L+H													
Dsgn. L = 23.00 ft	1	0.462	0.240	152.05		152.05	550.00	329.34	1.00	1.00	30.89	193.13	128.75
+D+0.750L+0.750S+H													
Dsgn. L = 23.00 ft	1	0.434	0.224	142.82		142.82	550.00	329.34	1.00	1.00	28.78	193.13	128.75
+D+0.60W+H													
Dsgn. L = 23.00 ft	1	0.291	0.152	95.72		95.72	550.00	329.34	1.00	1.00	19.51	193.13	128.75
+D+0.750Lr+0.450W+H													
Dsgn. L = 23.00 ft	1	0.319	0.168	104.98		104.98	550.00	329.34	1.00	1.00	21.62	193.13	128.75
+D+0.750S+0.450W+H													
Dsgn. L = 23.00 ft	1	0.291	0.152	95.72		95.72	550.00	329.34	1.00	1.00	19.51	193.13	128.75
+0.60D+0.60W+0.60H													
Dsgn. L = 23.00 ft	1	0.174	0.091	57.43		57.43	550.00	329.34	1.00	1.00	11.71	193.13	128.75
+D+0.70E+0.60H													
Dsgn. L = 23.00 ft	1	0.291	0.152	95.72		95.72	550.00	329.34	1.00	1.00	19.51	193.13	128.75
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 23.00 ft	1	0.434	0.224	142.82		142.82	550.00	329.34	1.00	1.00	28.78	193.13	128.75
+0.60D+0.70E+H													
Dsgn. L = 23.00 ft	1	0.174	0.091	57.43		57.43	550.00	329.34	1.00	1.00	11.71	193.13	128.75

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.7331	11.631		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	31.868	28.524
Overall MINimum	2.812	2.270
+D+H	19.509	17.265
+D+L+H	31.868	28.524
+D+Lr+H	22.321	19.535
+D+S+H	19.509	17.265
+D+0.750Lr+0.750L+H	30.887	27.412
+D+0.750L+0.750S+H	28.778	25.709
+D+0.60W+H	19.509	17.265
+D+0.750Lr+0.450W+H	21.618	18.968
+D+0.750S+0.450W+H	19.509	17.265
+0.60D+0.60W+0.60H	11.705	10.359
+D+0.70E+0.60H	19.509	17.265
+D+0.750L+0.750S+0.5250E+H	28.778	25.709
+0.60D+0.70E+H	11.705	10.359
D Only	19.509	17.265
Lr Only	2.812	2.270
L Only	12.359	11.259
S Only		
W Only		
E Only		
H Only		

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CODE REFERENCES

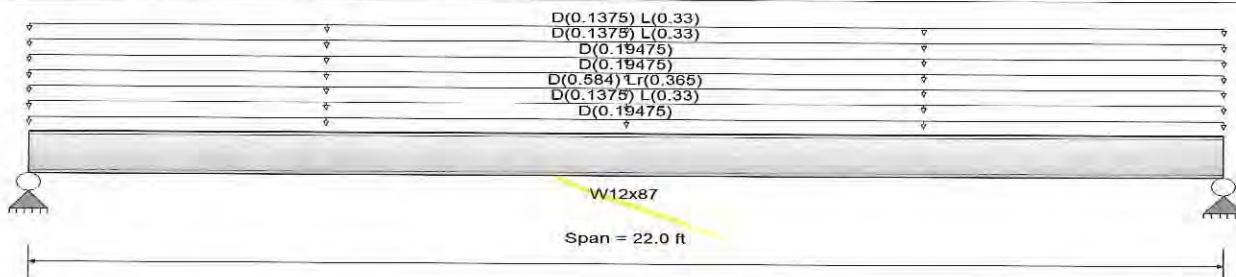
Load Combination Set : ASCE 7-16

Material Properties

F_y : Steel Yield : 50.0 ksi

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load : $D = 0.0190$ ksf, Tributary Width = 10.250 ft, (exterior)

Uniform Load : $D = 0.0250$, $L = 0.060$ ksf, Tributary Width = 5.50 ft. (deck)

Uniform Load : $D = 0.0320$, $L_r = 0.020$ ksf, Tributary Width = 18.250 ft. (roof)

Uniform Load : $D = 0.0190$ ksf, Tributary Width = 10.250 ft, (exterior)

Uniform Load : $D = 0.0190$ ksf, Tributary Width = 10.250 ft, (exterior)

Uniform Load : $D = 0.0250$, $L = 0.060$ ksf, Tributary Width = 5.50 ft. (deck)

Uniform Load : $D = 0.0250$, $L = 0.060$ ksf, Tributary Width = 5.50 ft. (deck)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.477 : 1	Maximum Shear Stress Ratio =	0.222 : 1
Section used for this span	W12x87	Section used for this span	W12x87
Ma : Applied	157.119 k-ft	Va : Applied	28.567 k
Mn / Omega : Allowable	329.341 k-ft	Vn/Omega : Allowable	128.750 k
Load Combination	+D+0.750Lr+0.750L+H	Load Combination	+D+0.750Lr+0.750L+H
Location of maximum on span	11.000 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.244 in	Ratio =	1,080 >=480
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480
Max Downward Total Deflection	0.641 in	Ratio =	412 >=360
Max Upward Total Deflection	0.000 in	Ratio =	0 <360

Maximum Forces & Stresses for Load Combinations

[illegible]

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description : B2.7

Load Combination Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
		M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 22.00 ft	1	0.290	0.135	95.64		95.64	550.00	329.34	1.00	1.00	17.39	193.13	128.75
+D+0.750Lr+0.750L+H													
Dsgn. L = 22.00 ft	1	0.477	0.222	157.12		157.12	550.00	329.34	1.00	1.00	28.57	193.13	128.75
+D+0.750L+0.750S+H													
Dsgn. L = 22.00 ft	1	0.427	0.198	140.56		140.56	550.00	329.34	1.00	1.00	25.56	193.13	128.75
+D+0.60W+H													
Dsgn. L = 22.00 ft	1	0.290	0.135	95.64		95.64	550.00	329.34	1.00	1.00	17.39	193.13	128.75
+D+0.750L+0.450W+H													
Dsgn. L = 22.00 ft	1	0.341	0.158	112.20		112.20	550.00	329.34	1.00	1.00	20.40	193.13	128.75
+D+0.750S+0.450W+H													
Dsgn. L = 22.00 ft	1	0.290	0.135	95.64		95.64	550.00	329.34	1.00	1.00	17.39	193.13	128.75
+0.60D+0.60W+0.60H													
Dsgn. L = 22.00 ft	1	0.174	0.081	57.38		57.38	550.00	329.34	1.00	1.00	10.43	193.13	128.75
+D+0.70E+0.60H													
Dsgn. L = 22.00 ft	1	0.290	0.135	95.64		95.64	550.00	329.34	1.00	1.00	17.39	193.13	128.75
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 22.00 ft	1	0.427	0.198	140.56		140.56	550.00	329.34	1.00	1.00	25.56	193.13	128.75
+0.60D+0.70E+H													
Dsgn. L = 22.00 ft	1	0.174	0.081	57.38		57.38	550.00	329.34	1.00	1.00	10.43	193.13	128.75

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L+H	1	0.6408	11.063		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	28.567	28.567
Overall MINimum	4.015	4.015
+D+H	17.388	17.388
+D+L+H	28.278	28.278
+D+Lr+H	21.403	21.403
+D+S+H	17.388	17.388
+D+0.750Lr+0.750L+H	28.567	28.567
+D+0.750L+0.750S+H	25.556	25.556
+D+0.60W+H	17.388	17.388
+D+0.750Lr+0.450W+H	20.400	20.400
+D+0.750S+0.450W+H	17.388	17.388
+0.60D+0.60W+0.60H	10.433	10.433
+D+0.70E+0.60H	17.388	17.388
+D+0.750L+0.750S+0.5250E+H	25.556	25.556
+0.60D+0.70E+H	10.433	10.433
D Only	17.388	17.388
Lr Only	4.015	4.015
L Only	10.890	10.890
S Only		
W Only		
E Only		
H Only		

Wood Beam

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Description: B2.9

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

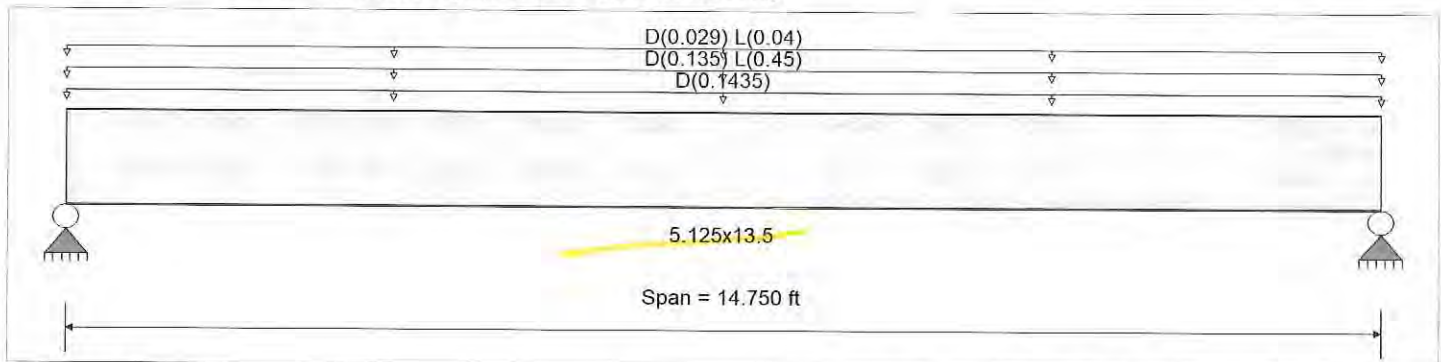
Wood Species: DF/DF
 Wood Grade: 24F - V4

Fb + 2,400.0 psi
 Fb - 1,850.0 psi
 Fc - Prll 1,650.0 psi
 Fc - Perp 650.0 psi
 Fv 265.0 psi
 Ft 1,100.0 psi

E: Modulus of Elasticity

Ebend-xx 1,800.0 ksi
 Eminbend-xx 950.0 ksi
 Ebend-yy 1,600.0 ksi
 Eminbend-yy 850.0 ksi
 Density 31.210 pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Uniform Load: D = 0.0140 ksf, Tributary Width = 10.250 ft, (Corridor wall)
 Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 4.50 ft, (corridor)
 Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.697	1	Maximum Shear Stress Ratio	=	0.411	1
Section used for this span		5.125x13.5		Section used for this span		5.125x13.5	
fb: Actual	=	1,671.84 psi		fv: Actual	=	108.90 psi	
FB: Allowable	=	2,400.00 psi		Fv: Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	7.375 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.278 in	Ratio = 637 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.452 in	Ratio = 391 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.882	5.882
Overall MINimum	3.614	3.614
+D+H	2.268	2.268
+D+L+H	5.882	5.882
+D+Lr+H	2.268	2.268
+D+S+H	2.268	2.268
+D+0.750Lr+0.750L+H	4.978	4.978
+D+0.750L+0.750S+H	4.978	4.978
+D+0.60W+H	2.268	2.268
+D+0.750Lr+0.450W+H	2.268	2.268
+D+0.750S+0.450W+H	2.268	2.268

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : B2.9

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+0.60D+0.60W+0.60H	1.361	1.361
+D+0.70E+0.60H	2.268	2.268
+D+0.750L+0.750S+0.5250E+H	4.978	4.978
+0.60D+0.70E+H	1.361	1.361
D Only	2.268	2.268
Lr Only		
L Only	3.614	3.614
S Only		
W Only		
E Only		
H Only		

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

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Description : B3.1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-16

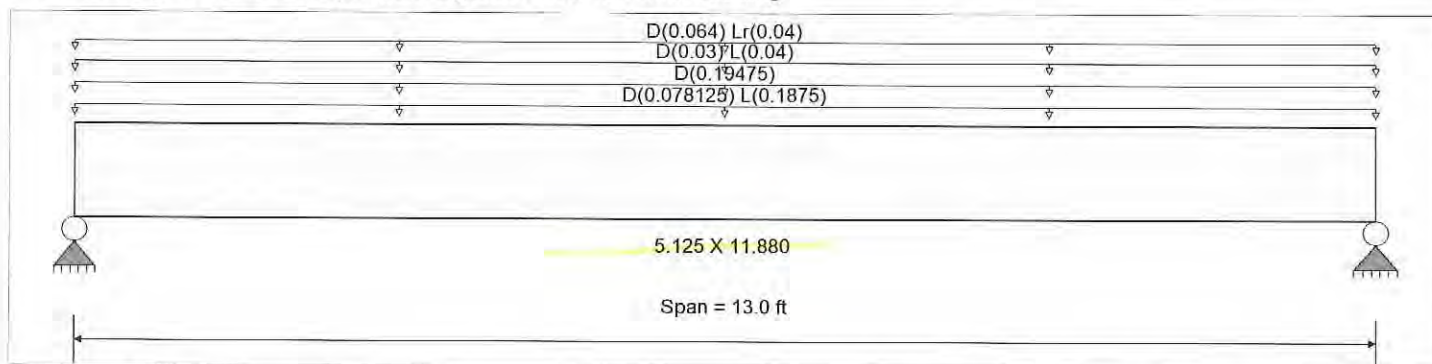
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Uniform Load : D = 0.0250, L = 0.060 ksf, Tributary Width = 3.125 ft, (Deck)

Uniform Load : D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior wall)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)

Uniform Load : D = 0.0320, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.521	1	Maximum Shear Stress Ratio	=	0.307	1
Section used for this span		5.125 X 11.880		Section used for this span		5.125 X 11.880	
fb : Actual	=	1,249.86 psi		fv : Actual	=	81.29 psi	
FB : Allowable	=	2,400.00 psi		Fv : Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	6.500 ft		Location of maximum on span	=	12.051 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.114 in	Ratio = 1367 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.298 in	Ratio = 523 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.863	3.863
Overall MINimum	1.479	1.479
+D+H	2.385	2.385
+D+L+H	3.863	3.863
+D+Lr+H	2.645	2.645
+D+S+H	2.385	2.385
+D+0.750Lr+0.750L+H	3.689	3.689
+D+0.750L+0.750S+H	3.494	3.494
+D+0.60W+H	2.385	2.385
+D+0.750Lr+0.450W+H	2.580	2.580

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : B3.1

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750S+0.450W+H	2.385	2.385
+0.60D+0.60W+0.60H	1.431	1.431
+D+0.70E+0.60H	2.385	2.385
+D+0.750L+0.750S+0.5250E+H	3.494	3.494
+0.60D+0.70E+H	1.431	1.431
D Only	2.385	2.385
Lr Only	0.260	0.260
L Only	1.479	1.479
S Only		
W Only		
E Only		
H Only		

Licensee : Peoples Associates Structural Engineers

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi

Diagram of a continuous beam with three spans and four supports. The beam is labeled W18x76. The spans are labeled with dimensions: Span 1 = 20.0 ft, Span 2 = 11.75 ft, Span 3 = 11.75 ft. The total span is 31.75 ft. The beam is supported by a pin support on the left and a roller support on the right. The beam is divided into four segments by three supports. The dimensions of the segments are: 20.0 ft, 11.75 ft, 11.75 ft, and 11.75 ft. The beam is labeled W18x76. The total span is 31.75 ft.

Maximum Bending Stress Ratio =	0.269 : 1	Maximum Shear Stress Ratio =	0.100 : 1
Section used for this span	W18x76	Section used for this span	W18x76
Ma : Applied	109.389 k-ft	Va : Applied	15.417 k
Mn / Omega : Allowable	406.687 k-ft	Vn/Omega : Allowable	154.70 k
Load Combination	+D+Lr+H	Load Combination	+D+0.750Lr+0.750L+H
Location of maximum on span	15.331 ft	Location of maximum on span	31.750 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.154 in	Ratio =	2,467 >=480
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480
Max Downward Total Deflection	0.527 in	Ratio =	723 >=360
Max Upward Total Deflection	0.000 in	Ratio =	0 <360

[illegible]

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description : B3.2A

Load Combination	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
		M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 31.75 ft	1	0.268	0.100	109.04		109.04	679.17	406.69	1.00	1.00	15.42	232.05	154.70
+D+0.750L+0.750S+H													
Dsgn. L = 31.75 ft	1	0.208	0.080	84.62		84.62	679.17	406.69	1.00	1.00	12.39	232.05	154.70
+D+0.60W+H													
Dsgn. L = 31.75 ft	1	0.189	0.068	76.82		76.82	679.17	406.69	1.00	1.00	10.56	232.05	154.70
+D+0.750Lr+0.450W+H													
Dsgn. L = 31.75 ft	1	0.249	0.088	101.25		101.25	679.17	406.69	1.00	1.00	13.59	232.05	154.70
+D+0.750S+0.450W+H													
Dsgn. L = 31.75 ft	1	0.189	0.068	76.82		76.82	679.17	406.69	1.00	1.00	10.56	232.05	154.70
+0.60D+0.60W+0.60H													
Dsgn. L = 31.75 ft	1	0.113	0.041	46.09		46.09	679.17	406.69	1.00	1.00	6.34	232.05	154.70
+D+0.70E+0.60H													
Dsgn. L = 31.75 ft	1	0.189	0.068	76.82		76.82	679.17	406.69	1.00	1.00	10.56	232.05	154.70
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 31.75 ft	1	0.208	0.080	84.62		84.62	679.17	406.69	1.00	1.00	12.39	232.05	154.70
+0.60D+0.70E+H													
Dsgn. L = 31.75 ft	1	0.113	0.041	46.09		46.09	679.17	406.69	1.00	1.00	6.34	232.05	154.70

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L+H	1	0.5266	15.784		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	14.086	15.417
Overall MINimum	1.360	2.439
+D+H	9.925	10.560
+D+L+H	11.284	13.000
+D+Lr+H	14.086	14.597
+D+S+H	9.925	10.560
+D+0.750Lr+0.750L+H	14.065	15.417
+D+0.750L+0.750S+H	10.944	12.390
+D+0.60W+H	9.925	10.560
+D+0.750Lr+0.450W+H	13.046	13.587
+D+0.750S+0.450W+H	9.925	10.560
+0.60D+0.60W+0.60H	5.955	6.336
+D+0.70E+0.60H	9.925	10.560
+D+0.750L+0.750S+0.5250E+H	10.944	12.390
+0.60D+0.70E+H	5.955	6.336
D Only	9.925	10.560
Lr Only	4.161	4.036
L Only	1.360	2.439
S Only		
W Only		
E Only		
H Only		

Wood Beam

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Description : B3.3

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-16

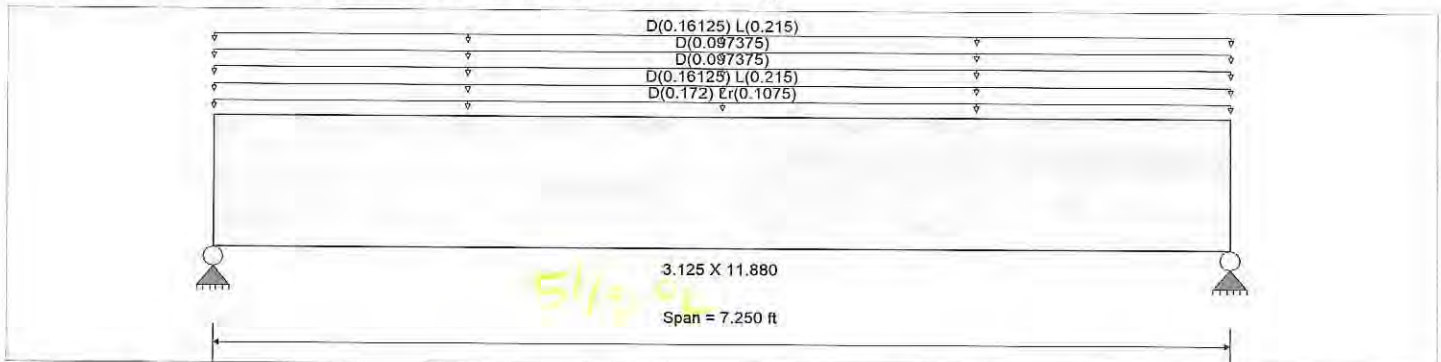
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Uniform Load : D = 0.0320, Lr = 0.020 ksf, Tributary Width = 5.375 ft, (roof)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 5.375 ft, (floor)
 Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
 Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 5.375 ft, (floor)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.500	1	Maximum Shear Stress Ratio	=	0.452	: 1
Section used for this span		3.125 X 11.880		Section used for this span		3.125 X 11.880	
fb : Actual	=	1,200.50 psi		fv : Actual	=	119.66 psi	
FB : Allowable	=	2,400.00 psi		Fv : Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	3.625 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.034 in	Ratio = 2543 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.089 in	Ratio = 977 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.057	4.057
Overall MINimum	1.559	1.559
+D+H	2.499	2.499
+D+L+H	4.057	4.057
+D+Lr+H	2.888	2.888
+D+S+H	2.499	2.499
+D+0.750Lr+0.750L+H	3.960	3.960
+D+0.750L+0.750S+H	3.668	3.668

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : B3.3

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.60W+H	2.499	2.499
+D+0.750Lr+0.450W+H	2.791	2.791
+D+0.750S+0.450W+H	2.499	2.499
+0.60D+0.60W+0.60H	1.499	1.499
+D+0.70E+0.60H	2.499	2.499
+D+0.750L+0.750S+0.5250E+H	3.668	3.668
+0.60D+0.70E+H	1.499	1.499
D Only	2.499	2.499
Lr Only	0.390	0.390
L Only	1.559	1.559
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Licensee: Peoples Associates Structural Engineers

Description: B3.4

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

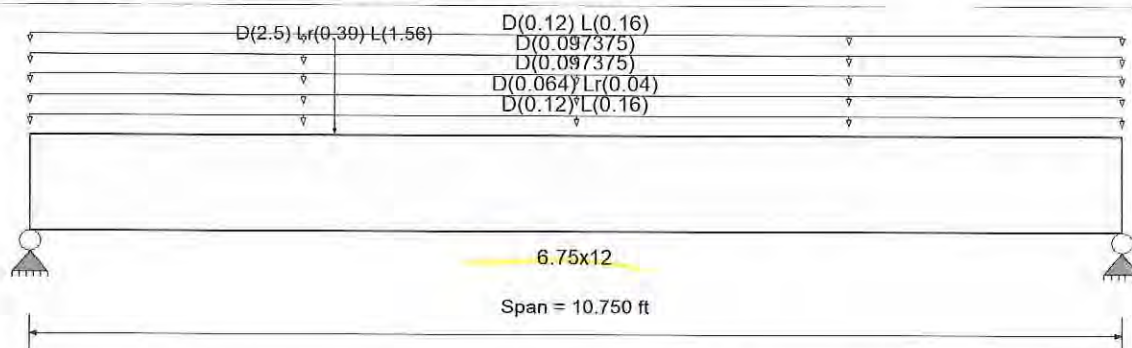
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E: Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 4.0 ft, (floor)
 Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)
 Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
 Point Load: D = 2.50, Lr = 0.390, L = 1.560 k @ 3.0 ft, (B3.3)
 Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
 Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 4.0 ft, (floor)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.577	1	Maximum Shear Stress Ratio	=	0.456	: 1
Section used for this span		6.75x12		Section used for this span		6.75x12	
fb: Actual	=	1,385.26 psi		fv: Actual	=	120.83 psi	
FB: Allowable	=	2,400.00 psi		Fv: Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	4.002 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.086 in	Ratio = 1507			>=480	
Max Upward Transient Deflection		0.000 in	Ratio = 0			<480	
Max Downward Total Deflection		0.220 in	Ratio = 585			>=360	
Max Upward Total Deflection		0.000 in	Ratio = 0			<360	

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.328	5.534
Overall MINimum	2.845	2.155
+D+H	4.483	3.378
+D+L+H	7.328	5.534
+D+Lr+H	4.979	3.702
+D+S+H	4.483	3.378
+D+0.750Lr+0.750L+H	6.989	5.238

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Licensee : Peoples Associates Structural Engineers

Description : B3.4

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	6.617	4.995
+D+0.60W+H	4.483	3.378
+D+0.750Lr+0.450W+H	4.855	3.621
+D+0.750S+0.450W+H	4.483	3.378
+0.60D+0.60W+0.60H	2.690	2.027
+D+0.70E+0.60H	4.483	3.378
+D+0.750L+0.750S+0.5250E+H	6.617	4.995
+0.60D+0.70E+H	2.690	2.027
D Only	4.483	3.378
Lr Only	0.496	0.324
L Only	2.845	2.155
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Licensee: Peoples Associates Structural Engineers

Description: B3.5

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

Analysis Method: Allowable Stress Design

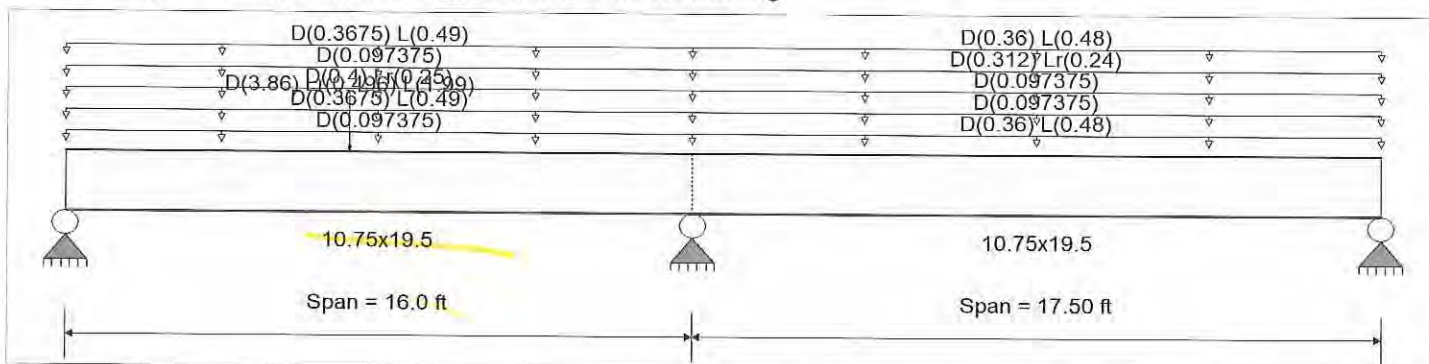
Load Combination: ASCE 7-16

Wood Species: DF/DF

Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E: Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Load for Span Number 1

- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 12.250 ft, (floor)
- Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 12.50 ft, (roof)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 12.250 ft, (floor)
- Point Load: D = 3.860, Lr = 0.4960, L = 1.990 k @ 7.250 ft, (B3.4)

Load for Span Number 2

- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 12.0 ft, (floor)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 12.0 ft, (roof)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 12.0 ft, (floor)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.920	1	Maximum Shear Stress Ratio	=	0.617	1
Section used for this span		10.75x19.5		Section used for this span		10.75x19.5	
fb: Actual	=	1,533.81 psi		fv: Actual	=	163.54 psi	
FB: Allowable	=	1,666.61 psi		Fv: Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	0.000 ft		Location of maximum on span	=	14.391 ft	
Span # where maximum occurs	=	Span # 2		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.070 in	Ratio = 2997 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.162 in	Ratio = 1187 >= 360				
Max Upward Total Deflection		-0.001 in	Ratio = 320608 >= 360				

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Licensee : Peoples Associates Structural Engineers

Description : B3.5

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	16.235	50.681	14.158
Overall MINimum	6.621	21.558	6.291
+D+H	9.614	29.123	7.867
+D+L+H	16.235	50.681	14.158
+D+Lr+H	11.303	34.561	9.436
+D+S+H	9.614	29.123	7.867
+D+0.750Lr+0.750L+H	15.847	49.370	13.762
+D+0.750L+0.750S+H	14.579	45.292	12.585
+D+0.60W+H	9.614	29.123	7.867
+D+0.750Lr+0.450W+H	10.881	33.201	9.044
+D+0.750S+0.450W+H	9.614	29.123	7.867
+0.60D+0.60W+0.60H	5.768	17.474	4.720
+D+0.70E+0.60H	9.614	29.123	7.867
+D+0.750L+0.750S+0.5250E+H	14.579	45.292	12.585
+0.60D+0.70E+H	5.768	17.474	4.720
D Only	9.614	29.123	7.867
Lr Only	1.690	5.438	1.568
L Only	6.621	21.558	6.291
S Only			
W Only			
E Only			
H Only			

Steel Beam

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Licensee: Peoples Associates Structural Engineers

Description: B3.5A

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

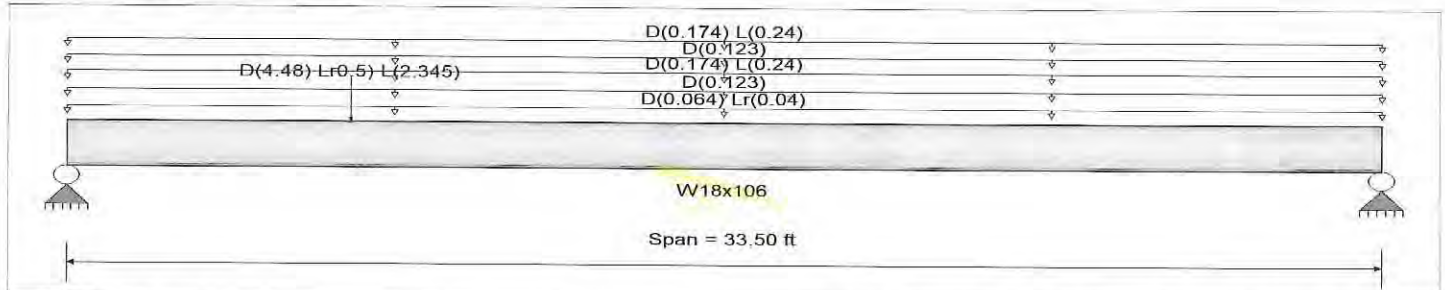
Analysis Method: Allowable Strength Design

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Bending Axis: Major Axis Bending

Fy: Steel Yield: 50.0 ksi

E: Modulus: 29,000.0 ksi



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)

Uniform Load: D = 0.0120 ksf, Tributary Width = 10.250 ft, (party wall)

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 6.0 ft, (floor)

Point Load: D = 4.480, Lr = 0.50, L = 2.345 k @ 7.250 ft, (B3.4)

Uniform Load: D = 0.0120 ksf, Tributary Width = 10.250 ft, (party)

Uniform Load: D = 0.0290, L = 0.040 ksf, Tributary Width = 6.0 ft, (floor)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.323 : 1	Maximum Shear Stress Ratio =	0.111 : 1
Section used for this span	W18x106	Section used for this span	W18x106
Ma: Applied	185.338 k-ft	Va: Applied	24.409 k
Mn / Omega: Allowable	573.852 k-ft	Vn / Omega: Allowable	220.660 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	15.410 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.282 in	Ratio =	1,426 >= 480
Max Upward Transient Deflection	0.000 in	Ratio =	0 < 480
Max Downward Total Deflection	0.687 in	Ratio =	585 >= 360
Max Upward Total Deflection	0.000 in	Ratio =	0 < 360

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 33.50 ft	1	0.190	0.066	109.26		109.26	958.33	573.85	1.00	1.00	14.53	330.99	220.66
+D+L+H													
Dsgn. L = 33.50 ft	1	0.323	0.111	185.34		185.34	958.33	573.85	1.00	1.00	24.41	330.99	220.66
+D+Lr+H													
Dsgn. L = 33.50 ft	1	0.204	0.071	116.80		116.80	958.33	573.85	1.00	1.00	15.59	330.99	220.66
+D+S+H													
Dsgn. L = 33.50 ft	1	0.190	0.066	109.26		109.26	958.33	573.85	1.00	1.00	14.53	330.99	220.66
+D+0.750Lr+0.750L+H													
Dsgn. L = 33.50 ft	1	0.300	0.103	171.97		171.97	958.33	573.85	1.00	1.00	22.74	330.99	220.66

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Steel Beam

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Description: B3.5A

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Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx
+D+0.750L+0.750S+H Dsgn. L = 33.50 ft	1	0.290	0.099	166.32		166.32	958.33	573.85	1.00	1.00	21.94	330.99	220.66
+D+0.60W+H Dsgn. L = 33.50 ft	1	0.190	0.066	109.26		109.26	958.33	573.85	1.00	1.00	14.53	330.99	220.66
+D+0.750Lr+0.450W+H Dsgn. L = 33.50 ft	1	0.200	0.069	114.92		114.92	958.33	573.85	1.00	1.00	15.33	330.99	220.66
+D+0.750S+0.450W+H Dsgn. L = 33.50 ft	1	0.190	0.066	109.26		109.26	958.33	573.85	1.00	1.00	14.53	330.99	220.66
+0.60D+0.60W+0.60H Dsgn. L = 33.50 ft	1	0.114	0.040	65.56		65.56	958.33	573.85	1.00	1.00	8.72	330.99	220.66
+D+0.70E+0.60H Dsgn. L = 33.50 ft	1	0.190	0.066	109.26		109.26	958.33	573.85	1.00	1.00	14.53	330.99	220.66
+D+0.750L+0.750S+0.5250E+H Dsgn. L = 33.50 ft	1	0.290	0.099	166.32		166.32	958.33	573.85	1.00	1.00	21.94	330.99	220.66
+0.60D+0.70E+H Dsgn. L = 33.50 ft	1	0.114	0.040	65.56		65.56	958.33	573.85	1.00	1.00	8.72	330.99	220.66

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.6872	16.463		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	24.409	20.539
Overall MINimum	1.062	0.778
+D+H	14.532	11.991
+D+L+H	24.409	20.539
+D+Lr+H	15.594	12.769
+D+S+H	14.532	11.991
+D+0.750Lr+0.750L+H	22.736	18.985
+D+0.750L+0.750S+H	21.940	18.402
+D+0.60W+H	14.532	11.991
+D+0.750Lr+0.450W+H	15.328	12.575
+D+0.750S+0.450W+H	14.532	11.991
+0.60D+0.60W+0.60H	8.719	7.195
+D+0.70E+0.60H	14.532	11.991
+D+0.750L+0.750S+0.5250E+H	21.940	18.402
+0.60D+0.70E+H	8.719	7.195
D Only	14.532	11.991
Lr Only	1.062	0.778
L Only	9.878	8.548
S Only		
W Only		
E Only		
H Only		

Wood Beam

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Description: B3.6- Two Columns

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

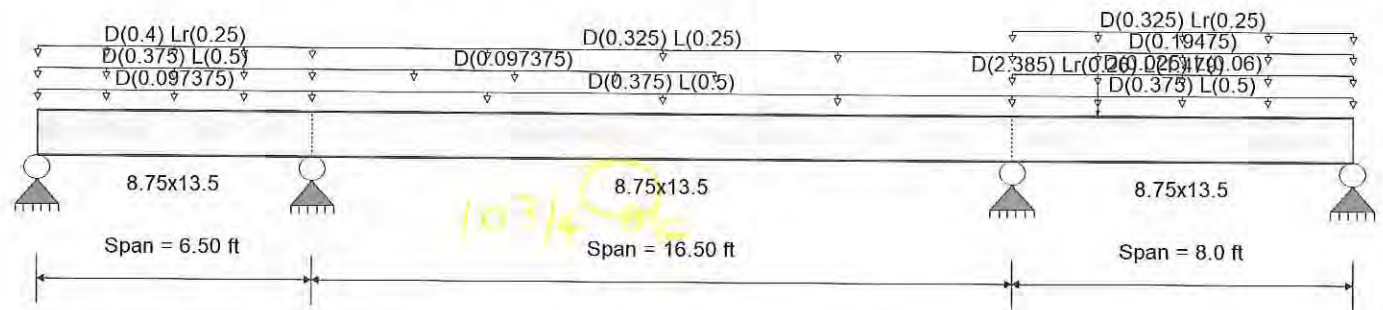
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E: Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Load for Span Number 1

Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
 Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 12.50 ft, (floor)
 Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 12.50 ft, (roof)

Load for Span Number 2

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 12.50 ft, (floor)
 Uniform Load: D = 0.00950 ksf, Extent = 0.0 --> 9.50 ft, Tributary Width = 10.250 ft, (interior wall)
 Uniform Load: D = 0.0260, L = 0.020 ksf, Tributary Width = 12.50 ft, (Roof)

Load for Span Number 3

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 12.50 ft, (floor)
 Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 1.0 ft, (deck)
 Uniform Load: D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior wall)
 Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 12.50 ft, (roof)
 Point Load: D = 2.385, Lr = 0.260, L = 1.479 k @ 2.0 ft, (B3.1)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.776 : 1	Maximum Shear Stress Ratio	=	0.529 : 1
Section used for this span		8.75x13.5	Section used for this span		8.75x13.5
fb: Actual	=	1,378.30 psi	fv: Actual	=	140.21 psi
FB: Allowable	=	1,775.41 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	16.500 ft	Location of maximum on span	=	16.500 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 2
Maximum Deflection					
Max Downward Transient Deflection		0.129 in Ratio = 1531 >= 480			
Max Upward Transient Deflection		-0.014 in Ratio = 5492 >= 480			
Max Downward Total Deflection		0.248 in Ratio = 798 >= 360			
Max Upward Total Deflection		-0.025 in Ratio = 3152 >= 360			

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : B3.6- Two Columns

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	1.432	21.257	25.009	3.605
Overall MINimum	-0.499	9.886	11.417	0.780
+D+H	0.637	11.371	13.592	2.289
+D+L+H	0.138	21.257	25.009	3.069
+D+Lr+H	1.432	12.163	14.915	3.263
+D+S+H	0.637	11.371	13.592	2.289
+D+0.750Lr+0.750L+H	0.859	19.380	23.147	3.605
+D+0.750L+0.750S+H	0.262	18.785	22.155	2.874
+D+0.60W+H	0.637	11.371	13.592	2.289
+D+0.750Lr+0.450W+H	1.233	11.965	14.585	3.020
+D+0.750S+0.450W+H	0.637	11.371	13.592	2.289
+0.60D+0.60W+0.60H	0.382	6.822	8.155	1.373
+D+0.70E+0.60H	0.637	11.371	13.592	2.289
+D+0.750L+0.750S+0.5250E+H	0.262	18.785	22.155	2.874
+0.60D+0.70E+H	0.382	6.822	8.155	1.373
D Only	0.637	11.371	13.592	2.289
Lr Only	0.795	0.793	1.323	0.974
L Only	-0.499	9.886	11.417	0.780
S Only				
W Only				
E Only				
H Only				

Wood Beam

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Description: B3.7

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

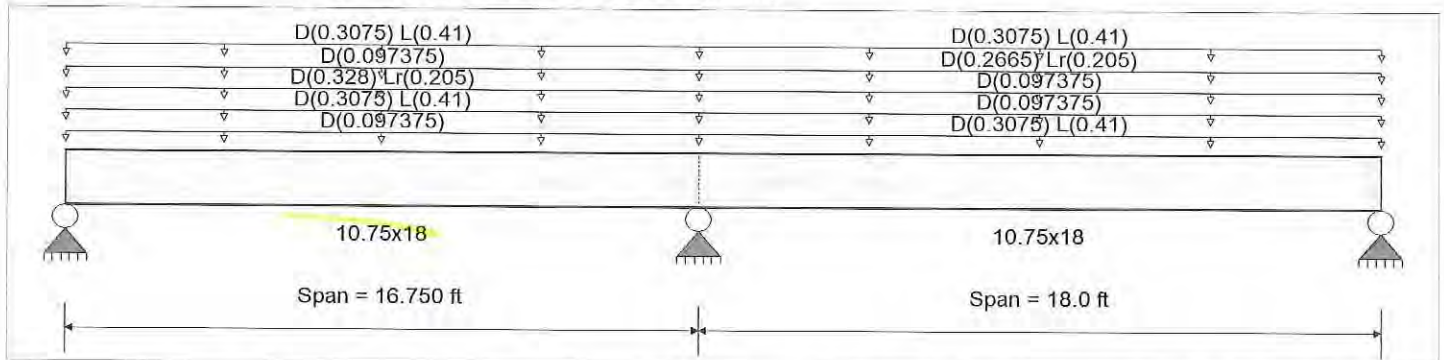
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E: Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Load for Span Number 1

- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.250 ft, (floor)
- Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 10.250 ft, (roof)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.250 ft, (floor)

Load for Span Number 2

- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.250 ft, (floor)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 10.250 ft, (roof)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.250 ft, (floor)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.899	1	Maximum Shear Stress Ratio	=	0.540	1
Section used for this span		10.75x18		Section used for this span		10.75x18	
fb: Actual	=	1,506.46 psi		fv: Actual	=	142.99 psi	
FB: Allowable	=	1,675.27 psi		Fv: Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	0.000 ft		Location of maximum on span	=	16.750 ft	
Span # where maximum occurs	=	Span # 2		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.093 in	Ratio = 2317 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.212 in	Ratio = 1019 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	12.045	41.862	13.018

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : B3.7

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MINimum	5.013	17.828	5.654
+D+H	7.032	24.034	7.363
+D+L+H	12.045	41.862	13.018
+D+Lr+H	8.286	28.491	8.777
+D+S+H	7.032	24.034	7.363
+D+0.750Lr+0.750L+H	11.732	40.748	12.664
+D+0.750L+0.750S+H	10.792	37.405	11.604
+D+0.60W+H	7.032	24.034	7.363
+D+0.750Lr+0.450W+H	7.972	27.377	8.424
+D+0.750S+0.450W+H	7.032	24.034	7.363
+0.60D+0.60W+0.60H	4.219	14.420	4.418
+D+0.70E+0.60H	7.032	24.034	7.363
+D+0.750L+0.750S+0.5250E+H	10.792	37.405	11.604
+0.60D+0.70E+H	4.219	14.420	4.418
D Only	7.032	24.034	7.363
Lr Only	1.253	4.457	1.414
L Only	5.013	17.828	5.654
S Only			
W Only			
E Only			
H Only			

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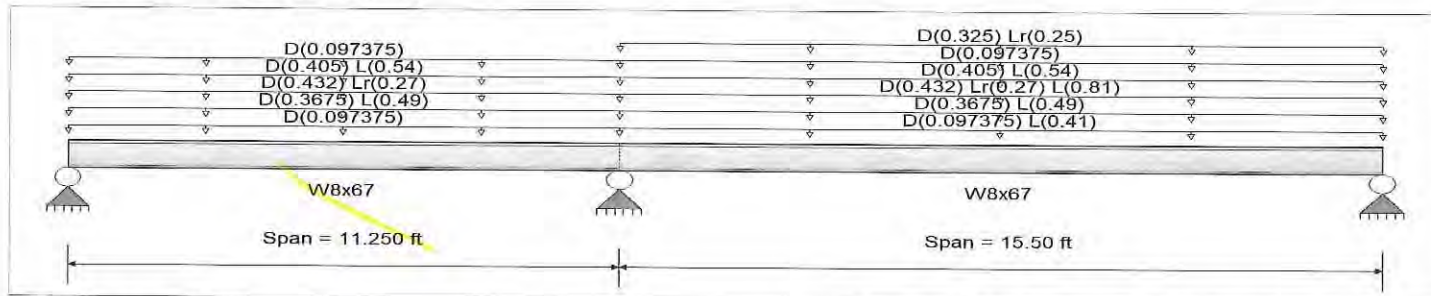
Description : B3.10

Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-16

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : $D = 0.00950$ ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 12.250 ft, (floor)

Uniform Load : $D = 0.0320$, $L_r = 0.020$ ksf, Tributary Width = 13.50 ft, (roof)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 13.50 ft, (floor)

Uniform Load : $D = 0.00950$ ksf, Tributary Width = 10.250 ft, (interior wall)

Load for Span Number 2

Uniform Load : $D = 0.00950$, $L = 0.040$ ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 12.250 ft, (floor)

Uniform Load : $D = 0.0320$, $L_r = 0.020$, $L = 0.060$ ksf, Tributary Width = 13.50 ft, (roof)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 13.50 ft, (floor)

Uniform Load : $D = 0.00950$ ksf, Tributary Width = 10.250 ft, (interior wall)

Uniform Load : $D = 0.0260$, $L_r = 0.020$ ksf, Tributary Width = 12.50 ft

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

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Description: B3.10

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.497 : 1	Maximum Shear Stress Ratio =	0.360 : 1
Section used for this span	W8x67	Section used for this span	W8x67
Ma : Applied	86.931 k-ft	Va : Applied	36.928 k
Mn / Omega : Allowable	174.900 k-ft	Vn/Omega : Allowable	102.60 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	11.250 ft	Location of maximum on span	11.250 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.222 in	Ratio =	837 >=480
Max Upward Transient Deflection	-0.038 in	Ratio =	3,556 >=480
Max Downward Total Deflection	0.385 in	Ratio =	483 >=360
Max Upward Total Deflection	-0.051 in	Ratio =	2649 >=360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H														
Dsgn. L = 11.25 ft		1	0.234	0.161	7.25	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
Dsgn. L = 15.50 ft		2	0.234	0.161	35.28	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
+D+L+H														
Dsgn. L = 11.25 ft		1	0.497	0.360	7.99	-86.93	86.93	292.08	174.90	1.00	1.00	36.93	153.90	102.60
Dsgn. L = 15.50 ft		2	0.497	0.360	81.79	-86.93	86.93	292.08	174.90	1.00	1.00	36.93	153.90	102.60
+D+Lr+H														
Dsgn. L = 11.25 ft		1	0.296	0.207	7.68	-51.77	51.77	292.08	174.90	1.00	1.00	21.25	153.90	102.60
Dsgn. L = 15.50 ft		2	0.296	0.207	45.94	-51.77	51.77	292.08	174.90	1.00	1.00	21.25	153.90	102.60
+D+S+H														
Dsgn. L = 11.25 ft		1	0.234	0.161	7.25	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
Dsgn. L = 15.50 ft		2	0.234	0.161	35.28	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
+D+0.750Lr+0.750L+H														
Dsgn. L = 11.25 ft		1	0.478	0.345	8.14	-83.56	83.56	292.08	174.90	1.00	1.00	35.37	153.90	102.60
Dsgn. L = 15.50 ft		2	0.478	0.345	78.16	-83.56	83.56	292.08	174.90	1.00	1.00	35.37	153.90	102.60
+D+0.750L+0.750S+H														
Dsgn. L = 11.25 ft		1	0.431	0.310	7.74	-75.43	75.43	292.08	174.90	1.00	1.00	31.83	153.90	102.60
Dsgn. L = 15.50 ft		2	0.431	0.310	70.16	-75.43	75.43	292.08	174.90	1.00	1.00	31.83	153.90	102.60
+D+0.60W+H														
Dsgn. L = 11.25 ft		1	0.234	0.161	7.25	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
Dsgn. L = 15.50 ft		2	0.234	0.161	35.28	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
+D+0.750Lr+0.450W+H														
Dsgn. L = 11.25 ft		1	0.280	0.196	7.57	-49.06	49.06	292.08	174.90	1.00	1.00	20.07	153.90	102.60
Dsgn. L = 15.50 ft		2	0.280	0.196	43.27	-49.06	49.06	292.08	174.90	1.00	1.00	20.07	153.90	102.60
+D+0.750S+0.450W+H														
Dsgn. L = 11.25 ft		1	0.234	0.161	7.25	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
Dsgn. L = 15.50 ft		2	0.234	0.161	35.28	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
+0.60D+0.60W+0.60H														
Dsgn. L = 11.25 ft		1	0.140	0.097	4.35	-24.56	24.56	292.08	174.90	1.00	1.00	9.91	153.90	102.60
Dsgn. L = 15.50 ft		2	0.140	0.097	21.17	-24.56	24.56	292.08	174.90	1.00	1.00	9.91	153.90	102.60
+D+0.70E+0.60H														
Dsgn. L = 11.25 ft		1	0.234	0.161	7.25	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
Dsgn. L = 15.50 ft		2	0.234	0.161	35.28	-40.93	40.93	292.08	174.90	1.00	1.00	16.52	153.90	102.60
+D+0.750L+0.750S+0.5250E+H														
Dsgn. L = 11.25 ft		1	0.431	0.310	7.74	-75.43	75.43	292.08	174.90	1.00	1.00	31.83	153.90	102.60
Dsgn. L = 15.50 ft		2	0.431	0.310	70.16	-75.43	75.43	292.08	174.90	1.00	1.00	31.83	153.90	102.60
+0.60D+0.70E+H														
Dsgn. L = 11.25 ft		1	0.140	0.097	4.35	-24.56	24.56	292.08	174.90	1.00	1.00	9.91	153.90	102.60
Dsgn. L = 15.50 ft		2	0.140	0.097	21.17	-24.56	24.56	292.08	174.90	1.00	1.00	9.91	153.90	102.60

Overall Maximum Deflections

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+L+H	-0.0510	8.145
+D+L+H	2	0.3850	8.494		0.0000	8.145

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	6.314	58.697	25.711
Overall MINimum	0.555	7.212	3.330
+D+H	4.610	28.408	11.242
+D+L+H	6.314	58.697	25.711

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description: B3.10

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H	5.165	35.620	14.572
+D+S+H	4.610	28.408	11.242
+D+0.750Lr+0.750L+H	6.304	56.534	24.592
+D+0.750L+0.750S+H	5.888	51.125	22.094
+D+0.60W+H	4.610	28.408	11.242
+D+0.750Lr+0.450W+H	5.026	33.817	13.740
+D+0.750S+0.450W+H	4.610	28.408	11.242
+0.60D+0.60W+0.60H	2.766	17.045	6.745
+D+0.70E+0.60H	4.610	28.408	11.242
+D+0.750L+0.750S+0.5250E+H	5.888	51.125	22.094
+0.60D+0.70E+H	2.766	17.045	6.745
D Only	4.610	28.408	11.242
Lr Only	0.555	7.212	3.330
L Only	1.704	30.289	14.469
S Only			
W Only			
E Only			
H Only			

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: B3.11

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

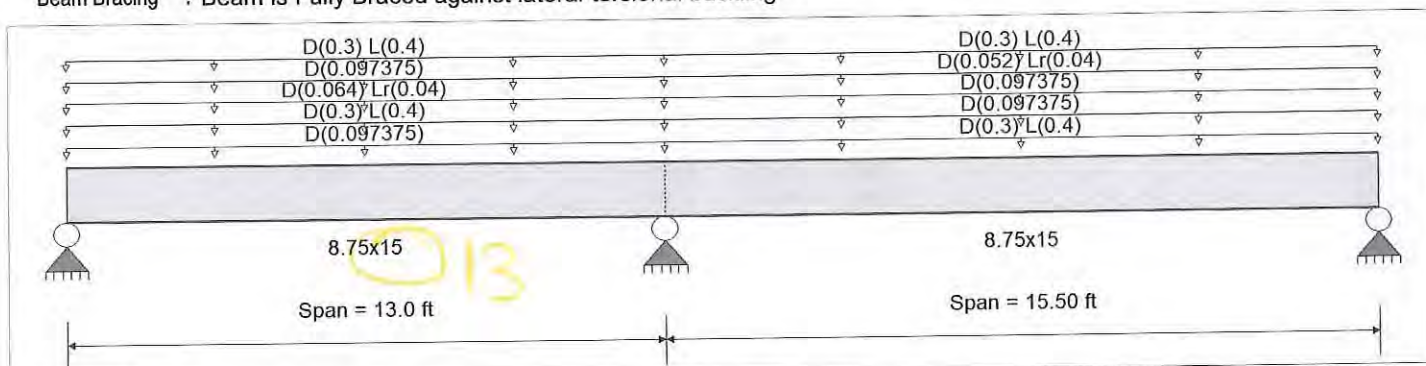
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.0 ft, (floor)
- Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.0 ft, (floor)

Load for Span Number 2

- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.0 ft, (floor)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
- Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.0 ft, (floor)

DESIGN SUMMARY

Maximum Bending Stress Ratio	=	0.902	1	Maximum Shear Stress Ratio	=	0.594	1
Section used for this span		8.75x15		Section used for this span		8.75x15	
fb : Actual	=	1,595.19 psi		fv : Actual	=	157.33 psi	
FB : Allowable	=	1,767.82 psi		Fv : Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	0.000 ft		Location of maximum on span	=	13.000 ft	
Span # where maximum occurs	=	Span # 2		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.116 in	Ratio = 1608 >= 480				
Max Upward Transient Deflection		-0.003 in	Ratio = 61826 >= 480				
Max Downward Total Deflection		0.242 in	Ratio = 770 >= 360				
Max Upward Total Deflection		-0.005 in	Ratio = 30955 >= 360				

Wood Beam

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Licensee: Peoples Associates Structural Engineers

Description: B3.11

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	7.612	30.119	10.169
Overall MINimum	3.602	14.338	4.860
+D+H	4.010	15.781	5.309
+D+L+H	7.612	30.119	10.169
+D+Lr+H	4.190	16.497	5.552
+D+S+H	4.010	15.781	5.309
+D+0.750Lr+0.750L+H	6.846	27.072	9.136
+D+0.750L+0.750S+H	6.711	26.534	8.954
+D+0.60W+H	4.010	15.781	5.309
+D+0.750Lr+0.450W+H	4.145	16.318	5.491
+D+0.750S+0.450W+H	4.010	15.781	5.309
+0.60D+0.60W+0.60H	2.406	9.468	3.185
+D+0.70E+0.60H	4.010	15.781	5.309
+D+0.750L+0.750S+0.5250E+H	6.711	26.534	8.954
+0.60D+0.70E+H	2.406	9.468	3.185
D Only	4.010	15.781	5.309
Lr Only	0.180	0.717	0.243
L Only	3.602	14.338	4.860
S Only			
W Only			
E Only			
H Only			

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: B3.12

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

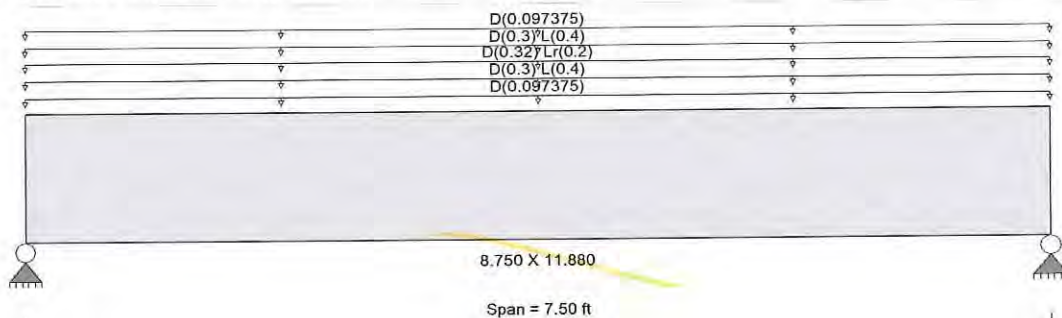
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
 Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.0 ft, (floor)
 Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 10.0 ft, (roof)
 Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 10.0 ft, (floor)
 Uniform Load: D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)

DESIGN SUMMARY

				Design OK	
Maximum Bending Stress Ratio	=	0.331 : 1	Maximum Shear Stress Ratio	=	0.292 : 1
Section used for this span	=	8.750 X 11.880	Section used for this span	=	8.750 X 11.880
fb : Actual	=	794.18 psi	fv : Actual	=	77.28 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination	=	+D+L+H	Load Combination	=	+D+L+H
Location of maximum on span	=	3.750 ft	Location of maximum on span	=	6.515 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.026 in	Ratio =		3457 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.063 in	Ratio =		1427 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.265	7.265
Overall MINimum	3.000	3.000
+D+H	4.265	4.265
+D+L+H	7.265	7.265
+D+Lr+H	5.015	5.015
+D+S+H	4.265	4.265
+D+0.750Lr+0.750L+H	7.077	7.077

Wood Beam

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Description : B3.12

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	6.515	6.515
+D+0.60W+H	4.265	4.265
+D+0.750L+0.450W+H	4.827	4.827
+D+0.750S+0.450W+H	4.265	4.265
+0.60D+0.60W+0.60H	2.559	2.559
+D+0.70E+0.60H	4.265	4.265
+D+0.750L+0.750S+0.5250E+H	6.515	6.515
+0.60D+0.70E+H	2.559	2.559
D Only	4.265	4.265
Lr Only	0.750	0.750
L Only	3.000	3.000
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

Lic. #: KW-06009713

Description: B3.13

Licensee: Peoples Associates Structural Engineers

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

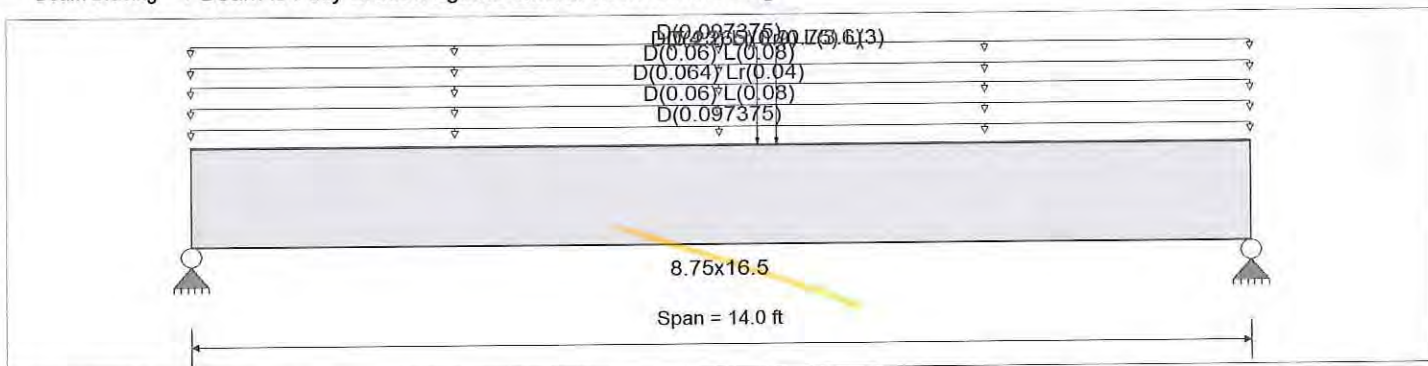
Wood Species : DF/DF
 Wood Grade : 24F - V4

Fb + 2,400.0 psi
 Fb - 1,850.0 psi
 Fc - Prll 1,650.0 psi
 Fc - Perp 650.0 psi
 Fv 265.0 psi
 Ft 1,100.0 psi

E : Modulus of Elasticity

Ebend- xx 1,800.0 ksi
 Eminbend - xx 950.0 ksi
 Ebend- yy 1,600.0 ksi
 Eminbend - yy 850.0 ksi
 Density 31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft, (floor)
 Uniform Load : D = 0.0320, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft, (floor)
 Uniform Load : D = 0.00950 ksf, Tributary Width = 10.250 ft, (interior wall)
 Point Load : D = 4.265, Lr = 0.750, L = 3.0 k @ 7.750 ft, (B3.12)
 Point Load : D = 5.230, Lr = 0.90, L = 3.60 k @ 7.50 ft, (B3.11)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.908 : 1	Maximum Shear Stress Ratio	=	0.470 : 1
Section used for this span		8.75x16.5	Section used for this span		8.75x16.5
fb : Actual	=	2,083.89psi	fv : Actual	=	124.52 psi
FB : Allowable	=	2,294.87psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	7.511 ft	Location of maximum on span	=	12.672 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.134 in	Ratio =		1257 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.352 in	Ratio =		476 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	11.333	12.742
Overall MINimum	4.131	4.709
+D+H	7.203	8.033
+D+L+H	11.333	12.742
+D+Lr+H	8.235	9.210

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : B3.13

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+S+H	7.203	8.033
+D+0.750Lr+0.750L+H	11.075	12.448
+D+0.750L+0.750S+H	10.301	11.565
+D+0.60W+H	7.203	8.033
+D+0.750Lr+0.450W+H	7.977	8.916
+D+0.750S+0.450W+H	7.203	8.033
+0.60D+0.60W+0.60H	4.322	4.820
+D+0.70E+0.60H	7.203	8.033
+D+0.750L+0.750S+0.5250E+H	10.301	11.565
+0.60D+0.70E+H	4.322	4.820
D Only	7.203	8.033
Lr Only	1.033	1.177
L Only	4.131	4.709
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : B3.14

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-16

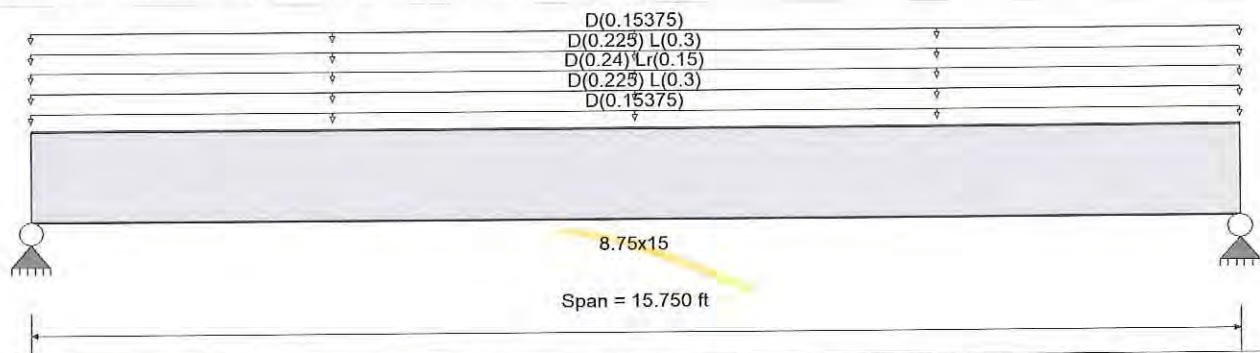
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F - V4

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.0150 ksf, Tributary Width = 10.250 ft, (party wall)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 7.50 ft, (floor)
 Uniform Load : D = 0.0320, Lr = 0.020 ksf, Tributary Width = 7.50 ft, (roof)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 7.50 ft, (floor)
 Uniform Load : D = 0.0150 ksf, Tributary Width = 10.250 ft, (party wall)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.805	1	Maximum Shear Stress Ratio	=	0.468	1
Section used for this span		8.75x15		Section used for this span		8.75x15	
fb : Actual	=	1,843.82	psi	fv : Actual	=	123.90	psi
FB : Allowable	=	2,289.72	psi	Fv : Allowable	=	265.00	psi
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	7.875	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.189	in	Ratio =		1001	>=480
Max Upward Transient Deflection		0.000	in	Ratio =		0	<480
Max Downward Total Deflection		0.511	in	Ratio =		369	>=360
Max Upward Total Deflection		0.000	in	Ratio =		0	<360

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	12.804	12.804
Overall MINimum	4.725	4.725
+D+H	8.079	8.079
+D+L+H	12.804	12.804
+D+Lr+H	9.261	9.261
+D+S+H	8.079	8.079
+D+0.750Lr+0.750L+H	12.509	12.509

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: B3.14

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	11.623	11.623
+D+0.60W+H	8.079	8.079
+D+0.750Lr+0.450W+H	8.965	8.965
+D+0.750S+0.450W+H	8.079	8.079
+0.60D+0.60W+0.60H	4.848	4.848
+D+0.70E+0.60H	8.079	8.079
+D+0.750L+0.750S+0.5250E+H	11.623	11.623
+0.60D+0.70E+H	4.848	4.848
D Only	8.079	8.079
Lr Only	1.181	1.181
L Only	4.725	4.725
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description: B3.15

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

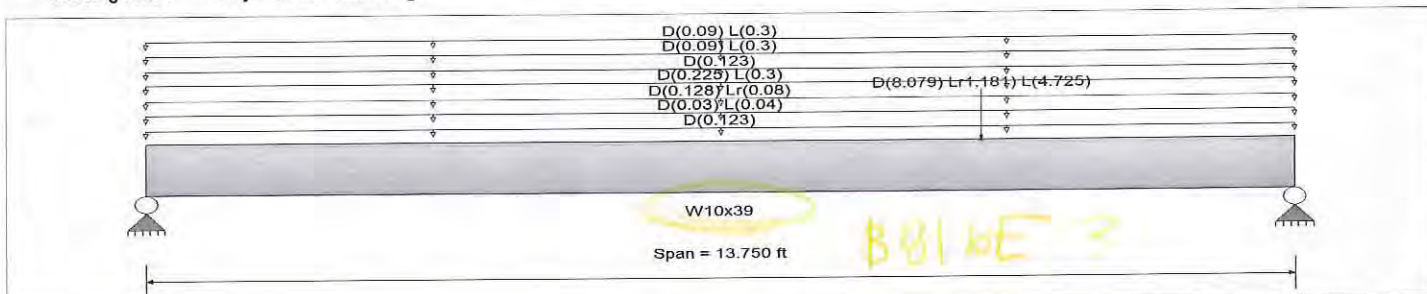
Analysis Method: Allowable Strength Design

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Bending Axis: Major Axis Bending

Fy: Steel Yield: 50.0 ksi

E: Modulus: 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load: D = 0.0120 ksf, Tributary Width = 10.250 ft, (corridor wall)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)

Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 4.0 ft, (roof)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 7.50 ft, (floor)

Uniform Load: D = 0.0120 ksf, Tributary Width = 10.250 ft, (corridor wall)

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 3.0 ft, (corridor)

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 3.0 ft, (corridor)

Point Load: D = 8.079, Lr = 1.181, L = 4.725 k @ 10.0 ft, (B3.14)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =

0.597 : 1

Maximum Shear Stress Ratio =

0.346 : 1

Section used for this span

W10x39

Section used for this span

W10x39

Ma: Applied

69.673 k-ft

Va: Applied

21.605 k

Mn / Omega: Allowable

116.766 k-ft

Vn/Omega: Allowable

62.496 k

Load Combination

+D+L+H

Load Combination

+D+L+H

Location of maximum on span

8.839 ft

Location of maximum on span

13.750 ft

Span # where maximum occurs

Span # 1

Span # where maximum occurs

Span # 1

Maximum Deflection

Max Downward Transient Deflection

0.179 in

Ratio =

919 >= 480

Max Upward Transient Deflection

0.000 in

Ratio =

0 < 480

Max Downward Total Deflection

0.385 in

Ratio =

428 >= 360

Max Upward Total Deflection

0.000 in

Ratio =

0 < 360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations														
Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H	Dsgn. L = 13.75 ft	1	0.326	0.187	38.05		38.05	195.00	116.77	1.00	1.00	11.71	93.74	62.50
+D+L+H	Dsgn. L = 13.75 ft	1	0.597	0.346	69.67		69.67	195.00	116.77	1.00	1.00	21.60	93.74	62.50

Steel Beam

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Description : B3.15

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+Lr+H														
Dsgn. L = 13.75 ft		1	0.366	0.210	42.73		42.73	195.00	116.77	1.00	1.00	13.11	93.74	62.50
+D+S+H														
Dsgn. L = 13.75 ft		1	0.326	0.187	38.05		38.05	195.00	116.77	1.00	1.00	11.71	93.74	62.50
+D+0.750Lr+0.750L+H														
Dsgn. L = 13.75 ft		1	0.558	0.323	65.18		65.18	195.00	116.77	1.00	1.00	20.19	93.74	62.50
+D+0.750L+0.750S+H														
Dsgn. L = 13.75 ft		1	0.529	0.306	61.73		61.73	195.00	116.77	1.00	1.00	19.13	93.74	62.50
+D+0.60W+H														
Dsgn. L = 13.75 ft		1	0.326	0.187	38.05		38.05	195.00	116.77	1.00	1.00	11.71	93.74	62.50
+D+0.750Lr+0.450W+H														
Dsgn. L = 13.75 ft		1	0.356	0.204	41.56		41.56	195.00	116.77	1.00	1.00	12.76	93.74	62.50
+D+0.750S+0.450W+H														
Dsgn. L = 13.75 ft		1	0.326	0.187	38.05		38.05	195.00	116.77	1.00	1.00	11.71	93.74	62.50
+0.60D+0.60W+0.60H														
Dsgn. L = 13.75 ft		1	0.196	0.112	22.83		22.83	195.00	116.77	1.00	1.00	7.02	93.74	62.50
+D+0.70E+0.60H														
Dsgn. L = 13.75 ft		1	0.326	0.187	38.05		38.05	195.00	116.77	1.00	1.00	11.71	93.74	62.50
+D+0.750L+0.750S+0.5250E+H														
Dsgn. L = 13.75 ft		1	0.529	0.306	61.73		61.73	195.00	116.77	1.00	1.00	19.13	93.74	62.50
+0.60D+0.70E+H														
Dsgn. L = 13.75 ft		1	0.196	0.112	22.83		22.83	195.00	116.77	1.00	1.00	7.02	93.74	62.50

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3854	7.189		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	15.785	21.605
Overall MINimum	0.872	1.409
+D+H	8.033	11.706
+D+L+H	15.785	21.605
+D+Lr+H	8.905	13.115
+D+S+H	8.033	11.706
+D+0.750Lr+0.750L+H	14.501	20.186
+D+0.750L+0.750S+H	13.847	19.130
+D+0.60W+H	8.033	11.706
+D+0.750Lr+0.450W+H	8.687	12.762
+D+0.750S+0.450W+H	8.033	11.706
+0.60D+0.60W+0.60H	4.820	7.023
+D+0.70E+0.60H	8.033	11.706
+D+0.750L+0.750S+0.5250E+H	13.847	19.130
+0.60D+0.70E+H	4.820	7.023
D Only	8.033	11.706
Lr Only	0.872	1.409
L Only	7.751	9.899
S Only		
W Only		
E Only		
H Only		

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

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Description: B3.16

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

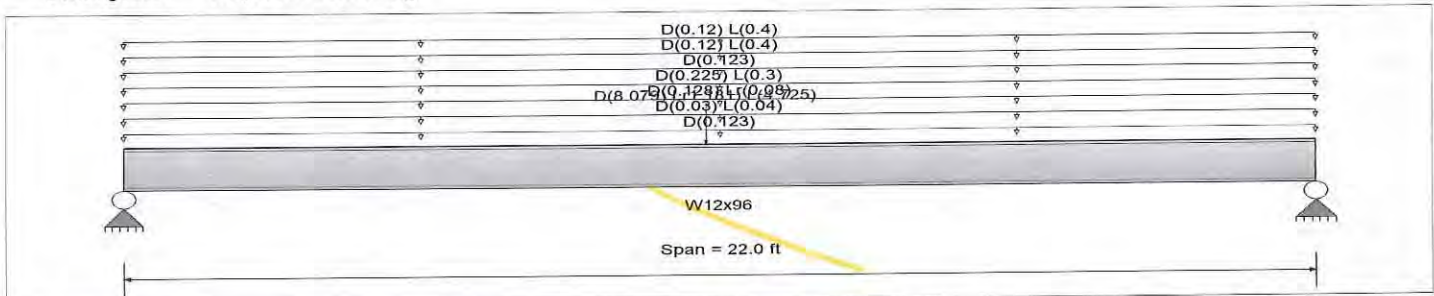
Material Properties

Analysis Method: Allowable Strength Design

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Bending Axis: Major Axis Bending

Fy: Steel Yield: 50.0 ksi
E: Modulus: 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load: D = 0.0120 ksf, Tributary Width = 10.250 ft, (corridor wall)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)

Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 4.0 ft, (roof)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 7.50 ft, (floor)

Uniform Load: D = 0.0120 ksf, Tributary Width = 10.250 ft, (corridor wall)

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 4.0 ft, (corridor)

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 4.0 ft, (corridor)

Point Load: D = 8.079, Lr = 1.181, L = 4.725 k @ 10.750 ft, (B3.14)

Deck 2

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.539 : 1	Maximum Shear Stress Ratio =	0.213 : 1
Section used for this span	W12x96	Section used for this span	W12x96
Ma: Applied	197.662 k-ft	Va: Applied	29.703 k
Mn / Omega: Allowable	366.766 k-ft	Vn / Omega: Allowable	139.70 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	10.749 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.325 in	Ratio =	812 >= 480
Max Upward Transient Deflection	0.000 in	Ratio =	0 < 480
Max Downward Total Deflection	0.665 in	Ratio =	397 >= 360
Max Upward Total Deflection	0.000 in	Ratio =	0 < 360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H														
Dsgn. L = 22.00 ft		1	0.280	0.106	102.76		102.76	612.50	366.77	1.00	1.00	14.75	209.55	139.70
+D+L+H														
Dsgn. L = 22.00 ft		1	0.539	0.213	197.66		197.66	612.50	366.77	1.00	1.00	29.70	209.55	139.70

Steel Beam

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Description: B3.16

Load Combination	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values			
Segment Length		M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega	
+D+Lr+H	1	Dsgn. L = 22.00 ft	0.311	0.116	114.09		114.09	612.50	366.77	1.00	1.00	16.23	209.55	139.70
+D+S+H		Dsgn. L = 22.00 ft	0.280	0.106	102.76		102.76	612.50	366.77	1.00	1.00	14.75	209.55	139.70
+D+0.750Lr+0.750L+H	1	Dsgn. L = 22.00 ft	0.497	0.194	182.43		182.43	612.50	366.77	1.00	1.00	27.08	209.55	139.70
+D+0.750L+0.750S+H		Dsgn. L = 22.00 ft	0.474	0.186	173.94		173.94	612.50	366.77	1.00	1.00	25.96	209.55	139.70
+D+0.60W+H	1	Dsgn. L = 22.00 ft	0.280	0.106	102.76		102.76	612.50	366.77	1.00	1.00	14.75	209.55	139.70
+D+0.750Lr+0.450W+H		Dsgn. L = 22.00 ft	0.303	0.114	111.25		111.25	612.50	366.77	1.00	1.00	15.86	209.55	139.70
+D+0.750S+0.450W+H	1	Dsgn. L = 22.00 ft	0.280	0.106	102.76		102.76	612.50	366.77	1.00	1.00	14.75	209.55	139.70
+0.60D+0.60W+0.60H		Dsgn. L = 22.00 ft	0.168	0.063	61.65		61.65	612.50	366.77	1.00	1.00	8.85	209.55	139.70
+D+0.70E+0.60H	1	Dsgn. L = 22.00 ft	0.280	0.106	102.76		102.76	612.50	366.77	1.00	1.00	14.75	209.55	139.70
+D+0.750L+0.750S+0.5250E+H		Dsgn. L = 22.00 ft	0.474	0.186	173.94		173.94	612.50	366.77	1.00	1.00	25.96	209.55	139.70
+0.60D+0.70E+H	1	Dsgn. L = 22.00 ft	0.168	0.063	61.65		61.65	612.50	366.77	1.00	1.00	8.85	209.55	139.70

Overall Maximum Deflections

Load Combination	Span	Max. "Δ" Defl	Location in Span	Load Combination	Max. "Δ" Defl	Location in Span
+D+L+H	1	0.6653	11.000		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	29.703	29.412
Overall MINimum	1.484	1.457
+D+H	14.746	14.563
+D+L+H	29.703	29.412
+D+Lr+H	16.230	16.020
+D+S+H	14.746	14.563
+D+0.750Lr+0.750L+H	27.076	26.792
+D+0.750L+0.750S+H	25.963	25.699
+D+0.60W+H	14.746	14.563
+D+0.750Lr+0.450W+H	15.859	15.656
+D+0.750S+0.450W+H	14.746	14.563
+0.60D+0.60W+0.60H	8.848	8.738
+D+0.70E+0.60H	14.746	14.563
+D+0.750L+0.750S+0.5250E+H	25.963	25.699
+0.60D+0.70E+H	8.848	8.738
D Only	14.746	14.563
Lr Only	1.484	1.457
L Only	14.956	14.849
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: B3.17

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-16

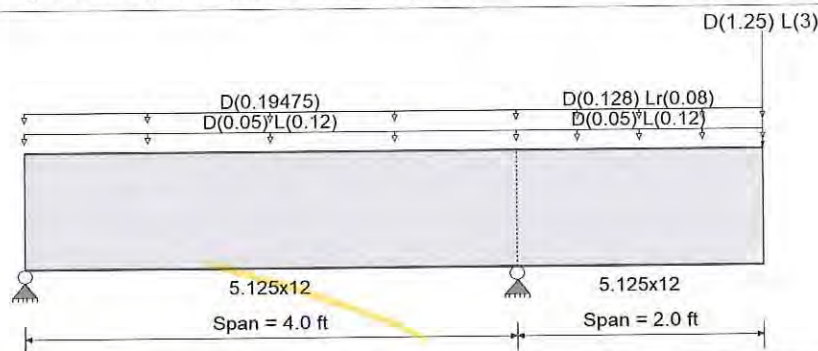
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 2.0 ft, (deck)

Uniform Load: D = 0.0190 ksf, Tributary Width = 10.250 ft, (exterior)

Load for Span Number 2

Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 2.0 ft, (deck)

Uniform Load: D = 0.0320, Lr = 0.020 ksf, Tributary Width = 4.0 ft, (roof)

Point Load: D = 1.250, L = 3.0 k @ 2.0 ft, (DECK)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.481	1	Maximum Shear Stress Ratio	=	0.420	1
Section used for this span	=	5.125x12		Section used for this span	=	5.125x12	
fb : Actual	=	890.02 psi		fv : Actual	=	111.29 psi	
FB : Allowable	=	1,850.00 psi		Fv : Allowable	=	265.00 psi	
Load Combination	=	+D+L+H		Load Combination	=	+D+L+H	
Location of maximum on span	=	4.000 ft		Location of maximum on span	=	4.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.031 in	Ratio = 1524 >= 480				
Max Upward Transient Deflection		-0.008 in	Ratio = 6089 >= 480				
Max Downward Total Deflection		0.045 in	Ratio = 1078 >= 360				
Max Upward Total Deflection		-0.011 in	Ratio = 4498 >= 360				

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-1.525	7.909	
Overall MINimum	-0.205	5.040	
+D+H	-0.205	2.869	
+D+L+H	-1.525	7.909	
+D+Lr+H	-0.245	3.069	

Wood Beam

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Description : B3.17

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+S+H	-0.205	2.869	
+D+0.750Lr+0.750L+H	-1.225	6.799	
+D+0.750L+0.750S+H	-1.195	6.649	
+D+0.60W+H	-0.205	2.869	
+D+0.750Lr+0.450W+H	-0.235	3.019	
+D+0.750S+0.450W+H	-0.205	2.869	
+0.60D+0.60W+0.60H	-0.123	1.722	
+D+0.70E+0.60H	-0.205	2.869	
+D+0.750L+0.750S+0.5250E+H	-1.195	6.649	
+0.60D+0.70E+H	-0.123	1.722	
D Only	-0.205	2.869	
Lr Only	-0.040	0.200	
L Only	-1.320	5.040	
S Only			
W Only			
E Only			
H Only			

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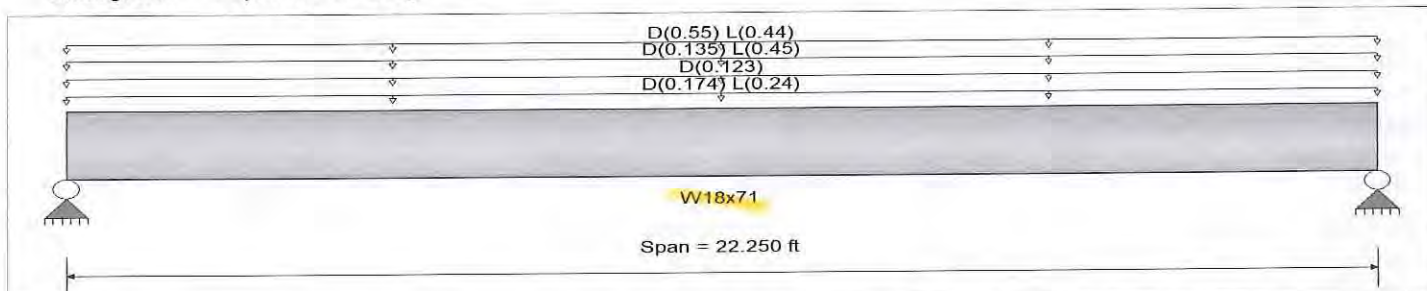
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Load Combination Set : ASCE 7-16

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



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

Uniform Load : $D = 0.0290$, $L = 0.040$ ksf, Tributary Width = 6.0 ft, (floor)

Uniform Load : $D = 0.0120$ ksf. Tributary Width = 10.250 ft. (corridor)

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 4.50 ft, (corridor)

Uniform Load : $D = 0.0250$, $L = 0.020$ ksf, Tributary Width = 22.0 ft, (roof)

Design OK

DESIGN SUMMARY		DESIGN SUMMARY	
Maximum Bending Stress Ratio =	0.371 : 1	Maximum Shear Stress Ratio =	0.133 : 1
Section used for this span	W18x71	Section used for this span	W18x71
Ma : Applied	135.090 k-ft	Va : Applied	24.286 k
Mn / Omega : Allowable	364.271 k-ft	Vn/Omega : Allowable	183.150 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	11.125 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection		Maximum Deflection	
Max Downward Transient Deflection	0.184 in Ratio = 1,447 >=480	Max Downward Transient Deflection	0.184 in Ratio = 1,447 >=480
Max Upward Transient Deflection	0.000 in Ratio = 0 <480	Max Upward Transient Deflection	0.000 in Ratio = 0 <480
Max Downward Total Deflection	0.356 in Ratio = 749 >=360	Max Downward Total Deflection	0.356 in Ratio = 749 >=360
Max Upward Total Deflection	0.000 in Ratio = 0 <360	Max Upward Total Deflection	0.000 in Ratio = 0 <360

Maximum Forces & Stresses for Load Combinations

[illegible]

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description : B3.18

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 22.25 ft		1	0.179	0.064	65.16		65.16	608.33	364.27	1.00	1.00	11.71	274.73	183.15
+D+0.750S+0.450W+H		1	0.179	0.064	65.16		65.16	608.33	364.27	1.00	1.00	11.71	274.73	183.15
Dsgn. L = 22.25 ft		1	0.179	0.064	65.16		65.16	608.33	364.27	1.00	1.00	11.71	274.73	183.15
+0.60D+0.60W+0.60H		1	0.107	0.038	39.10		39.10	608.33	364.27	1.00	1.00	7.03	274.73	183.15
Dsgn. L = 22.25 ft		1	0.107	0.038	39.10		39.10	608.33	364.27	1.00	1.00	7.03	274.73	183.15
+D+0.70E+0.60H		1	0.179	0.064	65.16		65.16	608.33	364.27	1.00	1.00	11.71	274.73	183.15
Dsgn. L = 22.25 ft		1	0.179	0.064	65.16		65.16	608.33	364.27	1.00	1.00	11.71	274.73	183.15
+D+0.750L+0.750S+0.5250E+H		1	0.323	0.115	117.61		117.61	608.33	364.27	1.00	1.00	21.14	274.73	183.15
Dsgn. L = 22.25 ft		1	0.323	0.115	117.61		117.61	608.33	364.27	1.00	1.00	21.14	274.73	183.15
+0.60D+0.70E+H		1	0.107	0.038	39.10		39.10	608.33	364.27	1.00	1.00	7.03	274.73	183.15
Dsgn. L = 22.25 ft		1	0.107	0.038	39.10		39.10	608.33	364.27	1.00	1.00	7.03	274.73	183.15

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3564	11.189		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	24.286	24.286
Overall MINimum	7.029	7.029
+D+H	11.715	11.715
+D+L+H	24.286	24.286
+D+Lr+H	11.715	11.715
+D+S+H	11.715	11.715
+D+0.750Lr+0.750L+H	21.143	21.143
+D+0.750L+0.750S+H	21.143	21.143
+D+0.60W+H	11.715	11.715
+D+0.750Lr+0.450W+H	11.715	11.715
+D+0.750S+0.450W+H	11.715	11.715
+0.60D+0.60W+0.60H	7.029	7.029
+D+0.70E+0.60H	11.715	11.715
+D+0.750L+0.750S+0.5250E+H	21.143	21.143
+0.60D+0.70E+H	7.029	7.029
D Only	11.715	11.715
Lr Only		
L Only	12.571	12.571
S Only		
W Only		
E Only		
H Only		

garage unstacked Framing
2nd Floor Framing

Area C
53.92C



2/11/19

Wood Beam

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Description: BM 1

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

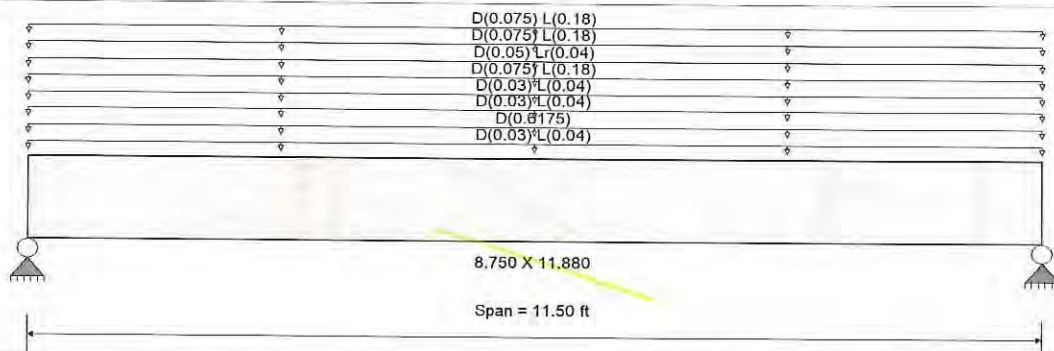
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E: Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend-xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend-xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend-yy	1,600.0 ksi
Fv	265.0 psi	Eminbend-yy	850.0 ksi
Ft	1,100.0 psi	Density	31.20 pcf



Applied Loads

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

- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (Floor)
- Uniform Load: D = 0.0190 ksf, Tributary Width = 32.50 ft, (exterior wall)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (Floor)
- Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (Floor)
- Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 3.0 ft, (deck)
- Uniform Load: D = 0.0250, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)
- Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 3.0 ft, (deck)
- Uniform Load: D = 0.0250, L = 0.060 ksf, Tributary Width = 3.0 ft, (deck)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.660	1	Maximum Shear Stress Ratio	=	0.428	1
Section used for this span		8.750 X 11.880		Section used for this span		8.750 X 11.880	
fb: Actual	=	1,583.08 psi		fv: Actual	=	113.40 psi	
FB: Allowable	=	2,400.00 psi		Fv: Allowable	=	265.00 psi	
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	5.750 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.119 in	Ratio = 1162 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.295 in	Ratio = 467 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.444	9.444
Overall MINimum	3.795	3.795
+D+H	5.649	5.649
+D+L+H	9.444	9.444
+D+Lr+H	5.879	5.879

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: BM 1

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+S+H	5.649	5.649
+D+0.750Lr+0.750L+H	8.668	8.668
+D+0.750L+0.750S+H	8.496	8.496
+D+0.60W+H	5.649	5.649
+D+0.750Lr+0.450W+H	5.822	5.822
+D+0.750S+0.450W+H	5.649	5.649
+0.60D+0.60W+0.60H	3.390	3.390
+D+0.70E+0.60H	5.649	5.649
+D+0.750L+0.750S+0.5250E+H	8.496	8.496
+0.60D+0.70E+H	3.390	3.390
D Only	5.649	5.649
Lr Only	0.230	0.230
L Only	3.795	3.795
S Only		
W Only		
E Only		
H Only		

Steel Beam

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Description: BM 2

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

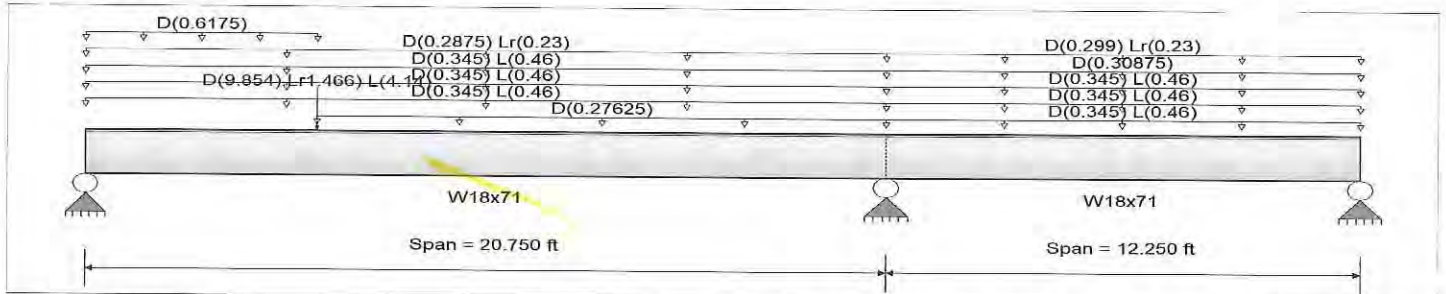
Analysis Method: Allowable Strength Design

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Bending Axis: Major Axis Bending

Fy: Steel Yield: 50.0 ksi

E: Modulus: 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load: D = 0.00850 ksf, Extent = 6.0 --> 20.750 ft, Tributary Width = 32.50 ft, (interior wall)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.0250, Lr = 0.020 ksf, Tributary Width = 11.50 ft, (roof)

Point Load: D = 9.854, Lr = 1.466, L = 4.140 k @ 6.0 ft, (BM1)

Uniform Load: D = 0.0190 ksf, Extent = 0.0 --> 6.0 ft, Tributary Width = 32.50 ft, (exterior wall)

Load for Span Number 2

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.00950 ksf, Tributary Width = 32.50 ft, (interior)

Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 11.50 ft, (roof)

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DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.436 : 1		Maximum Shear Stress Ratio = 0.236 : 1	
Section used for this span	W18x71	Section used for this span	W18x71
Ma : Applied	158.970 k-ft	Va : Applied	43.251 k
Mn / Omega : Allowable	364.271 k-ft	Vn/Omega : Allowable	183.150 k
Load Combination	+D+L+H, LL Comb Run (L*)	Load Combination	+D+L+H, LL Comb Run (LL)
Location of maximum on span	6.723ft	Location of maximum on span	20.750 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.129 in	Ratio =	1,937 >=480
Max Upward Transient Deflection	-0.027 in	Ratio =	5,509 >=480
Max Downward Total Deflection	0.299 in	Ratio =	832 >=360
Max Upward Total Deflection	-0.045 in	Ratio =	3241 >=360

Load Combination		Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx
+D+H													
Dsgn. L = 20.75 ft	1	0.261	0.135	95.02	-87.32	95.02	608.33	364.27	1.00	1.00	24.68	274.73	183.15
Dsgn. L = 12.25 ft	2	0.240	0.096	3.31	-87.32	87.32	608.33	364.27	1.00	1.00	17.63	274.73	183.15
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 20.75 ft	1	0.266	0.147	92.22	-96.93	96.93	608.33	364.27	1.00	1.00	26.86	274.73	183.15
Dsgn. L = 12.25 ft	2	0.266	0.147	19.68	-96.93	96.93	608.33	364.27	1.00	1.00	26.86	274.73	183.15
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 20.75 ft	1	0.436	0.234	158.97	-141.18	158.97	608.33	364.27	1.00	1.00	42.79	274.73	183.15
Dsgn. L = 12.25 ft	2	0.388	0.120		-141.18	141.18	608.33	364.27	1.00	1.00	22.02	274.73	183.15
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 20.75 ft	1	0.428	0.236	155.89	-150.79	155.89	608.33	364.27	1.00	1.00	43.25	274.73	183.15
Dsgn. L = 12.25 ft	2	0.414	0.171	7.12	-150.79	150.79	608.33	364.27	1.00	1.00	31.26	274.73	183.15
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 20.75 ft	1	0.260	0.135	94.56	-88.93	94.56	608.33	364.27	1.00	1.00	24.75	274.73	183.15
Dsgn. L = 12.25 ft	2	0.244	0.105	5.55	-88.93	88.93	608.33	364.27	1.00	1.00	19.16	274.73	183.15
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 20.75 ft	1	0.298	0.153	108.48	-97.64	108.48	608.33	364.27	1.00	1.00	27.98	274.73	183.15
Dsgn. L = 12.25 ft	2	0.268	0.101	1.86	-97.64	97.64	608.33	364.27	1.00	1.00	18.47	274.73	183.15
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 20.75 ft	1	0.297	0.153	108.01	-99.24	108.01	608.33	364.27	1.00	1.00	28.06	274.73	183.15
Dsgn. L = 12.25 ft	2	0.272	0.109	3.72	-99.24	99.24	608.33	364.27	1.00	1.00	20.01	274.73	183.15
+D+S+H													
Dsgn. L = 20.75 ft	1	0.261	0.135	95.02	-87.32	95.02	608.33	364.27	1.00	1.00	24.68	274.73	183.15
Dsgn. L = 12.25 ft	2	0.240	0.096	3.31	-87.32	87.32	608.33	364.27	1.00	1.00	17.63	274.73	183.15
+D+0.750Lr+0.750L+H, LL Comb Run (*)													
Dsgn. L = 20.75 ft	1	0.263	0.140	92.57	-95.73	95.73	608.33	364.27	1.00	1.00	25.71	274.73	183.15
Dsgn. L = 12.25 ft	2	0.263	0.140	17.38	-95.73	95.73	608.33	364.27	1.00	1.00	25.71	274.73	183.15
+D+0.750Lr+0.750L+H, LL Comb Run (L)													
Dsgn. L = 20.75 ft	1	0.420	0.222	152.98	-135.46	152.98	608.33	364.27	1.00	1.00	40.74	274.73	183.15
Dsgn. L = 12.25 ft	2	0.372	0.118		-135.46	135.46	608.33	364.27	1.00	1.00	21.55	274.73	183.15
+D+0.750Lr+0.750L+H, LL Comb Run (L)													
Dsgn. L = 20.75 ft	1	0.413	0.225	150.34	-143.86	150.34	608.33	364.27	1.00	1.00	41.15	274.73	183.15
Dsgn. L = 12.25 ft	2	0.395	0.162	6.47	-143.86	143.86	608.33	364.27	1.00	1.00	29.64	274.73	183.15
+D+0.750L+0.750S+H, LL Comb Run (*L)													
Dsgn. L = 20.75 ft	1	0.260	0.137	92.92	-94.53	94.53	608.33	364.27	1.00	1.00	25.02	274.73	183.15
Dsgn. L = 12.25 ft	2	0.260	0.134	15.13	-94.53								

Steel Beam

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Description: BM 2

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 20.75 ft	1	0.288	0.149	104.76	-96.26	104.76	608.33	364.27	1.00	1.00	27.22	274.73	183.15
Dsgn. L = 12.25 ft	2	0.264	0.106	3.62	-96.26	96.26	608.33	364.27	1.00	1.00	19.41	274.73	183.15
+D+0.750S+0.450W+H													
Dsgn. L = 20.75 ft	1	0.261	0.135	95.02	-87.32	95.02	608.33	364.27	1.00	1.00	24.68	274.73	183.15
Dsgn. L = 12.25 ft	2	0.240	0.096	3.31	-87.32	87.32	608.33	364.27	1.00	1.00	17.63	274.73	183.15
+0.60D+0.60W+0.60H													
Dsgn. L = 20.75 ft	1	0.157	0.081	57.01	-52.39	57.01	608.33	364.27	1.00	1.00	14.81	274.73	183.15
Dsgn. L = 12.25 ft	2	0.144	0.058	1.99	-52.39	52.39	608.33	364.27	1.00	1.00	10.58	274.73	183.15
+D+0.70E+0.60H													
Dsgn. L = 20.75 ft	1	0.261	0.135	95.02	-87.32	95.02	608.33	364.27	1.00	1.00	24.68	274.73	183.15
Dsgn. L = 12.25 ft	2	0.240	0.096	3.31	-87.32	87.32	608.33	364.27	1.00	1.00	17.63	274.73	183.15
+D+0.750L+0.750S+0.5250E+H, LL Con													
Dsgn. L = 20.75 ft	1	0.260	0.137	92.92	-94.53	94.53	608.33	364.27	1.00	1.00	25.02	274.73	183.15
Dsgn. L = 12.25 ft	2	0.260	0.134	15.13	-94.53	94.53	608.33	364.27	1.00	1.00	24.55	274.73	183.15
+D+0.750L+0.750S+0.5250E+H, LL Con													
Dsgn. L = 20.75 ft	1	0.392	0.209	142.88	-127.72	142.88	608.33	364.27	1.00	1.00	38.26	274.73	183.15
Dsgn. L = 12.25 ft	2	0.351	0.114	0.00	-127.72	127.72	608.33	364.27	1.00	1.00	20.92	274.73	183.15
+D+0.750L+0.750S+0.5250E+H, LL Con													
Dsgn. L = 20.75 ft	1	0.386	0.211	140.61	-134.92	140.61	608.33	364.27	1.00	1.00	38.61	274.73	183.15
Dsgn. L = 12.25 ft	2	0.370	0.152	6.17	-134.92	134.92	608.33	364.27	1.00	1.00	27.85	274.73	183.15
+0.60D+0.70E+H													
Dsgn. L = 20.75 ft	1	0.157	0.081	57.01	-52.39	57.01	608.33	364.27	1.00	1.00	14.81	274.73	183.15
Dsgn. L = 12.25 ft	2	0.144	0.058	1.99	-52.39	52.39	608.33	364.27	1.00	1.00	10.58	274.73	183.15

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2993	9.213		0.0000	0.000
	2	0.0000	9.213	+D+L+H	-0.0454	4.655

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	36.536	74.509	11.036
Overall MINimum	-0.077	1.617	0.071
+D+H	21.871	42.303	3.368
+D+L+H, LL Comb Run (*L)	21.408	52.003	11.036
+D+L+H, LL Comb Run (L*)	36.536	64.809	-1.028
+D+L+H, LL Comb Run (LL)	36.073	74.509	6.640
+D+Lr+H, LL Comb Run (*L)	21.794	43.919	4.646
+D+Lr+H, LL Comb Run (L*)	24.802	46.452	2.526
+D+Lr+H, LL Comb Run (LL)	24.725	48.069	3.804
+D+S+H	21.871	42.303	3.368
+D+0.750Lr+0.750L+H, LL Comb Run (* 21.466		50.790	10.078
+D+0.750Lr+0.750L+H, LL Comb Run (L 35.068		62.295	-0.561
+D+0.750Lr+0.750L+H, LL Comb Run (L 34.663		70.782	6.149
+D+0.750L+0.750S+H, LL Comb Run (*L 21.524		49.578	9.119
+D+0.750L+0.750S+H, LL Comb Run (L' 32.870		59.183	0.071
+D+0.750L+0.750S+H, LL Comb Run (LI 32.523		66.458	5.822
+D+0.60W+H	21.871	42.303	3.368
+D+0.750Lr+0.450W+H, LL Comb Run (* 21.813		43.515	4.327
+D+0.750Lr+0.450W+H, LL Comb Run (I 24.070		45.415	2.736
+D+0.750Lr+0.450W+H, LL Comb Run (I 24.012		46.627	3.695
+D+0.750S+0.450W+H	21.871	42.303	3.368
+0.60D+0.60W+0.60H	13.123	25.382	2.021
+D+0.70E+0.60H	21.871	42.303	3.368
+D+0.750L+0.750S+0.5250E+H, LL Con 21.524		49.578	9.119
+D+0.750L+0.750S+0.5250E+H, LL Con 32.870		59.183	0.071
+D+0.750L+0.750S+0.5250E+H, LL Con 32.523		66.458	5.822
+0.60D+0.70E+H	13.123	25.382	2.021
D Only	21.871	42.303	3.368
Lr Only, LL Comb Run (*L)	-0.077	1.617	1.278
Lr Only, LL Comb Run (L*)	2.931	4.150	-0.842
Lr Only, LL Comb Run (LL)	2.854	5.766	0.436
L Only, LL Comb Run (*L)	-0.463	9.700	7.668
L Only, LL Comb Run (L*)	14.665	22.507	-4.397
L Only, LL Comb Run (LL)	14.202	32.207	3.272
S Only			

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

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Description : BM 2

Vertical Reactions				Support notation : Far left is #1	Values in KIPS
Load Combination	Support 1	Support 2	Support 3		
W Only					
E Only					
H Only					

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Description : BM 3

Load Combination Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
		M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 32.00 ft	1	0.209	0.074	230.69		230.69	1,841.67	1,102.79	1.00	1.00	28.84	587.52	391.68
+D+0.750Lr+0.450W+H													
Dsgn. L = 32.00 ft	1	0.229	0.081	252.77		252.77	1,841.67	1,102.79	1.00	1.00	31.60	587.52	391.68
+D+0.750S+0.450W+H													
Dsgn. L = 32.00 ft	1	0.209	0.074	230.69		230.69	1,841.67	1,102.79	1.00	1.00	28.84	587.52	391.68
+0.60D+0.60W+0.60H													
Dsgn. L = 32.00 ft	1	0.126	0.044	138.41		138.41	1,841.67	1,102.79	1.00	1.00	17.30	587.52	391.68
+D+0.70E+0.60H													
Dsgn. L = 32.00 ft	1	0.209	0.074	230.69		230.69	1,841.67	1,102.79	1.00	1.00	28.84	587.52	391.68
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 32.00 ft	1	0.329	0.116	363.17		363.17	1,841.67	1,102.79	1.00	1.00	45.40	587.52	391.68
+0.60D+0.70E+H													
Dsgn. L = 32.00 ft	1	0.126	0.044	138.41		138.41	1,841.67	1,102.79	1.00	1.00	17.30	587.52	391.68

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.6720	16.091		0.0000	0.000

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	50.916	50.916
Overall MINimum	3.680	3.680
+D+H	28.836	28.836
+D+L+H	50.916	50.916
+D+Lr+H	32.516	32.516
+D+S+H	28.836	28.836
+D+0.750Lr+0.750L+H	48.156	48.156
+D+0.750L+0.750S+H	45.396	45.396
+D+0.60W+H	28.836	28.836
+D+0.750Lr+0.450W+H	31.596	31.596
+D+0.750S+0.450W+H	28.836	28.836
+0.60D+0.60W+0.60H	17.302	17.302
+D+0.70E+0.60H	28.836	28.836
+D+0.750L+0.750S+0.5250E+H	45.396	45.396
+0.60D+0.70E+H	17.302	17.302
D Only	28.836	28.836
Lr Only	3.680	3.680
L Only	22.080	22.080
S Only		
W Only		
E Only		
H Only		

Steel Beam

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Description: BM 4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

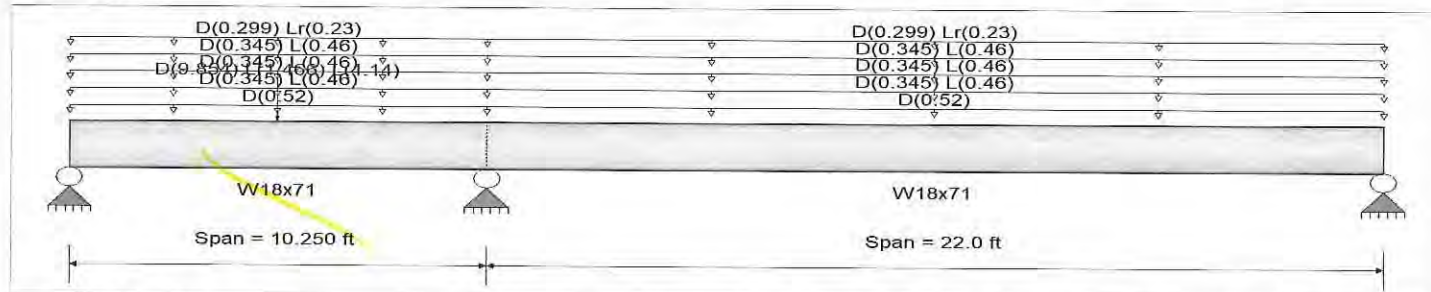
Analysis Method: Allowable Strength Design

Fy: Steel Yield: 50.0 ksi

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

E: Modulus: 29,000.0 ksi

Bending Axis: Major Axis Bending



Applied Loads

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

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load: D = 0.0160 ksf, Tributary Width = 32.50 ft, (party wall)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 11.50 ft, (roof)

Point Load: D = 9.854, Lr = 1.466, L = 4.140 k @ 5.125 ft, (BM 1)

Load for Span Number 2

Uniform Load: D = 0.0160 ksf, Tributary Width = 32.50 ft, (party wall)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 11.50 ft, (roof)

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Design OK

Maximum Forces & Stresses for Load Combinations

Overall Maximum Deflections

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	8.399	81.387	28.505
Overall MINimum	0.805	6.065	2.014
+D+H	5.621	47.733	16.291
+D+L+H	8.399	81.387	28.505

Steel Beam

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Description : BM 4

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H	6.426	53.798	18.305
+D+S+H	5.621	47.733	16.291
+D+0.750Lr+0.750L+H	8.308	77.522	26.962
+D+0.750L+0.750S+H	7.704	72.973	25.451
+D+0.60W+H	5.621	47.733	16.291
+D+0.750Lr+0.450W+H	6.225	52.282	17.801
+D+0.750S+0.450W+H	5.621	47.733	16.291
+0.60D+0.60W+0.60H	3.373	28.640	9.774
+D+0.70E+0.60H	5.621	47.733	16.291
+D+0.750L+0.750S+0.5250E+H	7.704	72.973	25.451
+0.60D+0.70E+H	3.373	28.640	9.774
D Only	5.621	47.733	16.291
Lr Only	0.805	6.065	2.014
L Only	2.777	33.653	12.214
S Only			
W Only			
E Only			
H Only			

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Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi

Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-16

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

Uniform Load : $D = 0.0330$, $L = 0.10$ ksf, Tributary Width = 12.0 ft, (corridor)

Design OK

Maximum Bending Stress Ratio =	0.532 : 1
Section used for this span	W18x211
Ma : Applied	650.962 k-ft
Mn / Omega : Allowable	1,222.555 k-ft
Load Combination	+D+L+H
Location of maximum on span	12.757 ft
Span # where maximum occurs	Span # 1

Maximum Shear Stress Ratio =	0.317 : 1
Section used for this span	W18x211
Va : Applied	139.069 k
Vn/Omega : Allowable	438.840 k
Load Combination	+D+L+H
Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1

Maximum Deflection			
Max Downward Transient Deflection	0.297 in	Ratio =	959 >= 480
Max Upward Transient Deflection	0.000 in	Ratio =	0 < 480
Max Downward Total Deflection	0.512 in	Ratio =	557 >= 360
Max Upward Total Deflection	0.000 in	Ratio =	0 < 360

Maximum Forces & Stresses for Load Combinations

Steel Beam

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Description : BM 6

Load Combination		Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
Segment	Length		M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H														
Dsgn.	L = 23.75 ft	1	0.227	0.145	276.93		276.93	2,041.67	1,222.55	1.00	1.00	63.55	658.26	438.84
+D+L+H														
Dsgn.	L = 23.75 ft	1	0.532	0.317	650.96		650.96	2,041.67	1,222.55	1.00	1.00	139.07	658.26	438.84
+D+Lr+H														
Dsgn.	L = 23.75 ft	1	0.240	0.156	292.96		292.96	2,041.67	1,222.55	1.00	1.00	68.42	658.26	438.84
+D+S+H														
Dsgn.	L = 23.75 ft	1	0.227	0.145	276.93		276.93	2,041.67	1,222.55	1.00	1.00	63.55	658.26	438.84
+D+0.750Lr+0.750L+H														
Dsgn.	L = 23.75 ft	1	0.466	0.282	569.48		569.48	2,041.67	1,222.55	1.00	1.00	123.85	658.26	438.84
+D+0.750L+0.750S+H														
Dsgn.	L = 23.75 ft	1	0.456	0.274	557.45		557.45	2,041.67	1,222.55	1.00	1.00	120.19	658.26	438.84
+D+0.60W+H														
Dsgn.	L = 23.75 ft	1	0.227	0.145	276.93		276.93	2,041.67	1,222.55	1.00	1.00	63.55	658.26	438.84
+D+0.750Lr+0.450W+H														
Dsgn.	L = 23.75 ft	1	0.236	0.153	288.95		288.95	2,041.67	1,222.55	1.00	1.00	67.21	658.26	438.84
+D+0.750S+0.450W+H														
Dsgn.	L = 23.75 ft	1	0.227	0.145	276.93		276.93	2,041.67	1,222.55	1.00	1.00	63.55	658.26	438.84
+0.60D+0.60W+0.60H														
Dsgn.	L = 23.75 ft	1	0.136	0.087	166.16		166.16	2,041.67	1,222.55	1.00	1.00	38.13	658.26	438.84
+D+0.70E+0.60H														
Dsgn.	L = 23.75 ft	1	0.227	0.145	276.93		276.93	2,041.67	1,222.55	1.00	1.00	63.55	658.26	438.84
+D+0.750L+0.750S+0.5250E+H														
Dsgn.	L = 23.75 ft	1	0.456	0.274	557.45		557.45	2,041.67	1,222.55	1.00	1.00	120.19	658.26	438.84
+0.60D+0.70E+H														
Dsgn.	L = 23.75 ft	1	0.136	0.087	166.16		166.16	2,041.67	1,222.55	1.00	1.00	38.13	658.26	438.84

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.5121	11.875		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	139.069	94.127
Overall MINimum	4.876	1.568
+D+H	63.549	37.677
+D+L+H	139.069	94.127
+D+Lr+H	68.425	39.245
+D+S+H	63.549	37.677
+D+0.750Lr+0.750L+H	123.846	81.191
+D+0.750L+0.750S+H	120.189	80.015
+D+0.60W+H	63.549	37.677
+D+0.750Lr+0.450W+H	67.206	38.853
+D+0.750S+0.450W+H	63.549	37.677
+0.60D+0.60W+0.60H	38.130	22.606
+D+0.70E+0.60H	63.549	37.677
+D+0.750L+0.750S+0.5250E+H	120.189	80.015
+0.60D+0.70E+H	38.130	22.606
D Only	63.549	37.677
Lr Only	4.876	1.568
L Only	75.519	56.451
S Only		
W Only		
E Only		
H Only		

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Fy : Steel Yield :	50.0 ksi
E: Modulus :	29,000.0 ksi

Beam self weight calculated and added to loading

Uniform Load : $D = 0.0150$ ksf, Tributary Width = 32.50 ft, (exterior wall)

Uniform Load : $D = 0.0250$, $L_r = 0.020$ ksf, Tributary Width = 2.0 ft, (roof)

Point Load : $D = 24.025$, $L_r = 1.115$, $L = 18.533$ k @ 22.50 ft, (BM 2)

Point Load : $D = 28.840$, $L_r = 3.680$, $L = 22.080$ k @ 3.750 ft, (BM 3)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 1.0 ft, (Floor)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 1.0 ft, (Floor)

Maximum Forces & Stresses for Load Combinations													
Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 22.75 ft	1	0.317	0.197	115.40		115.40	608.33	364.27	1.00	1.00	36.12	274.73	183.15
+D+L+H													
Dsgn. L = 22.75 ft	1	0.516	0.322	187.85		187.85	608.33	364.27	1.00	1.00	59.00	274.73	183.15
+D+Lr+H													
Dsgn. L = 22.75 ft	1	0.352	0.209	128.20		128.20	608.33	364.27	1.00	1.00	38.28	274.73	183.15
+D+S+H													
Dsgn. L = 22.75 ft	1	0.317	0.197	115.40		115.40	608.33	364.27	1.00	1.00	36.12	274.73	183.15
+D+0.750Lr+0.750L+H													
Dsgn. L = 22.75 ft	1	0.493	0.300	179.41		179.41	608.33	364.27	1.00	1.00	54.90	274.73	183.15

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description: BM 8

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.750L+0.750S+H													
Dsgn. L = 22.75 ft	1	0.466	0.291	169.67		169.67	608.33	364.27	1.00	1.00	53.28	274.73	183.15
+D+0.60W+H													
Dsgn. L = 22.75 ft	1	0.317	0.197	115.40		115.40	608.33	364.27	1.00	1.00	36.12	274.73	183.15
+D+0.750Lr+0.450W+H													
Dsgn. L = 22.75 ft	1	0.343	0.206	124.98		124.98	608.33	364.27	1.00	1.00	37.74	274.73	183.15
+D+0.750S+0.450W+H													
Dsgn. L = 22.75 ft	1	0.317	0.197	115.40		115.40	608.33	364.27	1.00	1.00	36.12	274.73	183.15
+0.60D+0.60W+0.60H													
Dsgn. L = 22.75 ft	1	0.190	0.118	69.24		69.24	608.33	364.27	1.00	1.00	21.67	274.73	183.15
+D+0.70E+0.60H													
Dsgn. L = 22.75 ft	1	0.317	0.197	115.40		115.40	608.33	364.27	1.00	1.00	36.12	274.73	183.15
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 22.75 ft	1	0.466	0.291	169.67		169.67	608.33	364.27	1.00	1.00	53.28	274.73	183.15
+0.60D+0.70E+H													
Dsgn. L = 22.75 ft	1	0.190	0.118	69.24		69.24	608.33	364.27	1.00	1.00	21.67	274.73	183.15

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.4600	10.400		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	51.508	58.998
Overall MINimum	3.541	2.164
+D+H	31.954	36.119
+D+L+H	51.508	58.998
+D+Lr+H	35.495	38.283
+D+S+H	31.954	36.119
+D+0.750Lr+0.750L+H	49.275	54.901
+D+0.750L+0.750S+H	46.620	53.278
+D+0.60W+H	31.954	36.119
+D+0.750Lr+0.450W+H	34.610	37.742
+D+0.750S+0.450W+H	31.954	36.119
+0.60D+0.60W+0.60H	19.173	21.671
+D+0.70E+0.60H	31.954	36.119
+D+0.750L+0.750S+0.5250E+H	46.620	53.278
+0.60D+0.70E+H	19.173	21.671
D Only	31.954	36.119
Lr Only	3.541	2.164
L Only	19.554	22.879
S Only		
W Only		
E Only		
H Only		

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Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-16

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



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

Beam self weight calculated and added to loading

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load : $D = 0.00850$ ksf, Tributary Width = 32.50 ft, (interior wall)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load : $D = 0.030$, $L = 0.040$ ksf, Tributary Width = 11.50 ft, (Floor)

Uniform Load : $D = 0.0260$, $L_r = 0.020$ ksf, Tributary Width = 11.50 ft, (Roof)

Point Load : $D = 9.850$, $L_r = 1.466$, $L = 4.140$ k @ 6.0 ft, (BM1)

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio =	0.370 : 1	Maximum Shear Stress Ratio =	0.143 : 1
Section used for this span	W18x211	Section used for this span	W18x211
Ma : Applied	452.805 k-ft	Va : Applied	62.587 k
Mn / Omega : Allowable	1,222.555 k-ft	Vn/Omega : Allowable	438.840 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	15.177 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.281 in	Ratio =	1,364 >=480
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480
Max Downward Total Deflection	0.675 in	Ratio =	569 >=360
Max Upward Total Deflection	0.000 in	Ratio =	0 <360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations													
Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 32.00 ft	1	0.216	0.085	263.61		263.61	2,041.67	1,222.55	1.00	1.00	37.14	658.26	438.84
+D+L+H													
Dsgn. L = 32.00 ft	1	0.370	0.143	452.80		452.80	2,041.67	1,222.55	1.00	1.00	62.59	658.26	438.84
+D+Lr+H													
Dsgn. L = 32.00 ft	1	0.243	0.096	297.60		297.60	2,041.67	1,222.55	1.00	1.00	42.01	658.26	438.84
+D+S+H													
Dsgn. L = 32.00 ft	1	0.216	0.085	263.61		263.61	2,041.67	1,222.55	1.00	1.00	37.14	658.26	438.84
+D+0.750Lr+0.750L+H													
Dsgn. L = 32.00 ft	1	0.353	0.136	430.99		430.99	2,041.67	1,222.55	1.00	1.00	59.88	658.26	438.84

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Load Combination	Support 1	Support 2
Overall MAXimum	62.587	53.843
Overall MINimum	4.871	3.955
+D+H	37.143	30.987
+D+L+H	62.587	53.843
+D+Lr+H	42.014	34.942
+D+S+H	37.143	30.987
+D+0.750Lr+0.750L+H	59.879	51.095
+D+0.750L+0.750S+H	56.226	48.129
+D+0.60W+H	37.143	30.987
+D+0.750Lr+0.450W+H	40.796	33.953
+D+0.750S+0.450W+H	37.143	30.987
+0.60D+0.60W+0.60H	22.286	18.592
+D+0.70E+0.60H	37.143	30.987
+D+0.750L+0.750S+0.5250E+H	56.226	48.129
+0.60D+0.70E+H	22.286	18.592
D Only	37.143	30.987
Lr Only	4.871	3.955
L Only	25.444	22.856
S Only		
W Only		
E Only		
H Only		

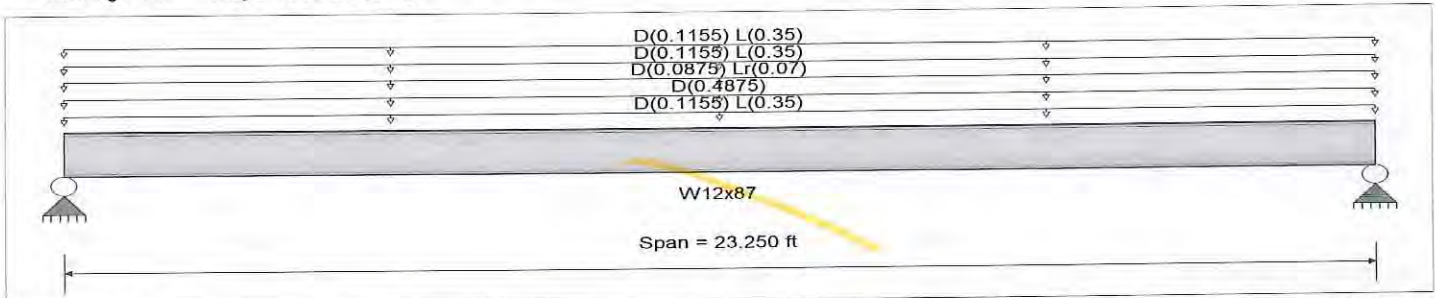
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Description : BM 10

Load Combination Set : ASCE 7-16

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



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

Uniform Load : $D = 0.0330$, $L = 0.10$ ksf, Tributary Width = 3.50 ft, (corridor)

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio =	0.404 : 1	Maximum Shear Stress Ratio =	0.178 : 1
Section used for this span	W12x87	Section used for this span	W12x87
Ma : Applied	133.215 k-ft	Va : Applied	22.919 k
Mn / Omega : Allowable	329.341 k-ft	Vn/Omega : Allowable	128.750 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	11.625 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.323 in	Ratio =	863 >=480
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480
Max Downward Total Deflection	0.607 in	Ratio =	460 >=360
Max Upward Total Deflection	0.000 in	Ratio =	0 <360

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Steel Beam

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Description : BM 10

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 23.25 ft	1	0.189	0.083	62.27		62.27	550.00	329.34	1.00	1.00	10.71	193.13	128.75
+D+0.750Lr+0.450W+H													
Dsgn. L = 23.25 ft	1	0.200	0.088	65.81		65.81	550.00	329.34	1.00	1.00	11.32	193.13	128.75
+D+0.750S+0.450W+H													
Dsgn. L = 23.25 ft	1	0.189	0.083	62.27		62.27	550.00	329.34	1.00	1.00	10.71	193.13	128.75
+0.60D+0.60W+0.60H													
Dsgn. L = 23.25 ft	1	0.113	0.050	37.36		37.36	550.00	329.34	1.00	1.00	6.43	193.13	128.75
+D+0.70E+0.60H													
Dsgn. L = 23.25 ft	1	0.189	0.083	62.27		62.27	550.00	329.34	1.00	1.00	10.71	193.13	128.75
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 23.25 ft	1	0.351	0.154	115.48		115.48	550.00	329.34	1.00	1.00	19.87	193.13	128.75
+0.60D+0.70E+H													
Dsgn. L = 23.25 ft	1	0.113	0.050	37.36		37.36	550.00	329.34	1.00	1.00	6.43	193.13	128.75

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.6068	11.691		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	22.919	22.919
Overall MINimum	0.814	0.814
+D+H	10.712	10.712
+D+L+H	22.919	22.919
+D+Lr+H	11.526	11.526
+D+S+H	10.712	10.712
+D+0.750Lr+0.750L+H	20.477	20.477
+D+0.750L+0.750S+H	19.867	19.867
+D+0.60W+H	10.712	10.712
+D+0.750Lr+0.450W+H	11.323	11.323
+D+0.750S+0.450W+H	10.712	10.712
+0.60D+0.60W+0.60H	6.427	6.427
+D+0.70E+0.60H	10.712	10.712
+D+0.750L+0.750S+0.5250E+H	19.867	19.867
+0.60D+0.70E+H	6.427	6.427
D Only	10.712	10.712
Lr Only	0.814	0.814
L Only	12.206	12.206
S Only		
W Only		
E Only		
H Only		

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Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-16

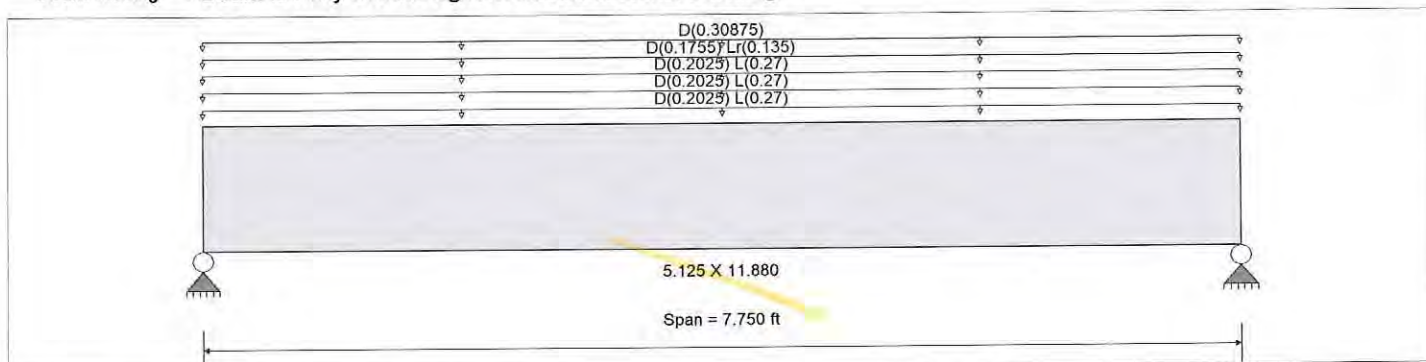
Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-16

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

Ebend- xx	1,800.0ksi
Eminbend - xx	950.0ksi
Ebend- yy	1,600.0ksi
Eminbend - yy	850.0ksi
Density	31.20pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Beam self weight calculated and added to loads

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.750 ft, (floor)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.750 ft, (floor)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.750 ft, (floor)
 Uniform Load : D = 0.0260, Lr = 0.020 ksf, Tributary Width = 6.750 ft, (roof)
 Uniform Load : D = 0.00950 ksf, Tributary Width = 32.50 ft, (wall)

Design OK

Maximum Bending Stress Ratio	=	0.596	1	Maximum Shear Stress Ratio	=	0.514	: 1
Section used for this span		5.125 X 11.880		Section used for this span		5.125 X 11.880	
fb : Actual	=	1,431.12	psi	f _v : Actual	=	136.11	psi
FB : Allowable	=	2,400.00	psi	F _v : Allowable	=	265.00	psi
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	3.875	ft	Location of maximum on span	=	6.760	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.051	in	Ratio =		1812	>=480
Max Upward Transient Deflection		0.000	in	Ratio =		0	<480
Max Downward Total Deflection		0.121	in	Ratio =		766	>=360
Max Upward Total Deflection		0.000	in	Ratio =		0	<360

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.420	7.420
Overall MINimum	3.139	3.139
+D+H	4.282	4.282
+D+L+H	7.420	7.420
+D+Lr+H	4.805	4.805
+D+S+H	4.282	4.282
+D+0.750Lr+0.750L+H	7.028	7.028

Wood Beam

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Description : BM 11

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	6.636	6.636
+D+0.60W+H	4.282	4.282
+D+0.750Lr+0.450W+H	4.674	4.674
+D+0.750S+0.450W+H	4.282	4.282
+0.60D+0.60W+0.60H	2.569	2.569
+D+0.70E+0.60H	4.282	4.282
+D+0.750L+0.750S+0.5250E+H	6.636	6.636
+0.60D+0.70E+H	2.569	2.569
D Only	4.282	4.282
Lr Only	0.523	0.523
L Only	3.139	3.139
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: BM 12

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

Analysis Method: Allowable Stress Design
 Load Combination ASCE 7-16

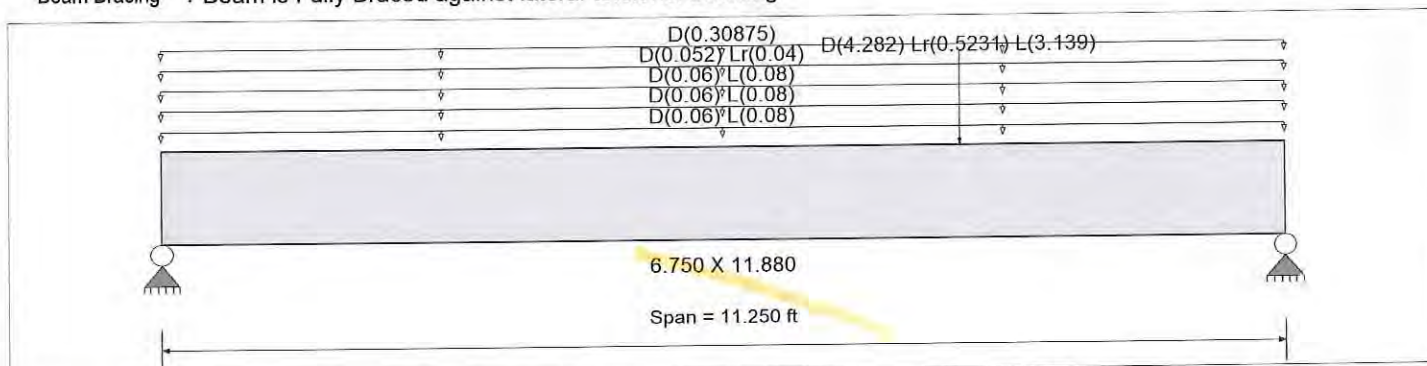
Wood Species: DF/DF
 Wood Grade: 24F - V4

Fb + 2,400.0 psi
 Fb - 1,850.0 psi
 Fc - Prll 1,650.0 psi
 Fc - Perp 650.0 psi
 Fv 265.0 psi
 Ft 1,100.0 psi

E: Modulus of Elasticity

Ebend-xx 1,800.0 ksi
 Eminbend-xx 950.0 ksi
 Ebend-yy 1,600.0 ksi
 Eminbend-yy 850.0 ksi
 Density 31.20pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft, (floor)
 Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft, (floor)
 Uniform Load: D = 0.030, L = 0.040 ksf, Tributary Width = 2.0 ft, (floor)
 Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)
 Uniform Load: D = 0.00950 ksf, Tributary Width = 32.50 ft, (wall)
 Point Load: D = 4.282, Lr = 0.5231, L = 3.139 k @ 8.0 ft, (BM11)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.867	1	Maximum Shear Stress Ratio	=	0.634	1
Section used for this span	=	6.750 X 11.880		Section used for this span	=	6.750 X 11.880	
fb: Actual	=	2,079.70psi		fv: Actual	=	167.98 psi	
FB: Allowable	=	2,400.00psi		Fv: Allowable	=	265.00 psi	
Load Combination	=	+D+L+H		Load Combination	=	+D+L+H	
Location of maximum on span	=	7.965ft		Location of maximum on span	=	10.265 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.125 in	Ratio = 1078 >= 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.345 in	Ratio = 391 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.633	9.767
Overall MINimum	2.257	3.582
+D+H	4.376	6.184
+D+L+H	6.633	9.767
+D+Lr+H	4.753	6.781
+D+S+H	4.376	6.184

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description: BM 12

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+H	6.351	9.319
+D+0.750L+0.750S+H	6.069	8.871
+D+0.60W+H	4.376	6.184
+D+0.750Lr+0.450W+H	4.659	6.632
+D+0.750S+0.450W+H	4.376	6.184
+0.60D+0.60W+0.60H	2.626	3.711
+D+0.70E+0.60H	4.376	6.184
+D+0.750L+0.750S+0.5250E+H	6.069	8.871
+0.60D+0.70E+H	2.626	3.711
D Only	4.376	6.184
Lr Only	0.376	0.597
L Only	2.257	3.582
S Only		
W Only		
E Only		
H Only		

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Description : BM14

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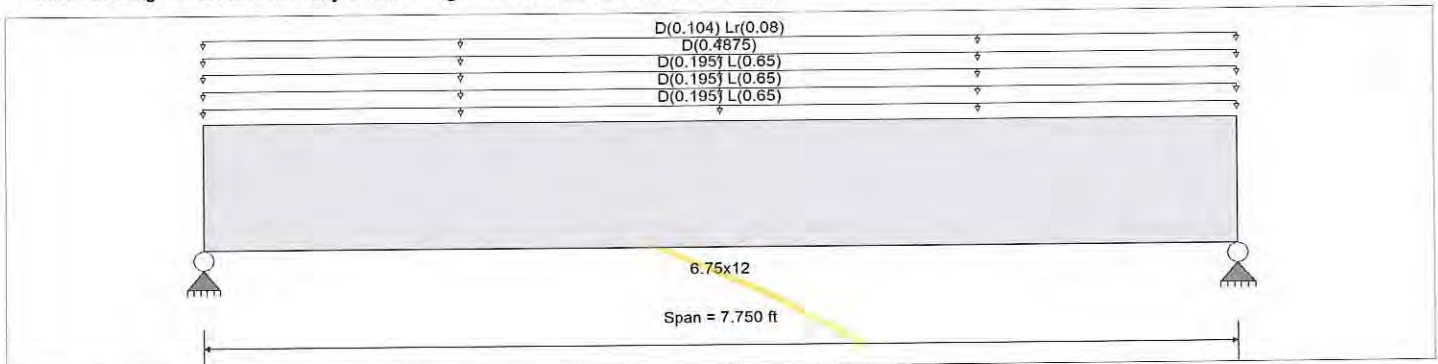
Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Material Properties

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

Ebend- xx	1,800.0ksi
Eminbend - xx	950.0ksi
Ebend- yy	1,600.0ksi
Eminbend - yy	850.0ksi
Density	31.210pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Uniform Load :	D = 0.030,	L = 0.10 ksf,	Tributary Width = 6.50 ft, (corridor)
Uniform Load :	D = 0.030,	L = 0.10 ksf,	Tributary Width = 6.50 ft, (corridor)
Uniform Load :	D = 0.030,	L = 0.10 ksf,	Tributary Width = 6.50 ft, (corridor)
Uniform Load :	D = 0.0150 ksf,	Tributary Width = 32.50 ft,	(corridor wall)
Uniform Load :	D = 0.0260,	Lr = 0.020 ksf,	Tributary Width = 4.0 ft, (roof)

Design OK

DESIGN SUMMARY					
Maximum Bending Stress Ratio	=	0.724 : 1	Maximum Shear Stress Ratio	=	0.630 : 1
Section used for this span		6.75x12	Section used for this span		6.75x12
fb : Actual	=	1,738.75psi	fv : Actual	=	167.04 psi
FB : Allowable	=	2,400.00psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.875ft	Location of maximum on span	=	6.760 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.091 in	Ratio =		1022 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.146 in	Ratio =		637 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	12.115	12.115
Overall MINimum	7.556	7.556
+D+H	4.559	4.559
+D+L+H	12.115	12.115
+D+Lr+H	4.869	4.869
+D+S+H	4.559	4.559
+D+0.750Lr+0.750L+H	10.459	10.459
+D+0.750L+0.750S+H	10.226	10.226

Wood Beam

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Description : BM14

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.60W+H	4.559	4.559
+D+0.750Lr+0.450W+H	4.791	4.791
+D+0.750S+0.450W+H	4.559	4.559
+0.60D+0.60W+0.60H	2.735	2.735
+D+0.70E+0.60H	4.559	4.559
+D+0.750L+0.750S+0.5250E+H	10.226	10.226
+0.60D+0.70E+H	2.735	2.735
D Only	4.559	4.559
Lr Only	0.310	0.310
L Only	7.556	7.556
S Only		
W Only		
E Only		
H Only		

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Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-16

Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-16

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)
 Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 3.0 ft, (corridor)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)
 Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 1.0 ft, (floor)
 Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 3.0 ft, (corridor)
 Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 3.0 ft, (corridor)
 Uniform Load : D = 0.0150 ksf, Tributary Width = 32.50 ft, (corridor wall)
 Uniform Load : D = 0.0260, Lr = 0.020 ksf, Tributary Width = 4.0 ft, (roof)

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.539	1
Section used for this span		5.125x9	
fb : Actual	=	1,292.96psi	
FB : Allowable	=	2,400.00psi	
Load Combination		+D+L+H	
Location of maximum on span	=	2.750ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection		0.038 in	Ratio = 1751 >=480
Max Upward Transient Deflection		0.000 in	Ratio = 0 <480
Max Downward Total Deflection		0.073 in	Ratio = 905 >=360
Max Upward Total Deflection		0.000 in	Ratio = 0 <360

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.422	5.422
Overall MINimum	2.805	2.805
+D+H	2.617	2.617
+D+L+H	5.422	5.422
+D+L+H	2.837	2.837

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

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Description : BM13

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+S+H	2.617	2.617
+D+0.750Lr+0.750L+H	4.885	4.885
+D+0.750L+0.750S+H	4.720	4.720
+D+0.60W+H	2.617	2.617
+D+0.750Lr+0.450W+H	2.782	2.782
+D+0.750S+0.450W+H	2.617	2.617
+0.60D+0.60W+0.60H	1.570	1.570
+D+0.70E+0.60H	2.617	2.617
+D+0.750L+0.750S+0.5250E+H	4.720	4.720
+0.60D+0.70E+H	1.570	1.570
D Only	2.617	2.617
Lr Only	0.220	0.220
L Only	2.805	2.805
S Only		
W Only		
E Only		
H Only		

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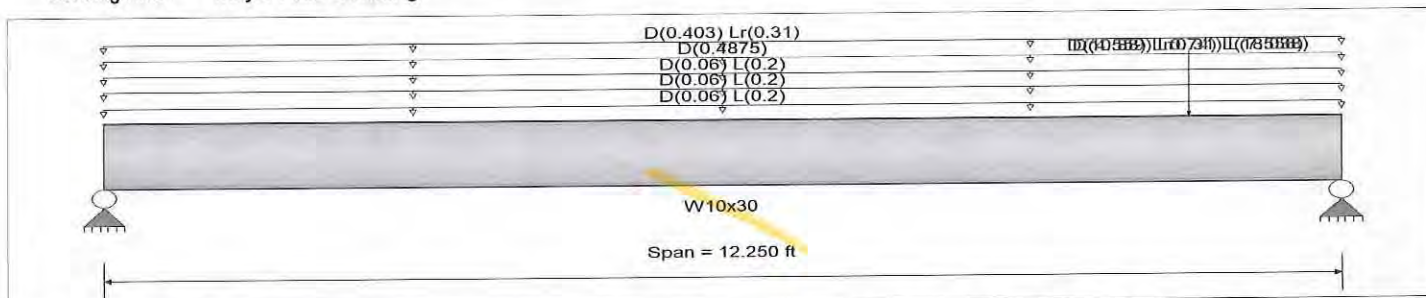
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Description : BM15

Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-16

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

E: Modulus : 29,000.0 ksi



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

Beam self weight NOT internally calculated and added

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 2.0 ft, (corridor)

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 2.0 ft, (corridor)

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 2.0 ft, (corridor)

Uniform Load : $D = 0.0150$ ksf, Tributary Width = 32.50 ft, (corridor wall)

Uniform Load : $D = 0.0260$, $L_r = 0.020$ ksf, Tributary Width = 15.50 ft, (roof)

Point Load : $D = 4.559$, $L_r = 0.310$, $L = 7.556$ k @ 10.750 ft, (BM14)

Point Load : $D = 10.880$, $L_r = 0.740$, $L = 18.038$ k @ 10.750 ft, (BM15)

Design OK

Maximum Bending Stress Ratio =	0.763 : 1	Maximum Shear Stress Ratio =	0.734 : 1
Section used for this span	W10x30	Section used for this span	W10x30
Ma : Applied	69.666 k-ft	Va : Applied	46.240 k
Mn / Omega : Allowable	91.317 k-ft	Vn/Omega : Allowable	63.0 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	9.135ft	Location of maximum on span	12.250 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.188 in	Ratio =	781 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.374 in	Ratio =	393 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

[illegible]

Steel Beam

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Description: BM15

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 12.25 ft	1	0.365	0.319	33.33		33.33	152.50	91.32	1.00	1.00	20.11	94.50	63.00
+D+0.750Lr+0.750L+H													
Dsgn. L = 12.25 ft	1	0.710	0.664	64.81		64.81	152.50	91.32	1.00	1.00	41.82	94.50	63.00
+D+0.750L+0.750S+H													
Dsgn. L = 12.25 ft	1	0.662	0.630	60.41		60.41	152.50	91.32	1.00	1.00	39.71	94.50	63.00
+D+0.60W+H													
Dsgn. L = 12.25 ft	1	0.365	0.319	33.33		33.33	152.50	91.32	1.00	1.00	20.11	94.50	63.00
+D+0.750Lr+0.450W+H													
Dsgn. L = 12.25 ft	1	0.418	0.353	38.13		38.13	152.50	91.32	1.00	1.00	22.22	94.50	63.00
+D+0.750S+0.450W+H													
Dsgn. L = 12.25 ft	1	0.365	0.319	33.33		33.33	152.50	91.32	1.00	1.00	20.11	94.50	63.00
+0.60D+0.60W+0.60H													
Dsgn. L = 12.25 ft	1	0.219	0.191	20.00		20.00	152.50	91.32	1.00	1.00	12.06	94.50	63.00
+D+0.70E+0.60H													
Dsgn. L = 12.25 ft	1	0.365	0.319	33.33		33.33	152.50	91.32	1.00	1.00	20.11	94.50	63.00
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 12.25 ft	1	0.662	0.630	60.41		60.41	152.50	91.32	1.00	1.00	39.71	94.50	63.00
+0.60D+0.70E+H													
Dsgn. L = 12.25 ft	1	0.219	0.191	20.00		20.00	152.50	91.32	1.00	1.00	12.06	94.50	63.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3740	6.615		0.0000	0.000

Vertical Reactions

Load Combination	Support 1	Support 2
Overall MAXimum	15.256	46.240
Overall MINimum	2.027	2.820
+D+H	8.447	20.105
+D+L+H	15.256	46.240
+D+Lr+H	10.475	22.926
+D+S+H	8.447	20.105
+D+0.750Lr+0.750L+H	15.075	41.822
+D+0.750L+0.750S+H	13.554	39.707
+D+0.60W+H	8.447	20.105
+D+0.750Lr+0.450W+H	9.968	22.220
+D+0.750S+0.450W+H	8.447	20.105
+0.60D+0.60W+0.60H	5.068	12.063
+D+0.70E+0.60H	8.447	20.105
+D+0.750L+0.750S+0.5250E+H	13.554	39.707
+0.60D+0.70E+H	5.068	12.063
D Only	8.447	20.105
Lr Only	2.027	2.820
L Only	6.809	26.135
S Only		
W Only		
E Only		
H Only		

Support notation: Far left is #1

Values in KIPS

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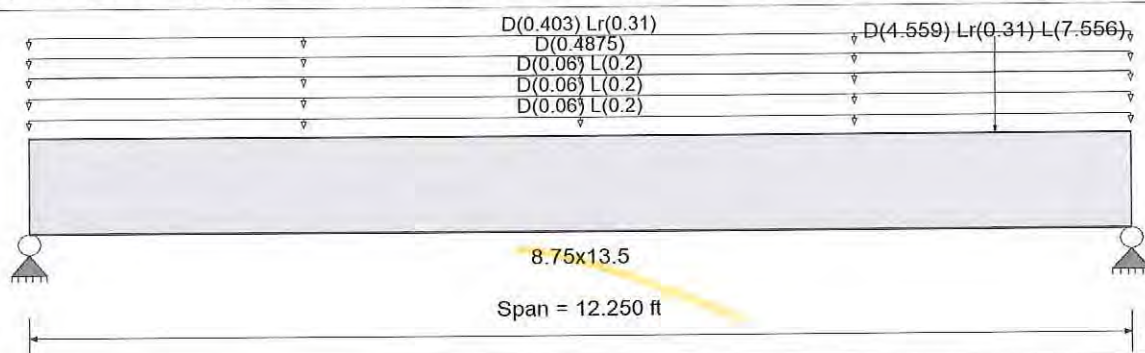
CODE REFERENCES

Load Combination Set : ASCE 7-16

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-16

Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1,850.0 psi	Eband- xx	1,800.0ksi
Fc- Prl	1,650.0 psi	Eminbend - xx	950.0ksi
Fc- Perp	650.0 psi	Eband- yy	1,600.0ksi
Fv	265.0 psi	Eminbend - yy	850.0ksi
Ft	1,100.0 psi	Density	31.210pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



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

Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 2.0 ft, (corridor)
 Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 2.0 ft, (corridor)
 Uniform Load : D = 0.030, L = 0.10 ksf, Tributary Width = 2.0 ft, (corridor)
 Uniform Load : D = 0.0150 ksf, Tributary Width = 32.50 ft, (corridor wall)
 Uniform Load : D = 0.0260, Lr = 0.020 ksf, Tributary Width = 15.50 ft, (roof)
 Point Load : D = 4.559, Lr = 0.310, L = 7.556 k @ 10.750 ft, (BM14)

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.782	1
Section used for this span		8.75x13.5	
fb : Actual	=	1,854.75psi	
FB : Allowable	=	2,372.86psi	
Load Combination		+D+L+H	
Location of maximum on span	=	7.019ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection		0.151 in	Ratio = 972 >=480
Max Upward Transient Deflection		0.000 in	Ratio = 0 <480
Max Downward Total Deflection		0.355 in	Ratio = 414 >=360
Max Upward Total Deflection		0.000 in	Ratio = 0 <360

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	12.018	20.863
Overall MINimum	4.600	10.306
+D+H	7.115	10.558
+D+L+H	11.715	20.863
+D+Lr+H	9.052	12.728
+D+S+H	7.115	10.558
+D+0.750Lr+0.750L+H	12.018	19.915

Wood Beam

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Description : BM17

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	10.565	18.287
+D+0.60W+H	7.115	10.558
+D+0.750Lr+0.450W+H	8.568	12.186
+D+0.750S+0.450W+H	7.115	10.558
+0.60D+0.60W+0.60H	4.269	6.335
+D+0.70E+0.60H	7.115	10.558
+D+0.750L+0.750S+0.5250E+H	10.565	18.287
+0.60D+0.70E+H	4.269	6.335
D Only	7.115	10.558
Lr Only	1.937	2.171
L Only	4.600	10.306
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description: BM18

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

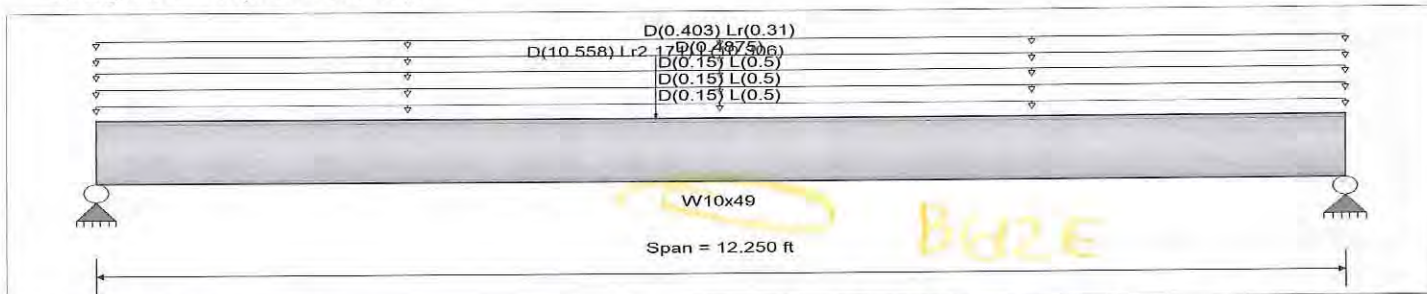
Analysis Method: Allowable Strength Design

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Bending Axis: Major Axis Bending

Fy: Steel Yield: 50.0 ksi

E: Modulus: 29,000.0 ksi



Applied Loads

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

Beam self weight NOT internally calculated and added

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 5.0 ft, (corridor)

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 5.0 ft, (corridor)

Uniform Load: D = 0.030, L = 0.10 ksf, Tributary Width = 5.0 ft, (corridor)

Uniform Load: D = 0.0150 ksf, Tributary Width = 32.50 ft, (corridor wall)

Uniform Load: D = 0.0260, Lr = 0.020 ksf, Tributary Width = 15.50 ft, (roof)

Point Load: D = 10.558, Lr = 2.171, L = 10.306 k @ 5.50 ft, (BM17)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =

0.769 : 1

Maximum Shear Stress Ratio =

0.425 : 1

Section used for this span

W10x49

Section used for this span

W10x49

Ma: Applied

115.891 k-ft

Va: Applied

28.895 k

Mn / Omega: Allowable

150.699 k-ft

Vn/Omega: Allowable

68.0 k

Load Combination

+D+L+H

Load Combination

+D+L+H

Location of maximum on span

5.495ft

Location of maximum on span

0.000 ft

Span # where maximum occurs

Span # 1

Span # where maximum occurs

Span # 1

Maximum Deflection

Max Downward Transient Deflection

0.182 in

Ratio =

805 >= 480

Max Upward Transient Deflection

0.000 in

Ratio =

0 < 480

Max Downward Total Deflection

0.357 in

Ratio =

412 >= 360

Max Upward Total Deflection

0.000 in

Ratio =

0 < 360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H	Dsgn. L = 12.25 ft	1	0.377	0.206	56.85		56.85	251.67	150.70	1.00	1.00	14.03	102.00	68.00
+D+L+H	Dsgn. L = 12.25 ft	1	0.769	0.425	115.89		115.89	251.67	150.70	1.00	1.00	28.89	102.00	68.00
+D+Lr+H	Dsgn. L = 12.25 ft	1	0.459	0.252	69.17		69.17	251.67	150.70	1.00	1.00	17.12	102.00	68.00
+D+S+H	Dsgn. L = 12.25 ft	1	0.377	0.206	56.85		56.85	251.67	150.70	1.00	1.00	14.03	102.00	68.00
+D+0.750Lr+0.750L+H	Dsgn. L = 12.25 ft	1	0.732	0.404	110.38		110.38	251.67	150.70	1.00	1.00	27.50	102.00	68.00

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

File = Z:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Preliminary Garage Lid Beams.ec6

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Description: BM18

Load Combination Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
		M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.750L+0.750S+H Dsgn. L = 12.25 ft	1	0.671	0.370	101.13		101.13	251.67	150.70	1.00	1.00	25.18	102.00	68.00
+D+0.60W+H Dsgn. L = 12.25 ft	1	0.377	0.206	56.85		56.85	251.67	150.70	1.00	1.00	14.03	102.00	68.00
+D+0.750Lr+0.450W+H Dsgn. L = 12.25 ft	1	0.439	0.240	66.09		66.09	251.67	150.70	1.00	1.00	16.35	102.00	68.00
+D+0.750S+0.450W+H Dsgn. L = 12.25 ft	1	0.377	0.206	56.85		56.85	251.67	150.70	1.00	1.00	14.03	102.00	68.00
+0.60D+0.60W+0.60H Dsgn. L = 12.25 ft	1	0.226	0.124	34.11		34.11	251.67	150.70	1.00	1.00	8.42	102.00	68.00
+D+0.70E+0.60H Dsgn. L = 12.25 ft	1	0.377	0.206	56.85		56.85	251.67	150.70	1.00	1.00	14.03	102.00	68.00
+D+0.750L+0.750S+0.5250E+H Dsgn. L = 12.25 ft	1	0.671	0.370	101.13		101.13	251.67	150.70	1.00	1.00	25.18	102.00	68.00
+0.60D+0.70E+H Dsgn. L = 12.25 ft	1	0.226	0.124	34.11		34.11	251.67	150.70	1.00	1.00	8.42	102.00	68.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3566	6.055		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	28.895	26.766
Overall MINimum	3.095	2.873
+D+H	14.028	12.951
+D+L+H	28.895	26.766
+D+Lr+H	17.123	15.824
+D+S+H	14.028	12.951
+D+0.750Lr+0.750L+H	27.499	25.467
+D+0.750L+0.750S+H	25.178	23.312
+D+0.60W+H	14.028	12.951
+D+0.750Lr+0.450W+H	16.349	15.106
+D+0.750S+0.450W+H	14.028	12.951
+0.60D+0.60W+0.60H	8.417	7.771
+D+0.70E+0.60H	14.028	12.951
+D+0.750L+0.750S+0.5250E+H	25.178	23.312
+0.60D+0.70E+H	8.417	7.771
D Only	14.028	12.951
Lr Only	3.095	2.873
L Only	14.866	13.815
S Only		
W Only		
E Only		
H Only		

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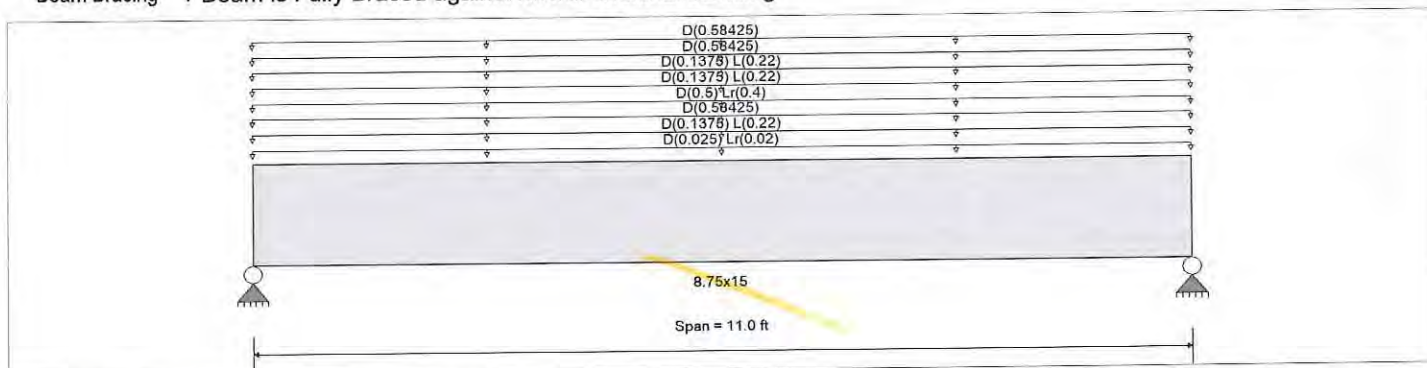
CODE REFERENCES

Load Combination Set : ASCE 7-16

Material Properties

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Et	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load: D = 0.0250, Lr = 0.020 ksf, Tributary Width = 1.0 ft, (lowroof)
 Uniform Load: D = 0.0250, L = 0.040 ksf, Tributary Width = 5.50 ft, (floor)
 Uniform Load: D = 0.0190 ksf, Tributary Width = 30.750 ft, (exterior wall)
 Uniform Load: D = 0.0250, Lr = 0.020 ksf, Tributary Width = 20.0 ft, (roof)
 Uniform Load: D = 0.0250, L = 0.040 ksf, Tributary Width = 5.50 ft, (floor)
 Uniform Load: D = 0.0250, L = 0.040 ksf, Tributary Width = 5.50 ft, (floor)
 Uniform Load: D = 0.0190 ksf, Tributary Width = 30.750 ft, (exterior wall)
 Uniform Load: D = 0.0190 ksf, Tributary Width = 30.750 ft, (exterior wall)

DESIGN SUMMARY

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.787	1
Section used for this span		8.75x15	
fb : Actual	=	1,868.90psi	
FB : Allowable	=	2,373.40psi	
Load Combination		+D+L+H	
Location of maximum on span	=	5.500ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection		0.049 in	Ratio = 2673 >=480
Max Upward Transient Deflection		0.000 in	Ratio = 0 <480
Max Downward Total Deflection		0.264 in	Ratio = 500 >=360
Max Upward Total Deflection		0.000 in	Ratio = 0 <360

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	19.408	19.408
Overall MINimum	3.630	3.630
+D+H	14.953	14.953
+D+L+H	18.583	18.583

Wood Beam

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Description : BM22

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+Lr+H	17.263	17.263
+D+S+H	14.953	14.953
+D+0.750Lr+0.750L+H	19.408	19.408
+D+0.750L+0.750S+H	17.675	17.675
+D+0.60W+H	14.953	14.953
+D+0.750Lr+0.450W+H	16.685	16.685
+D+0.750S+0.450W+H	14.953	14.953
+0.60D+0.60W+0.60H	8.972	8.972
+D+0.70E+0.60H	14.953	14.953
+D+0.750L+0.750S+0.5250E+H	17.675	17.675
+0.60D+0.70E+H	8.972	8.972
D Only	14.953	14.953
Lr Only	2.310	2.310
L Only	3.630	3.630
S Only		
W Only		
E Only		
H Only		

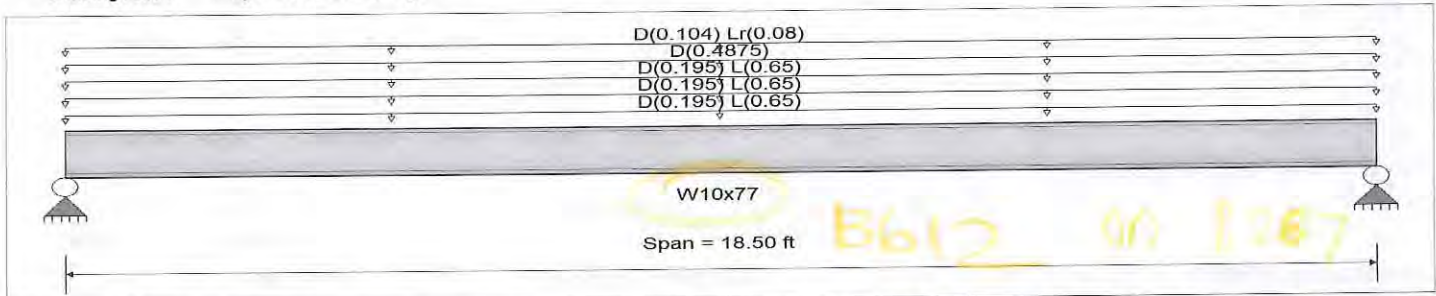
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CODE REFERENCES

Load Combination Set : ASCE 7-16

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



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

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 6.50 ft, (corridor)

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 6.50 ft, (corridor)

Uniform Load : $D = 0.030$, $L = 0.10$ ksf, Tributary Width = 6.50 ft, (corridor)

Uniform Load : $D = 0.0150$ ksf, Tributary Width = 32.50 ft, (corridor wall)

Uniform Load : $D = 0.0260$, $L_r = 0.020$ ksf, Tributary Width = 4.0 ft, (roof)

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio =	0.549 : 1	Maximum Shear Stress Ratio =	0.257 : 1
Section used for this span	W10x77	Section used for this span	W10x77
Ma : Applied	133.756 k-ft	Va : Applied	28.920 k
Mn / Omega : Allowable	243.513 k-ft	Vn/Omega : Allowable	112.360 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	9.250 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.391 in	Ratio =	567 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.627 in	Ratio =	354 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

[illegible]

Steel Beam

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Description: BM16

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 18.50 ft	1	0.207	0.097	50.33		50.33	406.67	243.51	1.00	1.00	10.88	168.54	112.36
+D+0.750Lr+0.450W+H													
Dsgn. L = 18.50 ft	1	0.217	0.102	52.90		52.90	406.67	243.51	1.00	1.00	11.44	168.54	112.36
+D+0.750S+0.450W+H													
Dsgn. L = 18.50 ft	1	0.207	0.097	50.33		50.33	406.67	243.51	1.00	1.00	10.88	168.54	112.36
+0.60D+0.60W+0.60H													
Dsgn. L = 18.50 ft	1	0.124	0.058	30.20		30.20	406.67	243.51	1.00	1.00	6.53	168.54	112.36
+D+0.70E+0.60H													
Dsgn. L = 18.50 ft	1	0.207	0.097	50.33		50.33	406.67	243.51	1.00	1.00	10.88	168.54	112.36
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 18.50 ft	1	0.464	0.217	112.90		112.90	406.67	243.51	1.00	1.00	24.41	168.54	112.36
+0.60D+0.70E+H													
Dsgn. L = 18.50 ft	1	0.124	0.058	30.20		30.20	406.67	243.51	1.00	1.00	6.53	168.54	112.36

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.6273	9.303		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	28.920	28.920
Overall MINimum	0.740	0.740
+D+H	10.883	10.883
+D+L+H	28.920	28.920
+D+Lr+H	11.623	11.623
+D+S+H	10.883	10.883
+D+0.750Lr+0.750L+H	24.966	24.966
+D+0.750L+0.750S+H	24.411	24.411
+D+0.60W+H	10.883	10.883
+D+0.750Lr+0.450W+H	11.438	11.438
+D+0.750S+0.450W+H	10.883	10.883
+0.60D+0.60W+0.60H	6.530	6.530
+D+0.70E+0.60H	10.883	10.883
+D+0.750L+0.750S+0.5250E+H	24.411	24.411
+0.60D+0.70E+H	6.530	6.530
D Only	10.883	10.883
Lr Only	0.740	0.740
L Only	18.038	18.038
S Only		
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

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Description: BM23

CODE REFERENCES

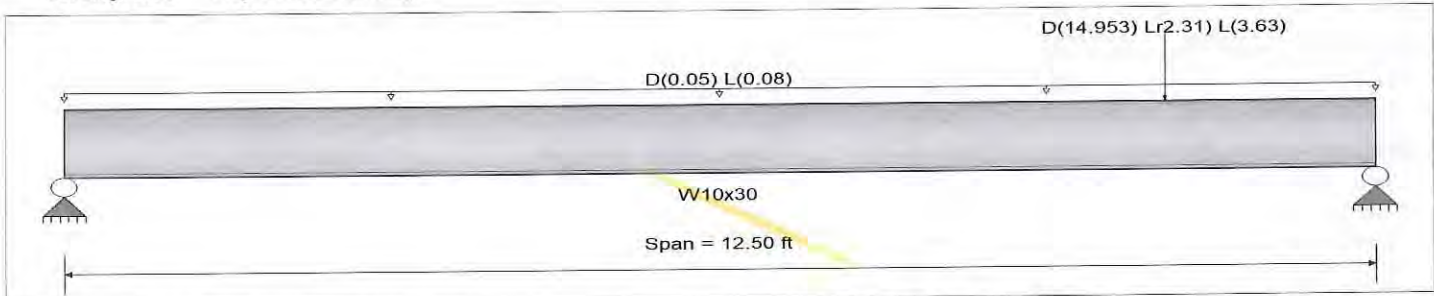
Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set: ASCE 7-16

Material Properties

Analysis Method: Allowable Strength Design
 Beam Bracing: Beam is Fully Braced against lateral-torsional buckling
 Bending Axis: Major Axis Bending

Fy: Steel Yield: 50.0 ksi
 E: Modulus: 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading
 Uniform Load: D = 0.0250, L = 0.040 ksf, Tributary Width = 2.0 ft, (Floor)

Point Load: D = 14.953, Lr = 2.310, L = 3.630 k @ 10.50 ft, (Bm23)

Point Load: D = 14.953, Lr = 2.310, L = 3.630 k @ 10.50 ft, (Bm23)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.730 : 1	Maximum Shear Stress Ratio =	0.531 : 1
Section used for this span	W10x30	Section used for this span	W10x30
Ma: Applied	66.681 k-ft	Va: Applied	33.480 k
Mn / Omega: Allowable	91.317 k-ft	Vn / Omega: Allowable	63.0 k
Load Combination	+D+0.750Lr+0.750L+H	Load Combination	+D+0.750Lr+0.750L+H
Location of maximum on span	10.500 ft	Location of maximum on span	12.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.058 in	Ratio =	2,584 >=480
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480
Max Downward Total Deflection	0.279 in	Ratio =	538 >=360
Max Upward Total Deflection	0.000 in	Ratio =	0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios			Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 12.50 ft	1	0.559	0.407	51.08		51.08	152.50	91.32	1.00	1.00	25.62	94.50	63.00
+D+L+H													
Dsgn. L = 12.50 ft	1	0.702	0.511	64.12		64.12	152.50	91.32	1.00	1.00	32.22	94.50	63.00
+D+Lr+H													
Dsgn. L = 12.50 ft	1	0.644	0.468	58.84		58.84	152.50	91.32	1.00	1.00	29.50	94.50	63.00
+D+S+H													
Dsgn. L = 12.50 ft	1	0.559	0.407	51.08		51.08	152.50	91.32	1.00	1.00	25.62	94.50	63.00
+D+0.750Lr+0.750L+H													
Dsgn. L = 12.50 ft	1	0.730	0.531	66.68		66.68	152.50	91.32	1.00	1.00	33.48	94.50	63.00
+D+0.750L+0.750S+H													
Dsgn. L = 12.50 ft	1	0.666	0.485	60.86		60.86	152.50	91.32	1.00	1.00	30.57	94.50	63.00
+D+0.60W+H													
Dsgn. L = 12.50 ft	1	0.559	0.407	51.08		51.08	152.50	91.32	1.00	1.00	25.62	94.50	63.00
+D+0.750Lr+0.450W+H													
Dsgn. L = 12.50 ft	1	0.623	0.453	56.90		56.90	152.50	91.32	1.00	1.00	28.53	94.50	63.00
+D+0.750S+0.450W+H													
Dsgn. L = 12.50 ft	1	0.559	0.407	51.08		51.08	152.50	91.32	1.00	1.00	25.62	94.50	63.00

Steel Beam

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Description : BM23

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+0.60D+0.60W+0.60H	Dsgn. L = 12.50 ft	1	0.336	0.244	30.65		30.65	152.50	91.32	1.00	1.00	15.37	94.50	63.00
+D+0.70E+0.60H	Dsgn. L = 12.50 ft	1	0.559	0.407	51.08		51.08	152.50	91.32	1.00	1.00	25.62	94.50	63.00
+D+0.750L+0.750S+0.5250E+H	Dsgn. L = 12.50 ft	1	0.666	0.485	60.86		60.86	152.50	91.32	1.00	1.00	30.57	94.50	63.00
+0.60D+0.70E+H	Dsgn. L = 12.50 ft	1	0.336	0.244	30.65		30.65	152.50	91.32	1.00	1.00	15.37	94.50	63.00

Overall Maximum Deflections

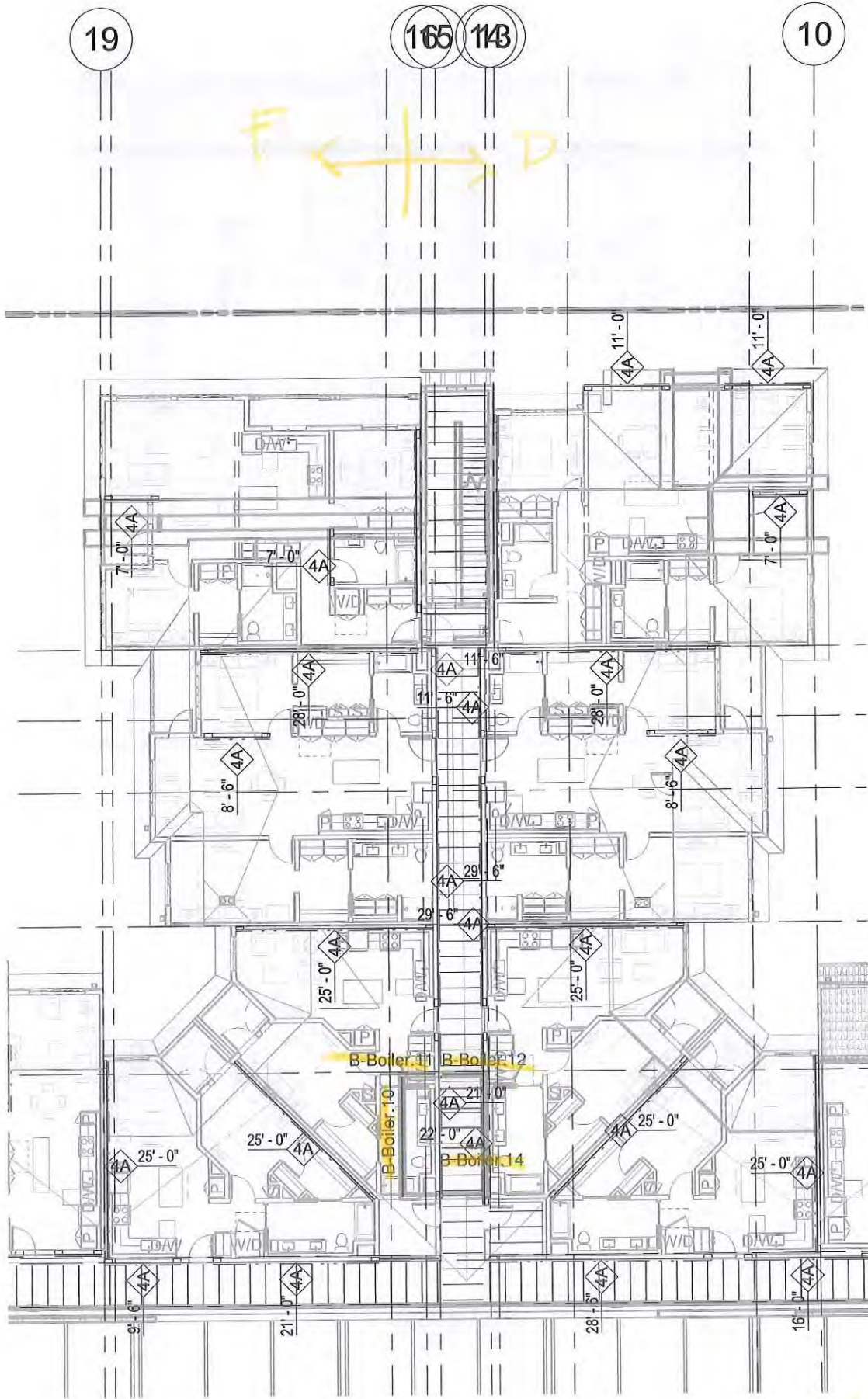
Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L+H	1	0.2786	7.107		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.086	33.480
Overall MINimum	0.739	3.881
+D+H	5.285	25.621
+D+L+H	6.947	32.219
+D+Lr+H	6.024	29.502
+D+S+H	5.285	25.621
+D+0.750Lr+0.750L+H	7.086	33.480
+D+0.750L+0.750S+H	6.531	30.570
+D+0.60W+H	5.285	25.621
+D+0.750Lr+0.450W+H	5.839	28.532
+D+0.750S+0.450W+H	5.285	25.621
+0.60D+0.60W+0.60H	3.171	15.373
+D+0.70E+0.60H	5.285	25.621
+D+0.750L+0.750S+0.5250E+H	6.531	30.570
+0.60D+0.70E+H	3.171	15.373
D Only	5.285	25.621
Lr Only	0.739	3.881
L Only	1.662	6.598
S Only		
W Only		
E Only		
H Only		



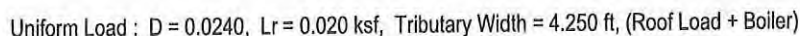
BOILER BEAM
KEY PLAN

BOILER BEAM
KEY PLAN

Description : B-Boiler.1

Load Combination Set : ASCE 7-10

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Et	1,100.0 psi	Density	31.20 pcf



DESIGN SUMMARY					
Maximum Bending Stress Ratio	=	0.071: 1	Maximum Shear Stress Ratio	=	0.076 : 1
Section used for this span		3.125 X 11.875	Section used for this span		3.125 X 11.875
fb : Actual	=	213.17 psi	fv : Actual	=	25.13 psi
FB : Allowable	=	3,000.00 psi	Fv : Allowable	=	331.25 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	2.665 ft	Location of maximum on span	=	4.357 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.004 in	Ratio =		16459 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.009 in	Ratio =		7481 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v	F ^v
+D+H													0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.054	0.057	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.71	116.27	2160.00	0.34	13.71	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.048	0.052	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.71	116.27	2400.00	0.34	13.71	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.071	0.076	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.30	213.17	3000.00	0.62	25.13	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.330 ft	1	0.042	0.045	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.71	116.27	2760.00	0.34	13.71	304.75

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

Project Title:
 Engineer:
 Project Descr:

Project ID:

310

Printed: 5 FEB 2019, 3:38PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\Calc\Gravity\Beams - Boiler Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.1

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
+D+0.750Lr+0.750L+H	Length = 5.330 ft	1	0.063	0.067	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.16	188.94	3000.00	0.00	0.00	0.00
+D+0.750L+0.750S+H	Length = 5.330 ft	1	0.042	0.045	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.71	116.27	2760.00	0.00	0.00	0.00
+D+0.60W+H	Length = 5.330 ft	1	0.030	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.71	116.27	3840.00	0.34	13.71	304.75
+D+0.70E+H	Length = 5.330 ft	1	0.030	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.71	116.27	3840.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+0.450W+H	Length = 5.330 ft	1	0.049	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.16	188.94	3840.00	0.00	0.00	0.00
+D+0.750L+0.750S+0.450W+H	Length = 5.330 ft	1	0.030	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.71	116.27	3840.00	0.34	13.71	304.75
+D+0.750L+0.750S+0.5250E+H	Length = 5.330 ft	1	0.030	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.71	116.27	3840.00	0.00	0.00	0.00
+0.60D+0.60W+0.60H	Length = 5.330 ft	1	0.018	0.019	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.43	69.76	3840.00	0.34	13.71	424.00
+0.60D+0.70E+0.60H	Length = 5.330 ft	1	0.018	0.019	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.43	69.76	3840.00	0.00	0.00	0.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0085	2.684		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.979	0.979
Overall MINimum	0.445	0.445
+D+H	0.534	0.534
+D+L+H	0.534	0.534
+D+Lr+H	0.979	0.979
+D+S+H	0.534	0.534
+D+0.750Lr+0.750L+H	0.868	0.868
+D+0.750L+0.750S+H	0.534	0.534
+D+0.60W+H	0.534	0.534
+D+0.70E+H	0.534	0.534
+D+0.750Lr+0.750L+0.450W+H	0.868	0.868
+D+0.750L+0.750S+0.450W+H	0.534	0.534
+D+0.750L+0.750S+0.5250E+H	0.534	0.534
+0.60D+0.60W+0.60H	0.320	0.320
+0.60D+0.70E+0.60H	0.320	0.320
D Only	0.534	0.534
Lr Only	0.445	0.445
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Title Block" selection.

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 5 FEB 2019, 3:37PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

Material Properties

Analysis Method: Allowable Stress Design
Load Combination: ASCE 7-10

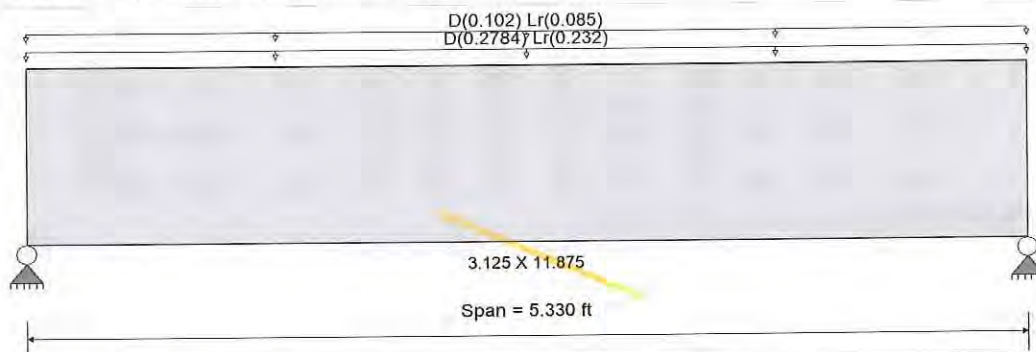
Wood Species: DF/DF
Wood Grade: 24F - V4

Fb + 2,400.0 psi
Fb - 1,850.0 psi
Fc - Prll 1,650.0 psi
Fc - Perp 650.0 psi
Fv 265.0 psi
Ft 1,100.0 psi

E: Modulus of Elasticity

Ebend-xx 1,800.0 ksi
Eminbend-xx 950.0 ksi
Ebend-yy 1,600.0 ksi
Eminbend-yy 850.0 ksi
Density 31.20pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Uniform Load: D = 0.0240, Lr = 0.020 ksf, Tributary Width = 11.60 ft, (Roof Load)

Uniform Load: D = 0.0240, Lr = 0.020 ksf, Tributary Width = 4.250 ft, (Roof Load + Boiler)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.135 : 1	Maximum Shear Stress Ratio	=	0.144 : 1
Section used for this span	=	3.125 X 11.875	Section used for this span	=	3.125 X 11.875
fb : Actual	=	404.63psi	fv : Actual	=	47.71 psi
FB : Allowable	=	3,000.00psi	Fv : Allowable	=	331.25 psi
Load Combination	=	+D+Lr+H	Load Combination	=	+D+Lr+H
Location of maximum on span	=	2.665ft	Location of maximum on span	=	4.357 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.007 in	Ratio =		8671 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.016 in	Ratio =		3941 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	Cd	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+H	Length = 5.330 ft	1	0.102	0.109	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.71	2160.00	0.64	26.02	238.50
+D+L+H	Length = 5.330 ft	1	0.092	0.098	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.71	2400.00	0.64	26.02	265.00
+D+Lr+H	Length = 5.330 ft	1	0.135	0.144	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.48	404.63	3000.00	1.18	47.71	331.25
+D+S+H	Length = 5.330 ft	1	0.080	0.085	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.71	2760.00	0.64	26.02	304.75

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

312

Printed: 5 FEB 2019, 3:37PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.2

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
+D+0.750Lr+0.750L+H	Length = 5.330 ft	1	0.120	0.128	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.20	358.65	3000.00	0.00	0.00	0.00
+D+0.750L+0.750S+H	Length = 5.330 ft	1	0.080	0.085	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.71	2760.00	0.00	0.00	0.00
+D+0.60W+H	Length = 5.330 ft	1	0.057	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.71	3840.00	0.00	0.00	0.00
+D+0.70E+H	Length = 5.330 ft	1	0.057	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.71	3840.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+0.450W+H	Length = 5.330 ft	1	0.093	0.100	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.20	358.65	3840.00	0.00	0.00	0.00
+D+0.750L+0.750S+0.450W+H	Length = 5.330 ft	1	0.057	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.71	3840.00	0.00	0.00	0.00
+D+0.750L+0.750S+0.5250E+H	Length = 5.330 ft	1	0.057	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.71	3840.00	0.00	0.00	0.00
+0.60D+0.60W+0.60H	Length = 5.330 ft	1	0.034	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.81	132.43	3840.00	0.00	0.00	0.00
+0.60D+0.70E+0.60H	Length = 5.330 ft	1	0.034	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.81	132.43	3840.00	0.00	0.00	0.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0162	2.684		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.859	1.859
Overall MINimum	0.845	0.845
+D+H	1.014	1.014
+D+L+H	1.014	1.014
+D+Lr+H	1.859	1.859
+D+S+H	1.014	1.014
+D+0.750Lr+0.750L+H	1.647	1.647
+D+0.750L+0.750S+H	1.014	1.014
+D+0.60W+H	1.014	1.014
+D+0.70E+H	1.014	1.014
+D+0.750Lr+0.750L+0.450W+H	1.647	1.647
+D+0.750L+0.750S+0.450W+H	1.014	1.014
+D+0.750L+0.750S+0.5250E+H	1.014	1.014
+0.60D+0.60W+0.60H	0.608	0.608
+0.60D+0.70E+0.60H	0.608	0.608
D Only	1.014	1.014
Lr Only	0.845	0.845
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
You can change this area
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

314

Printed: 5 FEB 2019, 3:40PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.3

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	fb	F'b	V	fv	F'v
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.110	0.183	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.01	328.56	3000.00	1.50	60.58	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.073	0.122	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.24	202.33	2760.00	0.92	37.30	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.053	0.088	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	202.33	3840.00	0.92	37.30	424.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.053	0.088	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	202.33	3840.00	0.92	37.30	424.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.086	0.143	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.01	328.56	3840.00	1.50	60.58	424.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.053	0.088	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	202.33	3840.00	0.92	37.30	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.053	0.088	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	202.33	3840.00	0.92	37.30	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.032	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.74	121.40	3840.00	0.55	22.38	424.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1		0.032	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.74	121.40	3840.00	0.55	22.38	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0246	4.205		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.546	1.747
Overall MINimum	0.248	0.793
+D+H	0.298	0.954
+D+L+H	0.298	0.954
+D+Lr+H	0.546	1.747
+D+S+H	0.298	0.954
+D+0.750Lr+0.750L+H	0.484	1.549
+D+0.750L+0.750S+H	0.298	0.954
+D+0.60W+H	0.298	0.954
+D+0.70E+H	0.298	0.954
+D+0.750Lr+0.750L+0.450W+H	0.484	1.549
+D+0.750L+0.750S+0.450W+H	0.298	0.954
+D+0.750L+0.750S+0.5250E+H	0.298	0.954
+0.60D+0.60W+0.60H	0.179	0.572
+0.60D+0.70E+0.60H	0.179	0.572
D Only	0.298	0.954
Lr Only	0.248	0.793
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
 You can change this area
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 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

315

Printed: 5 FEB 2019, 4:14PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - Boiler Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.4

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

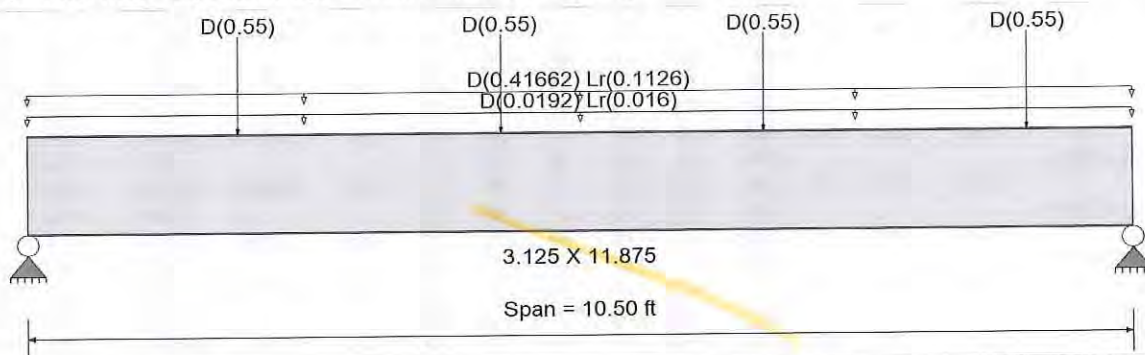
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination ASCE 7-10

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.20 pcf



Applied Loads

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

Uniform Load: D = 0.0240, Lr = 0.020 ksf, Tributary Width = 0.80 ft, (Roof Load)

Uniform Load: D = 0.0740, Lr = 0.020 ksf, Tributary Width = 5.630 ft, (Roof + Concrete Pad)

Point Load: D = 0.550 k @ 2.0 ft, (Boiler Load)

Point Load: D = 0.550 k @ 4.50 ft, (Boiler Load)

Point Load: D = 0.550 k @ 7.0 ft, (Boiler Load)

Point Load: D = 0.550 k @ 9.50 ft, (Boiler Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.684 : 1	Maximum Shear Stress Ratio	=	0.521 : 1
Section used for this span		3.125 X 11.875	Section used for this span		3.125 X 11.875
fb : Actual	=	1,477.62 psi	fv : Actual	=	124.31 psi
FB : Allowable	=	2,160.00 psi	Fv : Allowable	=	238.50 psi
Load Combination		+D+H	Load Combination		+D+H
Location of maximum on span	=	5.020 ft	Location of maximum on span	=	9.542 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.045 in	Ratio =		2795 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.276 in	Ratio =		457 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Maximum Forces & Stresses for Load Combinations

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

Project Title:
Engineer:
Project Descr:

Project ID:

316

Printed: 5 FEB 2019, 4:14PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - Boiler Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.4

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
		M	V								M	f _b	F _b	V	f _v	F _v
+D+H													0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.684	0.521	0.90	1.000	1.00	1.00	1.00	1.00	1.00	9.04	1,477.62	2160.00	3.08	124.31	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.616	0.469	1.00	1.000	1.00	1.00	1.00	1.00	1.00	9.04	1,477.62	2400.00	3.08	124.31	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.589	0.443	1.25	1.000	1.00	1.00	1.00	1.00	1.00	10.81	1,766.71	3000.00	3.63	146.62	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.535	0.408	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.04	1,477.62	2760.00	3.08	124.31	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.565	0.426	1.25	1.000	1.00	1.00	1.00	1.00	1.00	10.37	1,694.42	3000.00	3.49	141.04	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.535	0.408	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.04	1,477.62	2760.00	3.08	124.31	304.75
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.385	0.293	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.04	1,477.62	3840.00	3.08	124.31	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.385	0.293	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.04	1,477.62	3840.00	3.08	124.31	424.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.441	0.333	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.37	1,694.42	3840.00	3.49	141.04	424.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.385	0.293	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.04	1,477.62	3840.00	3.08	124.31	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.385	0.293	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.04	1,477.62	3840.00	3.08	124.31	424.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.231	0.176	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.43	886.57	3840.00	1.85	74.58	424.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.231	0.176	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.43	886.57	3840.00	1.85	74.58	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.2756	5.288		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.958	4.168
Overall MINimum	0.675	0.675
+D+H	3.283	3.493
+D+L+H	3.283	3.493
+D+Lr+H	3.958	4.168
+D+S+H	3.283	3.493
+D+0.750Lr+0.750L+H	3.790	3.999
+D+0.750L+0.750S+H	3.283	3.493
+D+0.60W+H	3.283	3.493
+D+0.70E+H	3.283	3.493
+D+0.750Lr+0.750L+0.450W+H	3.790	3.999
+D+0.750L+0.750S+0.450W+H	3.283	3.493
+D+0.750L+0.750S+0.5250E+H	3.283	3.493
+0.60D+0.60W+0.60H	1.970	2.096
+0.60D+0.70E+0.60H	1.970	2.096
D Only	3.283	3.493
Lr Only	0.675	0.675
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 5 FEB 2019, 4:16PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Licensee : Peoples Associates Structural Engineers

Lic. # : KW-06009713

Description : B-Boiler.5

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

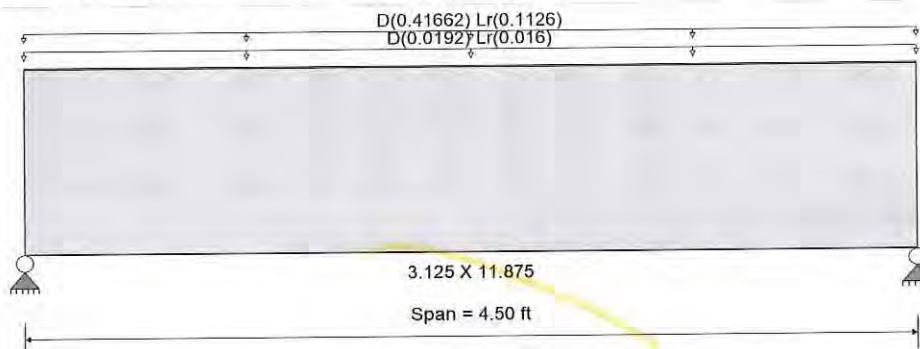
Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 2,400.0 psi
Fb - 1,850.0 psi
Fc - Prll 1,650.0 psi
Fc - Perp 650.0 psi
Fv 265.0 psi
Ft 1,100.0 psi

E : Modulus of Elasticity
E_{bend-xx} 1,800.0 ksi
E_{minbend-xx} 950.0 ksi
E_{bend-yy} 1,600.0 ksi
E_{minbend-yy} 850.0 ksi
Density 31.20 pcf

**Applied Loads**

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

Uniform Load : D = 0.0240, Lr = 0.020 ksf, Tributary Width = 0.80 ft, (Roof Load)

Uniform Load : D = 0.0740, Lr = 0.020 ksf, Tributary Width = 5.630 ft, (Roof + Concrete Pad)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio	=	0.083 : 1	Maximum Shear Stress Ratio	=	0.093 : 1
Section used for this span	=	3.125 X 11.875	Section used for this span	=	3.125 X 11.875
fb : Actual	=	180.24 psi	fv : Actual	=	22.28 psi
FB : Allowable	=	2,160.00 psi	Fv : Allowable	=	238.50 psi
Load Combination	=	+D+H	Load Combination	=	+D+H
Location of maximum on span	=	2.250 ft	Location of maximum on span	=	3.515 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.002 in	Ratio =		35516 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.007 in	Ratio =		8092 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00
Length = 4.50 ft	1	0.083	0.093	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.10	180.24	2160.00	0.55	22.28	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.50 ft	1	0.075	0.084	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.10	180.24	2400.00	0.55	22.28	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.50 ft	1	0.078	0.087	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.43	233.43	3000.00	0.71	28.85	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.50 ft	1	0.065	0.073	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.10	180.24	2760.00	0.55	22.28	304.75

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

Project Title:
Engineer:
Project Descr:

Project ID:

318

Printed: 5 FEB 2019, 4:16PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.5

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+0.750Lr+0.750L+H	Length = 4.50 ft	1	0.073	0.082	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.13	3000.00	0.67	27.21	331.25
+D+0.750L+0.750S+H	Length = 4.50 ft	1	0.065	0.073	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.10	180.24	2760.00	0.55	22.28	304.75
+D+0.60W+H	Length = 4.50 ft	1	0.047	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.10	180.24	3840.00	0.55	22.28	424.00
+D+0.70E+H	Length = 4.50 ft	1	0.047	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.10	180.24	3840.00	0.55	22.28	424.00
+D+0.750Lr+0.750L+0.450W+H	Length = 4.50 ft	1	0.057	0.064	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.35	220.13	3840.00	0.67	27.21	424.00
+D+0.750L+0.750S+0.450W+H	Length = 4.50 ft	1	0.047	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.10	180.24	3840.00	0.55	22.28	424.00
+D+0.750L+0.750S+0.5250E+H	Length = 4.50 ft	1	0.047	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.10	180.24	3840.00	0.55	22.28	424.00
+0.60D+0.60W+0.60H	Length = 4.50 ft	1	0.028	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	108.15	3840.00	0.33	13.37	424.00
+0.60D+0.70E+0.60H	Length = 4.50 ft	1	0.028	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.66	108.15	3840.00	0.33	13.37	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0067	2.266		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.270	1.270
Overall MINimum	0.289	0.289
+D+H	0.981	0.981
+D+L+H	0.981	0.981
+D+Lr+H	1.270	1.270
+D+S+H	0.981	0.981
+D+0.750Lr+0.750L+H	1.198	1.198
+D+0.750L+0.750S+H	0.981	0.981
+D+0.60W+H	0.981	0.981
+D+0.70E+H	0.981	0.981
+D+0.750Lr+0.750L+0.450W+H	1.198	1.198
+D+0.750L+0.750S+0.450W+H	0.981	0.981
+D+0.750L+0.750S+0.5250E+H	0.981	0.981
+0.60D+0.60W+0.60H	0.588	0.588
+0.60D+0.70E+0.60H	0.588	0.588
D Only	0.981	0.981
Lr Only	0.289	0.289
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 6

Printed: 5 FEB 2019, 4:26PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\(\C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.6

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

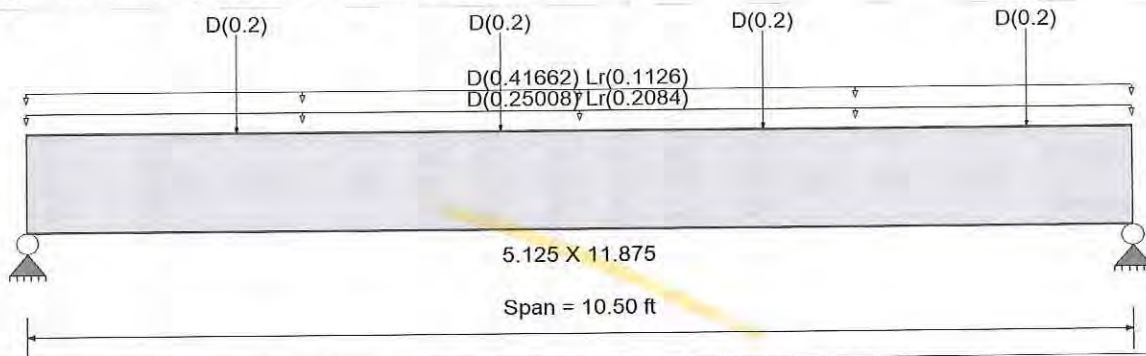
Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10

Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1,850.0 psi	Eband- xx	1,800.0ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Eband- yy	1,600.0ksi
Fv	265.0 psi	Eminbend - yy	850.0ksi
Ft	1,100.0 psi	Density	31.20pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Uniform Load : $D = 0.0240$, $L_r = 0.020$ ksf, Tributary Width = 10.420 ft, (Roof Load)

Uniform Load : $D = 0.0740$, $L_r = 0.020$ ksf, Tributary Width = 5.630 ft, (Roof + Concrete Pad)

Point Load : $D = 0.20 \text{ k @ } 2.0 \text{ ft, (Boiler Load)}$

Point Load : $D = 0.20 \text{ k @ } 4.50 \text{ ft, (Boiler Load)}$

Point Load : $D = 0.20 \text{ k @ } 7.0 \text{ ft, (Boiler Load)}$

Point Load : $D = 0.20 \text{ k @ } 9.50 \text{ ft, (Boiler Load)}$

DESIGN SUMMARY

Design OK

DESIGN SUMMARY					
Maximum Bending Stress Ratio	=	0.489 : 1	Maximum Shear Stress Ratio	=	0.348 : 1
Section used for this span		5.125 X 11.875	Section used for this span		5.125 X 11.875
fb : Actual	=	1,465.74 psi	fv : Actual	=	115.28 psi
FB : Allowable	=	3,000.00 psi	Fv : Allowable	=	331.25 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	5.212ft	Location of maximum on span	=	9.542 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.069 in	Ratio =		1836 >=480
Max Upward Transient Deflection		0.000 in	Ratio =		0 <480
Max Downward Total Deflection		0.228 in	Ratio =		551 >=360
Max Upward Total Deflection		0.000 in	Ratio =		0 <360

Maximum Forces & Stresses for Load Combinations

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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

320

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.6

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+H														0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.475	0.341	0.90	1.000	1.00	1.00	1.00	1.00	1.00	10.29	1,025.04	2160.00	3.30	81.32	238.50
+D+L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.427	0.307	1.00	1.000	1.00	1.00	1.00	1.00	1.00	10.29	1,025.04	2400.00	3.30	81.32	265.00
+D+Lr+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.489	0.348	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.71	1,465.74	3000.00	4.68	115.28	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.371	0.267	1.15	1.000	1.00	1.00	1.00	1.00	1.00	10.29	1,025.04	2760.00	3.30	81.32	304.75
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.452	0.322	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.61	1,355.57	3000.00	4.33	106.79	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.371	0.267	1.15	1.000	1.00	1.00	1.00	1.00	1.00	10.29	1,025.04	2760.00	3.30	81.32	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.267	0.192	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.29	1,025.04	3840.00	3.30	81.32	424.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.267	0.192	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.29	1,025.04	3840.00	3.30	81.32	424.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.353	0.252	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.61	1,355.57	3840.00	4.33	106.79	424.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.267	0.192	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.29	1,025.04	3840.00	3.30	81.32	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.267	0.192	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.29	1,025.04	3840.00	3.30	81.32	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.160	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.17	615.03	3840.00	1.98	48.79	424.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1		0.160	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.17	615.03	3840.00	1.98	48.79	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.2283	5.288		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.547	5.624
Overall MINimum	1.685	1.685
+D+H	3.862	3.938
+D+L+H	3.862	3.938
+D+Lr+H	5.547	5.624
+D+S+H	3.862	3.938
+D+0.750Lr+0.750L+H	5.126	5.202
+D+0.750L+0.750S+H	3.862	3.938
+D+0.60W+H	3.862	3.938
+D+0.70E+H	3.862	3.938
+D+0.750Lr+0.750L+0.450W+H	5.126	5.202
+D+0.750L+0.750S+0.450W+H	3.862	3.938
+D+0.750L+0.750S+0.5250E+H	3.862	3.938
+0.60D+0.60W+0.60H	2.317	2.363
+0.60D+0.70E+0.60H	2.317	2.363
D Only	3.862	3.938
Lr Only	1.685	1.685
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 6

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File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.7

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

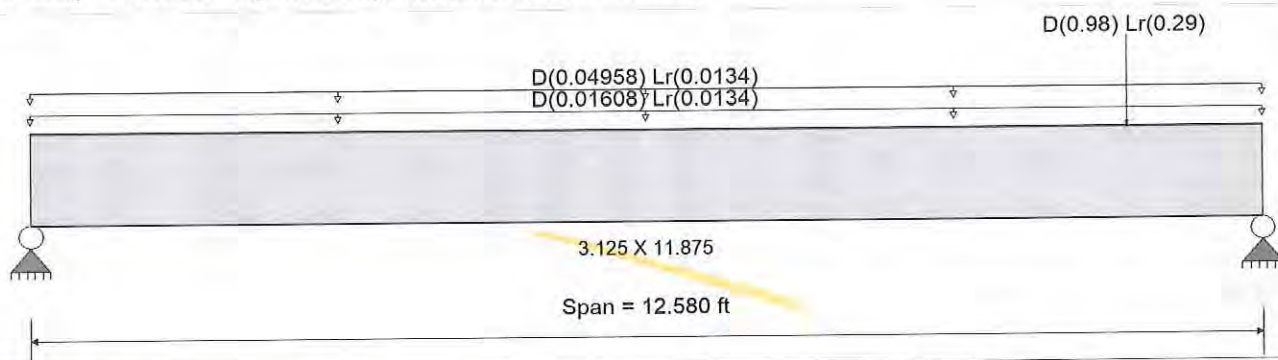
Material Properties

Analysis Method : Allowable Stress Design
Load Combination :ASCE 7-10

Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Fv	265.0 psi	Eminbend - yy	850.0ksi
Ft	1,100.0 psi	Density	31.20pcf

Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Uniform Load : $D = 0.0240$, $L_r = 0.020$ ksf, Tributary Width = 0.670 ft, (Roof Load)

Uniform Load : $D = 0.0740$, $L_r = 0.020$ ksf, Tributary Width = 0.670 ft, (Roof + Concrete Pad)

Point Load : $D = 0.980$, $L_r = 0.290$ k @ 11.20 ft, (B-Boiler.5)

DESIGN SUMMARY

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.156	1
Section used for this span	=	3.125 X 11.875	
fb : Actual	=	337.08psi	
FB : Allowable	=	2,160.00psi	
Load Combination	=	+D+H	
Location of maximum on span	=	7.943ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection		0.028 in	Ratio = 5386 >=480
Max Upward Transient Deflection		0.000 in	Ratio = 0 <480
Max Downward Total Deflection		0.105 in	Ratio = 1440 >=360
Max Upward Total Deflection		0.000 in	Ratio = 0 <360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v	F ^v
+D+H													0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.156	0.207	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.06	337.08	2160.00	1.22	49.40	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.140	0.186	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.06	337.08	2400.00	1.22	49.40	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 5 FEB 2019, 4:26PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.7

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
Length = 12.580 ft	1		0.153	0.198	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.81	459.16	3000.00	1.62	65.61	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.122	0.162	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.06	337.08	2760.00	1.22	49.40	304.75
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.143	0.186	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.62	428.62	3000.00	1.52	61.56	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.122	0.162	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.06	337.08	2760.00	1.22	49.40	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.088	0.117	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.06	337.08	3840.00	1.22	49.40	424.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.088	0.117	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.06	337.08	3840.00	1.22	49.40	424.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.112	0.145	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.62	428.62	3840.00	1.52	61.56	424.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.088	0.117	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.06	337.08	3840.00	1.22	49.40	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.088	0.117	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.06	337.08	3840.00	1.22	49.40	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.053	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	202.25	3840.00	0.73	29.64	424.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1		0.053	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	202.25	3840.00	0.73	29.64	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.1048	6.611		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.721	1.712
Overall MINimum	0.200	0.427
+D+H	0.521	1.285
+D+L+H	0.521	1.285
+D+Lr+H	0.721	1.712
+D+S+H	0.521	1.285
+D+0.750Lr+0.750L+H	0.671	1.606
+D+0.750L+0.750S+H	0.521	1.285
+D+0.60W+H	0.521	1.285
+D+0.70E+H	0.521	1.285
+D+0.750Lr+0.750L+0.450W+H	0.671	1.606
+D+0.750L+0.750S+0.450W+H	0.521	1.285
+D+0.750L+0.750S+0.5250E+H	0.521	1.285
+0.60D+0.60W+0.60H	0.312	0.771
+0.60D+0.70E+0.60H	0.312	0.771
D Only	0.521	1.285
Lr Only	0.200	0.427
L Only		
S Only		
W Only		
E Only		
H Only		

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC. INC. 1983-2017. Build:10.17.12.10, Ver:10.17.12.10

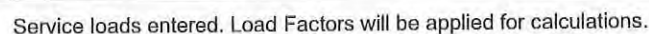
Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.8

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.20 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Point Load : $D = 0.5210$, $L_r = 0.20 \text{ k @ } 4.20 \text{ ft}$, (B-Boiler.7)

Design OK

DESIGN SUMMARY			
Maximum Bending Stress Ratio	=	0.448	1
Section used for this span		6.750 X 11.875	
fb : Actual	=	1,345.21 psi	
FB : Allowable	=	3,000.00 psi	
Load Combination		+D+Lr+H	
Location of maximum on span	=	5.862 ft	
Span # where maximum occurs	=	Span # 1	
Maximum Deflection			
Max Downward Transient Deflection		0.127 in	Ratio = 1211 >=480
Max Upward Transient Deflection		0.000 in	Ratio = 0 <480
Max Downward Total Deflection		0.315 in	Ratio = 489 >=360
Max Upward Total Deflection		0.000 in	Ratio = 0 <360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																	
Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00	

Title Block Line 1
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Project Title:
 Engineer:
 Project Descr:

Project ID:

324

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - Boiler Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.8

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
Length = 12.850 ft	1		0.372	0.249	0.90	1.000	1.00	1.00	1.00	1.00	1.00	10.61	802.55	2160.00	3.17	59.30	238.50
+D+L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.334	0.224	1.00	1.000	1.00	1.00	1.00	1.00	1.00	10.61	802.55	2400.00	3.17	59.30	265.00
+D+Lr+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.448	0.287	1.25	1.000	1.00	1.00	1.00	1.00	1.00	17.78	1,345.21	3000.00	5.07	94.92	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.291	0.195	1.15	1.000	1.00	1.00	1.00	1.00	1.00	10.61	802.55	2760.00	3.17	59.30	304.75
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.403	0.260	1.25	1.000	1.00	1.00	1.00	1.00	1.00	15.99	1,209.22	3000.00	4.60	86.02	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.291	0.195	1.15	1.000	1.00	1.00	1.00	1.00	1.00	10.61	802.55	2760.00	3.17	59.30	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.209	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.61	802.55	3840.00	3.17	59.30	424.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.209	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.61	802.55	3840.00	3.17	59.30	424.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.315	0.203	1.60	1.000	1.00	1.00	1.00	1.00	1.00	15.99	1,209.22	3840.00	4.60	86.02	424.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.209	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.61	802.55	3840.00	3.17	59.30	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.209	0.140	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.61	802.55	3840.00	3.17	59.30	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.125	0.084	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.37	481.53	3840.00	1.90	35.58	424.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.850 ft	1		0.125	0.084	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.37	481.53	3840.00	1.90	35.58	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.3147	6.331		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.029	5.102
Overall MINimum	2.215	2.191
+D+H	3.814	2.910
+D+L+H	3.814	2.910
+D+Lr+H	6.029	5.102
+D+S+H	3.814	2.910
+D+0.750Lr+0.750L+H	5.475	4.554
+D+0.750L+0.750S+H	3.814	2.910
+D+0.60W+H	3.814	2.910
+D+0.70E+H	3.814	2.910
+D+0.750Lr+0.750L+0.450W+H	5.475	4.554
+D+0.750L+0.750S+0.450W+H	3.814	2.910
+D+0.750L+0.750S+0.5250E+H	3.814	2.910
+0.60D+0.60W+0.60H	2.288	1.746
+0.60D+0.70E+0.60H	2.288	1.746
D Only	3.814	2.910
Lr Only	2.215	2.191
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

325

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File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Description: B-Boiler.9

Licensee: Peoples Associates Structural Engineers

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

Material Properties

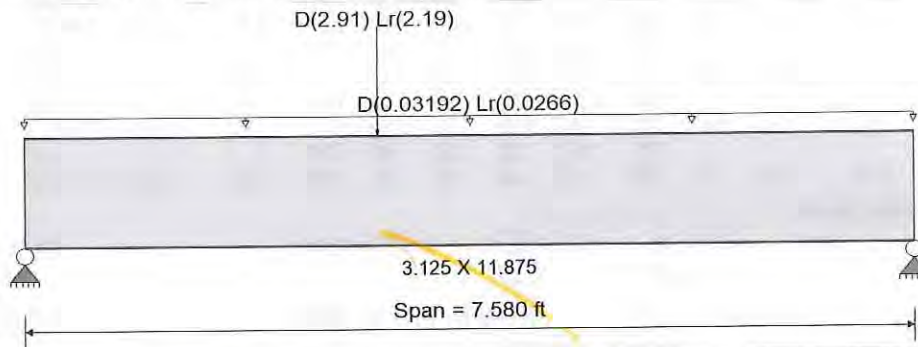
Analysis Method: Allowable Stress Design
Load Combination: ASCE 7-10

Wood Species: DF/DF
Wood Grade: 24F - V4

Fb + 2,400.0 psi
Fb - 1,850.0 psi
Fc - Prll 1,650.0 psi
Fc - Perp 650.0 psi
Fv 265.0 psi
Ft 1,100.0 psi

E: Modulus of Elasticity
E bend-xx 1,800.0 ksi
E min bend-xx 950.0 ksi
E bend-yy 1,600.0 ksi
E min bend-yy 850.0 ksi
Density 31.20 pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling



Applied Loads

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

Uniform Load: D = 0.0240, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (Roof Load)

Point Load: D = 2.910, Lr = 2.190 k @ 3.0 ft, (B-Boiler.7)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.524	1	Maximum Shear Stress Ratio	=	0.396	1
Section used for this span	=	3.125 X 11.875		Section used for this span	=	3.125 X 11.875	
fb: Actual	=	1,571.16 psi		fv: Actual	=	131.23 psi	
FB: Allowable	=	3,000.00 psi		Fv: Allowable	=	331.25 psi	
Load Combination	=	+D+Lr+H		Load Combination	=	+D+Lr+H	
Location of maximum on span	=	3.015 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.044 in	Ratio =	2064		>=480	
Max Upward Transient Deflection		0.000 in	Ratio =	0		<480	
Max Downward Total Deflection		0.102 in	Ratio =	889		>=360	
Max Upward Total Deflection		0.000 in	Ratio =	0		<360	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Max Stress Ratios										Moment Values			Shear Values		
		Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+H	Length = 7.580 ft	1	0.414	0.313	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.48	894.83	2160.00	1.85	74.71	238.50
+D+L+H	Length = 7.580 ft	1	0.373	0.282	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.48	894.83	2400.00	1.85	74.71	265.00
+D+Lr+H	Length = 7.580 ft	1	0.524	0.396	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.62	1,571.16	3000.00	3.25	131.23	331.25
+D+S+H	Length = 7.580 ft	1	0.324	0.245	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.48	894.83	2760.00	1.85	74.71	304.75

Title Block Line 1
 You can change this area
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 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

326

Printed: 5 FEB 2019, 4:38PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\Calc\Gravity\Beams - Boiler Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.9

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	fb	F'b	V	fv	F'v
+D+0.750Lr+0.750L+H	Length = 7.580 ft	1	0.467	0.354	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.58	1,402.08	3000.00	2.90	117.10	331.25
+D+0.750L+0.750S+H	Length = 7.580 ft	1	0.324	0.245	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.48	894.83	2760.00	1.85	74.71	304.75
+D+0.60W+H	Length = 7.580 ft	1	0.233	0.176	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.48	894.83	3840.00	1.85	74.71	424.00
+D+0.70E+H	Length = 7.580 ft	1	0.233	0.176	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.48	894.83	3840.00	1.85	74.71	424.00
+D+0.750Lr+0.750L+0.450W+H	Length = 7.580 ft	1	0.365	0.276	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.58	1,402.08	3840.00	2.90	117.10	424.00
+D+0.750L+0.750S+0.450W+H	Length = 7.580 ft	1	0.233	0.176	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.48	894.83	3840.00	1.85	74.71	424.00
+D+0.750L+0.750S+0.5250E+H	Length = 7.580 ft	1	0.233	0.176	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.48	894.83	3840.00	1.85	74.71	424.00
+0.60D+0.60W+0.60H	Length = 7.580 ft	1	0.140	0.106	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.29	536.90	3840.00	1.11	44.83	424.00
+0.60D+0.70E+0.60H	Length = 7.580 ft	1	0.140	0.106	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.29	536.90	3840.00	1.11	44.83	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.1023	3.596		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.303	2.240
Overall MINimum	1.424	0.968
+D+H	1.879	1.273
+D+L+H	1.879	1.273
+D+Lr+H	3.303	2.240
+D+S+H	1.879	1.273
+D+0.750Lr+0.750L+H	2.947	1.998
+D+0.750L+0.750S+H	1.879	1.273
+D+0.60W+H	1.879	1.273
+D+0.70E+H	1.879	1.273
+D+0.750Lr+0.750L+0.450W+H	2.947	1.998
+D+0.750L+0.750S+0.450W+H	1.879	1.273
+D+0.750L+0.750S+0.5250E+H	1.879	1.273
+0.60D+0.60W+0.60H	1.128	0.764
+0.60D+0.70E+0.60H	1.128	0.764
D Only	1.879	1.273
Lr Only	1.424	0.968
L Only		
S Only		
W Only		
E Only		
H Only		

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Project Descr:

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327

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File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.10

B513

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

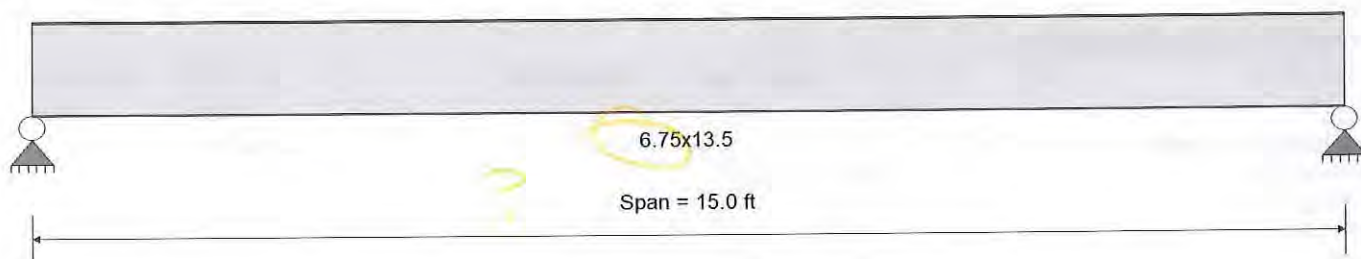
Material Properties

Analysis Method: Allowable Stress Design
Load Combination ASCE 7-10

Wood Species: DF/DF
Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb + 2,400.0 psi
Fb - 1,850.0 psi
Fc - Prll 1,650.0 psi
Fc - Perp 650.0 psi
Fv 265.0 psi
Ft 1,100.0 psi
E: Modulus of Elasticity
Ebend-xx 1,800.0 ksi
Eminbend-xx 950.0 ksi
Ebend-yy 1,600.0 ksi
Eminbend-yy 850.0 ksi
Density 31.20 pcf



Applied Loads

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

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.575 : 1	Maximum Shear Stress Ratio	=	0.325 : 1
Section used for this span	=	6.75x13.5	Section used for this span	=	6.75x13.5
fb : Actual	=	1,715.36 psi	fv : Actual	=	107.57 psi
FB : Allowable	=	2,983.03 psi	Fv : Allowable	=	331.25 psi
Load Combination	=	+D+Lr+H	Load Combination	=	+D+Lr+H
Location of maximum on span	=	6.241 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.170 in	Ratio =		1060 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.428 in	Ratio =		420 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length		Max Stress Ratios									Moment Values			Shear Values			
		Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H														0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.476	0.270	0.90	0.994	1.00	1.00	1.00	1.00	1.00	17.48	1,022.91	2147.78	3.91	64.42	238.50	
+D+L+H					0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 15.0 ft	1	0.429	0.243	1.00	0.994	1.00	1.00	1.00	1.00	1.00	17.48	1,022.91	2386.43	3.91	64.42	265.00	
+D+Lr+H					0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 15.0 ft	1	0.575	0.325	1.25	0.994	1.00	1.00	1.00	1.00	1.00	29.31	1,715.36	2983.03	6.53	107.57	331.25	
+D+S+H					0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 15.0 ft	1	0.373	0.211	1.15	0.994	1.00	1.00	1.00	1.00	1.00	17.48	1,022.91	2744.39	3.91	64.42	304.75	
+D+0.750Lr+0.750L+H					0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 15.0 ft	1	0.517	0.292	1.25	0.994	1.00	1.00	1.00	1.00	1.00	26.35	1,542.25	2983.03	5.88	96.78	331.25	
+D+0.750L+0.750S+H					0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 15.0 ft	1	0.373	0.211	1.15	0.994	1.00	1.00	1.00	1.00	1.00	17.48	1,022.91	2744.39	3.91	64.42	304.75	
+D+0.60W+H					0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	

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328

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Wood Beam

File = Y:\Jobs\18-Jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - Boiler Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.10

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
Length = 15.0 ft	1		0.268	0.152	1.60	0.994	1.00	1.00	1.00	1.00	1.00	17.48	1,022.91	3818.28	3.91	64.42	424.00
+D+0.70E+H						0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.268	0.152	1.60	0.994	1.00	1.00	1.00	1.00	1.00	17.48	1,022.91	3818.28	3.91	64.42	424.00
+D+0.750Lr+0.750L+0.450W+H						0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.404	0.228	1.60	0.994	1.00	1.00	1.00	1.00	1.00	26.35	1,542.25	3818.28	5.88	96.78	424.00
+D+0.750L+0.750S+0.450W+H						0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.268	0.152	1.60	0.994	1.00	1.00	1.00	1.00	1.00	17.48	1,022.91	3818.28	3.91	64.42	424.00
+D+0.750L+0.750S+0.5250E+H						0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.268	0.152	1.60	0.994	1.00	1.00	1.00	1.00	1.00	17.48	1,022.91	3818.28	3.91	64.42	424.00
+0.60D+0.60W+0.60H						0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.161	0.091	1.60	0.994	1.00	1.00	1.00	1.00	1.00	10.49	613.75	3818.28	2.35	38.65	424.00
+0.60D+0.70E+0.60H						0.994	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.161	0.091	1.60	0.994	1.00	1.00	1.00	1.00	1.00	10.49	613.75	3818.28	2.35	38.65	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.4285	7.172		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.528	4.634
Overall MINimum	3.013	1.697
+D+H	4.515	2.937
+D+L+H	4.515	2.937
+D+Lr+H	7.528	4.634
+D+S+H	4.515	2.937
+D+0.750Lr+0.750L+H	6.775	4.209
+D+0.750L+0.750S+H	4.515	2.937
+D+0.60W+H	4.515	2.937
+D+0.70E+H	4.515	2.937
+D+0.750Lr+0.750L+0.450W+H	6.775	4.209
+D+0.750L+0.750S+0.450W+H	4.515	2.937
+D+0.750L+0.750S+0.5250E+H	4.515	2.937
+0.60D+0.60W+0.60H	2.709	1.762
+0.60D+0.70E+0.60H	2.709	1.762
D Only	4.515	2.937
Lr Only	3.013	1.697
L Only		
S Only		
W Only		
E Only		
H Only		

Maximum Forces & Stresses for Load Combinations																		
Load Combination Segment Length		Max Stress Ratios				Moment Values										Shear Values		
		Span #	M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ['] _b	V	f _v	F ['] _v	
+D+H														0.00	0.00	0.00	0.00	
Length = 7.0 ft	1	0.264	0.218	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.49	569.72	2160.00	1.28	51.88	238.50		
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00		
Length = 7.0 ft	1	0.237	0.196	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.49	569.72	2400.00	1.28	51.88	265.00		
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00		

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 Project Descr:

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Wood Beam

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 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.11

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
Length = 7.0 ft	1		0.348	0.287	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.39	1,044.49	3000.00	2.35	95.11	331.25
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.206	0.170	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.49	569.72	2760.00	1.28	51.88	304.75
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.309	0.255	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.67	925.79	3000.00	2.09	84.30	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.206	0.170	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.49	569.72	2760.00	1.28	51.88	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.148	0.122	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.49	569.72	3840.00	1.28	51.88	424.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.148	0.122	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.49	569.72	3840.00	1.28	51.88	424.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.241	0.199	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.67	925.79	3840.00	2.09	84.30	424.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.148	0.122	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.49	569.72	3840.00	1.28	51.88	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.148	0.122	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.49	569.72	3840.00	1.28	51.88	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.089	0.073	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.09	341.83	3840.00	0.77	31.13	424.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1		0.089	0.073	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.09	341.83	3840.00	0.77	31.13	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0581	3.321		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.410	1.632
Overall MINimum	1.096	0.742
+D+H	1.315	0.890
+D+L+H	1.315	0.890
+D+Lr+H	2.410	1.632
+D+S+H	1.315	0.890
+D+0.750Lr+0.750L+H	2.136	1.447
+D+0.750L+0.750S+H	1.315	0.890
+D+0.60W+H	1.315	0.890
+D+0.70E+H	1.315	0.890
+D+0.750Lr+0.750L+0.450W+H	2.136	1.447
+D+0.750L+0.750S+0.450W+H	1.315	0.890
+D+0.750L+0.750S+0.5250E+H	1.315	0.890
+0.60D+0.60W+0.60H	0.789	0.534
+0.60D+0.70E+0.60H	0.789	0.534
D Only	1.315	0.890
Lr Only	1.096	0.742
L Only		
S Only		
W Only		
E Only		
H Only		

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Project ID:

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - Boiler Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.12

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

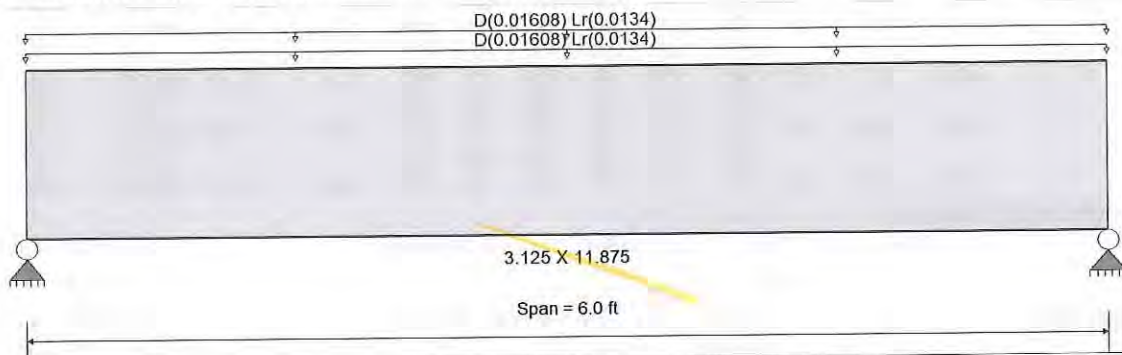
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-10

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Fb + 2,400.0 psi
 Fb - 1,850.0 psi
 Fc - Prll 1,650.0 psi
 Fc - Perp 650.0 psi
 Fv 265.0 psi
 Ft 1,100.0 psi
 E: Modulus of Elasticity
 Ebend-xx 1,800.0 ksi
 Eminbend-xx 950.0 ksi
 Ebend-yy 1,600.0 ksi
 Eminbend-yy 850.0 ksi
 Density 31.20 pcf



Applied Loads

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

Uniform Load: D = 0.0240, Lr = 0.020 ksf, Tributary Width = 0.670 ft, (Roof + Concrete)

Uniform Load: D = 0.0240, Lr = 0.020 ksf, Tributary Width = 0.670 ft, (Roof Loads)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.014 : 1	Maximum Shear Stress Ratio	=	0.014 : 1
Section used for this span	=	3.125 X 11.875	Section used for this span	=	3.125 X 11.875
fb : Actual	=	43.35 psi	fv : Actual	=	4.80 psi
FB : Allowable	=	3,000.00 psi	Fv : Allowable	=	331.25 psi
Load Combination	=	+D+Lr+H	Load Combination	=	+D+Lr+H
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.001 in	Ratio =		71899 >= 480
Max Upward Transient Deflection		0.000 in	Ratio =		0 < 480
Max Downward Total Deflection		0.002 in	Ratio =		32681 >= 360
Max Upward Total Deflection		0.000 in	Ratio =		0 < 360

Maximum Forces & Stresses for Load Combinations

Maximum Forces & Stresses for Load Combinations																
Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F' _b	V	f _v	F' _v
+D+H													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.011	0.011	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.14	23.65	2160.00	0.06	2.62	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.010	0.010	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.14	23.65	2400.00	0.06	2.62	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.014	0.014	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.27	43.35	3000.00	0.12	4.80	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.009	0.009	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.14	23.65	2760.00	0.06	2.62	304.75

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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

332

Printed: 5 FEB 2019, 5:21PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.12

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
+D+0.750Lr+0.750L+H	Length = 6.0 ft	1	0.013	0.013	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.24	38.42	3000.00	0.11	4.26	331.25
+D+0.750L+0.750S+H	Length = 6.0 ft	1	0.009	0.009	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.14	23.65	2760.00	0.06	2.62	304.75
+D+0.60W+H	Length = 6.0 ft	1	0.006	0.006	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.14	23.65	3840.00	0.06	2.62	424.00
+D+0.70E+H	Length = 6.0 ft	1	0.006	0.006	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.14	23.65	3840.00	0.06	2.62	424.00
+D+0.750Lr+0.750L+0.450W+H	Length = 6.0 ft	1	0.010	0.010	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.24	38.42	3840.00	0.11	4.26	424.00
+D+0.750L+0.750S+0.450W+H	Length = 6.0 ft	1	0.006	0.006	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.14	23.65	3840.00	0.06	2.62	424.00
+D+0.750L+0.750S+0.5250E+H	Length = 6.0 ft	1	0.006	0.006	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.14	23.65	3840.00	0.06	2.62	424.00
+0.60D+0.60W+0.60H	Length = 6.0 ft	1	0.004	0.004	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.09	14.19	3840.00	0.04	1.57	424.00
+0.60D+0.70E+0.60H	Length = 6.0 ft	1	0.004	0.004	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.09	14.19	3840.00	0.04	1.57	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0022	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.177	0.177
Overall MINimum	0.080	0.080
+D+H	0.096	0.096
+D+L+H	0.096	0.096
+D+Lr+H	0.177	0.177
+D+S+H	0.096	0.096
+D+0.750Lr+0.750L+H	0.157	0.157
+D+0.750L+0.750S+H	0.096	0.096
+D+0.60W+H	0.096	0.096
+D+0.70E+H	0.096	0.096
+D+0.750Lr+0.750L+0.450W+H	0.157	0.157
+D+0.750L+0.750S+0.450W+H	0.096	0.096
+D+0.750L+0.750S+0.5250E+H	0.096	0.096
+0.60D+0.60W+0.60H	0.058	0.058
+0.60D+0.70E+0.60H	0.058	0.058
D Only	0.096	0.096
Lr Only	0.080	0.080
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 5 FEB 2019, 5:37PM

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.13

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

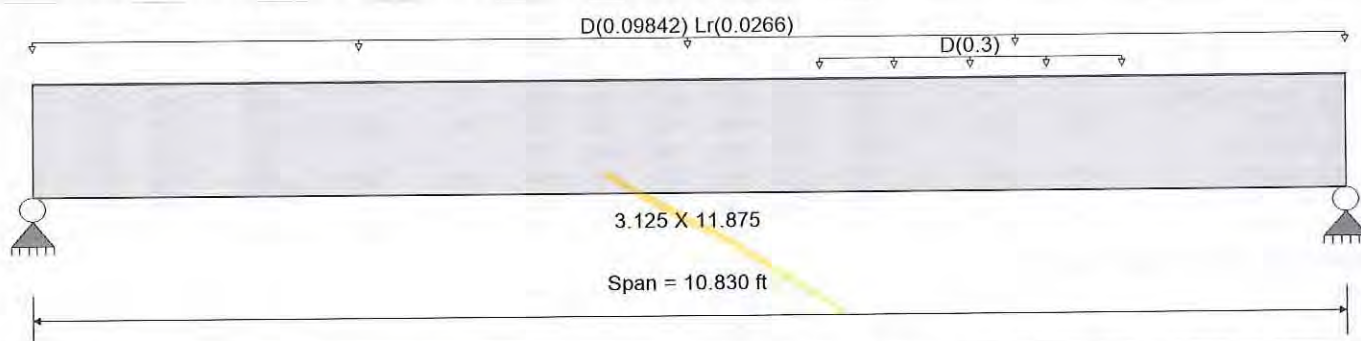
Material Properties

Analysis Method: Allowable Stress Design
Load Combination: ASCE 7-10

Wood Species: DF/DF
Wood Grade: 24F - V4

Fb +	2400 psi	E : Modulus of Elasticity	
Fb -	1850 psi	Ebend-xx	1800 ksi
Fc - Prll	1650 psi	Eminbend-xx	950 ksi
Fc - Perp	650 psi	Ebend-yy	1600 ksi
Fv	265 psi	Eminbend-yy	850 ksi
Ft	1100 psi	Density	31.2pcf

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

**Applied Loads**

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

Load for Span Number 1

Uniform Load: D = 0.30 k/ft, Extent = 6.50 --> 9.0 ft, Tributary Width = 1.0 ft, (Boiler Load)

Uniform Load: D = 0.0740, Lr = 0.020 ksf, Tributary Width = 1.330 ft, (Roof + Concrete)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio	=	0.211: 1	Maximum Shear Stress Ratio	=	0.165: 1
Section used for this span	=	3.125 X 11.875	Section used for this span	=	3.125 X 11.875
fb : Actual	=	455.14 psi	fv : Actual	=	39.31 psi
FB : Allowable	=	2,160.00 psi	Fv : Allowable	=	238.50 psi
Load Combination	=	+D+H	Load Combination	=	+D+H
Location of maximum on span	=	6.759 ft	Location of maximum on span	=	9.842 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.011 in Ratio = 12318 >= 480			
Max Upward Transient Deflection		0.000 in Ratio = 0 < 480			
Max Downward Total Deflection		0.083 in Ratio = 1575 >= 360			
Max Upward Total Deflection		0.000 in Ratio = 0 < 360			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	fb	F'b	V	fv	F'v
+D+H														0.00			
Length = 10.830 ft	1		0.211	0.165	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.14	2160.00	0.97	39.31	238.50
+D+L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00			
Length = 10.830 ft	1		0.190	0.148	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.14	2400.00	0.97	39.31	265.00
+D+Lr+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00			
Length = 10.830 ft	1		0.172	0.133	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.15	515.13	3000.00	1.09	44.07	331.25

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Project Title:
Engineer:
Project Descr:

Project ID:

334

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Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - Boiler Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.13

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F _b	V	f _v	F _v
+D+S+H	Length = 10.830 ft	1	0.165	0.129	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.14	2760.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+H	Length = 10.830 ft	1	0.167	0.129	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.06	500.08	3000.00	0.00	0.00	0.00
+D+0.750L+0.750S+H	Length = 10.830 ft	1	0.165	0.129	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.14	2760.00	0.00	0.00	0.00
+D+0.60W+H	Length = 10.830 ft	1	0.119	0.093	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.14	3840.00	0.00	0.00	0.00
+D+0.70E+H	Length = 10.830 ft	1	0.119	0.093	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.14	3840.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+0.450W+H	Length = 10.830 ft	1	0.130	0.101	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.06	500.08	3840.00	0.00	0.00	0.00
+D+0.750L+0.750S+0.450W+H	Length = 10.830 ft	1	0.119	0.093	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.14	3840.00	0.00	0.00	0.00
+D+0.750L+0.750S+0.5250E+H	Length = 10.830 ft	1	0.119	0.093	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.79	455.14	3840.00	0.00	0.00	0.00
+0.60D+0.60W+0.60H	Length = 10.830 ft	1	0.071	0.056	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.67	273.08	3840.00	0.00	0.00	0.00
+0.60D+0.70E+0.60H	Length = 10.830 ft	1	0.071	0.056	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.67	273.08	3840.00	0.00	0.00	0.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0825	5.652		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.890	1.214
Overall MINimum	0.144	0.144
+D+H	0.746	1.070
+D+L+H	0.746	1.070
+D+Lr+H	0.890	1.214
+D+S+H	0.746	1.070
+D+0.750Lr+0.750L+H	0.854	1.178
+D+0.750L+0.750S+H	0.746	1.070
+D+0.60W+H	0.746	1.070
+D+0.70E+H	0.746	1.070
+D+0.750Lr+0.750L+0.450W+H	0.854	1.178
+D+0.750L+0.750S+0.450W+H	0.746	1.070
+D+0.750L+0.750S+0.5250E+H	0.746	1.070
+0.60D+0.60W+0.60H	0.448	0.642
+0.60D+0.70E+0.60H	0.448	0.642
D Only	0.746	1.070
Lr Only	0.144	0.144
L Only		
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

335

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File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Beams - Boiler Framing.ec6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Wood Beam

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B-Boiler.14

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

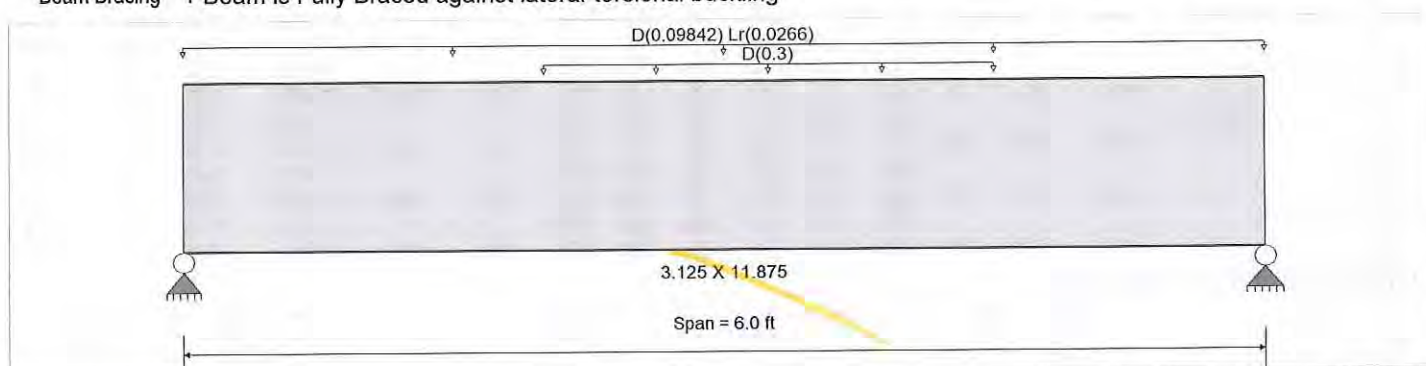
Material Properties

Analysis Method: Allowable Stress Design
 Load Combination: ASCE 7-10

Wood Species: DF/DF
 Wood Grade: 24F - V4

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

F_b + 2,400.0 psi
 F_b - 1,850.0 psi
 F_c - Prll 1,650.0 psi
 F_c - Perp 650.0 psi
 F_v 265.0 psi
 F_t 1,100.0 psi
 E: Modulus of Elasticity
 E_{bend-xx} 1,800.0 ksi
 E_{minbend-xx} 950.0 ksi
 E_{bend-yy} 1,600.0 ksi
 E_{minbend-yy} 850.0 ksi
 Density 31.20 pcf



Applied Loads

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

Load for Span Number 1

Uniform Load: D = 0.30 k/ft, Extent = 2.0 --> 4.50 ft, Tributary Width = 1.0 ft, (Boiler Load)

Uniform Load: D = 0.0740, L_r = 0.020 ksf, Tributary Width = 1.330 ft, (Roof + Concrete)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.100	1	Maximum Shear Stress Ratio	=	0.102	1
Section used for this span	=	3.125 X 11.875		Section used for this span	=	3.125 X 11.875	
fb: Actual	=	216.74 psi		fv: Actual	=	24.44 psi	
FB: Allowable	=	2,160.00 psi		Fv: Allowable	=	238.50 psi	
Load Combination	=	+D+H		Load Combination	=	+D+H	
Location of maximum on span	=	3.109 ft		Location of maximum on span	=	5.015 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Upward Transient Deflection		0.000 in	Ratio = 0 < 480				
Max Downward Total Deflection		0.012 in	Ratio = 6260 >= 360				
Max Upward Total Deflection		0.000 in	Ratio = 0 < 360				

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	C _d	C _{FV}	C _i	C _T	C _m	C _t	C _L	M	fb	F _b	V	fv	F _v
+D+H	Length = 6.0 ft	1	0.100	0.102	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.33	216.74	2160.00	0.60	24.44	238.50
+D+L+H	Length = 6.0 ft	1	0.090	0.092	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.33	216.74	2400.00	0.60	24.44	265.00
+D+L _r +H	Length = 6.0 ft	1	0.079	0.080	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.45	236.27	3000.00	0.66	26.60	331.25

Title Block Line 1
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 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

336

Printed: 5 FEB 2019, 5:39PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore\C) Calculations\Gravity\Beams - Boiler Framing.ec6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. # : KW-06009713

Licensee : Peoples Associates Structural Engineers

Description : B-Boiler.14

Load Combination	Segment Length	Span #	Max Stress Ratios		C_d	C_{FV}	C_i	C_r	C_m	C_t	C_L	Moment Values			Shear Values		
			M	V								M	f_b	$F'b$	V	f_v	F_v
+D+S+H	Length = 6.0 ft	1	0.079	0.080	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.33	216.74	2760.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+H	Length = 6.0 ft	1	0.077	0.079	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.42	231.39	3000.00	0.60	24.44	304.75
+D+0.750L+0.750S+H	Length = 6.0 ft	1	0.079	0.080	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.33	216.74	2760.00	0.60	24.44	304.75
+D+0.60W+H	Length = 6.0 ft	1	0.056	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.33	216.74	3840.00	0.60	24.44	424.00
+D+0.70E+H	Length = 6.0 ft	1	0.056	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.33	216.74	3840.00	0.60	24.44	424.00
+D+0.750Lr+0.750L+0.450W+H	Length = 6.0 ft	1	0.060	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.42	231.39	3840.00	0.60	24.44	424.00
+D+0.750L+0.750S+0.450W+H	Length = 6.0 ft	1	0.056	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.33	216.74	3840.00	0.60	24.44	424.00
+D+0.750L+0.750S+0.5250E+H	Length = 6.0 ft	1	0.056	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.33	216.74	3840.00	0.60	24.44	424.00
+0.60D+0.60W+0.60H	Length = 6.0 ft	1	0.034	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	130.04	3840.00	0.36	14.66	424.00
+0.60D+0.70E+0.60H	Length = 6.0 ft	1	0.034	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	130.04	3840.00	0.36	14.66	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0115	3.044		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.719	0.781
Overall MINimum	0.080	0.080
+D+H	0.639	0.702
+D+L+H	0.639	0.702
+D+Lr+H	0.719	0.781
+D+S+H	0.639	0.702
+D+0.750Lr+0.750L+H	0.699	0.761
+D+0.750L+0.750S+H	0.639	0.702
+D+0.60W+H	0.639	0.702
+D+0.70E+H	0.639	0.702
+D+0.750Lr+0.750L+0.450W+H	0.699	0.761
+D+0.750L+0.750S+0.450W+H	0.639	0.702
+D+0.750L+0.750S+0.5250E+H	0.639	0.702
+0.60D+0.60W+0.60H	0.383	0.421
+0.60D+0.70E+0.60H	0.383	0.421
D Only	0.639	0.702
Lr Only	0.080	0.080
L Only		
S Only		
W Only		
E Only		
H Only		

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F ^b	V	f _v	F ^v
+D+H													0.00	0.00	0.00	0.00
Length = 11.125 ft	1	0.392	0.263	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	1665.00	2.55	62.79	238.50
Length = 11.125 ft	2	0.392	0.263	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	1665.00	2.55	62.79	238.50
+D+L+H													0.00	0.00	0.00	0.00
Length = 11.125 ft	1	0.353	0.237	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	1850.00	2.55	62.79	265.00
Length = 11.125 ft	2	0.353	0.237	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	1850.00	2.55	62.79	265.00
+D+L _r +H													0.00	0.00	0.00	0.00
Length = 11.125 ft	1	0.517	0.348	1.25	1.000	1.00	1.00	1.00	1.00	1.00	12.00	1,195.60	2312.50	4.67	115.11	331.25
Length = 11.125 ft	2	0.517	0.348	1.25	1.000	1.00	1.00	1.00	1.00	1.00	12.00	1,195.60	2312.50	4.67	115.11	331.25

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

Title Block Line 6

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 6 FEB 2019, 2:00PM

Wood Beam

File = Y:\Jobs\18-jobs\18-234 Legacy at Livermore(C) Calculations\Gravity\Beams - Boiler Framing.ec6
ENERCALC, INC. 1993-2017, Build:10.17.12.10, Ver:10.17.12.10

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: Beam Supporting the Roof Overhang

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{FN}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v	F _v
+D+S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.307	0.206	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2127.50	2.55	62.79	304.75
Length = 11.125 ft	2		0.307	0.206	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2127.50	2.55	62.79	304.75
+D+0.750Lr+0.750L+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.458	0.308	1.25	1.000	1.00	1.00	1.00	1.00	1.00	10.64	1,059.74	2312.50	4.14	102.03	331.25
Length = 11.125 ft	2		0.458	0.308	1.25	1.000	1.00	1.00	1.00	1.00	1.00	10.64	1,059.74	2312.50	4.14	102.03	331.25
+D+0.750L+0.750S+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.307	0.206	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2127.50	2.55	62.79	304.75
Length = 11.125 ft	2		0.307	0.206	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2127.50	2.55	62.79	304.75
+D+0.60W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.220	0.148	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2960.00	2.55	62.79	424.00
Length = 11.125 ft	2		0.220	0.148	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2960.00	2.55	62.79	424.00
+D+0.70E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.220	0.148	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2960.00	2.55	62.79	424.00
Length = 11.125 ft	2		0.220	0.148	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2960.00	2.55	62.79	424.00
+D+0.750Lr+0.750L+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.358	0.241	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.64	1,059.74	2960.00	4.14	102.03	424.00
Length = 11.125 ft	2		0.358	0.241	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.64	1,059.74	2960.00	4.14	102.03	424.00
+D+0.750L+0.750S+0.450W+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.220	0.148	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2960.00	2.55	62.79	424.00
Length = 11.125 ft	2		0.220	0.148	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2960.00	2.55	62.79	424.00
+D+0.750L+0.750S+0.5250E+H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.220	0.148	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2960.00	2.55	62.79	424.00
Length = 11.125 ft	2		0.220	0.148	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.55	652.15	2960.00	2.55	62.79	424.00
+0.60D+0.60W+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.132	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.93	391.29	2960.00	1.53	37.67	424.00
Length = 11.125 ft	2		0.132	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.93	391.29	2960.00	1.53	37.67	424.00
+0.60D+0.70E+0.60H						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.125 ft	1		0.132	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.93	391.29	2960.00	1.53	37.67	424.00
Length = 11.125 ft	2		0.132	0.089	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.93	391.29	2960.00	1.53	37.67	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0873	4.723		0.0000	0.000
+D+Lr+H	2	0.0864	6.464		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	3.236	10.787	3.236
Overall MINimum	1.471	4.903	1.471
+D+H	1.765	5.884	1.765
+D+L+H	1.765	5.884	1.765
+D+Lr+H	3.236	10.787	3.236
+D+S+H	1.765	5.884	1.765
+D+0.750Lr+0.750L+H	2.868	9.562	2.868
+D+0.750L+0.750S+H	1.765	5.884	1.765
+D+0.60W+H	1.765	5.884	1.765
+D+0.70E+H	1.765	5.884	1.765
+D+0.750Lr+0.750L+0.450W+H	2.868	9.562	2.868
+D+0.750L+0.750S+0.450W+H	1.765	5.884	1.765
+D+0.750L+0.750S+0.5250E+H	1.765	5.884	1.765
+0.60D+0.60W+0.60H	1.059	3.530	1.059
+0.60D+0.70E+0.60H	1.059	3.530	1.059
D Only	1.765	5.884	1.765
Lr Only	1.471	4.903	1.471
L Only			
S Only			
W Only			
E Only			
H Only			

Project: Typical Headers

Location: Header Span 6' (4x10)

Uniformly Loaded Floor Beam

[2015 International Building Code(2012 NDS)]

3.5 IN x 9.25 IN x 6.0 FT

#2 - Hem-Fir - Dry Use

Seadequate By: 1.5%

Controlling Factor: Moment



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DEFLECTIONS

Center

Live Load 0.05 IN L/1425

Dead Load 0.04 in

Total Load 0.09 IN L/798

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

A

B

Live Load 1560 lb 1560 lb

Dead Load 1227 lb 1227 lb

Total Load 2787 lb 2787 lb

Bearing Length 1.97 in 1.97 in

BEAM DATA

Center

Span Length 6 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

MATERIAL PROPERTIES

#2 - Hem-Fir

Base Values

Adjusted

Bending Stress: $F_b = 850$ psi $F_b' = 1020$ psi

$C_d = 1.00$ $C_F = 1.20$

Shear Stress: $F_v = 150$ psi $F_v' = 150$ psi

$C_d = 1.00$

Modulus of Elasticity: $E = 1300$ ksi $E' = 1300$ ksi

Comp. $\perp$ to Grain: $F_c \perp = 405$ psi $F_c \perp' = 405$ psi

Controlling Moment:

4181 ft-lb

from left support

ed by combining all dead and live loads.

Controlling Shear:

-2118 lb

At a distance d from support.

Created by combining all dead and live loads.

Comparisons with required sections:

Req'd

Provided

Section Modulus: 49.18 in³ 49.91 in³

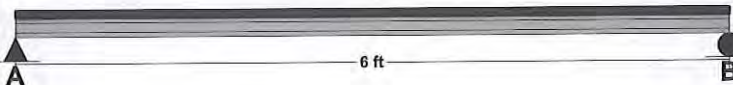
Area (Shear): 21.18 in² 32.38 in²

Moment of Inertia (deflection): 69.45 in⁴ 230.84 in⁴

Moment: 4181 ft-lb 4242 ft-lb

Shear: -2118 lb 3238 lb

LOADING DIAGRAM



FLOOR LOADING

Side 1

Side 2

Floor Live Load FLL = 40 psf 40 psf

Floor Dead Load FDL = 31 psf 15 psf

Floor Tributary Width FTW = 13 ft 0 ft

Wall Load WALL = 0 plf

BEAM LOADING

Beam Total Live Load: wL = 520 plf

Beam Total Dead Load: wD = 403 plf

Beam Self Weight: BSW = 6 plf

Total Maximum Load: wT = 929 plf

NOTES

Project: Typical Headers

Location: Header Span 3' (4x6)

Uniformly Loaded Floor Beam

[2015 International Building Code(2012 NDS)]

3.5 IN x 5.5 IN x 3.0 FT

#2 - Hem-Fir - Dry Use

Section Adequate By: 1.5%

Controlling Factor: Moment



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DEFLECTIONS

Center

Live Load 0.02 IN L/1558

Dead Load 0.02 in

Total Load 0.04 IN L/875

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

A

B

Live Load 1200 lb 1200 lb

Dead Load 935 lb 935 lb

Total Load 2135 lb 2135 lb

Bearing Length 1.51 in 1.51 in

BEAM DATA

Center

Span Length 3 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

MATERIAL PROPERTIES

#2 - Hem-Fir

Base Values

Adjusted

Bending Stress: $F_b = 850$ psi $F_b' = 1105$ psi

$C_d = 1.00$ $CF = 1.30$

Shear Stress: $F_v = 150$ psi $F_v' = 150$ psi

$C_d = 1.00$

Modulus of Elasticity: $E = 1300$ ksi $E' = 1300$ ksi

Comp. $\perp$ to Grain: $F_c - \perp = 405$ psi $F_c - \perp' = 405$ psi

Controlling Moment: 1602 ft-lb

1.5 ft from left support

Created by combining all dead and live loads.

Controlling Shear: 1495 lb

At a distance d from support.

Created by combining all dead and live loads.

Comparisons with required sections:

Req'd

Provided

Section Modulus: 17.39 in³ 17.65 in³

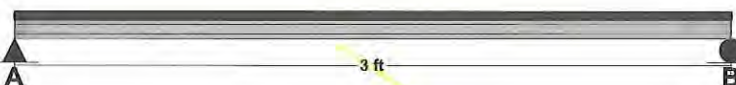
Area (Shear): 14.95 in² 19.25 in²

Moment of Inertia (deflection): 19.95 in⁴ 48.53 in⁴

Moment: 1602 ft-lb 1625 ft-lb

Shear: 1495 lb 1925 lb

LOADING DIAGRAM



FLOOR LOADING

Side 1

Side 2

Floor Live Load FLL = 40 psf 40 psf

Floor Dead Load FDL = 31 psf 15 psf

Floor Tributary Width FTW = 20 ft 0 ft

Wall Load WALL = 0 plf

BEAM LOADING

Beam Total Live Load: wL = 800 plf

Beam Total Dead Load: wD = 620 plf

Beam Self Weight: BSW = 4 plf

Total Maximum Load: wT = 1424 plf

NOTES

Project: Typical Headers

Location: Header Span 6' (6x10)

Uniformly Loaded Floor Beam

[2015 International Building Code(2012 NDS)]

5.5 IN x 9.5 IN x 6.0 FT

#2 - Hem-Fir - Dry Use

Seadequate By: 3.0%

Controlling Factor: Moment



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DEFLECTIONS

Center

Live Load 0.04 IN L/1906

Dead Load 0.03 in

Total Load 0.07 IN L/1064

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

A

B

Live Load 1680 lb 1680 lb

Dead Load 1331 lb 1331 lb

Total Load 3011 lb 3011 lb

Bearing Length 1.35 in 1.35 in

BEAM DATA

Center

Span Length 6 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

MATERIAL PROPERTIES

#2 - Hem-Fir

Base Values

Adjusted

Bending Stress: $F_b = 675$ psi $F_b' = 675$ psi

$C_d = 1.00$ $C_F = 1.00$

Shear Stress: $F_v = 140$ psi $F_v' = 140$ psi

$C_d = 1.00$

Modulus of Elasticity: $E = 1100$ ksi $E' = 1100$ ksi

Comp. $\perp$ to Grain: $F_c \perp = 405$ psi $F_c \perp' = 405$ psi

Controlling Moment: 4517 ft-lb

from left support

ed by combining all dead and live loads.

Controlling Shear: 2228 lb

At a distance d from support.

Created by combining all dead and live loads.

Comparisons with required sections:

Req'd

Provided

Section Modulus: 80.3 in³ 82.73 in³

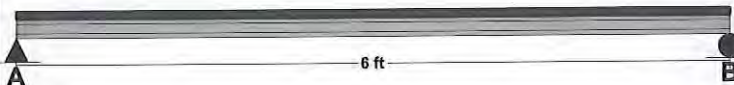
Area (Shear): 23.87 in² 52.25 in²

Moment of Inertia (deflection): 133.02 in⁴ 392.96 in⁴

Moment: 4517 ft-lb 4654 ft-lb

Shear: 2228 lb 4877 lb

LOADING DIAGRAM



FLOOR LOADING

Side 1

Side 2

Floor Live Load FLL = 40 psf 40 psf

Floor Dead Load FDL = 31 psf 15 psf

Floor Tributary Width FTW = 14 ft 0 ft

Wall Load WALL = 0 plf

BEAM LOADING

Beam Total Live Load: wL = 560 plf

Beam Total Dead Load: wD = 434 plf

Beam Self Weight: BSW = 10 plf

Total Maximum Load: wT = 1004 plf

NOTES

Project: Typical Headers

Location: Header Span 8' (4x10)

Uniformly Loaded Floor Beam

[2015 International Building Code(2012 NDS)]

3.5 IN x 9.25 IN x 8.0 FT

#2 - Hem-Fir - Dry Use

Section Adequate By: 5.4%

Controlling Factor: Moment



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DEFLECTIONS

Center

Live Load 0.09 IN L/1117

Dead Load 0.07 in

Total Load 0.15 IN L/622

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

A

B

Live Load 1120 lb 1120 lb

Dead Load 892 lb 892 lb

Total Load 2012 lb 2012 lb

Bearing Length 1.42 in 1.42 in

BEAM DATA

Center

Span Length 8 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

MATERIAL PROPERTIES

#2 - Hem-Fir

Base Values

Adjusted

Bending Stress: $F_b = 850$ psi $F_b' = 1020$ psi

$C_d = 1.00$ $CF = 1.20$

Shear Stress: $F_v = 150$ psi $F_v' = 150$ psi

$C_d = 1.00$

Modulus of Elasticity: $E = 1300$ ksi $E' = 1300$ ksi

Comp. $\perp$ to Grain: $F_c - \perp = 405$ psi $F_c - \perp' = 405$ psi

Controlling Moment: 4024 ft-lb

4.0 ft from left support

Created by combining all dead and live loads.

Controlling Shear: 1650 lb

At a distance d from support.

Created by combining all dead and live loads.

Comparisons with required sections:

Req'd

Provided

Section Modulus: 47.34 in³ 49.91 in³

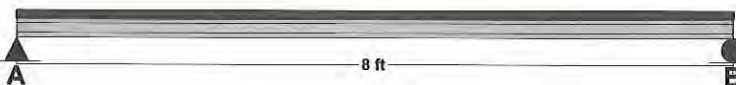
Area (Shear): 16.5 in² 32.38 in²

Moment of Inertia (deflection): 89.14 in⁴ 230.84 in⁴

Moment: 4024 ft-lb 4242 ft-lb

Shear: 1650 lb 3238 lb

LOADING DIAGRAM



FLOOR LOADING

Side 1

Side 2

Floor Live Load FLL = 40 psf 40 psf

Floor Dead Load FDL = 31 psf 15 psf

Floor Tributary Width FTW = 7 ft 0 ft

Wall Load WALL = 0 plf

BEAM LOADING

Beam Total Live Load: wL = 280 plf

Beam Total Dead Load: wD = 217 plf

Beam Self Weight: BSW = 6 plf

Total Maximum Load: wT = 503 plf

NOTES

Project: Typical Headers

Location: Header Span 3' (6x6)
Uniformly Loaded Floor Beam
[2015 International Building Code(2012 NDS)]
5.5 IN x 5.5 IN x 3.0 FT
#2 - Hem-Fir - Dry Use
Seadequate By: 0.3%
Controlling Factor: Moment



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DEFLECTIONS Center

Live Load	0.01	IN L/2511
Dead Load	0.01	in
Total Load	0.03	IN L/1408
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

REACTIONS

	A	B
Live Load	990 lb	990 lb
Dead Load	776 lb	776 lb
Total Load	1766 lb	1766 lb
Bearing Length	0.79 in	0.79 in

BEAM DATA Center

Span Length	3 ft
Unbraced Length-Top	0 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

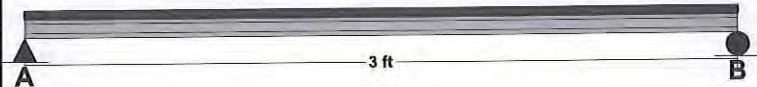
#2 - Hem-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 575 psi Cd=1.00 CF=1.00	Fb' = 575 psi
Shear Stress:	Fv = 140 psi Cd=1.00	Fv' = 140 psi
Modulus of Elasticity:	E = 1100 ksi	E' = 1100 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 405 psi	Fc $\perp$ = 405 psi

Controlling Moment: 1324 ft-lb
from left support
ed by combining all dead and live loads.
Controlling Shear: -1236 lb
At a distance d from support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	27.64 in ³	27.73 in ³
Area (Shear):	13.24 in ²	30.25 in ²
Moment of Inertia (deflection):	19.5 in ⁴	76.26 in ⁴
Moment:	1324 ft-lb	1329 ft-lb
Shear:	-1236 lb	2823 lb

LOADING DIAGRAM



FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	31 psf	15 psf
Floor Tributary Width	FTW =	16.5 ft	0 ft
Wall Load	WALL =	0 plf	

BEAM LOADING

Beam Total Live Load:	wL =	660 plf
Beam Total Dead Load:	wD =	512 plf
Beam Self Weight:	BSW =	6 plf
Total Maximum Load:	wT =	1177 plf

NOTES

Project: Typical Headers

Location: Header Span 8' (6x10)
Uniformly Loaded Floor Beam
[2015 International Building Code(2012 NDS)]
5.5 IN x 9.5 IN x 8.0 FT
#2 - Hem-Fir - Dry Use
Section Adequate By: 0.7%
Controlling Factor: Moment



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DEFLECTIONS	Center
Live Load	0.07 IN L/1407
Dead Load	0.05 in
Total Load	0.12 IN L/779
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360	

REACTIONS	A	B
Live Load	1280 lb	1280 lb
Dead Load	1031 lb	1031 lb
Total Load	2311 lb	2311 lb
Bearing Length	1.04 in	1.04 in

BEAM DATA	Center
Span Length	8 ft
Unbraced Length-Top	0 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Hem-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 675 psi Cd=1.00 CF=1.00	Fb' = 675 psi
Shear Stress:	Fv = 140 psi Cd=1.00	Fv' = 140 psi
Modulus of Elasticity:	E = 1100 ksi	E' = 1100 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 405 psi	Fc $\perp$ = 405 psi

Controlling Moment: 4622 ft-lb

4.0 ft from left support

Created by combining all dead and live loads.

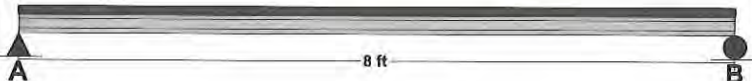
Controlling Shear: 1895 lb

At a distance d from support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	82.17 in3	82.73 in3
Area (Shear):	20.3 in2	52.25 in2
Moment of Inertia (deflection):	181.49 in4	392.96 in4
Moment:	4622 ft-lb	4654 ft-lb
Shear:	1895 lb	4877 lb

LOADING DIAGRAM



FLOOR LOADING

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	40 psf
Floor Dead Load	FDL = 31 psf	15 psf
Floor Tributary Width	FTW = 8 ft	0 ft
Wall Load	WALL = 0 plf	

BEAM LOADING

Beam Total Live Load:	wL = 320 plf
Beam Total Dead Load:	wD = 248 plf
Beam Self Weight:	BSW = 10 plf
Total Maximum Load:	wT = 578 plf

NOTES

Project: Typical Headers

Location: Header Span 11' (6x12)

Uniformly Loaded Floor Beam

[2015 International Building Code(2012 NDS)]

5.5 IN x 11.5 IN x 11.0 FT

#2 - Hem-Fir - Dry Use

Sec Adequate By: 3.0%

Controlling Factor: Moment



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Milpitas, CA 95035

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DEFLECTIONS

Center

Live Load 0.10 IN L/1280

Dead Load 0.08 in

Total Load 0.19 IN L/702

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

A

B

Live Load 1320 lb 1320 lb

Dead Load 1088 lb 1088 lb

Total Load 2408 lb 2408 lb

Bearing Length 1.08 in 1.08 in

BEAM DATA

Center

Span Length 11 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

MATERIAL PROPERTIES

#2 - Hem-Fir

Base Values

Adjusted

Bending Stress: $F_b = 675$ psi $F_b' = 675$ psi

$C_d = 1.00$ $CF = 1.00$

Shear Stress: $F_v = 140$ psi $F_v' = 140$ psi

$C_d = 1.00$

Modulus of Elasticity: $E = 1100$ ksi $E' = 1100$ ksi

Comp. $\perp$ to Grain: $F_c \perp = 405$ psi $F_c \perp' = 405$ psi

Controlling Moment: 6622 ft-lb

from left support

ed by combining all dead and live loads.

Controlling Shear: 2023 lb

At a distance d from support.

Created by combining all dead and live loads.

Comparisons with required sections:

Req'd

Provided

Section Modulus: 117.72 in³ 121.23 in³

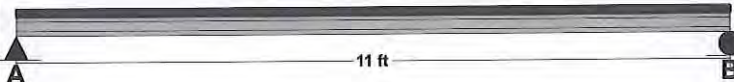
Area (Shear): 21.67 in² 63.25 in²

Moment of Inertia (deflection): 357.51 in⁴ 697.07 in⁴

Moment: 6622 ft-lb 6819 ft-lb

Shear: 2023 lb 5903 lb

LOADING DIAGRAM



FLOOR LOADING

Side 1

Side 2

Floor Live Load FLL = 40 psf 40 psf

Floor Dead Load FDL = 31 psf 15 psf

Floor Tributary Width FTW = 6 ft 0 ft

Wall Load WALL = 0 plf

BEAM LOADING

Beam Total Live Load: wL = 240 plf

Beam Total Dead Load: wD = 186 plf

Beam Self Weight: BSW = 12 plf

Total Maximum Load: wT = 438 plf

NOTES

Project: Typical Headers

Location: Header Span 11' (4x12)

Uniformly Loaded Floor Beam

[2015 International Building Code(2012 NDS)]

3.5 IN x 11.25 IN x 11.0 FT

#2 - Hem-Fir - Dry Use

Section Adequate By: 5.0%

Controlling Factor: Moment



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DEFLECTIONS

Center

Live Load 0.12 IN L/1082

Dead Load 0.10 in

Total Load 0.22 IN L/597

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

A

B

Live Load 1100 lb 1100 lb

Dead Load 893 lb 893 lb

Total Load 1993 lb 1993 lb

Bearing Length 1.41 in 1.41 in

BEAM DATA

Center

Span Length 11 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

MATERIAL PROPERTIES

#2 - Hem-Fir

Base Values

Adjusted

Bending Stress: $F_b = 850$ psi $F_b' = 935$ psi

$C_d = 1.00$ $CF = 1.10$

Shear Stress: $F_v = 150$ psi $F_v' = 150$ psi

$C_d = 1.00$

Modulus of Elasticity: $E = 1300$ ksi $E' = 1300$ ksi

Comp. $\perp$ to Grain: $F_c - \perp = 405$ psi $F_c - \perp' = 405$ psi

Controlling Moment: 5480 ft-lb

5.5 ft from left support

Created by combining all dead and live loads.

Controlling Shear: 1674 lb

At a distance d from support.

Created by combining all dead and live loads.

Comparisons with required sections:

Req'd

Provided

Section Modulus: 70.34 in³ 73.83 in³

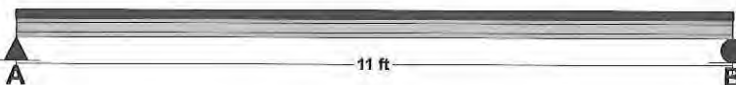
Area (Shear): 16.74 in² 39.38 in²

Moment of Inertia (deflection): 250.37 in⁴ 415.28 in⁴

Moment: 5480 ft-lb 5752 ft-lb

Shear: 1674 lb 3938 lb

LOADING DIAGRAM



FLOOR LOADING

Side 1

Side 2

Floor Live Load FLL = 40 psf 40 psf

Floor Dead Load FDL = 31 psf 15 psf

Floor Tributary Width FTW = 5 ft 0 ft

Wall Load WALL = 0 plf

BEAM LOADING

Beam Total Live Load: wL = 200 plf

Beam Total Dead Load: wD = 155 plf

Beam Self Weight: BSW = 7 plf

Total Maximum Load: wT = 362 plf

NOTES

Wood Material Properties

Label	Type	Database	Species	Grade	Cm	Emod	Nu	Therm (Δ)	Dens(kN/m ³)
1	DF	Solid Sawn	Visually Gr.	Douglas Fir-Larch	No.1	1	3	3	0.35
2	SP	Solid Sawn	Visually Gr.	Southern Pine	No.1	1	3	3	0.35
3	SP	Solid Sawn	Visually Gr.	Hem-Fir	No.1	1	3	3	0.35
4	HFE	Solid Sawn	Visually Gr.	Spruce-Pine-fir	No.1	1	3	3	0.35
5	24F-1.8E DF B	Glulam	NDS Table, 24F-1.8E DF BAL	na	na	1	3	3	0.35
6	24F-1.8E DF U	Glulam	NDS Table, 24F-1.8E DF UNB.	na	na	1	3	3	0.35
7	24F-1.8E SP B	Glulam	NDS Table, 24F-1.8E SP BAL	na	na	1	3	3	0.35
8	24F-1.8E SP U	Glulam	NDS Table, 24F-1.8E SP UNB.	na	na	1	3	3	0.35
9	24F-V4	Glulam	NDS Table, 24F-V4 DF/DF	na	na	1	3	3	0.35
10	glulam	Glulam	NDS Table, 24F-V4 DF/DF	na	na	1	3	3	0.35

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Ivy [in4]	Izz [in4]	J [in4]
1	WOOD1A	2X6	Beam	None	DF	Typical	8.25	1,547	207.967	5,125
2	6X10	6X10	Beam	Rectangular	DF	Typical	52.25	131,714	392,964	336,429
3	6X8	6X8	Beam	Rectangular	DF	Typical	41.25	103,984	193,359	228,406
4	6X12	6X12	Beam	Rectangular	DF	Typical	63.25	159,433	697,068	446,446
5	6X6	6X6	Beam	Rectangular	DF	Typical	30.25	76,255	176,255	128,871

Joint Coordinates and Temperatures

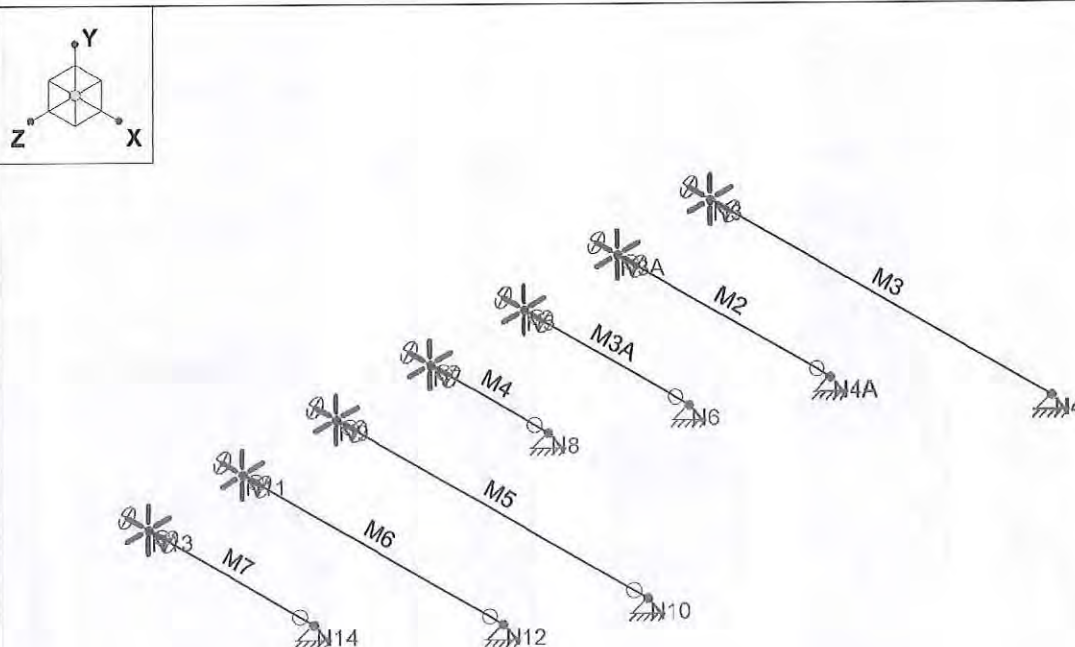
Label	X 間	Y 間	Z 間	Temp. If	Detach From Diagram
1	0	0	0	0	
2	N4	7.2	0	0	
3	N3A	0	0	0	
4	N4A	4.5	2	0	
5	N5	0	4	0	
6	N6	3.5	4	0	
7	N7	0	6	0	
8	N8	2.5	6	0	
9	N9	0	8	0	
10	N10	6.58	8	0	
11	N11	0	10	0	
12	N12	5.5	10	0	
13	N13	0	0	0	
14	N14	3.5	12	0	

Joint Boundary Conditions

	Joint Label	X [in]	Y [in]	Z [in]	X Rot.[k/rad]	Y Rot.[k/rad]	Z Rot.[k/rad]
1	N3		Reaction	Reaction			
2	N4		Reaction	Reaction	Fixed		
3	N3A		Reaction	Reaction			
4	N4A		Reaction	Reaction	Fixed		
5	N5		Reaction	Reaction			
6	N6		Reaction	Reaction	Fixed		
7	N7		Reaction	Reaction			
8	N8		Reaction	Reaction	Fixed		
9	N9		Reaction	Reaction			
10	N10		Reaction	Reaction	Fixed		
11	N11		Reaction	Reaction			
12	N12		Reaction	Reaction	Fixed		

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Envelope Only Solution

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Exterior header calcs.r3d

Joint Boundary Conditions (Continued)

Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k- μ /rad]	Y Rot [k- μ /rad]	Z Rot [k- μ /rad]
13	Reaction	Reaction	Reaction	Fixed		
14	Reaction	Reaction	Reaction			

Member Primary Data

	Label	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M3	N3	N4		6x11	Beam	Rectangular	DF	Typical
2	M2	N3A	N4A		6x8	Beam	Rectangular	DF	Typical
3	M3A	N5	N6		6x8	Beam	Rectangular	DF	Typical
4	M4	N7	N8		6x6	Beam	Rectangular	DF	Typical
5	M5	N10	N12		6x10	Beam	Rectangular	DF	Typical
6	M6	N11	N12		6x8	Beam	Rectangular	DF	Typical
7	M7	N13	N14		6x8	Beam	Rectangular	DF	Typical

Wood Design Parameters

	Label	Shape	Length[m]	leff[m]	le-band bo.	Kyy	Kzz	CV	Cr	y sway	z sway
1	M1	6x10	7.2		Lbwy						
2	M2	6x8	4.5		Lbwy						
3	M3A	6x8	3.5		Lbwy						
4	M4	6x6	2.5		Lbwy						
5	M5	6x10	6.58		Lbwy						
6	M6	6x8	5.5		Lbwy						
7	M7	6x8	3.5		Lbwy						

Member Point Loads (BLC 1 : D)

	Member Label	Direction	Magnitude[k.k-rt]	Location[rt.%]
1	M3A	Y	-1.46	2.25
2	M5	Y	-1.1	2.67
3	M5	Y	-1.45	3.58

Member Point Loads (BLC 2:L)

	Member Label	Direction	Magnitude k , k[Γ]	Location Γ , %
1	IM5	Y	-1.2	3.58

Member Distributed Loads (BLC 1 : D)

1	Member Label	Direction	Start Magnitude(k/ft)	End Magnitude(k/ft)	Start Location(ft)	End Location(ft)
1	M3	Y	-488	-488	0	0
2	M3	Y	-147	-147	0	0
3	M2	Y	-194	-194	0	0
4	M3A	Y	-612	-612	0	2.25
5	M3A	Y	-19	-19	2.25	0
6	M4	Y	-488	-488	0	0
7	M4	Y	-241	-241	0	0
8	M5	Y	-082	-082	0	0
9	M5	Y	-209	-209	0	2.67
10	M5	Y	-638	-638	3.58	0
11	M6	Y	-367	-367	0	0
12	M7	Y	-595	-595	0	0

Member Distributed Loads (BLC 2 : L)

Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,...	Start Location[ft,...	End Location[ft,...]
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Member Distributed Loads (BLC 2:L) (Continued)

	Member Label	Direction	Start Magnitude [m/f...]	End Magnitude [k/f...]	Start Location [ft. %]	End Location [ft. %]
1	M3	Y	-407	-407	0	0
2	M2	Y	-407	-407	0	0
3	M5	Y	-113	-113	0	0

Member Distributed Loads (BLC 4 : Wz)

	Member Label	Direction	Start Magnitude (ft.)	End Magnitude (ft.)	Start Location (ft.)	End Location (ft.)
1	M3	Z	.131	.131	0	0
2	M2	Z	.093	.093	0	0
3	M3A	Z	.074	.074	0	0
4	M4	Z	.141	.141	0	0
5	M5	Z	.081	.081	0	0
6	M6	Z	.082	.082	0	0
7	M7	Z	.082	.082	0	0

Load Combination Design

[illegible]

Envelope Joint Reactions

	Joint	X [k]		Y [k]		Z [k]		LC		MX [k-H]		MY [k-H]		MZ [k-H]		LC	
		max	min	max	min	max	min	max	min	max	min	max	min	max	min		
1	N3	0	1	3.751	2	0	7	-788	1	NC	NC	0	1	0	1		
2		0	1	0	7	-788	1	0	1	NC	NC	0	1	0	1		
3	N4	max	0	3.751	2	0	1	0	1	0	1	0	1	0	1		
4		min	0	1	7	-788	1	0	1	0	1	0	1	0	1		
5	N3A	max	0	1.352	2	0	1	1.352	2	1	NC	NC	0	1	0	1	
6		min	0	1	7	-349	7	-349	7	1	NC	NC	0	1	0	1	
7	N4A	max	0	1.352	2	0	1	1.352	2	0	1	0	1	0	1	1	
8		min	0	1	7	-349	7	-349	7	0	1	0	1	0	1	1	
9	N5	max	0	1.498	1	0	1	1.498	1	1	NC	NC	0	1	0	1	
10		min	0	1	7	-216	7	-216	7	1	NC	NC	0	1	0	1	
11	N6	max	0	1.576	1	0	1	1.576	1	0	1	0	1	0	1	1	
12		min	0	1	7	-216	7	-216	7	0	1	0	1	0	1	1	
13	N7	max	0	1	.911	1	0	1	1	1	NC	NC	0	1	0	1	
14		min	0	1	7	-294	7	-294	7	1	NC	NC	0	1	0	1	
15	N8	max	0	1	.911	1	0	1	1	0	1	0	1	0	1	1	
16		min	0	1	7	-294	7	-294	7	0	1	0	1	0	1	1	
17	N9	max	0	1	3.385	2	0	1	3.385	2	1	NC	NC	0	1	0	1
18		min	0	1	0	7	-445	7	-445	7	1	NC	NC	0	1	0	1
19	N10	max	0	1	4.121	2	0	1	4.121	2	0	1	0	1	0	1	1
20		min	0	1	0	7	-445	7	-445	7	0	1	0	1	0	1	1
21	N11	max	0	1	1.009	1	0	1	1.009	1	1	NC	NC	0	1	0	1
22		min	0	1	7	-377	7	-377	7	1	NC	NC	0	1	0	1	1
23	N12	max	0	1	1.009	1	0	1	1.009	1	0	1	0	1	0	1	1
24		min	0	1	7	-377	7	-377	7	0	1	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

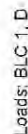
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Envelope Joint Displacements

Joint	max	min	max	min	X [in]	LC	Y [in]	LC	Z [in]	LC X Rotat...	LC Y Rotat...	LC Z Rotat...
1												
N3	max	min	max	min	0	1	1	0	7	7	0	7
2					0	1	0	2	2	0	2	0
N4	max	min	max	min	0	1	0	7	7	0	7	0
3												
N4	max	min	max	min	0	1	0	2	0	1	0	7
4												
N3A	max	min	max	min	0	1	0	7	0	7	0	1
5					0	1	0	7	0	1	0	1
6					0	1	0	2	0	1	0	1
7					0	1	0	7	0	7	0	1
N4A	max	min	max	min	0	1	0	2	0	1	0	1
8					0	1	0	7	0	7	0	1
N5	max	min	max	min	0	1	0	7	0	1	0	7
9					0	1	0	1	0	7	0	1
10					0	1	0	7	0	7	0	1
N6	max	min	max	min	0	1	0	7	0	1	0	1
11					0	1	0	1	0	1	0	1
12					0	1	0	7	0	7	0	1
13					0	1	0	1	0	1	0	1
N7	max	min	max	min	0	1	0	7	0	1	0	1
14					0	1	0	1	0	1	0	1
N8	max	min	max	min	0	1	0	7	0	7	0	1
15					0	1	0	1	0	1	0	1
16					0	1	0	7	0	7	0	1
N9	max	min	max	min	0	1	0	2	0	1	0	1
17					0	1	0	7	0	7	0	1
18					0	1	0	7	0	7	0	1
N10	max	min	max	min	0	1	0	2	0	1	0	1
19					0	1	0	7	0	7	0	1
20					0	1	0	2	0	1	0	1
N11	max	min	max	min	0	1	0	7	0	7	0	1
21					0	1	0	1	0	1	0	1
22					0	1	0	7	0	7	0	1
N12	max	min	max	min	0	1	0	1	0	1	0	1
23					0	1	0	7	0	7	0	1
24					0	1	0	1	0	1	0	1
N13	max	min	max	min	0	1	0	7	0	7	0	1
25					0	1	0	1	0	1	0	1
26					0	1	0	7	0	7	0	1
N14	max	min	max	min	0	1	0	7	0	7	0	1
27					0	1	0	1	0	1	0	1

Envelope Maximum Member Section Forces

Member	Axial (kN)	Local (kN)	LC y	Shear (kN)	LC z	Shear (kN)	LC x	Torque (kN)	Local (kN)	LC y	Local (kN)	LC z	z-z	Wome	Log(L)	Log(L)
1	M3	min	0	1	3.751	0	2	.788	7.2	7	0	0	1	0	0	1
2		min	0	1	-3.751	7.2	2	-788	0	7	0	0	1	-1.418	3.6	7
3	M2	min	0	1	1.352	0	2	349	4.5	7	0	0	1	0	0	1
4		min	0	1	-1.352	4.5	2	-349	0	7	0	0	1	-393	2.25	7
5	M3A	min	0	1	1.498	0	1	216	3.5	7	0	0	1	0	0	1
6		min	0	1	-1.576	3.5	1	-216	0	7	0	0	1	-189	1.75	7
7	M4	min	0	1	1.911	0	1	284	2.5	7	0	0	1	0	0	1
8		min	0	1	-9.11	2.5	1	-284	0	7	0	0	1	-184	1.25	7
9	M5	min	0	1	3.385	0	2	445	6.58	7	0	0	1	0	0	1
10		min	0	1	-4.121	6.58	2	-445	0	7	0	0	1	-732	3.29	7
11	M6	min	0	1	1.009	0	1	377	5.5	7	0	0	1	0	0	1
12		min	0	1	-1.009	5.5	1	-377	0	7	0	0	1	-518	2.75	7
13	M7	min	0	1	1.041	0	1	24	3.5	7	0	0	1	0	0	1
14		min	0	1	-1.041	3.5	1	-24	0	7	0	0	1	-21	1.75	7



Feb 6, 2019 at 12:00 PM

Header 1.13d

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Wood Section Sets

Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Ivy [in4]	Izz [in4]	J [in4]
1	WOOD 1A	Beam	None	DF	Typical	8.25	1.547	20.797	5.125
2	6x10	Beam	Rectangular	DF	Typical	52.25	131.714	392.964	338.49
3	6x8	Beam	Rectangular	DF	Typical	41.25	103.984	193.989	228.406
4	6x12	Beam	Rectangular	DF	Typical	63.25	159.443	697.068	448.466
5	6x6	Beam	Rectangular	DF	Typical	30.25	70.958	126.871	128.871
6	6x12S9FS	Beam	24F-V4	24F-V4	Typical	46.125	100.956	311.344	260.278

Joint Coordinates and Temperatures

Label	X [m]	Y [m]	Z [m]	Temp [F]	Detach From Diap...
1	0	0	0	0	
N3	0	0	0	0	
N4	3.5	0	0	0	

Joint Boundary Conditions

Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-kt/rad]	Y Rot [k-kt/rad]	Z Rot [k-kt/rad]
1	Reaction	Reaction	Reaction	Fixed		
2	N3	Reaction	Reaction			

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M/3	N3	N4			GLB Header	Beam	Rosboro X-Be...	24F-1/4	Typical

Wood Design Parameters

Label	Shape	length[ft]	le2[ft]	le1[ft]	le-bend to...	K _{yw}	K _{zz}	CV	Cr	y sway	z sway
1	M3	3.5			hvw						

Member Point Loads (BLC 1 : D)

	Member Label	Direction	Magnitude[k, k-ft]	Location[ft, %]
1	M3	Y	-2.44	24

Member Point Loads (BLC 2 : L)

	Member Label	Direction	Magnitude(k-f)	Location(ift,%)
1	M3	Y	-3.01	24

	Member Label	Direction	Start Magnitude(kN)	End Magnitude(kN)	Start Location(ft.)	End Location(ft.)
1	M3	Y	-577	-577	0	2.4
2	M3	Y	-19	-19	2.4	0

Member Label	Direction	Start magitude [NUT, ...]	End magitude [NUT, ...]	Start longitude [NUT, ...]	End longitude [NUT, ...]
1	M3	Y	-577	0	2.4
2	M3	Y	-19	2.4	0

Member Distributed Loads (BLC 4 : Wz)					
	Member Label	Direction	Start Magnitude/(ft.)	End Magnitude/(ft.)	End Location(ft. %)
1	M3	Z		.074	0

1	Member Label	Direction	Start Magnitude [k/fh....]	End Magnitude [k/fh....]	Start Location [ft. %]	End Location [ft. %]
	M3	Z		.074	0	0

Lead Combination Design								
		Description	ASIF	CD	Service	Hot Rol.	Cold Form..	
	1	D			Yes	Yes	Yes	Wood
	2	D+L			Yes	Yes	Yes	Concrete
	3	D+LR		1.25	Yes	Yes	Yes	Masonry
	4	D+0.75L+0.7... D+0.6W			Yes	Yes	Yes	Aluminum
	5	D+0.75L+0.7... D+0.6W		1.6	Yes	Yes	Yes	Stainless
	6	L		1.6	Yes	Yes	Yes	Connection
	7	W		1	Yes	Yes	Yes	Yes
	8	LR		1.6	Yes	Yes	Yes	Yes
	9	DL		1	Yes	Yes	Yes	Yes
	10	LL		1.6	Yes	Yes	Yes	Yes

[illegible]

Envelope Joint Reactions														
	Joint	X [k]		Y [k]		Z [k]		MX [k-ft]		MY [k-ft]		MZ [k-ft]		LC
		max	min	max	min	max	min	max	min	max	min	max	min	
1	N3	0	1	2,656	2	0	1		NC	NC	0	1	0	1
2		0	1	0	7	-216	7	NC	NC	0	1	0	1	1
3	N4	max	min	4,388	2	0	1	0	1	0	1	0	1	1
4		0	1	0	7	-216	7	0	1	0	1	0	1	1
5	Totals:	max	min	7,044	2	0	1							
6		0	1	0	7	-433	7							

1	2	3	4	Totals:	Joint	X (r)	LC	Y (r)	LC	Z (r)	LC		MC (r)		LC		MZ (r)		LC
											max	min	max	min	max	min	max	min	
1					N3	0	1	2,656	2	0		NC	0	1	0	1			
2						0	1	0	7	-216	7	NC	0	1	0	1			
3					N4	0	1	4,388	2	0		0	1	0	1	0	1		
4						0	1	0	7	-216	7	0	1	0	1	0	1		
5					Totals:	max	0	1	7,044	2	0								
6						min	0	1	0	7	-433	7							

Envelope Joint Displacements										
	Joint	X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotat...LC	Y Rotat...LC	Z Rotat...LC
1	N3	max	0	1	0	7	0	1	0	7
2		min	0	1	0	2	0	1	-1.568e-04	7 -1.026e-03
3	N4	max	0	1	0	7	0	1	1.568e-04	7 1.259e-03
4		min	0	1	0	2	0	1	0	7

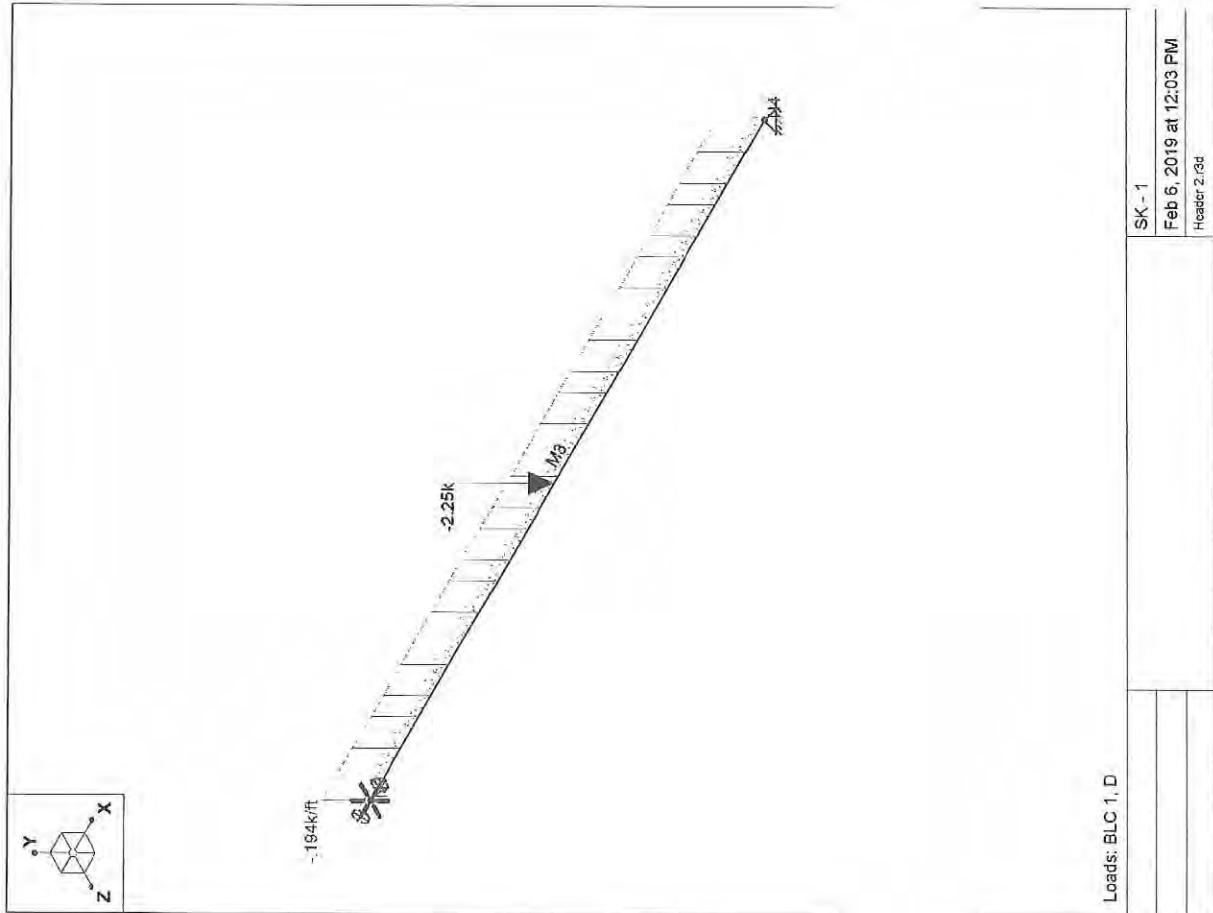
	Joint	X [in]	LC	Y [in]	C	Z [in]	LC X Rotati...	LC Y Rotati...	LC Z Rotati...
1									
1	N3	max	0	1	0	7	0	1	0
2									
2		min	0	1	0	2	0	1	-1.566e-...
3	N4	max	0	1	0	7	0	1	1.269e-03
4									
4		min	0	1	0	2	0	1	0

Envelope Maximum Member Section Forces											
Member	Axial(k)	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC9	LC10
1	M3	0	0	1	2.656	0	2	-216	3.5	7	0
2	M3	0	0	1	-44	388	3.5	2	-216	0	7

Member	Axial[k]	Loc1[mm]	LC y	Shear	Loc1[mm]	LC z	Shear	Loc1[mm]	LC Torque	Loc1[mm]	LC yy	Moment	Loc1[mm]	LC zz	Moment	Loc1[mm]
1	m...	0	0	1	2,656	0	2	-216	3.5	7	0	0	1	0	1	0
M3	mir	0	1	-4,368	3.5	2	-216	0	7	0	1	-189	1.75	7	-4,686	2,406
2		0	0	1	2,656	0	2	-216	3.5	7	0	0	1	0	1	0

	Member	Shape	Type	Log(M)	LC	Shear	Log(M)Dir	LC	Fc [ksi]	Fv [ksi]	Fb ¹ L _v	Fb ² L _v	R _B	CL	CP	E _{eqn}	
1	M3	5.125X	C39	2.406	2	5.38	3.5	V	2	1.62	1	2.396	1.595	285	3.794	998	3.9-3

	Member	Shape	Code	Loc(fit)	LC	Shear	Loc(fit)	Dir	LC	F _r [ksi]	F _t [ksi]	Fb1 _r [ksi]	Fb2 _r [ksi]	F _y [ksi]	CP	Eqn	
1	M3	5.125X	339	2.406	2	538	3.5	V	2	1.62	1.1	2.396	1.595	265	3.794	998	3.9-3



Wood Material Properties

Label	Type	Database	Species	Grade	Cm	Emod	Nu	Therm (Δ)	Dens (kg/m^3)
1	Solid Sawm	Visually Gr...	Douglas Fir-Larch	No.1		1	3	3	0.35
2	SP	Solid Sawm	Visually Gr...	Southern Pine	No.1	1	3	3	0.35
3	SP	Solid Sawm	Visually Gr...	Hem-Fir	No.1	1	3	3	0.35
4	HFF	Solid Sawm	Visually Gr...	Spruce-Pine-fir	No.1	1	3	3	0.35
5	24F-1.8E DFB	Glulam	NDS Table, 24F-1.8E DF BAL	na		1	3	3	0.35
6	24F-1.8E DF U	Glulam	NDS Table, 24F-1.8E DF UBL	na		1	3	3	0.35
7	24F-1.8E SP U	Glulam	NDS Table, 24F-1.8E SP BAL	na		1	3	3	0.35
8	24F-1.8E SP U	Glulam	NDS Table, 24F-1.8E SP UNL	na		1	3	3	0.35
9	24F-V4	Glulam	NDS Table, 24F-V4 D/FDF	na		1	3	3	0.35
10	glulam	Glulam	NDS Table, 24F-V4 D/FDF	na		1	3	3	0.35

Wood Section Sets

Label	Shape	Type	Design List	Material	Design Rules	A [In2]	Ivy [In4]	Izz [In4]	J [In4]
1	WOOD 1A	Beam	None	DF	Typical	8.25	1.547	5.125	
2	6X10	Beam	Rectangular	DF	Typical	52.25	131.714	392.964	336.49
3	6X8	Beam	Rectangular	DF	Typical	41.25	103.984	328.406	
4	6X12	Beam	Rectangular	DF	Typical	63.25	159.443	697.068	446.446
5	6X6	Beam	Rectangular	DF	Typical	36.25	76.255	128.871	
6	GLB Header	Beam	Rosboro X-Beam	24F-V4	Typical	46.125	100.956	311.344	260.278

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap. _{ss}
1	N3	0	0	0	0	
2	N4	7.5	0	0	0	

Joint Boundary Conditions

Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	Reaction	Reaction	Reaction	Fixed		
2	Reaction	Reaction	Reaction			

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M3	N3	N4			GLB Header	Beam	Rosboro X-Be, 24F-V4		Design Rules Tlrcal

Wood Design Parameters

	Label	Shape	Length[ft]	le2[ft]	le1[ft]	le-band bo...	Kyw	Kzz	CV	Cr	y sway	z sway
1	M3	GLB Header	7.5			lbw						

Member Point Loads (BLC 1 : D)

	Member Label	Direction	Magnitude[k, k-ft]	Location[m, %]
1	M3	Y	-2.25	3.5

Member Point Loads (BLC 2 : L)

	Member Label	Direction	Magnitude(k.k.ft)	Location(ft.%)
1	M3	Y	-3.01	3.5

Wood Material Properties

Label	Type	Database	Species	Grade	Cm	Emod	Nu	Therm (°C)	Dens(kg/m ³)
1	DF	Solid Sawn	Visually Gr.	No.1	1	3	3	035	
2	SP	Solid Sawn	Visually Gr.	No.1	1	3	3	035	
3	SP	Solid Sawn	Visually Gr.	No.1	1	3	3	035	
4	HF	Solid Sawn	Visually Gr.	No.1	1	3	3	035	
5	24F-1.8E DF B.	Glulam	NDS Table, 24F-1.8E DF BAL	na	1	3	3	035	
6	24F-1.8E DF U.	Glulam	NDS Table, 24F-1.8E DF UNB.	na	1	3	3	035	
7	24F-1.8E SP B.	Glulam	NDS Table, 24F-1.8E SP BAL	na	1	3	3	035	
8	24F-1.8E SP U.	Glulam	NDS Table, 24F-1.8E SP UNB.	na	1	3	3	035	
9	24F-V4	Glulam	NDS Table, 24F-V4 DF/DF	na	1	3	3	035	
10	glulam	Glulam	NDS Table, 24F-V4 DF/DF	na	1	3	3	035	

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Ivy [in4]	Izz [in4]	J [in4]
1	WOOD1A	2x6	Beam	None	DF	Typical	8.25	1,547	20,797	5,125
2	6x10	6x10	Beam	Rectangular	DF	Typical	52.25	131,714	392,964	336,49
3	6x8	6x8	Beam	Rectangular	DF	Typical	41.25	103,984	319,359	228,406
4	6x12	6x12	Beam	Rectangular	DF	Typical	63.25	159,443	697,068	446,446
5	6x6	6x6	Beam	Rectangular	DF	Typical	30.25	76,255	176,255	128,871
6	GLB Header	5.125x9FS	Beam	Roshoro X-Beam	24F-V4	Typical	46.125	100,958	311,344	280,228

Joint Coordinates and Temperatures

Label	X [m]	Y [m]	Z [m]	Temp [F]	Detach From Diap...
1		0	0	0	
N3		0	0	0	
2		3.2	0	0	
N4		3.2	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	N3	Reaction	Reaction	Reaction	Fixed		
2	N4	Reaction	Reaction	Reaction			

Member Primary Data

member 1 - primary data										
	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M3	N3	N4			6x8	Resm	Rectangular	DF	Typical

Wood Design Parameters

	Label	Shape	Length(ft)	le2(ft)	le1(ft)	le-bend to...	Kyy	Kzz	CV	Cr	y sway	z sway
1	M3	6x8	3.2			hw						

Member Point Loads (BLC 1 : D)

1	Member Label	Direction	Magnitude [k.k-ft]	Location [ft.]
1	M3	Y	-63	33

Member Point Loads (BLC 2: L)

Member Label	Direction	Magnitude (k.ft)	Location (ft.)
M3	Y	-85	33

Member Distributed Loads (BLC 1 : D)

Member Label	Direction	Start Magnitude[kft]	End Magnitude[kft]	Start Location[ft.%]	End Location[ft.%]
M3	Y	-058	-058	0	0

Member Distributed Loads (BLC2.1)

	Member Label	Direction	Start Magnitude[kN/m]	End Magnitude[kN/m]	Start Location[m]	End Location[m]
1	M3	Y	-08	-08	0	0

Basic Load Cases

	BL.C Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Pont	Distributed Area (Me... Surface...
1	D	DL					1	
2	L	LL				LL		
3	LR	RLL					1	
4	Wz	WLZ						

Load Combination Design

[illegible]

Envelope Joint Reactions

Joint	X [K]	Y [K]	Z [K]	LC	MX [K-ft]	MY [K-ft]	MZ [K-ft]	LC	MX [K-ft]	MY [K-ft]	MZ [K-ft]
1	max	1	1,548	2	0	1	0	1	0	0	1
2	min	0	1	0	7	0	1	0	1	0	1
3	max	0	1	0	2	0	1	0	1	0	1
4	min	0	1	0	7	0	1	0	1	0	1
5	max	0	1	0	1,922	2	0	1	0	1	0
6	min	0	1	0	7	0	1	0	1	0	1
Totals:	min	0	1	0	7	0	1	0	1	0	1

Envelope Joint Displacements

Joint	X [in]	LC	Y [in]	LC	Z [in]	LC X Rotati...	LC Y Rotati...	LC Z Rotatio...	LC
1	max	0	1	0	7	0	1	0	7
N3									
2	min	0	1	0	2	0	1	0	2
3	max	0	1	0	2	0	1	0	2
N4									
4	min	0	1	0	2	0	1	0	2
5	max	0	1	0	2	0	1	0	2

Envelope Maximum Member Section Forces

Member	Axial/LC	LC v Shear	LC z Shear	LC Torque	LC y-y Mome	LC z-z Mome	LC/LC
1	m...	1.548	0	0	0	0	1
2	M3	0	0	0	0	0	0
	m/r	0	1	-373	3.2	0	1
							-50F
							5
							2

Feb 6, 2019
12:09 PM
Checked By: [redacted]

Envelope Wood Code Checks

Member	Shape	Shape Code	LC	Shear	Logit(Dir	LC	F _c [ksi]	F _t [ksi]	Fb1 [ksi]	Fv2 [ksi]	F _v [ksi]	CP	CL	RB	E _{gn}			
1	M3	6X8	.098	.5	2	.331	0	y	2	.978	.825	1.199	1.2	.17	3.086	.999	.978	3.9-3

Feb 6, 2019
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Wood Material Properties

Label	Type	Databases	Species	Grade	Cn	Emod	Nu	Therm (°C)	Density (kg/m ³)
1	DF	Solid Sawn Visually Gr.	Douglas Fir-Larch	No.1		1	3	035	
2	SP	Solid Sawn Visually Gr.	Southern Pine	No.1		1	3	035	
3	HF	Solid Sawn Visually Gr.	Hem-Fir	No.1		1	3	035	
4	SPF	Solid Sawn Visually Gr.	Spruce-Pine-Fir	No.1		1	3	035	
5	24F-1.8E DF B...	Glulam	NDS Table, 24F-1.8E DF BAL	na		1	3	035	
6	24F-1.8E DF U...	Glulam	NDS Table, 24F-1.8E DF UNB...	na		1	3	035	
7	24F-1.8E SP B...	Glulam	NDS Table, 24F-1.8E SP BAL	na		1	3	035	
8	24F-1.8E SP U...	Glulam	NDS Table, 24F-1.8E SP UNB...	na		1	3	035	
9	24F-V4	Glulam	NDS Table, 24F-V4 DF/DF	na		1	3	035	
10	glulam	Glulam	NDS Table, 24F-V4 DF/DF	na		1	3	035	

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	lv [in4]	lvz [in4]	J [in4]
1	WOOD1A	2x6	Beam	None	DF	Typical	1.347	20.797	5.125
2	6x10	6x10	Beam	Rectangular	DF	Typical	131.714	392.964	336.49
3	6x8	6x8	Beam	Rectangular	DF	Typical	41.25	193.359	228.406
4	6x12	6x12	Beam	Rectangular	DF	Typical	83.25	159.443	697.068
5	6x6	6x6	Beam	Rectangular	DF	Typical	30.25	76.255	126.871
6	GLB Header	5.125x9FS	Beam	Rosboro X-Beam	24F-V4	Typical	46.125	100.951	811.344
								131.344	260.228

Joint Coordinates and Temperatures

	Label	X (ft)	Y (ft)	Z (ft)	Temp (F)	Detach From Diag.
1	N3	0	0	0	0	
2	N4	4.25	0	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	N3	Reaction	Reaction	Reaction	Fixed		
2	N4	Reaction	Reaction	Reaction			

Member Primary Data

[illegible]

Joint Loads and Enforced Displacements

Joint Label	I.D.M	Direction	Magnitude(k.k-ft). (in.rad). (k...
No Data to Print ...			

Member Distributed Loads (BLC 1 : D)

	Member Label	Direction	Start Magnitude(kJ/ft....	End Magnitude(kJ/ft....	Start Location(ft, %)	End Location(ft, %)
1	M3	Y	-123	-123	0	1

Member Distributed Loads (BLC 2 : L)

Member Label	Direction	Start Magnitude [k/f, ...]	End Magnitude [k/f, F _{max}]	Start Location [ft, %]	End Location [ft, %]
1	M3	Y	-41	-41	0

BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area (M ²)	Surface
1	D					1		
2	L						1	
3	LR							
4	WLZ							

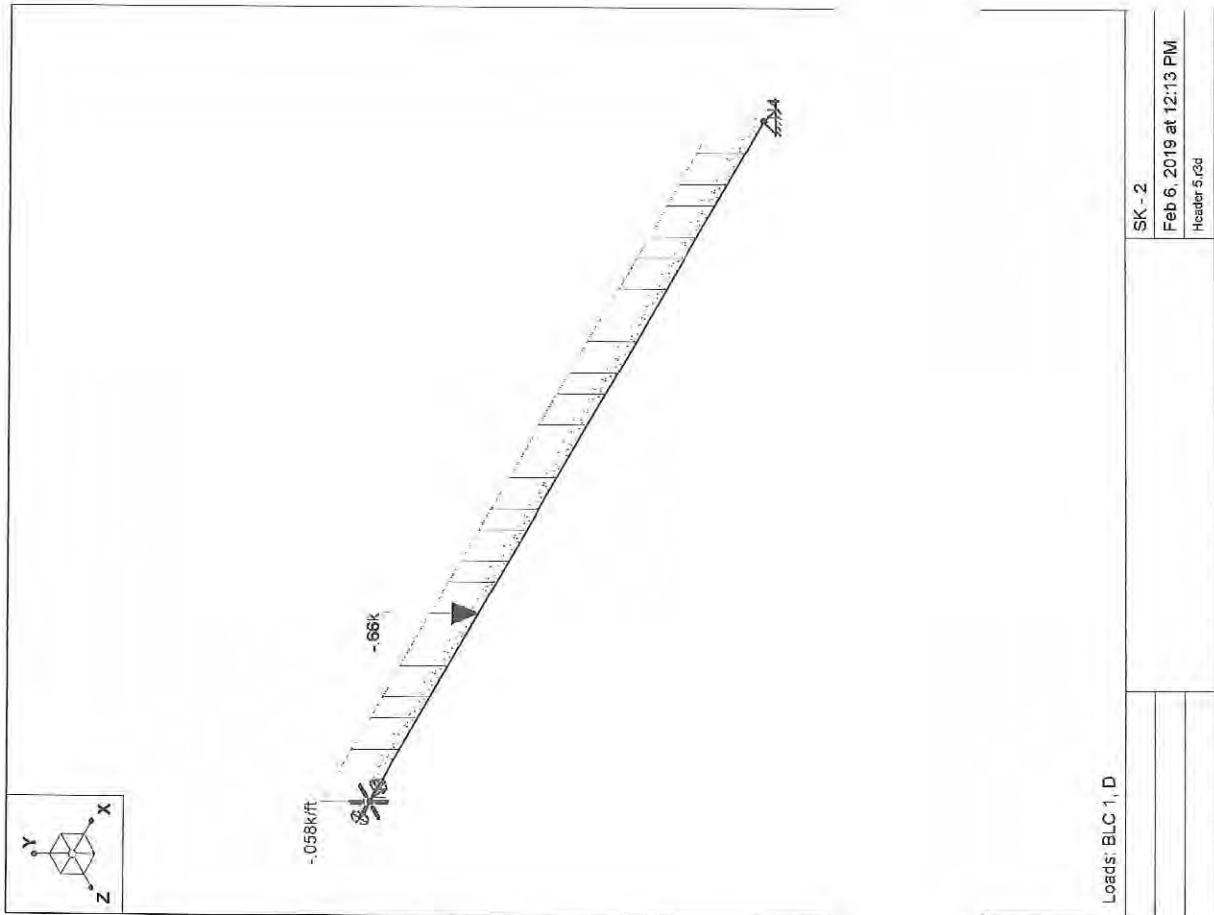
		Description	ASIF	CD	Service	Hot Rel.	Cold Form.	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1		D					Yes	Yes	Yes	Yes	Yes	Yes	Yes
2		D+L					Yes	Yes	Yes	Yes	Yes	Yes	Yes
3		D+Lr		1, 25			Yes	Yes	Yes	Yes	Yes	Yes	Yes
4		D+0.75L+0.7...					Yes	Yes	Yes	Yes	Yes	Yes	Yes
5		D+0.6W		1, 6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
6		D+0.75L+0.7...					Yes	Yes	Yes	Yes	Yes	Yes	Yes
7		W		1, 6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
8		L		1, 6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
9		DL		1, 6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
10		LL		1, 6			Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Joint	X[k]	LC	Y[k]	LC	Z[k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N3	max	0	1	1,755	2	0	1	NC	NC	0	1	0
2		min	0	1	0	7	0	1	NC	0	1	0	1
3	N4	max	0	1	458	2	0	1	0	1	0	1	0
4		min	0	1	0	7	0	1	0	1	0	1	0
Totals:		max	0	1	2,213	2	0	1					
5		min	0	1	0	7	0	1					
6		max	0	1	0	7	0	1					

Joint	X [in]	LC	Y [in]	LC	Z [in]	LC X Rotati...	LC Y Rotati...	LC Z Rotatio...
1	max	0	1	0	7	0	1	0
N3								
2	min	0	1	0	7	0	1	0
3	max	0	1	0	7	0	1	0
N4								
4	min	0	1	0	7	0	1	0
5	max	0	1	0	7	0	1	0
6	min	0	1	0	7	0	1	0
7	max	0	1	0	7	0	1	0
8	min	0	1	0	7	0	1	0
9	max	0	1	0	7	0	1	0
10	min	0	1	0	7	0	1	0
11	max	0	1	0	7	0	1	0
12	min	0	1	0	7	0	1	0
13	max	0	1	0	7	0	1	0
14	min	0	1	0	7	0	1	0
15	max	0	1	0	7	0	1	0
16	min	0	1	0	7	0	1	0
17	max	0	1	0	7	0	1	0
18	min	0	1	0	7	0	1	0
19	max	0	1	0	7	0	1	0
20	min	0	1	0	7	0	1	0
21	max	0	1	0	7	0	1	0
22	min	0	1	0	7	0	1	0
23	max	0	1	0	7	0	1	0
24	min	0	1	0	7	0	1	0
25	max	0	1	0	7	0	1	0
26	min	0	1	0	7	0	1	0
27	max	0	1	0	7	0	1	0
28	min	0	1	0	7	0	1	0
29	max	0	1	0	7	0	1	0
30	min	0	1	0	7	0	1	0
31	max	0	1	0	7	0	1	0
32	min	0	1	0	7	0	1	0
33	max	0	1	0	7	0	1	0
34	min	0	1	0	7	0	1	0
35	max	0	1	0	7	0	1	0
36	min	0	1	0	7	0	1	0
37	max	0	1	0	7	0	1	0
38	min	0	1	0	7	0	1	0
39	max	0	1	0	7	0	1	0
40	min	0	1	0	7	0	1	0
41	max	0	1	0	7	0	1	0
42	min	0	1	0	7	0	1	0
43	max	0	1	0	7	0	1	0
44	min	0	1	0	7	0	1	0
45	max	0	1	0	7	0	1	0
46	min	0	1	0	7	0	1	0
47	max	0	1	0	7	0	1	0
48	min	0	1	0	7	0	1	0
49	max	0	1	0	7	0	1	0
50	min	0	1	0	7	0	1	0
51	max	0	1	0	7	0	1	0
52	min	0	1	0	7	0	1	0
53	max	0	1	0	7	0	1	0
54	min	0	1	0	7	0	1	0
55	max	0	1	0	7	0	1	0
56	min	0	1	0	7	0	1	0
57	max	0	1	0	7	0	1	0
58	min	0	1	0	7	0	1	0
59	max	0	1	0	7	0	1	0
60	min	0	1	0	7	0	1	0
61	max	0	1	0	7	0	1	0
62	min	0	1	0	7	0	1	0
63	max	0	1	0	7	0	1	0
64	min	0	1	0	7	0	1	0
65	max	0						

Member	Max	Min	LC y Shear	LC z Shear	LC Torque	LC y-y Moment	LC z-z Moment	LC Lateral
M3	0	0	1.755	0	0	0	0	0
2	0	0	1.018	2	0	0	0	0
1	0	0	-458	0	0	0	0	0

Member	Shape	Code	Locfil	LC	Shear	Locfil	Dir	LC	F _c [ksi]	Dir	LC	F _c [ksi]	Fb1 ¹ [ksi]	Fb2 ¹ [ksi]	Fv [ksi]	RB	CL	CP	Eqn
1	M3	6X8	287	1,018	2	375	0	V	2	96	825	1,199	1.2	.17	3,556	.999	.96	3.9-3	



Wood Material Properties

Label	Type	Database	Species	Grade	Om	Emod	Nu	Therm (Δ)	Dens (ρ) [3]
1	DF	Solid Sawn	Visually Gr...	Douglas Fir-Larch	No.1	1	3	3	0.35
2	SP	Solid Sawn	Visually Gr...	Southern Pine	No.1	1	3	3	0.35
3	DF	Solid Sawn	Visually Gr...	Hem-Fir	No.1	1	3	3	0.35
4	SP	Solid Sawn	Visually Gr...	Hem-Fir	No.1	1	3	3	0.35
5	24F-1.8E	DFB	Glulam	NDS Table, 24F-1.8E	DF BAL	na	1	3	0.35
6	24F-1.8E	DF U	Glulam	NDS Table, 24F-1.8E	DF UNB	na	1	3	0.35
7	24F-1.8E	SP B	Glulam	NDS Table, 24F-1.8E	SP BAL	na	1	3	0.35
8	24F-1.8E	SP U	Glulam	NDS Table, 24F-1.8E	SP UNB	na	1	3	0.35
9	24F-V4	Glulam	NDS Table, 24F-V4	DF/DF	na	1	3	3	0.35
10	glulam	Glulam	NDS Table, 24F-V4	DF/DF	na	1	3	3	0.35

Wood Section Sets

	Label	Shapes	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	WOCOD1A	2x6	Beam	None	DF	Typical	8.25	1,547	20,797	3,125
2		6x10	Beam	Rectangular	DF	Typical	52.25	131,714	392,964	636,49
3		6x8	Beam	Rectangular	DF	Typical	41.25	103,984	193,359	228,406
4		6x12	Beam	Rectangular	DF	Typical	63.25	159,443	697,068	446,446
5		6x6	Beam	Rectangular	DF	Typical	30.25	76,255	126,871	182,871
6	GLB Header	5.125x9FS	Beam	Rosborg X-Beam	24F-V4	Typical	46.125	100,958	111,344	280,228

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Disp...
1	N3	0	0	0	0	
2	N4	3	0	0	0	

Joint Boundary Conditions

Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	N3	Reaction	Reaction	Fixed		
2	N4	Reaction	Reaction	Reaction		

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M3	N3	N4			6x6	Beam	Rectangular	DF	Typical

Wood Design Parameters

	Label	Shape	Length(f)	le2(f)	le1(f)	le-bend to...	le-bend bo...	Klv	Kzz	Qv	Cr	y sway	z sway
1	M3	6x6	3				Lhw						

Member Point Loads (BLC 1 : D)

	Member Label	Direction	Magnitude(k,k-ft)	Location(ft.%)
1	M3	Y	-66	833

Member Point Loads (BLC 2 : L)

	Member Label	Direction	Magnitude(k, k-R)	Location(fr, %)
1	M3	Y	-89	833

Member Label	Direction	Start Magnitude[kN]	End Magnitude[kN]	Start Location[ft.]	End Location[ft.]
M3	Y	-0.58	-0.58	0	0

Member Label	Drection	Start Magnitude[k/ft....	End Magnitude[k/ft....	Start Location[ft.%]	End Location[ft.%]
1	M3	Y	-058	0	0

Member Label	Direction	Start Magnitude[kN...	End Magnitude[kN...	Start Location(ft. %)	End Location(ft. %)
1	Y	-08	-08	0	0

	Member Label	Direction	Start Magnitude[k/f,...]	End Magnitude[k/f,...]	Start Location[ft. %]	End Location[ft. %]
1	M3	Y	-08	-08	0	0

Basic Load Cases						
	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Point Distributed Area (W _e , Surface, L _u)
1	D	DL				1
2	L	LL				1
3	LR	RL				
4	WL	WL				

	BLD Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area (M ² /Surface)
1	D	DL					1	1
2	L	LL					1	1
3	LR	RL						
4	WL	WL						

[illegible]

	Description	ASIF	CD	Service	Hot Rod.	Cold Form.	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1	D						Yes	Yes	Yes	Yes	Yes	Yes
2	D+L					Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	D+Lr		1.25			Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	D+0.75L+0.7...					Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	D+0.6W		1.6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	D+0.75L+0.7...		1.6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	W		1.6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Lr		1.6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	L		1.6			Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	LL		1.6			Yes	Yes	Yes	Yes	Yes	Yes	Yes

Envelope Joint Reactions													
	Joint	X[k]	LC	Y[k]	LC	Z[k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N3	max	0	1,327	2	0	1	NC	NC	0	1	0	1
2		min	0	0	7	0	1	NC	NC	0	1	0	1
3	N4	max	0	637	2	0	1	0	1	0	1	0	1
4		min	0	1	7	0	1	0	1	0	1	0	1
5	Totals:	max	0	1,964	2	0	1	1	1				
6		min	0	1	7	0	1	1	1				

	Joint	X [r]	LC	Y [r]	LC	Z [r]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N3	max	0	1	1,327	2	0	1	NC	0	1	0	1
2		min	0	1	0	7	0	1	NC	0	1	0	1
3		max	0	1	637	2	0	1	0	1	0	1	0
4	N4	min	0	1	0	7	0	1	0	1	0	1	0
5		max	0	1	1,964	2	0	1	0	1	0	1	0
6	Totals:	min	0	1	0	7	0	1	1	0	1	0	1
7		max	0	1	0	7	0	1	1	0	1	0	1

[illegible]

Member	Axial	LC	LC y	Shear	LC	LC z	Shear	LC	LC y	Mome	LC	LC z	Mome	LC	LC z	Mome	LC	LC z	Mome
1	M3	0	0	1	1.327	0	2	0	1	0	1	0	1	0	1	0	1	0	1
2		0	0	1	-637	3	2	0	0	1	0	0	1	0	0	0	0	0	-1.054

	Member	Shape	Cdn	Loc[ft]	LC Shear	Loc[ft] Dir	LC Fc [ksi]	Fc [ksi]	Fb ¹ [ksi]	Fb ² [ksi]	Fv [ksi]	Rb	CL	CP	Eqn		
1	M3	6X6	380	84.4	2	387	v	2	981	825	1.2	1.2	17	2,558	1	981	3.9-3

Member	Shape	Code	Loc(f)	LC Shear	Loc(f)Dir	LC Fc [ksi]	Fv [ksi]	Fb1' [ksi]	Fb2' [ksi]	RB	CL	CP	Eqn					
1	M3	636	380	844	2	387	0	v	2	981	825	1.2	1.2	17	2,558	1	981	3.9-3

BY JJN DATE 02/06/19
CHKD. BY _____ DATE _____

SHEET NO. _____ OF _____
JOB 18-234

PEOPLES ASSOCIATES
STRUCTURAL ENGINEERS

Legacy at Livermore

Post Design Capacities^{1,2,3,4}

Story Height = 10.25'
Stud Height = 8.89'

Buckling Length coefficient, $K_b = 1.00$
Load Duration Factor, $C_D = 1.00$
Euler buckling coeff for columns, $K_{CE} = 0.82$
 $c = 0.80$

Dress size (in) Wood Grade

Post	Width	Depth	Grade	F_c	$F_c(\text{perp})^4$	E ($\times 10^6$)	$E_{\min}$ ($\times 10^6$)	C_F	L_e/d	F_{CE}	F^*c	C_p	F^*c	P_{buck}^2	C_b	F_c'	P_{bear}	P_{allow}^3
2x4	3.50	1.50	DF#1	1500 psi	625 psi	1.7	0.62	1.15	30.46	549 psi	1725 psi	0.29	507 psi	2661 #	1.00	625	3281 #	2661 #
3x4	3.50	2.50	DF#1	1500 psi	625 psi	1.7	0.62	1.15	30.46	549 psi	1725 psi	0.29	507 psi	4436 #	1.00	625	5469 #	4436 #
4x4	3.50	3.50	DF#1	1500 psi	625 psi	1.7	0.62	1.15	30.46	549 psi	1725 psi	0.29	507 psi	6210 #	1.00	625	7656 #	6210 #
4x6	3.50	5.50	DF#1	1500 psi	625 psi	1.7	0.62	1.10	30.46	549 psi	1650 psi	0.31	505 psi	9715 #	1.00	625	12031 #	9715 #
4x8	3.50	7.25	DF#1	1500 psi	625 psi	1.7	0.62	1.05	30.46	549 psi	1575 psi	0.32	502 psi	12742 #	1.00	625	15859 #	12742 #
4x10	3.50	9.25	DF#1	1500 psi	625 psi	1.7	0.62	1.00	30.46	549 psi	1500 psi	0.33	499 psi	16165 #	1.00	625	20234 #	16165 #
4x12	3.50	11.25	DF#1	1500 psi	625 psi	1.7	0.62	1.00	30.46	549 psi	1500 psi	0.33	499 psi	19660 #	1.00	625	24609 #	19660 #
4x14	3.50	13.25	DF#1	1500 psi	625 psi	1.7	0.62	0.90	30.46	549 psi	1350 psi	0.36	493 psi	22842 #	1.00	625	28984 #	22842 #
4x16	3.50	15.25	DF#1	1500 psi	625 psi	1.7	0.62	0.90	30.46	549 psi	1350 psi	0.36	493 psi	26290 #	1.00	625	33359 #	26290 #
2x6	5.50	1.50	DF#1	1500 psi	625 psi	1.7	0.62	1.10	19.39	1356 psi	1650 psi	0.62	1023 psi	8437 #	1.00	625	5156 #	5156 #
4x6	5.50	3.50	DF#1	1500 psi	625 psi	1.7	0.62	1.10	19.39	1356 psi	1650 psi	0.62	1023 psi	19686 #	1.00	625	12031 #	12031 #
6x6	5.50	5.50	DF#1	1000 psi	625 psi	1.6	0.58	1.00	19.39	1269 psi	1000 psi	0.77	766 psi	23179 #	1.00	625	18906 #	18906 #
6x8	5.50	7.50	DF#1	1000 psi	625 psi	1.6	0.58	1.00	19.39	1269 psi	1000 psi	0.77	766 psi	31607 #	1.00	625	25781 #	25781 #
6x10	5.50	9.50	DF#1	925 psi	625 psi	1.6	0.58	1.00	19.39	1269 psi	925 psi	0.79	728 psi	38063 #	1.00	625	32656 #	32656 #
6x12	5.50	11.50	DF#1	925 psi	625 psi	1.6	0.58	1.00	19.39	1269 psi	925 psi	0.79	728 psi	46076 #	1.00	625	39531 #	39531 #
6x14	5.50	13.50	DF#1	925 psi	625 psi	1.6	0.58	1.00	19.39	1269 psi	925 psi	0.79	728 psi	54089 #	1.00	625	46406 #	46406 #
8x4	7.25	3.50	DF#1	1500 psi	625 psi	1.7	0.62	1.05	14.71	2356 psi	1575 psi	0.81	1275 psi	32343 #	1.00	625	15859 #	15859 #
8x6	7.50	5.50	DF#1	1000 psi	625 psi	1.6	0.58	1.00	14.22	2359 psi	1000 psi	0.89	892 psi	36780 #	1.00	625	25781 #	25781 #
8x8	7.50	7.50	DF#1	1000 psi	625 psi	1.6	0.58	1.00	14.22	2359 psi	1000 psi	0.89	892 psi	50154 #	1.00	625	35156 #	35156 #
10x4	9.25	3.50	DF#1	1500 psi	625 psi	1.7	0.62	1.00	11.53	3836 psi	1500 psi	0.90	1353 psi	43791 #	1.00	625	20234 #	20234 #
10x6	9.50	5.50	DF#1	925 psi	625 psi	1.6	0.58	1.00	11.22	3785 psi	925 psi	0.94	873 psi	45598 #	1.00	625	32656 #	32656 #

Note:

1. All design provisions are based on CBC 2010, and the NDS 2005 edition
2. Holes may not occur within the center 1/3 or 12" of either end of the compression posts.
3. The allowable compression force is governed by the lower of the post buckling capacity or the sill plate bearing capacity.
4. Peoples Associates Standard sill plates for residential structures are Douglas Fir No.2 material u.n.o.

$S_{ps} = 1.01$ $DL+LL$
 $\Omega_0 = 3$ $(1.0+0.14S_{ps})DL+0.7\Omega_0E$
 $\rho = 1$ $(1+0.105S_{ps})D + 0.75LL + 0.75(0.7 \Omega_0E)$
 $DL+Lr$
 $L5=$ $DL+0.75LL+0.75Lr$

Stacked Area Post Calcs

			Post Design Calcs												
		Beam ID	Loading			Load Combinations								Size	D/C
Level			DL (kips)	LL (kips)	LR (kips)	E	L1 (kips)	L2 (kips)	L3(kips)	L4 (kips)	L5 (kips)	Max Combo Case (kips)	Allow (kips)		
4th	B-B4.0.1		1.44	1.93	0.00		3.37	1.64	3.04	1.44	2.89	3.37	12.00	4x6	0.28
3rd			2.88	3.86	0.00		6.74	3.29	6.08	2.88	5.78	6.74	12.00	4x6	0.56
2nd			4.32	5.79	0.00		10.11	4.93	9.12	4.32	8.66	10.11	12.00	4x6	0.84
4th	B-B6.0.3		2.25	3.01	0		5.26	2.57	4.75	2.25	4.51	5.26	18.91	6x6	0.28
3rd			4.50	6.02	0.00		10.52	5.14	9.49	4.50	9.02	10.52	18.91	6x6	0.56
2nd			6.75	9.03	0.00		15.78	7.70	14.24	6.75	13.52	15.78	18.91	6x6	0.83
Roof	B-CO-B.11		2.83	2.26	0.00		5.09	3.23	4.83	2.83	4.53	5.09	25.70	6x8	0.20
4th			4.55	5.06	0.00		9.61	5.19	8.83	4.55	8.35	9.61	25.70	6x8	0.37
3rd			6.27	7.86	0.00		14.13	7.16	12.83	6.27	12.17	14.13	25.70	6x8	0.55
2nd			7.99	10.66	0.00		18.65	9.12	16.83	7.99	15.99	18.65	25.70	6x8	0.73
4th	B-B4.0.1		3.88	5.15	0.00		9.03	4.43	8.15	3.88	7.74	9.03	18.91	6x6	0.48
3rd			7.76	10.30	0.00		18.06	8.86	16.31	7.76	15.49	18.06	18.91	6x6	0.96
2nd			11.64	15.45	0.00		27.09	13.29	24.46	11.64	23.23	27.09	18.91	6x6	1.43
4th	B-B5.0.1		2.81	3.59	0.00		6.40	3.21	5.80	2.81	5.50	6.40	25.70	6x8	0.25
3rd			5.62	7.18	0.00		12.80	6.41	11.60	5.62	11.01	12.80	25.70	6x8	0.50
2nd			8.43	10.77	0.00		19.20	9.62	17.40	8.43	16.51	19.20	25.70	6x8	0.75
Roof	B-CO-B.13		0.22	0.17	0.00		0.39	0.25	0.37	0.22	0.35	0.39	6.20	4x4	0.06
4th			0.79	0.82	0.00		1.61	0.90	1.49	0.79	1.41	1.61	6.20	4x4	0.26
3rd			1.36	1.47	0.00		2.83	1.55	2.61	1.36	2.46	2.83	6.20	4x4	0.46
2nd			1.93	2.12	0.00		4.05	2.20	3.72	1.93	3.52	4.05	6.20	4x4	0.65

BY: JJN

CHKD. BY:

PROJECT NAME: Legacy at Livermore

$S_{OS} = 1.01$ $L1 = DL+LL$
 $\Omega_o = 3$ $L2 = (1.0+0.14S_{OS})DL+0.7\Omega_o E$
 $\rho = 1$ $L3 = (1+0.105S_{OS})D + 0.75LL + 0.75(0.7\Omega_o E)$
 $L4 = DL+Lr$
 $L5 = DL+0.75LL+0.75Lr$

Stacked Area Post Calcs

		Post Design Calcs												
		Loading				Load Combinations								
Level	Beam ID	DL (kips)	LL (kips)	LR (kips)	E	L1 (kips)	L2 (kips)	L3(kips)	L4 (kips)	L5 (kips)	Max Combo Case (kips)	Allow (kips)	Size	D/C
Roof														
4th		0.26	0.19	0.00		0.45	0.30	0.43	0.26	0.40	0.45	9.70	4x6	0.05
3rd		1.11	1.13	0.00		2.24	1.27	2.08	1.11	1.96	2.24	9.70	4x6	0.23
2nd	B-CO-B.1	1.96	2.07	0.00		4.03	2.24	3.72	1.96	3.51	4.03	9.70	4x6	0.42
		2.81	3.01	0.00		5.82	3.21	5.37	2.81	5.07	5.82	9.70	4x6	0.60
4th		0.35	0.44	0.00		0.79	0.40	0.72	0.35	0.68	0.79	9.70	4x6	0.08
3rd		0.70	0.88	0.00		1.58	0.80	1.43	0.70	1.36	1.58	9.70	4x6	0.16
2nd	B-A2.0.1	1.05	1.32	0.00		2.37	1.20	2.15	1.05	2.04	2.37	9.70	4x6	0.24
4th		1.04	0.43	0.00		1.47	1.19	1.47	1.04	1.36	1.47	18.91	6x6	0.08
3rd		2.08	0.86	0.00		2.94	2.37	2.95	2.08	2.73	2.95	18.91	6x6	0.16
2nd	B-A2.0.1	3.12	1.29	0.00		4.41	3.56	4.42	3.12	4.09	4.42	18.91	6x6	0.23
2nd	B-A4.0.1	6.00	5.46	0.00		11.46	6.85	10.73	6.00	10.10	11.46	18.91	6x6	0.61
2nd	B-A4.0.2	14.52	13.14	0.00		27.66	16.57	25.91	14.52	24.38	27.66	32.66	6x10	0.85
2nd	B-CO-B.15	6.71	6.14	0.00		12.85	7.66	12.03	6.71	11.32	12.85	32.66	6x10	0.39
2nd	B-CO-B.20	11.46	11.01	0.00		22.47	13.08	20.93	11.46	19.72	22.47	32.66	6x10	0.69
2nd	B-CO-B.21 and B-CO.22	15.70	11.19	0.00		26.89	17.92	25.76	15.70	24.09	26.89	32.66	6x10	0.82
2nd	B-CO-B.22 and B-CO.23	6.03	2.34	0.00		8.37	6.88	8.42	6.03	7.79	8.42	15.80	4x8	0.53
2nd	B-CO-B.18	4.31	3.72	0.00		8.03	4.92	7.56	4.31	7.10	8.03	12.74	4x8	0.63

$$S_{ps} = 1.01$$

$$\Omega_0 = 3$$

$$\rho = 1$$

$$DL+LL$$

$$(1.0+0.14S_{ps})DL+0.7\Omega_0E$$

$$(1+0.105S_{ps})D + 0.75LL + 0.75(0.7\Omega_0E)$$

$$DL+Lr$$

$$DL+0.75LL+0.75Lr$$

Unstacked Area Post Calcs

Post Design Calcs														
		Loading				Load Combinations								
Level	Beam ID	DL (kips)	LL (kips)	LR (kips)	E	L1 (kips)	L2 (kips)	L3(kips)	L4 (kips)	L5 (kips)	Max Combo Case (kips)	Allow (kips)	Size	D/C
Roof	B-Boiler.9	1.88	1.42	0.00		3.30	2.15	3.14	1.88	2.95	3.30	12.00	4x6	0.28
Roof	B-Boiler.6 + B-Boiler.8	7.75	3.91	0.00		11.66	8.85	11.50	7.75	10.68	11.66	25.70	6x8	0.45
Roof	B-Boiler.4 + B-Boiler.5	4.47	0.97	0.00		5.44	5.10	5.67	4.47	5.20	5.67	6.21	4x4	0.91
Roof	B-Boiler.6	3.94	1.69	0.00		5.63	4.50	5.63	3.94	5.21	5.63	9.70	4x6	0.58

1. 1997-1998
2. 1998-1999
3. 1999-2000
4. 2000-2001

C

2000-2001

2000-2001

1. 1997-1998
2. 1998-1999
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2. 1998-1999
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1. 1997-1998
2. 1998-1999
3. 1999-2000
4. 2000-2001

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1. 1997-1998
2. 1998-1999
3. 1999-2000
4. 2000-2001

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

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Description: BM 2 (middle column)

Note: Only non-zero reactions are listed.

Maximum Reactions

Load Combination	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
+D+Lr+H	45.986										
+D+S+H	43.055										
+D+0.750Lr+0.750L+H	69.408										
+D+0.750L+0.750S+H	67.210										
+D+0.60W+H	43.055										
+D+0.750Lr+0.450W+H	45.253										
+D+0.750S+0.450W+H	43.055										
+0.60D+0.60W+0.60H	25.833										
+D+0.70E+0.60H	43.055										
+D+0.750L+0.750S+0.5250E+H	67.210										
+0.60D+0.70E+H	25.833										
D Only	43.055										
Lr Only	2.931										
L Only	32.207										
S Only											
W Only											
E Only											
H Only											

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
			@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
Axial @ Base	Maximum	75.262										
"	Minimum											
Reaction, X-X Axis Base	Maximum	43.055										
"	Minimum	43.055										
Reaction, Y-Y Axis Base	Maximum	43.055										
"	Minimum	43.055										
Reaction, X-X Axis Top	Maximum	43.055										
"	Minimum	43.055										
Reaction, Y-Y Axis Top	Maximum	43.055										
"	Minimum	43.055										
Moment, X-X Axis Base	Maximum	43.055										
"	Minimum	43.055										
Moment, Y-Y Axis Base	Maximum	43.055										
"	Minimum	43.055										
Moment, X-X Axis Top	Maximum	43.055										
"	Minimum	43.055										
Moment, Y-Y Axis Top	Maximum	43.055										
"	Minimum	43.055										

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+Lr+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.60W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750S+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Steel Column

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Description: BM 2 (middle column)

Maximum Deflections for Load Combinations

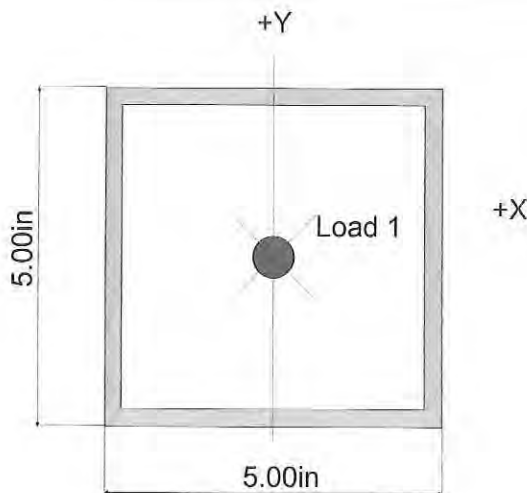
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties: HSS5x5x1/4

Depth	=	5.000 in	I _{xx}	=	16.00 in ⁴	J	=	25.800 in ⁴
Design Thick	=	0.233 in	S _{xx}	=	6.41 in ³			
Width	=	5.000 in	R _{xx}	=	1.930 in			
Wall Thick	=	0.250 in	Z _x	=	7.610 in ³			
Area	=	4.300 in ²	I _{yy}	=	16.000 in ⁴	C	=	10.500 in ³
Weight	=	15.620 plf	S _{yy}	=	6.410 in ³			
			R _{yy}	=	1.930 in			

Ycg = 0.000 in

Sketches



Steel Column

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Description : BM 8

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
+D+L+H	38.464										
+D+S+H	36.304										
+D+0.750Lr+0.750L+H	55.084										
+D+0.750L+0.750S+H	53.464										
+D+0.60W+H	36.304										
+D+0.750Lr+0.450W+H	37.924										
+D+0.750S+0.450W+H	36.304										
+0.60D+0.60W+0.60H	21.782										
+D+0.70E+0.60H	36.304										
+D+0.750L+0.750S+0.5250E+H	53.464										
+0.60D+0.70E+H	21.782										
D Only	36.304										
Lr Only	2.160										
L Only	22.880										
S Only											
W Only											
E Only											
H Only											

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
			@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
Axial @ Base	Maximum	59.184										
"	Minimum											
Reaction, X-X Axis Base	Maximum	36.304										
"	Minimum	36.304										
Reaction, Y-Y Axis Base	Maximum	36.304										
"	Minimum	36.304										
Reaction, X-X Axis Top	Maximum	36.304										
"	Minimum	36.304										
Reaction, Y-Y Axis Top	Maximum	36.304										
"	Minimum	36.304										
Moment, X-X Axis Base	Maximum	36.304										
"	Minimum	36.304										
Moment, Y-Y Axis Base	Maximum	36.304										
"	Minimum	36.304										
Moment, X-X Axis Top	Maximum	36.304										
"	Minimum	36.304										
Moment, Y-Y Axis Top	Maximum	36.304										
"	Minimum	36.304										

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+Lr+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.60W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750S+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Steel Column

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Description : BM 8

Maximum Deflections for Load Combinations

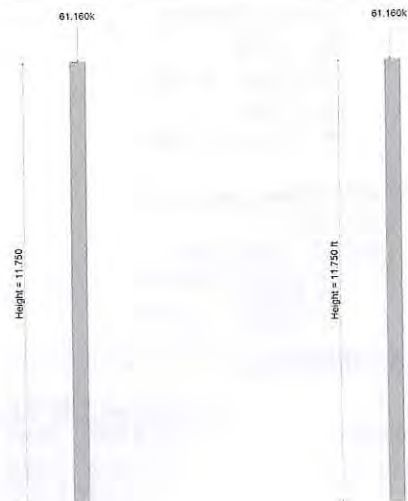
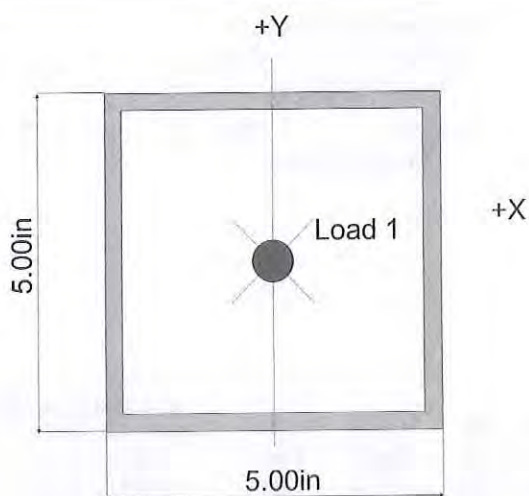
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS5x5x1/4

Depth	=	5.000 in	I xx	=	16.00 in ⁴	J	=	25.800 in ⁴
Design Thick	=	0.233 in	S xx	=	6.41 in ³			
Width	=	5.000 in	R xx	=	1.930 in			
Wall Thick	=	0.250 in	Zx	=	7.610 in ³			
Area	=	4.300 in ²	I yy	=	16.000 in ⁴	C	=	10.500 in ³
Weight	=	15.620 plf	S yy	=	6.410 in ³			
			R yy	=	1.930 in			

Ycg = 0.000 in

Sketches



Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

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Description: B2.2

Note: Only non-zero reactions are listed.

Maximum Reactions

Load Combination	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
+D+Lr+H	39.374										
+D+S+H	35.024										
+D+0.750Lr+0.750L+H	56.294										
+D+0.750L+0.750S+H	53.031										
+D+0.60W+H	35.024										
+D+0.750Lr+0.450W+H	38.286										
+D+0.750S+0.450W+H	35.024										
+0.60D+0.60W+0.60H	21.014										
+D+0.70E+0.60H	35.024										
+D+0.750L+0.750S+0.5250E+H	53.031										
+0.60D+0.70E+H	21.014										
D Only	35.024										
Lr Only	4.350										
L Only	24.010										
S Only											
W Only											
E Only											
H Only											

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
			@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
Axial @ Base	Maximum	59.034										
"	Minimum											
Reaction, X-X Axis Base	Maximum	35.024										
"	Minimum	35.024										
Reaction, Y-Y Axis Base	Maximum	35.024										
"	Minimum	35.024										
Reaction, X-X Axis Top	Maximum	35.024										
"	Minimum	35.024										
Reaction, Y-Y Axis Top	Maximum	35.024										
"	Minimum	35.024										
Moment, X-X Axis Base	Maximum	35.024										
"	Minimum	35.024										
Moment, Y-Y Axis Base	Maximum	35.024										
"	Minimum	35.024										
Moment, X-X Axis Top	Maximum	35.024										
"	Minimum	35.024										
Moment, Y-Y Axis Top	Maximum	35.024										
"	Minimum	35.024										

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+Lr+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.60W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750S+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

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Description : B2.2

Maximum Deflections for Load Combinations

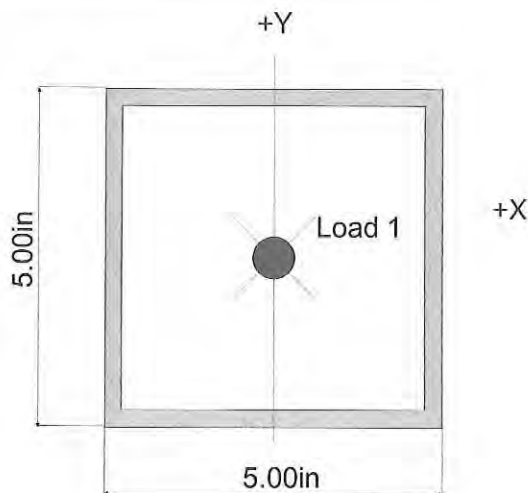
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS5x5x1/4

Depth	=	5.000 in	I _{xx}	=	16.00 in ⁴	J	=	25.800 in ⁴
Design Thick	=	0.233 in	S _{xx}	=	6.41 in ³			
Width	=	5.000 in	R _{xx}	=	1.930 in			
Wall Thick	=	0.250 in	Z _x	=	7.610 in ³			
Area	=	4.300 in ²	I _{yy}	=	16.000 in ⁴	C	=	10.500 in ³
Weight	=	15.620 plf	S _{yy}	=	6.410 in ³			
			R _{yy}	=	1.930 in			

Ycg = 0.000 in

Sketches



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Description : B3.5 2-story

Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : ASCE 7-16

Steel Section Name :	HSS5x5x1/4
Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height 20.5 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for X-X Axis buckling = 20.5 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for Y-Y Axis buckling = 20.5 ft, K = 1.0

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

AXIAL LOADS . . .

B3.6: Axial Load at 20.50 ft, D = 13.592, LR = 1.323, L = 11.417 k

Bending & Shear Check Results

0.6367 : 1

+D+L+H

0.0 ft

Pa : Axial

25.329 k

 $P_n / \Omega_{\text{mega}} : \text{Allowable}$

39.783 k

Ma-x : Applied

0.0 k-ft

Mn-x / Omega : Allowable

17.468 k-ft

Ma-y : Applied

0.0 k-ft

Mn-γ / Omega : Allowable

17.468 k-ft

Maximum Load Reactions . .

Top along X-X

0.0 k

Bottom along X-X

0.0 k

Top along Y-Y

0.0 k

Bottom along Y-Y

0.0 k

Maximum Load Deflections . . .

Along Y-Y

0.0 in at

0.0ft above base

for load combination :

$$A_{11} = \frac{1}{2} \left(\frac{1}{\rho_1} + \frac{1}{\rho_2} \right)$$

Along X-X

for load combination :

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio					Status	Location	
+D+H	0.350	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+L+H	0.637	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+Lr+H	0.383	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+S+H	0.350	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+0.750Lr+0.750L+H	0.590	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+0.750L+0.750S+H	0.565	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+0.60W+H	0.350	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+0.750Lr+0.450W+H	0.375	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+0.750S+0.450W+H	0.350	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+0.60D+0.60W+0.60H	0.210	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+0.70E+0.60H	0.350	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+D+0.750L+0.750S+0.5250E+H	0.565	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	
+0.60D+0.70E+H	0.210	PASS	0.00 ft	1.00	1.00	127.46	127.46	0.000	PASS	0.00 ft	

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction	X-X Axis Reaction	k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments
	@ Base	@ Base @ Top		@ Base @ Top	@ Base @ Top	@ Base @ Top	@ Base @ Top	
+D+H	13.912							
+D+H +H	25.329							

Steel Column

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Description: B3.5 2-story

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
+D+Lr+H	15.235									
+D+S+H	13.912									
+D+0.750Lr+0.750L+H	23.467									
+D+0.750L+0.750S+H	22.475									
+D+0.60W+H	13.912									
+D+0.750Lr+0.450W+H	14.904									
+D+0.750S+0.450W+H	13.912									
+0.60D+0.60W+0.60H	8.347									
+D+0.70E+0.60H	13.912									
+D+0.750L+0.750S+0.5250E+H	22.475									
+0.60D+0.70E+H	8.347									
D Only	13.912									
Lr Only	1.323									
L Only	11.417									
S Only										
W Only										
E Only										
H Only										

Extreme Reactions

Item	Extreme Value	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
Axial @ Base	Maximum	25.329										
"	Minimum											
Reaction, X-X Axis Base	Maximum	13.912										
"	Minimum	13.912										
Reaction, Y-Y Axis Base	Maximum	13.912										
"	Minimum	13.912										
Reaction, X-X Axis Top	Maximum	13.912										
"	Minimum	13.912										
Reaction, Y-Y Axis Top	Maximum	13.912										
"	Minimum	13.912										
Moment, X-X Axis Base	Maximum	13.912										
"	Minimum	13.912										
Moment, Y-Y Axis Base	Maximum	13.912										
"	Minimum	13.912										
Moment, X-X Axis Top	Maximum	13.912										
"	Minimum	13.912										
Moment, Y-Y Axis Top	Maximum	13.912										
"	Minimum	13.912										

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+Lr+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.60W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750S+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

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Description : B3.5 2-story

Maximum Deflections for Load Combinations

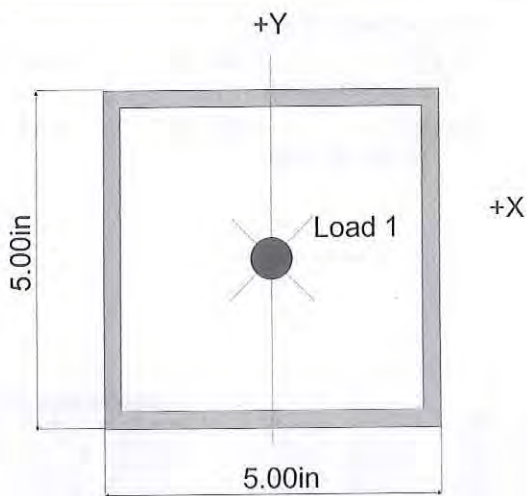
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS5x5x1/4

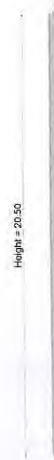
Depth	=	5.000 in	I xx	=	16.00 in ⁴	J	=	25.800 in ⁴
Design Thick	=	0.233 in	S xx	=	6.41 in ³			
Width	=	5.000 in	R xx	=	1.930 in			
Wall Thick	=	0.250 in	Zx	=	7.610 in ³			
Area	=	4.300 in ²	I yy	=	16.000 in ⁴	C	=	10.500 in ⁴
Weight	=	15.620 plf	S yy	=	6.410 in ³			
			R yy	=	1.930 in			

Ycg = 0.000 in

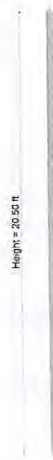
Sketches



26.332k



26.332k



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Description : BM 4

Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : ASCE 7-16

Steel Section Name :	HSS5x5x1/4
Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height 11.750 ft
 Top & Bottom Fixity Top & Bottom Pinned
 Brace condition for deflection (buckling) along columns :
 X-X (width) axis :
 Unbraced Length for X-X Axis buckling = 11.750 ft, K = 1.0
 Y-Y (depth) axis :
 Unbraced Length for Y-Y Axis buckling = 11.750 ft, K = 1.0

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

Column self weight included : 183,535 lbs * Dead Load Factor

AXIAL LOADS . . .

BM 4: Axial Load at 11.750 ft, D = 47.733, LR = 6.065, L = 33.653 k

Bending & Shear Check Results

PASS	Max. Axial+Bending Stress Ratio =	0.9862 : 1
	Load Combination	+D+L+H
	Location of max.above base	0.0 ft
	At maximum location values are . . .	
	Pa : Axial	81.570 k
	Pn / Omega : Allowable	82.715 k
	Ma-x : Applied	0.0 k-ft
	Mn-x / Omega : Allowable	17.468 k-ft
	Ma-y : Applied	0.0 k-ft
	Mn-y / Omega : Allowable	17.468 k-ft

Maximum Load Reactions . .	
Top along X-X	0.0 k
Bottom along X-X	0.0 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :				

PASS	Maximum Shear Stress Ratio =	0.0	1
	Load Combination		
	Location of max.above base	0.0	ft
	At maximum location values are . . .		
	Va : Applied	0.0	k
	Vn / Omega : Allowable	0.0	k

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios						
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location	
+D+H	0.579	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+L+H	0.986	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+Lr+H	0.653	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+S+H	0.579	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+0.750Lr+0.750L+H	0.939	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+0.750L+0.750S+H	0.884	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+0.60W+H	0.579	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+0.750Lr+0.450W+H	0.634	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+0.750S+0.450W+H	0.579	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+0.60D+0.60W+0.60H	0.348	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+0.70E+0.60H	0.579	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+D+0.750L+0.750S+0.5250E+H	0.884	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	
+0.60D+0.70E+H	0.348	PASS	0.00 ft	1.00	1.00	73.06	73.06	0.000	PASS	0.00 ft	

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments
	@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	
+D+H	47.917								
+D+L+H	81.570								

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

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Description: BM 4

Note: Only non-zero reactions are listed.

Maximum Reactions

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+D+Lr+H	53.982						
+D+S+H	47.917						
+D+0.750Lr+0.750L+H	77.705						
+D+0.750L+0.750S+H	73.156						
+D+0.60W+H	47.917						
+D+0.750Lr+0.450W+H	52.465						
+D+0.750S+0.450W+H	47.917						
+0.60D+0.60W+0.60H	28.750						
+D+0.70E+0.60H	47.917						
+D+0.750L+0.750S+0.5250E+H	73.156						
+0.60D+0.70E+H	28.750						
D Only	47.917						
Lr Only	6.065						
L Only	33.653						
S Only							
W Only							
E Only							
H Only							

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	81.570						
"	Minimum							
Reaction, X-X Axis Base	Maximum	47.917						
"	Minimum	47.917						
Reaction, Y-Y Axis Base	Maximum	47.917						
"	Minimum	47.917						
Reaction, X-X Axis Top	Maximum	47.917						
"	Minimum	47.917						
Reaction, Y-Y Axis Top	Maximum	47.917						
"	Minimum	47.917						
Moment, X-X Axis Base	Maximum	47.917						
"	Minimum	47.917						
Moment, Y-Y Axis Base	Maximum	47.917						
"	Minimum	47.917						
Moment, X-X Axis Top	Maximum	47.917						
"	Minimum	47.917						
Moment, Y-Y Axis Top	Maximum	47.917						
"	Minimum	47.917						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Column

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Description: BM 4

Maximum Deflections for Load Combinations

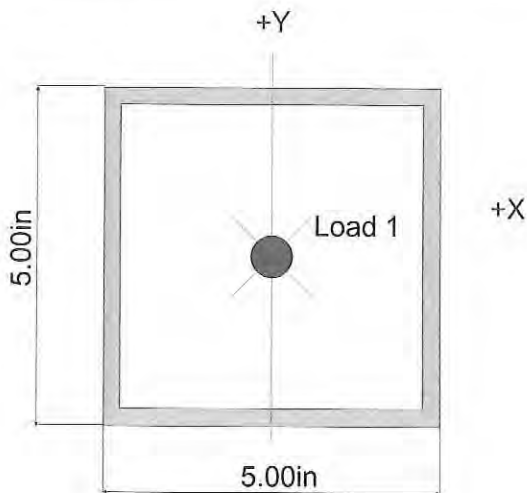
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS5x5x1/4

Depth	=	5.000 in	I _{xx}	=	16.00 in ⁴	J	=	25.800 in ⁴
Design Thick	=	0.233 in	S _{xx}	=	6.41 in ³			
Width	=	5.000 in	R _{xx}	=	1.930 in			
Wall Thick	=	0.250 in	Z _x	=	7.610 in ³			
Area	=	4.300 in ²	I _{yy}	=	16.000 in ⁴	C	=	10.500 in ³
Weight	=	15.620 plf	S _{yy}	=	6.410 in ³			
			R _{yy}	=	1.930 in			

Ycg = 0.000 in

Sketches



Steel Column

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Description : B3.5 2-story

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+D+Lr+H	35.090						
+D+S+H	29.652						
+D+0.750Lr+0.750L+H	49.899						
+D+0.750L+0.750S+H	45.821						
+D+0.60W+H	29.652						
+D+0.750Lr+0.450W+H	33.731						
+D+0.750S+0.450W+H	29.652						
+0.60D+0.60W+0.60H	17.791						
+D+0.70E+0.60H	29.652						
+D+0.750L+0.750S+0.5250E+H	45.821						
+0.60D+0.70E+H	17.791						
D Only	29.652						
Lr Only	5.438						
L Only	21.558						
S Only							
W Only							
E Only							
H Only							

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	51.210						
"	Minimum							
Reaction, X-X Axis Base	Maximum	29.652						
"	Minimum	29.652						
Reaction, Y-Y Axis Base	Maximum	29.652						
"	Minimum	29.652						
Reaction, X-X Axis Top	Maximum	29.652						
"	Minimum	29.652						
Reaction, Y-Y Axis Top	Maximum	29.652						
"	Minimum	29.652						
Moment, X-X Axis Base	Maximum	29.652						
"	Minimum	29.652						
Moment, Y-Y Axis Base	Maximum	29.652						
"	Minimum	29.652						
Moment, X-X Axis Top	Maximum	29.652						
"	Minimum	29.652						
Moment, Y-Y Axis Top	Maximum	29.652						
"	Minimum	29.652						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

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Description : B3.5 2-story

Maximum Deflections for Load Combinations

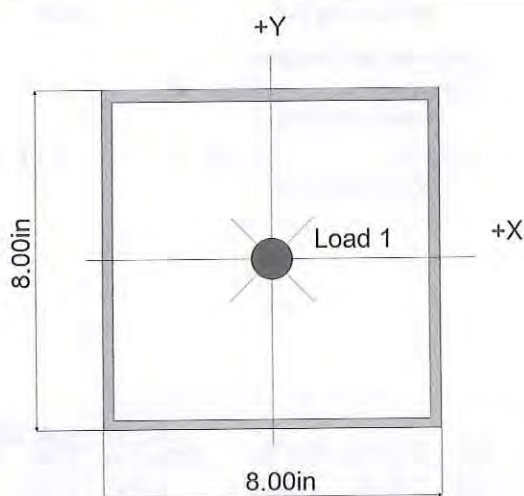
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS8x8x1/4

Depth	=	8.000 in	I xx	=	70.70 in^4	J	=	111.000 in^4
Design Thick	=	0.233 in	S xx	=	17.70 in^3			
Width	=	8.000 in	R xx	=	3.150 in			
Wall Thick	=	0.250 in	Zx	=	20.500 in^3			
Area	=	7.100 in^2	I yy	=	70.700 in^4	C	=	28.100 in^3
Weight	=	25.820 plf	S yy	=	17.700 in^3			
			R yy	=	3.150 in			

Ycg = 0.000 in

Sketches



Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

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Description: B2.6 and B2.7

Note: Only non-zero reactions are listed.

Maximum Reactions

Load Combination	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
+D+L+H	56.986										
+D+Lr+H	41.122										
+D+S+H	34.837										
+D+0.750Lr+0.750L+H	56.162										
+D+0.750L+0.750S+H	51.448										
+D+0.60W+H	34.837										
+D+0.750Lr+0.450W+H	39.550										
+D+0.750S+0.450W+H	34.837										
+0.60D+0.60W+0.60H	20.902										
+D+0.70E+0.60H	34.837										
+D+0.750L+0.750S+0.5250E+H	51.448										
+0.60D+0.70E+H	20.902										
D Only	34.837										
Lr Only	6.285										
L Only	22.149										
S Only											
W Only											
E Only											
H Only											

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
			@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
Axial @ Base	Maximum	56.986										
"	Minimum											
Reaction, X-X Axis Base	Maximum	34.837										
"	Minimum	34.837										
Reaction, Y-Y Axis Base	Maximum	34.837										
"	Minimum	34.837										
Reaction, X-X Axis Top	Maximum	34.837										
"	Minimum	34.837										
Reaction, Y-Y Axis Top	Maximum	34.837										
"	Minimum	34.837										
Moment, X-X Axis Base	Maximum	34.837										
"	Minimum	34.837										
Moment, Y-Y Axis Base	Maximum	34.837										
"	Minimum	34.837										
Moment, X-X Axis Top	Maximum	34.837										
"	Minimum	34.837										
Moment, Y-Y Axis Top	Maximum	34.837										
"	Minimum	34.837										

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+Lr+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.60W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750Lr+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750S+0.450W+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	0.0000	in	0.000	ft	0.000	in	0.000	ft
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

File = Z:\Jobs\18-jobs\18-234 Legacy at Livermore\18-234 Legacy at Livermore\Calculations\Gravity\Columns.ec6
 Software copyright ENERCALC, INC. 1983-2018, Build:10.18.12.12

Lic. #: KW-06009713

Licensee: Peoples Associates Structural Engineers

Description: B2.6 and B2.7

Maximum Deflections for Load Combinations

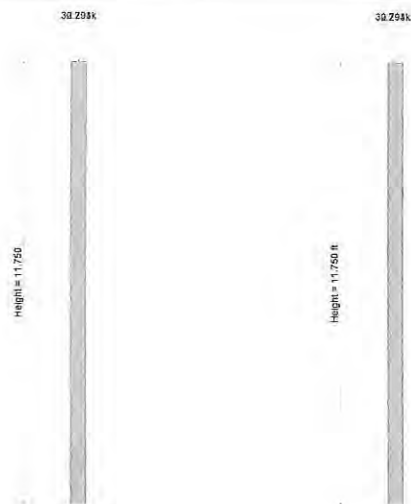
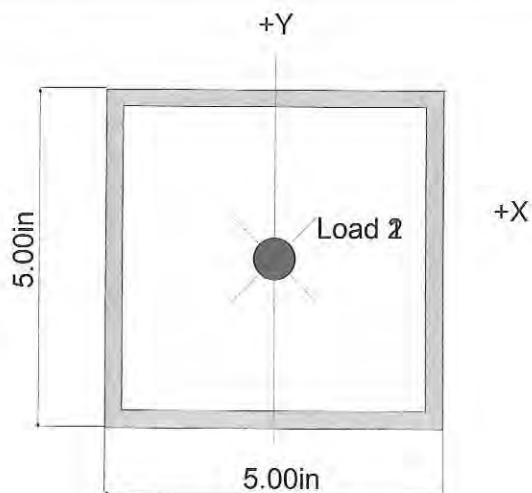
Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
L Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
S Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
E Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
H Only	0.0000	in	0.000 ft	0.000	in	0.000 ft

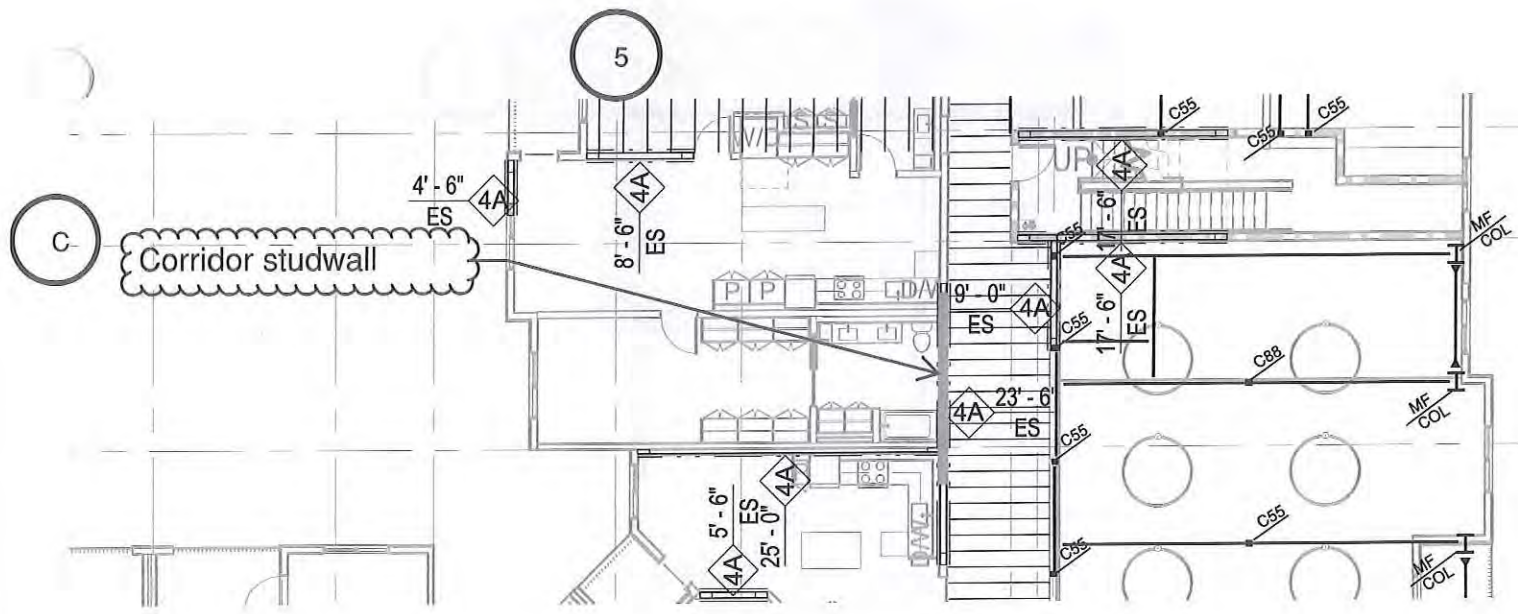
Steel Section Properties : HSS5x5x1/4

Depth	=	5.000 in	I _{xx}	=	16.00 in ⁴	J	=	25.800 in ⁴
Design Thick	=	0.233 in	S _{xx}	=	6.41 in ³			
Width	=	5.000 in	R _{xx}	=	1.930 in			
Wall Thick	=	0.250 in	Z _x	=	7.610 in ³			
Area	=	4.300 in ²	I _{yy}	=	16.000 in ⁴	C	=	10.500 in ³
Weight	=	15.620 plf	S _{yy}	=	6.410 in ³			
			R _{yy}	=	1.930 in			

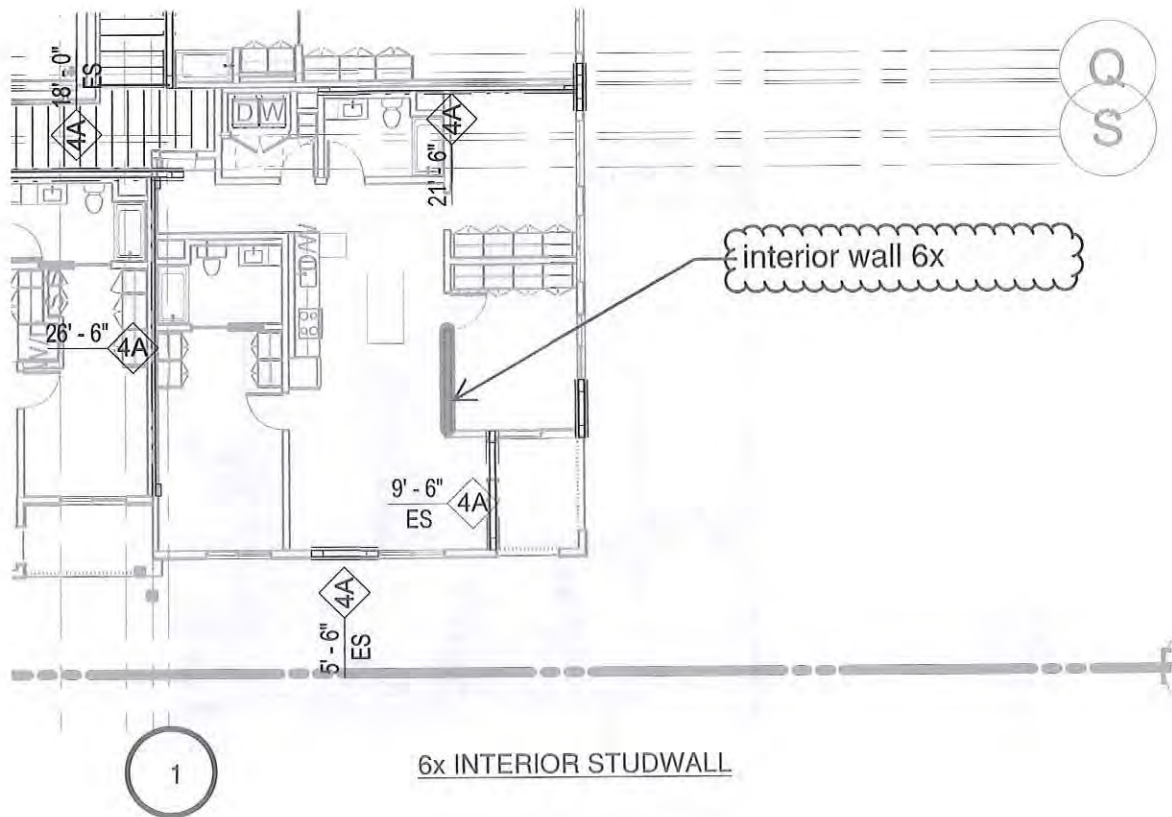
Ycg = 0.000 in

Sketches



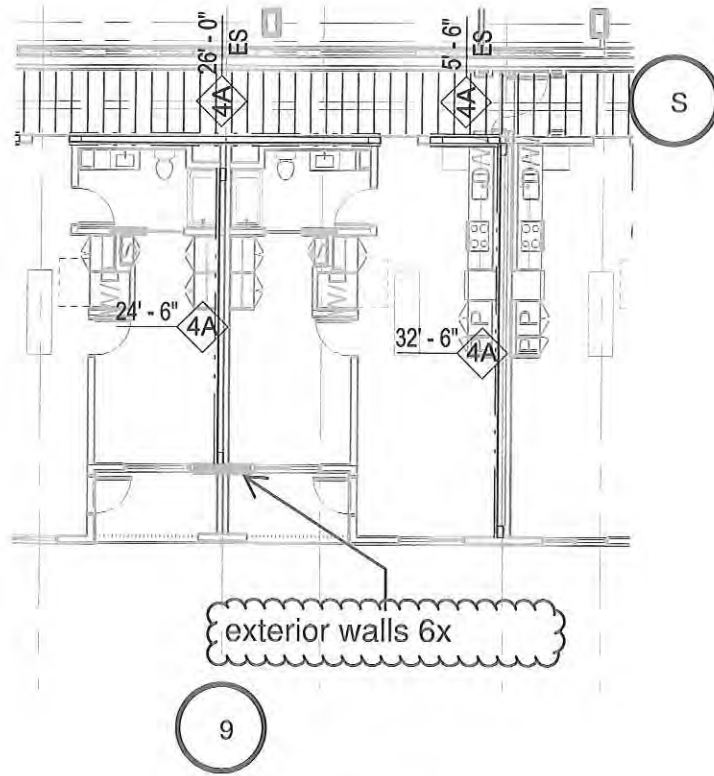


CORRIDOR STUDWALL

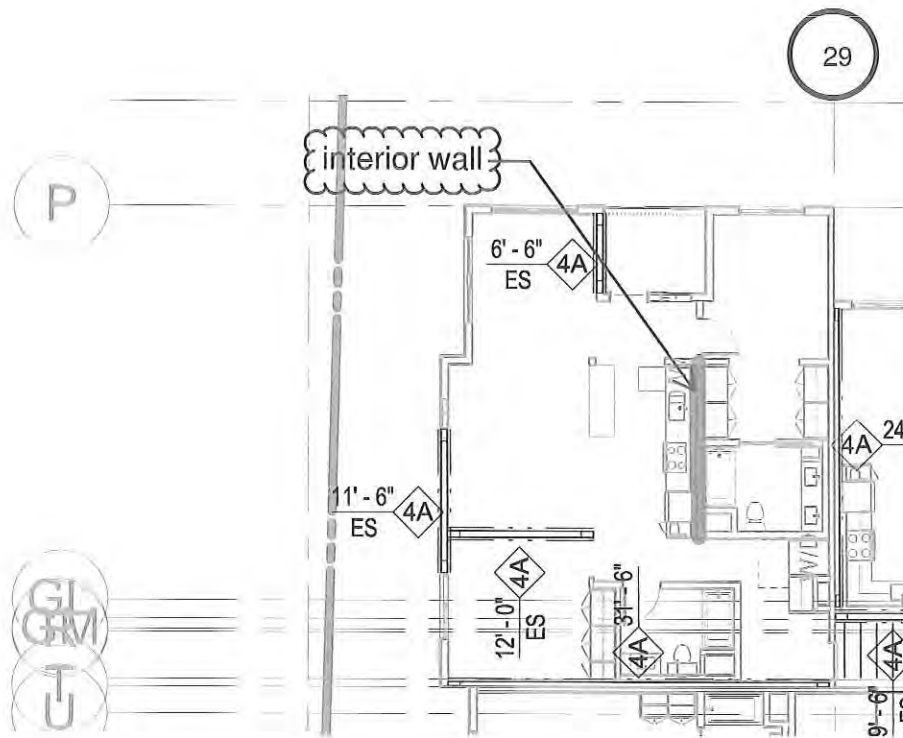


6x INTERIOR STUDWALL

STUDWALL KEY PLAN

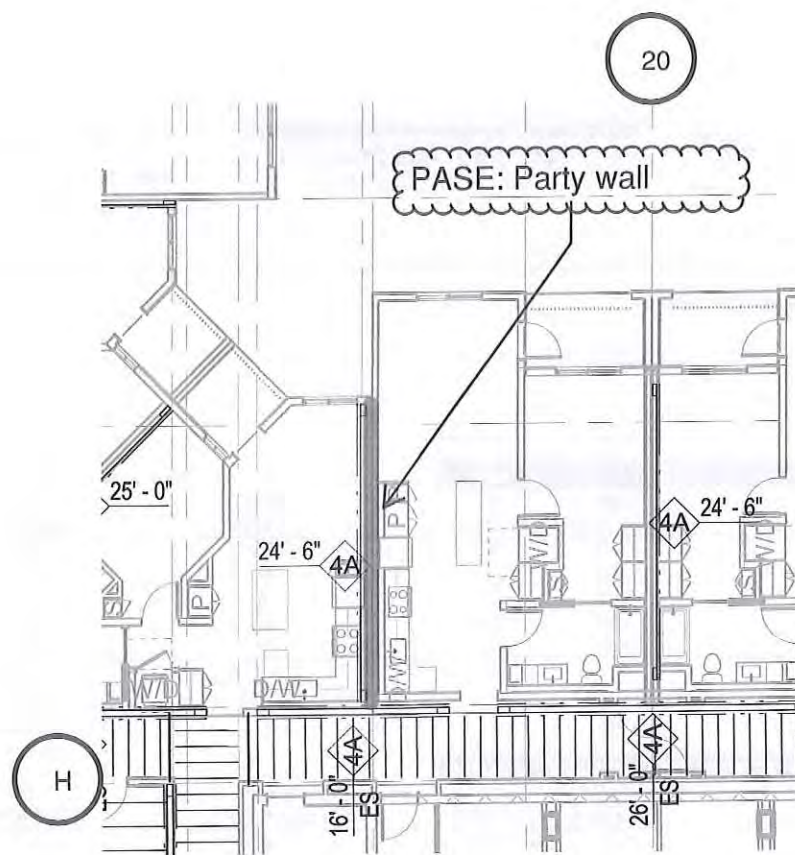


6x EXTERIOR STUDWALL



INTERIOR STUDWALL

STUDWALL KEY PLAN



PARTY STUDWALL

STUDWALL KEY PLAN

BY **ACM** DATE 2/6/2019
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF **1**
 JOB NO. 17-234

Legacy at Hayward

Katerra

STUDWALL ANALYSIS - Dead and Live Loads

Segment: Unit: **TYP**

6" Interior Wall (Nominal)-4 story

Stud Height: 9.88 ft	Floor: Roof				
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	18.0	32.0	20.0	576	360
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	0.0	31.0	40.0	0	0
Interior Corridor:	0.0	30.0	100.0	0	0
Interior Walls	10.3	9.5	0.0	98	0

DL = **674 plf**

LL = **0 plf**
 Lr = **360 plf**

Stud Height: 8.93 ft	Floor: 4th				
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	6.5	31.0	40.0	202	260
Interior Corridor:	0.0	30.0	100.0	0	0
Interior Walls	10.3	9.5	0.0	98	0

DL = **973 plf**

LL = **260 plf**
 Lr = **360 plf**

Stud Height: 8.93 ft	Floor: 3rd				
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	17.1	31.0	40.0	531	685
Interior Corridor:	0.0	30.0	100.0	0	0
Interior Walls	10.3	9.5	0.0	98	0

DL = **1602 plf**

LL = **945 plf**
 Lr = **360 plf**

Stud Height: 8.93 ft	Floor: 2nd				
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	17.1	31.0	40.0	531	685
Interior Corridor:	0.0	30.0	100.0	0	0
Interior Walls	10.2	9.5	0.0	97	0

DL = **2230 plf**

LL = **1630 plf**
 Lr = **360 plf**

Max D/C = 0.67

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 17-234

Legacy at Hayward

Katerra

STUDWALL ANALYSIS

KMC ver 1.3

6" Interior Wall (Nominal)-4 story
 Unit: TYP

Reference Building Code: CBC 2013

Stud Size: 2 x 6 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 9.88 ft
 Ie/d: 21.55 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

* Design capacities based of '05 NDS Specifications

LOADING CRITERIA

Dead Load 674 plf
 Floor Live Load 0 plf
 Roof Live Load 360 plf
 Earthquake 5 psf
 Wind Load 0 psf

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G									
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)
1. D + RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-
3. D + EQ	1.6	81	129	900	1.00	1.30	1.15	2153	0.06	0.043
4. D + 0.75FL + 0.75EQ	1.6	61	97	900	1.00	1.30	1.15	2153	0.04	0.043
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.30	1.15	2153	0.00	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G									
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _{cE} (psi)	C _p	F' _c (psi)
1. D + RL	1.25	1378	167	1350	1.00	1.10	1856	1027	0.47	872
2. D + 0.75FL + 0.75RL	1.25	1258	153	1350	1.00	1.10	1856	1027	0.47	872
3. D + EQ	1.6	898	109	1350	1.00	1.10	2376	1027	0.38	913
4. D + 0.75FL + 0.75EQ	1.6	898	109	1350	1.00	1.10	2376	1027	0.38	913
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1258	153	1350	1.00	1.10	2376	1027	0.38	913

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _{cE})	D/C
1. D + RL	0.04	0.00	0.19
2. D + 0.75FL + 0.75RL	0.03	0.00	0.17
3. D + EQ	0.01	0.07	0.08
4. D + 0.75FL + 0.75EQ	0.01	0.05	0.06

<--- Governs

Deflection = 0.043 " = L / 2764 < L / 180 D/C = 0.07 ok
 Plate Bearing = 167 psi < 625 psi D/C = 0.27 ok

USE: 2 x 6 DOUG-FIR NO. 2 STUDS @ 16" o.c. OK
 Max D/C = 0.27

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. ____ OF ____
 JOB NO. **17-234**

Legacy at Hayward

Katerra

STUDWALL ANALYSIS

KMC ver 1.3

6" Interior Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

4th Floor

Stud Size: 2 x 6

Wood Grade: NO. 2

Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 8.93 ft
 Ie/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1536000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 973 plf
 Floor Live Load 260 plf
 Roof Live Load 360 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + EQ	1.6	66	105	900	1.00	1.30	1.15	2153	0.05	0.030	3592
4. D + 0.75FL + 0.75EQ	1.6	50	79	900	1.00	1.30	1.15	2153	0.04	0.030	3592
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.30	1.15	2153	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + RL	1.25	1778	215	1350	1.00	1.10	1856	1257	0.55	1013	0.21
2. D + 0.75FL + 0.75RL	1.25	1918	232	1350	1.00	1.10	1856	1257	0.55	1013	0.23
3. D + EQ	1.6	1298	157	1350	1.00	1.10	2376	1257	0.45	1078	0.15
4. D + 0.75FL + 0.75EQ	1.6	1558	189	1350	1.00	1.10	2376	1257	0.45	1078	0.18
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1918	232	1350	1.00	1.10	2376	1257	0.45	1078	0.22

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c E)	D/C
1. D + RL	0.05	0.00	0.21
2. D + 0.75FL + 0.75RL	0.05	0.00	0.23
3. D + EQ	0.02	0.06	0.08
4. D + 0.75FL + 0.75EQ	0.03	0.04	0.07

← Governs

Deflection = 0.030 " = L / 3592 < L / 180 D/C = 0.05 ok
 Plate Bearing = 232 psi < 625 psi D/C = 0.37 ok

USE: 2 x 6 DOUG-FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.37

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 17-234

Legacy at Hayward

Kattera

STUDWALL ANALYSIS

6" Interior Wall (Nominal)-4 story

Unit: TYP

KMC ver 1.3

Reference Building Code: CBC 2013

3rd Floor

Stud Size: 2 x 6 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 8.93 ft
 Ie/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1602 plf
 Floor Live Load 945 plf
 Roof Live Load 360 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G									
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)
1. D + FL	1.00	0	0	900	1.00	1.30	1.15	1346	0.00	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-
3. D + EQ	1.6	66	105	900	1.00	1.30	1.15	2153	0.05	0.029
4. D + 0.75FL + 0.75EQ	1.6	50	79	900	1.00	1.30	1.15	2153	0.04	0.029
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.30	1.15	2153	0.00	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G									
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)
1. D + FL	1.00	3396	412	1350	1.00	1.10	1485	1257	0.63	937
2. D + 0.75FL + 0.75RL	1.25	3441	417	1350	1.00	1.10	1856	1257	0.55	1013
3. D + EQ	1.6	2136	259	1350	1.00	1.10	2376	1257	0.45	1078
4. D + 0.75FL + 0.75EQ	1.6	3081	373	1350	1.00	1.10	2376	1257	0.45	1078
5. D + 0.75FL + 0.75RL + 0.75W	1.6	3441	417	1350	1.00	1.10	2376	1257	0.45	1078

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c)	D/C
1. D + FL	0.19	0.00	0.44
2. D + 0.75FL + 0.75RL	0.17	0.00	0.41
3. D + EQ	0.06	0.06	0.12
4. D + 0.75FL + 0.75EQ	0.12	0.05	0.17

<--- Governs

Deflection = 0.029 " = L / 3742 < L / 180 D/C = 0.05 ok
 Plate Bearing = 417 psi < 625 psi D/C = 0.67 ok

USE: 2 x 6 DOUG-FIR NO. 2 STUDS @ 16" o.c. OK
 Max D/C = 0.67

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 17-234

Legacy at Hayward

Katerra

STUDWALL ANALYSIS

6" Interior Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

2nd Floor

Stud Size: 3 x 6 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 2.5 in
 Depth: 5.5 in
 Area: 13.75 in²
 Sx: 12.60 in³
 Stud Height: 8.93 ft
 le/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 2230 plf
 Floor Live Load 1630 plf
 Roof Live Load 360 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.30	1.15	1346	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + EQ	1.6	66	63	900	1.00	1.30	1.15	2153	0.03	0.017	6236
4. D + 0.75FL + 0.75EQ	1.6	50	47	900	1.00	1.30	1.15	2153	0.02	0.017	6236
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.30	1.15	2153	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + FL	1.00	5146	374	1350	1.00	1.10	1485	1257	0.63	937	0.40
2. D + 0.75FL + 0.75RL	1.25	4963	361	1350	1.00	1.10	1856	1257	0.55	1013	0.36
3. D + EQ	1.6	2973	216	1350	1.00	1.10	2376	1257	0.45	1078	0.20
4. D + 0.75FL + 0.75EQ	1.6	4603	335	1350	1.00	1.10	2376	1257	0.45	1078	0.31
5. D + 0.75FL + 0.75RL + 0.75W	1.6	4963	361	1350	1.00	1.10	2376	1257	0.45	1078	0.33

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c E)	D/C
1. D + FL	0.16	0.00	0.40
2. D + 0.75FL + 0.75RL	0.13	0.00	0.36
3. D + EQ	0.04	0.04	0.08
4. D + 0.75FL + 0.75EQ	0.10	0.03	0.13

<--- Governs

Deflection = 0.017 " = L / 6236 < L / 180 D/C = 0.03 ok
 Plate Bearing = 374 psi < 625 psi D/C = 0.60 ok

USE: 3 x 6 DOUG-FIR NO. 2 STUDS @ 16" o.c. OK
 Max D/C = 0.60

BY **ACM**

DATE 2/6/2019

PEOPLES ASSOCIATES
STRUCTURAL ENGINEERS

SHEET NO. _____

OF 1

CHKD. BY _____

DATE _____

JOB NO. _____

17-234

Legacy at Livermore**Katerra****STUDWALL ANALYSIS - Dead and Live Loads**Segment: Unit: **TYP****4" Interior Wall (Nominal)-4 story**

Stud Height: 9.92 ft	Floor:		Roof			
	Trib.	Dead	Live		Dead	Live
	Width (ft.)	Load (psf)	Load (psf)		Load (plf)	Load (plf)
Roof	16.0	32.0	20.0		512	320
Exterior Walls	0.0	19.0	0.0		0	0
Floor:	0.0	31.0	40.0		0	0
Interior Corridor:	0.0	30.0	100.0		0	0
Interior Walls	10.3	8.5	0.0		88	0

DL = 600 plf

LL = 0 plf

Lr = 320 plf

Stud Height: 8.93 ft		Floor: 4th			
	Trib.	Dead	Live	Dead	Live
	Width (ft.)	Load (psf)	Load (psf)	Load (plf)	Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	6.5	31.0	40.0	202	260
Interior Corridor:	0.0	30.0	100.0	0	0
Interior Walls	10.3	8.5	0.0	88	0

DL = 889 plf

LL = 260 plf

Lr = 320 plf

Stud Height: 8.93 ft		Floor: 3rd			
	Trib.	Dead	Live	Dead	Live
	Width (ft.)	Load (psf)	Load (psf)	Load (plf)	Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	6.5	31.0	40.0	202	260
Interior Corridor:	0.0	30.0	100.0	0	0
Interior Walls	10.3	8.5	0.0	88	0

DL = 1178 plf

LL = 520 plf

Lr = 320 plf

Stud Height: 8.93 ft		Floor: 2nd			
	Trib.	Dead	Live	Dead	Live
	Width (ft.)	Load (psf)	Load (psf)	Load (plf)	Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	6.5	31.0	40.0	202	260
Interior Corridor:	0.0	30.0	100.0	0	0
Interior Walls	10.2	8.5	0.0	87	0

DL = 1466 plf

LL = 780 plf

Lr = 320 plf

Max D/C = 0.73

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 17-234

Legacy at Livermore

Katterra

STUDWALL ANALYSIS

4" Interior Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

Roof

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 16 " o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 9.92 ft
 le/d: 34.00 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 600 plf
 Floor Live Load 0 plf
 Roof Live Load 320 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	82	321	900	1.00	1.50	1.15	2484	0.13	0.169	703.4
4. D + 0.75FL + 0.75EQ	1.6	61	241	900	1.00	1.50	1.15	2484	0.10	0.169	703.4
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + RL	1.25	1226	234	1350	1.00	1.15	1941	412	0.20	393	0.59
2. D + 0.75FL + 0.75RL	1.25	1119	213	1350	1.00	1.15	1941	412	0.20	393	0.54
3. D + EQ	1.6	799	152	1350	1.00	1.15	2484	412	0.16	397	0.38
4. D + 0.75FL + 0.75EQ	1.6	799	152	1350	1.00	1.15	2484	412	0.16	397	0.38
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1119	213	1350	1.00	1.15	2484	412	0.16	397	0.54

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c E)	D/C
1. D + RL	0.35	0.00	0.59
2. D + 0.75FL + 0.75RL	0.30	0.00	0.54
3. D + EQ	0.15	0.20	0.35
4. D + 0.75FL + 0.75EQ	0.15	0.15	0.30

← Governs

Deflection = 0.169 " = L / 703 < L / 180 D/C = 0.26 ok
 Plate Bearing = 234 psi < 625 psi D/C = 0.37 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.59

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STUDWALL ANALYSIS

KMC ver 1.3

4" Interior Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

4th Floor

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 889 plf
 Floor Live Load 260 plf
 Roof Live Load 320 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	66	260	900	1.00	1.50	1.15	2484	0.10	0.111	964.3
4. D + 0.75FL + 0.75EQ	1.6	50	195	900	1.00	1.50	1.15	2484	0.08	0.111	964.3
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + RL	1.25	1611	307	1350	1.00	1.15	1941	509	0.25	478	0.64
2. D + 0.75FL + 0.75RL	1.25	1765	336	1350	1.00	1.15	1941	509	0.25	478	0.70
3. D + EQ	1.6	1185	226	1350	1.00	1.15	2484	509	0.20	485	0.46
4. D + 0.75FL + 0.75EQ	1.6	1445	275	1350	1.00	1.15	2484	509	0.20	485	0.57
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1765	336	1350	1.00	1.15	2484	509	0.20	485	0.69

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c)	D/C
1. D + RL	0.41	0.00	0.64
2. D + 0.75FL + 0.75RL	0.50	0.00	0.70
3. D + EQ	0.22	0.19	0.40
4. D + 0.75FL + 0.75EQ	0.32	0.17	0.49

<--- Governs

Deflection = 0.111 " = L / 964 < L / 180 D/C = 0.19 ok
 Plate Bearing = 336 psi < 625 psi D/C = 0.54 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.70

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Legacy at Livermore

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STUDWALL ANALYSIS

KMC ver 1.3

4" Interior Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

3rd Floor

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 12" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1178 plf
 Floor Live Load 520 plf
 Roof Live Load 320 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	50	195	900	1.00	1.50	1.15	2484	0.08	0.083	1286
4. D + 0.75FL + 0.75EQ	1.6	37	146	900	1.00	1.50	1.15	2484	0.06	0.083	1286
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + FL	1.00	1698	323	1350	1.00	1.15	1553	509	0.30	468	0.69
2. D + 0.75FL + 0.75RL	1.25	1808	344	1350	1.00	1.15	1941	509	0.25	478	0.72
3. D + EQ	1.6	1178	224	1350	1.00	1.15	2484	509	0.20	485	0.46
4. D + 0.75FL + 0.75EQ	1.6	1568	299	1350	1.00	1.15	2484	509	0.20	485	0.62
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1808	344	1350	1.00	1.15	2484	509	0.20	485	0.71

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + FL	0.48	0.00	0.69
2. D + 0.75FL + 0.75RL	0.52	0.00	0.72
3. D + EQ	0.21	0.14	0.35
4. D + 0.75FL + 0.75EQ	0.38	0.14	0.52

← Governs

Deflection = 0.083 " = L / 1286 < L / 180 D/C = 0.14 ok
 Plate Bearing = 344 psi < 625 psi D/C = 0.55 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 12" o.c. **OK**
 Max D/C = 0.72

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Legacy at Livermore

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STUDWALL ANALYSIS

KMC ver 1.3

4" Interior Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

2nd Floor

Stud Size: 3 x 4 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 2.5 in
 Depth: 3.5 in
 Area: 8.75 in²
 Sx: 5.10 in³
 Stud Height: 8.93 ft
 Ie/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1466 plf
 Floor Live Load 780 plf
 Roof Live Load 320 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	66	156	900	1.00	1.50	1.15	2484	0.06	0.067	1607
4. D + 0.75FL + 0.75EQ	1.6	50	117	900	1.00	1.50	1.15	2484	0.05	0.067	1607
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + FL	1.00	2994	342	1350	1.00	1.15	1553	509	0.30	468	0.73
2. D + 0.75FL + 0.75RL	1.25	3054	349	1350	1.00	1.15	1941	509	0.25	478	0.73
3. D + EQ	1.6	1954	223	1350	1.00	1.15	2484	509	0.20	485	0.46
4. D + 0.75FL + 0.75EQ	1.6	2734	313	1350	1.00	1.15	2484	509	0.20	485	0.64
5. D + 0.75FL + 0.75RL + 0.75W	1.6	3054	349	1350	1.00	1.15	2484	509	0.20	485	0.72

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + FL	0.53	0.00	0.73
2. D + 0.75FL + 0.75RL	0.53	0.00	0.73
3. D + EQ	0.21	0.11	0.32
4. D + 0.75FL + 0.75EQ	0.41	0.12	0.54

<--- Governs

Deflection = 0.067 " = L / 1607 < L / 180 D/C = 0.11 ok
 Plate Bearing = 349 psi < 625 psi D/C = 0.56 ok

USE: 3 x 4 HEM FIR NO. 2 STUDS @ 16" o.c. **OK**
 Max D/C = 0.73

BY ACM DATE 2/6/2019
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Legacy at Livermore

Katerra

STUDWALL ANALYSIS - Dead and Live Loads

Segment: Unit: TYP

4" Party Wall (Nominal)-4 story

Stud Height: 9.92 ft		Floor: Roof		Dead Load (plf)	Live Load (plf)
Trib. Width (ft.)		Dead Load (psf)	Live Load (psf)		
Roof	2.0	32.0	20.0	64	40
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	0.0	31.0	40.0	0	0
Interior Corridor:	0.0	30.0	100.0	0	0
Party Walls	10.3	14.0	0.0	144	0

DL = 208 plf

LL = 0 plf
 Lr = 40 plf

Stud Height: 8.93 ft		Floor: 4th		Dead Load (plf)	Live Load (plf)
Trib. Width (ft.)		Dead Load (psf)	Live Load (psf)		
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	10.0	31.0	40.0	310	400
Interior Corridor:	0.0	30.0	100.0	0	0
Party Walls	10.3	14.0	0.0	144	0

DL = 661 plf

LL = 400 plf
 Lr = 40 plf

Stud Height: 8.93 ft		Floor: 3rd		Dead Load (plf)	Live Load (plf)
Trib. Width (ft.)		Dead Load (psf)	Live Load (psf)		
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	10.0	31.0	40.0	310	400
Interior Corridor:	0.0	30.0	100.0	0	0
Party Walls	10.2	14.0	0.0	143	0

DL = 1114 plf

LL = 800 plf
 Lr = 40 plf

Stud Height: 8.93 ft		Floor: 2nd		Dead Load (plf)	Live Load (plf)
Trib. Width (ft.)		Dead Load (psf)	Live Load (psf)		
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	10.0	31.0	40.0	310	400
Interior Corridor:	0.0	30.0	100.0	0	0
Party Walls	10.2	14.0	0.0	143	0

DL = 1567 plf

LL = 1200 plf
 Lr = 40 plf

Max D/C = 0.90

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 JOB NO. 18-234

Legacy at Livermore

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STUDWALL ANALYSIS

4" Party Wall (Nominal)-4 story

Unit: TYP

KMC ver 1.3

Reference Building Code: CBC 2013

Roof

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 9.92 ft
 le/d: 34.00 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 208 plf
 Floor Live Load 0 plf
 Roof Live Load 40 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)	L / δ
1. D + RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	82	321	900	1.00	1.50	1.15	2484	0.13	0.169	703.4
4. D + 0.75FL + 0.75EQ	1.6	61	241	900	1.00	1.50	1.15	2484	0.10	0.169	703.4
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + RL	1.25	330	63	1350	1.00	1.15	1941	412	0.20	393	0.16
2. D + 0.75FL + 0.75RL	1.25	317	60	1350	1.00	1.15	1941	412	0.20	393	0.15
3. D + EQ	1.6	277	53	1350	1.00	1.15	2484	412	0.16	397	0.13
4. D + 0.75FL + 0.75EQ	1.6	277	53	1350	1.00	1.15	2484	412	0.16	397	0.13
5. D + 0.75FL + 0.75RL + 0.75W	1.6	317	60	1350	1.00	1.15	2484	412	0.16	397	0.15

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + RL	0.03	0.00	0.16
2. D + 0.75FL + 0.75RL	0.02	0.00	0.15
3. D + EQ	0.02	0.15	0.17
4. D + 0.75FL + 0.75EQ	0.02	0.11	0.13

Deflection = 0.169 " = L / 703 < L / 180 D/C = 0.26 ok
 Plate Bearing = 63 psi < 625 psi D/C = 0.10 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 16" o.c. OK
 Max D/C = 0.26

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STUDWALL ANALYSIS

4" Party Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

4th Floor

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 12" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1536000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 661 plf
 Floor Live Load 400 plf
 Roof Live Load 40 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	50	195	900	1.00	1.50	1.15	2484	0.08	0.087	1234
4. D + 0.75FL + 0.75EQ	1.6	37	146	900	1.00	1.50	1.15	2484	0.06	0.087	1234
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + FL	1.00	1061	202	1350	1.00	1.15	1553	509	0.30	468	0.43
2. D + 0.75FL + 0.75RL	1.25	991	189	1350	1.00	1.15	1941	509	0.25	478	0.40
3. D + EQ	1.6	661	126	1350	1.00	1.15	2484	509	0.20	485	0.26
4. D + 0.75FL + 0.75EQ	1.6	961	183	1350	1.00	1.15	2484	509	0.20	485	0.38
5. D + 0.75FL + 0.75RL + 0.75W	1.6	991	189	1350	1.00	1.15	2484	509	0.20	485	0.39

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c E)	D/C
1. D + FL	0.19	0.00	0.43
2. D + 0.75FL + 0.75RL	0.16	0.00	0.40
3. D + EQ	0.07	0.10	0.17
4. D + 0.75FL + 0.75EQ	0.14	0.09	0.23

← Governs

Deflection = 0.087" = L / 1234 < L / 180 D/C = 0.15 ok
 Plate Bearing = 202 psi < 625 psi D/C = 0.32 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 12" o.c. **OK**
 Max D/C = 0.43

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Legacy at Livermore

Katerra

STUDWALL ANALYSIS

KMC ver 1.3

4" Party Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

3rd Floor

Stud Size: 3 x 4

Wood Grade: NO. 2

Spacing: 16" o.c.

SECTION PROPERTIES

Width: 2.5 in
 Depth: 3.5 in
 Area: 8.75 in²
 Sx: 5.10 in³
 Stud Height: 8.93 ft
 Ie/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1114 plf
 Floor Live Load 800 plf
 Roof Live Load 40 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	66	156	900	1.00	1.50	1.15	2484	0.06	0.067	1607
4. D + 0.75FL + 0.75EQ	1.6	50	117	900	1.00	1.50	1.15	2484	0.05	0.067	1607
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c ' (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + FL	1.00	2552	292	1350	1.00	1.15	1553	509	0.30	468	0.62
2. D + 0.75FL + 0.75RL	1.25	2325	266	1350	1.00	1.15	1941	509	0.25	478	0.56
3. D + EQ	1.6	1485	170	1350	1.00	1.15	2484	509	0.20	485	0.35
4. D + 0.75FL + 0.75EQ	1.6	2285	261	1350	1.00	1.15	2484	509	0.20	485	0.54
5. D + 0.75FL + 0.75RL + 0.75W	1.6	2325	266	1350	1.00	1.15	2484	509	0.20	485	0.55

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c)	D/C	
1. D + FL	0.39	0.00	0.62	← Governs
2. D + 0.75FL + 0.75RL	0.31	0.00	0.56	
3. D + EQ	0.12	0.09	0.22	
4. D + 0.75FL + 0.75EQ	0.29	0.10	0.39	

Deflection = 0.067 " = L / 1607 < L / 180 D/C = 0.11 ok
 Plate Bearing = 292 psi < 625 psi D/C = 0.47 ok

USE: 3 x 4 HEM FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.62

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STUDWALL ANALYSIS

4" Party Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2016

Unit: TYP

2nd Floor

Stud Size: 3 x 4 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 2.5 in
 Depth: 3.5 in
 Area: 8.75 in²
 Sx: 5.10 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1567 plf
 Floor Live Load 1200 plf
 Roof Live Load 40 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '12 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2016 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	Cr	F'b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	66	156	900	1.00	1.50	1.15	2484	0.06	0.067	1607
4. D + 0.75FL + 0.75EQ	1.6	50	117	900	1.00	1.50	1.15	2484	0.05	0.067	1607
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + FL	1.00	3689	422	1350	1.00	1.15	1553	509	0.30	468	0.90
2. D + 0.75FL + 0.75RL	1.25	3329	380	1350	1.00	1.15	1941	509	0.25	478	0.80
3. D + EQ	1.6	2089	239	1350	1.00	1.15	2484	509	0.20	485	0.49
4. D + 0.75FL + 0.75EQ	1.6	3289	376	1350	1.00	1.15	2484	509	0.20	485	0.77
5. D + 0.75FL + 0.75RL + 0.75W	1.6	3329	380	1350	1.00	1.15	2484	509	0.20	485	0.78

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + FL	0.81	0.00	0.90
2. D + 0.75FL + 0.75RL	0.63	0.00	0.80
3. D + EQ	0.24	0.12	0.36
4. D + 0.75FL + 0.75EQ	0.60	0.18	0.78

← Governs

Deflection = 0.067" = L / 1607 < L / 180 D/C = 0.11 ok
 Plate Bearing = 422 psi < 625 psi D/C = 0.67 ok

USE: 3 x 4 HEM FIR NO. 2 STUDS @ 16" o.c. OK
 Max D/C = 0.90

BY **ACM**

DATE 2/6/2019

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DATE _____

JOB NO. **18-234****Legacy Livermore****Katerra****STUDWALL ANALYSIS - Dead and Live Loads**Segment: Unit: **TYP****4" Corridor Wall (Nominal)-4 story**

Stud Height:	9.92 ft	Floor:	Roof		
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	4.5	32.0	20.0	144	90
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	0.0	31.0	40.0	0	0
Interior Corridor:	0.0	30.0	100.0	0	0
Corridor Walls	10.3	14.0	0.0	144	0

DL = 288 plf

LL = 0 plf
Lr = 90 plf

Stud Height:	8.93 ft	Floor:	4th		
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	1.0	32.0	40.0	32	40
Interior Corridor:	4.5	30.0	100.0	135	450
Corridor Walls	10.3	14.0	0.0	144	0

DL = 599 plf

LL = 490 plf
Lr = 90 plf

Stud Height:	8.93 ft	Floor:	3rd		
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	1.0	32.0	40.0	32	40
Interior Corridor:	4.5	30.0	100.0	135	450
Corridor Walls	10.2	14.0	0.0	143	0

DL = 909 plf

LL = 980 plf
Lr = 90 plf

Stud Height:	8.93 ft	Floor:	2nd		
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	1.0	32.0	40.0	32	40
Interior Corridor:	4.5	30.0	100.0	135	450
Corridor Walls	10.2	14.0	0.0	143	0

DL = 1219 plf

LL = 1470 plf
Lr = 90 plf

Max D/C = 0.87

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Legacy Livermore

Katerra

STUDWALL ANALYSIS

4" Corridor Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

Roof

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 9.92 ft
 le/d: 34.00 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 288 plf
 Floor Live Load 0 plf
 Roof Live Load 90 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	82	321	900	1.00	1.50	1.15	2484	0.13	0.169	703.4
4. D + 0.75FL + 0.75EQ	1.6	61	241	900	1.00	1.50	1.15	2484	0.10	0.169	703.4
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + RL	1.25	504	96	1350	1.00	1.15	1941	412	0.20	393	0.24
2. D + 0.75FL + 0.75RL	1.25	474	90	1350	1.00	1.15	1941	412	0.20	393	0.23
3. D + EQ	1.6	384	73	1350	1.00	1.15	2484	412	0.16	397	0.18
4. D + 0.75FL + 0.75EQ	1.6	384	73	1350	1.00	1.15	2484	412	0.16	397	0.18
5. D + 0.75FL + 0.75RL + 0.75W	1.6	474	90	1350	1.00	1.15	2484	412	0.16	397	0.23

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c E)	D/C
1. D + RL	0.06	0.00	0.24
2. D + 0.75FL + 0.75RL	0.05	0.00	0.23
3. D + EQ	0.03	0.16	0.19
4. D + 0.75FL + 0.75EQ	0.03	0.12	0.15

<--- Governs

Deflection = 0.169 " = L / 703 < L / 180 D/C = 0.26 ok
 Plate Bearing = 96 psi < 625 psi D/C = 0.15 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 16" o.c. **OK**
 Max D/C = 0.26

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Legacy Livermore

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STUDWALL ANALYSIS

4" Corridor Wall (Nominal)-4 story

Unit: TYP

KMC ver 1.3

Reference Building Code: CBC 2013

4th Floor

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1536000 psi
 FcL: 593.75 psi (bearing on plates)

LOADING CRITERIA

Dead Load 599 plf
 Floor Live Load 490 plf
 Roof Live Load 90 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	Cr	F'b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	66	260	900	1.00	1.50	1.15	2484	0.10	0.116	925.7
4. D + 0.75FL + 0.75EQ	1.6	50	195	900	1.00	1.50	1.15	2484	0.08	0.116	925.7
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + FL	1.00	1453	277	1350	1.00	1.15	1553	509	0.30	468	0.59
2. D + 0.75FL + 0.75RL	1.25	1379	263	1350	1.00	1.15	1941	509	0.25	478	0.55
3. D + EQ	1.6	799	152	1350	1.00	1.15	2484	509	0.20	485	0.31
4. D + 0.75FL + 0.75EQ	1.6	1289	246	1350	1.00	1.15	2484	509	0.20	485	0.51
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1379	263	1350	1.00	1.15	2484	509	0.20	485	0.54

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + FL	0.35	0.00	0.59
2. D + 0.75FL + 0.75RL	0.30	0.00	0.55
3. D + EQ	0.10	0.15	0.25
4. D + 0.75FL + 0.75EQ	0.26	0.15	0.41

<--- Governs

Deflection = 0.116 " = L / 926 < L / 180 D/C = 0.19 ok
 Plate Bearing = 277 psi < 593.75 psi D/C = 0.47 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.59

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Legacy Livermore

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STUDWALL ANALYSIS

4" Corridor Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

3rd Floor

Stud Size: 3 x 4 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 2.5 in
 Depth: 3.5 in
 Area: 8.75 in²
 Sx: 5.10 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 909 plf
 Floor Live Load 980 plf
 Roof Live Load 90 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	66	156	900	1.00	1.50	1.15	2484	0.06	0.067	1607
4. D + 0.75FL + 0.75EQ	1.6	50	117	900	1.00	1.50	1.15	2484	0.05	0.067	1607
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + FL	1.00	2519	288	1350	1.00	1.15	1553	509	0.30	468	0.61
2. D + 0.75FL + 0.75RL	1.25	2282	261	1350	1.00	1.15	1941	509	0.25	478	0.55
3. D + EQ	1.6	1212	139	1350	1.00	1.15	2484	509	0.20	485	0.29
4. D + 0.75FL + 0.75EQ	1.6	2192	251	1350	1.00	1.15	2484	509	0.20	485	0.52
5. D + 0.75FL + 0.75RL + 0.75W	1.6	2282	261	1350	1.00	1.15	2484	509	0.20	485	0.54

CONCLUSION

Load Combination	(fc / Fc) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + FL	0.38	0.00	0.61
2. D + 0.75FL + 0.75RL	0.30	0.00	0.55
3. D + EQ	0.08	0.09	0.17
4. D + 0.75FL + 0.75EQ	0.27	0.09	0.36

<--- Governs

Deflection = 0.067 " = L / 1607 < L / 180 D/C = 0.11 ok
 Plate Bearing = 288 psi < 625 psi D/C = 0.46 ok

USE: 3 x 4 HEM FIR NO. 2 STUDS @ 16" o.c. **OK**
 Max D/C = 0.61

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Katerra

STUDWALL ANALYSIS

KMC ver 1.3

4" Corridor Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

2nd Floor

Stud Size: 3 x 4

Wood Grade: NO. 2

Spacing: 16" o.c.

SECTION PROPERTIES

Width: 2.5 in
 Depth: 3.5 in
 Area: 8.75 in²
 Sx: 5.10 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1219 plf
 Floor Live Load 1470 plf
 Roof Live Load 90 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G									
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-
3. D + EQ	1.6	66	156	900	1.00	1.50	1.15	2484	0.06	0.067
4. D + 0.75FL + 0.75EQ	1.6	50	117	900	1.00	1.50	1.15	2484	0.05	0.067
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G									
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)
1. D + FL	1.00	3585	410	1350	1.00	1.15	1553	509	0.30	468
2. D + 0.75FL + 0.75RL	1.25	3185	364	1350	1.00	1.15	1941	509	0.25	478
3. D + EQ	1.6	1625	186	1350	1.00	1.15	2484	509	0.20	485
4. D + 0.75FL + 0.75EQ	1.6	3095	354	1350	1.00	1.15	2484	509	0.20	485
5. D + 0.75FL + 0.75RL + 0.75W	1.6	3185	364	1350	1.00	1.15	2484	509	0.20	485

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c)	D/C
1. D + FL	0.77	0.00	0.87
2. D + 0.75FL + 0.75RL	0.58	0.00	0.76
3. D + EQ	0.15	0.10	0.25
4. D + 0.75FL + 0.75EQ	0.53	0.15	0.69

← Governs

Deflection = 0.067 " = L/ 1607 < L/ 180 D/C = 0.11 ok
 Plate Bearing = 410 psi < 625 psi D/C = 0.66 ok

USE: 3 x 4 HEM FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.87

BY **ACM** DATE 2/6/2019
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF **I**
 JOB NO. **18-234**

Legacy Livermore

Katterra

STUDWALL ANALYSIS - Dead and Live Loads

Segment: Unit: **TYP**

6" Corridor Wall (Nominal)-4 story

Stud Height: 9.92 ft		Floor: Roof			
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	21.8	32.0	20.0	696	435
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	0.0	31.0	40.0	0	0
Interior Corridor:	0.0	30.0	100.0	0	0
Corridor Walls	10.3	14.0	0.0	144	0

DL = **840 plf**

LL = **0 plf**
 Lr = **435 plf**

Stud Height: 8.93 ft		Floor: 4th			
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	1.0	32.0	40.0	32	40
Interior Corridor:	4.4	30.0	100.0	132	440
Corridor Walls	10.3	14.0	0.0	144	0

DL = **1148 plf**

LL = **480 plf**
 Lr = **435 plf**

Stud Height: 8.93 ft		Floor: 3rd			
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	1.0	32.0	40.0	32	40
Interior Corridor:	4.4	30.0	100.0	132	440
Corridor Walls	10.2	14.0	0.0	143	0

DL = **1455 plf**

LL = **960 plf**
 Lr = **435 plf**

Stud Height: 8.93 ft		Floor: 2nd			
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	1.0	32.0	40.0	32	40
Interior Corridor:	4.4	30.0	100.0	132	440
Corridor Walls	10.2	14.0	0.0	143	0

DL = **1762 plf**

LL = **1440 plf**
 Lr = **435 plf**

Max D/C = **0.83**

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 18-234

Legacy Livermore

Katerra

STUDWALL ANALYSIS

KMC ver 1.3

6" Corridor Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

Roof

Stud Size: 2 x 6 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 9.92 ft
 Ie/d: 21.64 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 840 plf
 Floor Live Load 0 plf
 Roof Live Load 435 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)	L / δ
1. D + RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + EQ	1.6	82	130	900	1.00	1.30	1.15	2153	0.06	0.044	2730
4. D + 0.75FL + 0.75EQ	1.6	61	98	900	1.00	1.30	1.15	2153	0.05	0.044	2730
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.30	1.15	2153	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + RL	1.25	1700	206	1350	1.00	1.10	1856	1018	0.47	867	0.24
2. D + 0.75FL + 0.75RL	1.25	1555	189	1350	1.00	1.10	1856	1018	0.47	867	0.22
3. D + EQ	1.6	1120	136	1350	1.00	1.10	2376	1018	0.38	907	0.15
4. D + 0.75FL + 0.75EQ	1.6	1120	136	1350	1.00	1.10	2376	1018	0.38	907	0.15
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1555	189	1350	1.00	1.10	2376	1018	0.38	907	0.21

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C	
1. D + RL	0.06	0.00	0.24	← Governs
2. D + 0.75FL + 0.75RL	0.05	0.00	0.22	
3. D + EQ	0.02	0.07	0.09	
4. D + 0.75FL + 0.75EQ	0.02	0.05	0.07	

Deflection = 0.044 " = L / 2730 < L / 180 D/C = 0.07 ok
 Plate Bearing = 206 psi < 625 psi D/C = 0.33 ok

USE: 2 x 6 HEM FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.33

BY ACM DATE 02/06/19
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PEOPLES ASSOCIATES
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SHEET NO. _____ OF _____
 JOB NO. 18-234

Legacy Livermore

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STUDWALL ANALYSIS

6" Corridor Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

4th Floor

Stud Size: 2 x 6 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 8.93 ft
 le/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1536000 psi
 FcL: 593.75 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1148 plf
 Floor Live Load 480 plf
 Roof Live Load 435 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.30	1.15	1346	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + EQ	1.6	66	105	900	1.00	1.30	1.15	2153	0.05	0.030	3592
4. D + 0.75FL + 0.75EQ	1.6	50	79	900	1.00	1.30	1.15	2153	0.04	0.030	3592
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.30	1.15	2153	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + FL	1.00	2171	263	1350	1.00	1.10	1485	1257	0.63	937	0.28
2. D + 0.75FL + 0.75RL	1.25	2446	297	1350	1.00	1.10	1856	1257	0.55	1013	0.29
3. D + EQ	1.6	1531	186	1350	1.00	1.10	2376	1257	0.45	1078	0.17
4. D + 0.75FL + 0.75EQ	1.6	2011	244	1350	1.00	1.10	2376	1257	0.45	1078	0.23
5. D + 0.75FL + 0.75RL + 0.75W	1.6	2446	297	1350	1.00	1.10	2376	1257	0.45	1078	0.28

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + FL	0.08	0.00	0.28
2. D + 0.75FL + 0.75RL	0.09	0.00	0.29
3. D + EQ	0.03	0.06	0.09
4. D + 0.75FL + 0.75EQ	0.05	0.05	0.10

← Governs

Deflection = 0.030 " = L / 3592 < L / 180 D/C = 0.05 ok
 Plate Bearing = 297 psi < 593.75 psi D/C = 0.50 ok

USE: 2 x 6 HEM FIR NO. 2 STUDS @ 16" o.c. OK
 Max D/C = 0.50

BY ACM DATE 02/06/19
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PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 18-234

Legacy Livermore

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STUDWALL ANALYSIS

KMC ver 1.3

6" Corridor Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

3rd Floor

Stud Size: 2 x 6 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 8.93 ft
 Ie/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1455 plf
 Floor Live Load 960 plf
 Roof Live Load 435 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G									
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)
1. D + FL	1.00	0	0	900	1.00	1.30	1.15	1346	0.00	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-
3. D + EQ	1.6	66	105	900	1.00	1.30	1.15	2153	0.05	0.029
4. D + 0.75FL + 0.75EQ	1.6	50	79	900	1.00	1.30	1.15	2153	0.04	0.029
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.30	1.15	2153	0.00	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G									
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _{cE} (psi)	C _p	F' _c (psi)
1. D + FL	1.00	3220	390	1350	1.00	1.10	1485	1257	0.63	937
2. D + 0.75FL + 0.75RL	1.25	3335	404	1350	1.00	1.10	1856	1257	0.55	1013
3. D + EQ	1.6	1940	235	1350	1.00	1.10	2376	1257	0.45	1078
4. D + 0.75FL + 0.75EQ	1.6	2900	352	1350	1.00	1.10	2376	1257	0.45	1078
5. D + 0.75FL + 0.75RL + 0.75W	1.6	3335	404	1350	1.00	1.10	2376	1257	0.45	1078

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F _{cE})	D/C
1. D + FL	0.17	0.00	0.42
2. D + 0.75FL + 0.75RL	0.16	0.00	0.40
3. D + EQ	0.05	0.06	0.11
4. D + 0.75FL + 0.75EQ	0.11	0.05	0.16

← Governs

Deflection = 0.029 " = L / 3742 < L / 180 D/C = 0.05 ok
 Plate Bearing = 404 psi < 625 psi D/C = 0.65 ok

USE: 2 x 6 HEM FIR NO. 2 STUDS @ 16" o.c. **OK**
 Max D/C = 0.65

BY ACM DATE 02/06/19
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PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 18-234

Legacy Livermore

Katerra

STUDWALL ANALYSIS

6" Corridor Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

2nd Floor

Stud Size: 2 x 6 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 8.93 ft
 le/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1762 plf
 Floor Live Load 1440 plf
 Roof Live Load 435 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.30	1.15	1346	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + EQ	1.6	66	105	900	1.00	1.30	1.15	2153	0.05	0.029	3742
4. D + 0.75FL + 0.75EQ	1.6	50	79	900	1.00	1.30	1.15	2153	0.04	0.029	3742
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.30	1.15	2153	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _{cE} (psi)	C _p	F' _c (psi)	D/C
1. D + FL	1.00	4269	517	1350	1.00	1.10	1485	1257	0.63	937	0.55
2. D + 0.75FL + 0.75RL	1.25	4224	512	1350	1.00	1.10	1856	1257	0.55	1013	0.51
3. D + EQ	1.6	2349	285	1350	1.00	1.10	2376	1257	0.45	1078	0.26
4. D + 0.75FL + 0.75EQ	1.6	3789	459	1350	1.00	1.10	2376	1257	0.45	1078	0.43
5. D + 0.75FL + 0.75RL + 0.75W	1.6	4224	512	1350	1.00	1.10	2376	1257	0.45	1078	0.48

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F _{cE})	D/C
1. D + FL	0.31	0.00	0.55
2. D + 0.75FL + 0.75RL	0.26	0.00	0.51
3. D + EQ	0.07	0.06	0.13
4. D + 0.75FL + 0.75EQ	0.18	0.06	0.24

← Governs

Deflection = 0.029" = L / 3742 < L / 180 D/C = 0.05 ok
 Plate Bearing = 517 psi < 625 psi D/C = 0.83 ok

USE: 2 x 6 HEM FIR NO. 2 STUDS @ 16" o.c. OK
 Max D/C = 0.83

BY **ACM** DATE 2/6/2019
 CHKD. BY DATE

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. OF 1
 JOB NO. 18-234

Legacy Livermore

Katerra

STUDWALL ANALYSIS - Dead and Live Loads

Segment: Unit: **TYP**

6" Staggered Corridor Wall (Nominal)-4 story

Stud Height:	9.92	ft	Floor:	Roof		
	Trib.		Dead	Live	Dead	Live
	Width (ft.)		Load (psf)	Load (psf)	Load (plf)	Load (plf)
Roof	21.8		32.0	20.0	696	435
Exterior Walls	0.0		19.0	0.0	0	0
Floor:	0.0		31.0	40.0	0	0
Interior Corridor:	0.0		30.0	100.0	0	0
Corridor Walls	10.3		14.0	0.0	144	0

DL = 840 plf

LL = 0 plf
 Lr = 435 plf

Stud Height: 8.93 ft		Floor: 4th			
	Trib.	Dead	Live	Dead	Live
	Width (ft.)	Load (psf)	Load (psf)	Load (plf)	Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	1.0	31.0	40.0	31	40
Interior Corridor:	4.4	30.0	100.0	132	440
Corridor Walls	10.3	14.0	0.0	144	0

DL = 1147 plf

LL = 480 plf
 Lr = 435 plf

Stud Height: 8.93 ft	Floor: 3rd			
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	
			Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0
Exterior Walls	0.0	19.0	0.0	0
Floor:	1.0	31.0	40.0	40
Interior Corridor:	4.4	30.0	100.0	440
Corridor Walls	10.2	14.0	0.0	0

DL = 1453 plf

LL = 960 plf
 Lr = 435 plf

Stud Height: 8.93 ft		Floor: 2nd			
	Trib.	Dead	Live	Dead	Live
	Width (ft.)	Load (psf)	Load (psf)	Load (plf)	Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	0.0	19.0	0.0	0	0
Floor:	1.0	31.0	40.0	31	40
Interior Corridor:	4.4	30.0	100.0	132	440
Corridor Walls	10.2	14.0	0.0	143	0

DL = 1759 plf

LL = 1440 plf
 Lr = 435 plf

Max D/C = 0.87

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 18-234

Legacy Livermore

Katerra

STUDWALL ANALYSIS

KMC ver 1.3

6" Staggered Corridor Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

Roof

Stud Size: 2 x 4

Wood Grade: NO. 2

Spacing: 8" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 9.92 ft
 le/d: 34.00 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 840 plf
 Floor Live Load 0 plf
 Roof Live Load 435 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	41	161	900	1.00	1.50	1.15	2484	0.06	0.085	1407
4. D + 0.75FL + 0.75EQ	1.6	31	120	900	1.00	1.50	1.15	2484	0.05	0.085	1407
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + RL	1.25	850	162	1350	1.00	1.15	1941	412	0.20	393	0.41
2. D + 0.75FL + 0.75RL	1.25	778	148	1350	1.00	1.15	1941	412	0.20	393	0.38
3. D + EQ	1.6	560	107	1350	1.00	1.15	2484	412	0.16	397	0.27
4. D + 0.75FL + 0.75EQ	1.6	560	107	1350	1.00	1.15	2484	412	0.16	397	0.27
5. D + 0.75FL + 0.75RL + 0.75W	1.6	778	148	1350	1.00	1.15	2484	412	0.16	397	0.37

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c E)	D/C
1. D + RL	0.17	0.00	0.41
2. D + 0.75FL + 0.75RL	0.14	0.00	0.38
3. D + EQ	0.07	0.09	0.16
4. D + 0.75FL + 0.75EQ	0.07	0.07	0.14

← Governs

Deflection = 0.085 " = L / 1407 < L / 180 D/C = 0.13 ok
 Plate Bearing = 162 psi < 625 psi D/C = 0.26 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 8 " o.c. **OK**
 Max D/C = 0.41

BY ACM DATE 02/06/19
 CHKD, BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 18-234

Legacy Livermore

Katerra

STUDWALL ANALYSIS

KMC ver 1.3

6" Staggered Corridor Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

4th Floor

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 8" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1536000 psi
 FcL: 593.75 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1147 plf
 Floor Live Load 480 plf
 Roof Live Load 435 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G									
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-
3. D + EQ	1.6	33	130	900	1.00	1.50	1.15	2484	0.05	0.058
4. D + 0.75FL + 0.75EQ	1.6	25	98	900	1.00	1.50	1.15	2484	0.04	0.058
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G									
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)
1. D + FL	1.00	1085	207	1350	1.00	1.15	1553	509	0.30	468
2. D + 0.75FL + 0.75RL	1.25	1222	233	1350	1.00	1.15	1941	509	0.25	478
3. D + EQ	1.6	765	146	1350	1.00	1.15	2484	509	0.20	485
4. D + 0.75FL + 0.75EQ	1.6	1005	191	1350	1.00	1.15	2484	509	0.20	485
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1222	233	1350	1.00	1.15	2484	509	0.20	485

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + FL	0.19	0.00	0.44
2. D + 0.75FL + 0.75RL	0.24	0.00	0.49
3. D + EQ	0.09	0.07	0.16
4. D + 0.75FL + 0.75EQ	0.16	0.06	0.22

← Governs

Deflection = 0.058 " = L / 1851 < L / 180 D/C = 0.10 ok
 Plate Bearing = 233 psi < 593.75 psi D/C = 0.39 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 8" o.c. **OK**
 Max D/C = 0.49

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

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STUDWALL ANALYSIS

6" Staggered Corridor Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

3rd Floor

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 8" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 8.93 ft
 le/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1453 plf
 Floor Live Load 960 plf
 Roof Live Load 435 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-	-
3. D + EQ	1.6	33	130	900	1.00	1.50	1.15	2484	0.05	0.056	1929
4. D + 0.75FL + 0.75EQ	1.6	25	98	900	1.00	1.50	1.15	2484	0.04	0.056	1929
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _{cE} (psi)	C _p	F' _c (psi)	D/C
1. D + FL	1.00	1609	306	1350	1.00	1.15	1553	509	0.30	468	0.65
2. D + 0.75FL + 0.75RL	1.25	1666	317	1350	1.00	1.15	1941	509	0.25	478	0.66
3. D + EQ	1.6	969	185	1350	1.00	1.15	2484	509	0.20	485	0.38
4. D + 0.75FL + 0.75EQ	1.6	1449	276	1350	1.00	1.15	2484	509	0.20	485	0.57
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1666	317	1350	1.00	1.15	2484	509	0.20	485	0.65

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F'b (1 - f _c / F _{cE})	D/C
1. D + FL	0.43	0.00	0.65
2. D + 0.75FL + 0.75RL	0.44	0.00	0.66
3. D + EQ	0.14	0.08	0.23
4. D + 0.75FL + 0.75EQ	0.32	0.09	0.41

<--- Governs

Deflection = 0.056" = L / 1929 < L / 180 D/C = 0.09 ok
 Plate Bearing = 317 psi < 625 psi D/C = 0.51 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 8" o.c. OK
 Max D/C = 0.66

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

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SHEET NO. _____ OF _____
 JOB NO. 18-234

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STUDWALL ANALYSIS

KMC ver 1.3

6" Staggered Corridor Wall (Nominal)-4 story

Reference Building Code: CBC 2013

Unit: TYP

2nd Floor

Stud Size: 2 x 4 Wood Grade: NO. 2 Spacing: 8" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 3.5 in
 Area: 5.25 in²
 Sx: 3.06 in³
 Stud Height: 8.93 ft
 Ie/d: 30.61 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*
 Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1759 plf
 Floor Live Load 1440 plf
 Roof Live Load 435 plf
 Earthquake 5 psf
 Wind Load 0 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G									
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)
1. D + FL	1.00	0	0	900	1.00	1.50	1.15	1553	0.00	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.50	1.15	1941	0.00	-
3. D + EQ	1.6	33	130	900	1.00	1.50	1.15	2484	0.05	0.056
4. D + 0.75FL + 0.75EQ	1.6	25	98	900	1.00	1.50	1.15	2484	0.04	0.056
5. D + 0.75FL + 0.75RL + 0.75W	1.6	0	0	900	1.00	1.50	1.15	2484	0.00	-

Load Combinations	C O M P R E S S I O N / B U C K L I N G									
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _{cE} (psi)	C _p	F' _c (psi)
1. D + FL	1.00	2133	406	1350	1.00	1.15	1553	509	0.30	468
2. D + 0.75FL + 0.75RL	1.25	2110	402	1350	1.00	1.15	1941	509	0.25	478
3. D + EQ	1.6	1173	223	1350	1.00	1.15	2484	509	0.20	485
4. D + 0.75FL + 0.75EQ	1.6	1893	361	1350	1.00	1.15	2484	509	0.20	485
5. D + 0.75FL + 0.75RL + 0.75W	1.6	2110	402	1350	1.00	1.15	2484	509	0.20	485

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _{cE})	D/C
1. D + FL	0.75	0.00	0.87
2. D + 0.75FL + 0.75RL	0.71	0.00	0.84
3. D + EQ	0.21	0.09	0.31
4. D + 0.75FL + 0.75EQ	0.55	0.13	0.69

← Governs

Deflection = 0.056 " = L / 1929 < L / 180 D/C = 0.09 ok
 Plate Bearing = 406 psi < 625 psi D/C = 0.65 ok

USE: 2 x 4 HEM FIR NO. 2 STUDS @ 8" o.c. **OK**
 Max D/C = 0.87

BY ACM DATE 2/6/2019
 CHKD. BY DATE

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. OF
 JOB NO. **17-234**

Legacy of Livermore

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STUDWALL ANALYSIS - Dead and Live Loads

Segment: Unit: TYP

6" Exterior Wall (Nominal)-4 story

Stud Height:	9.92 ft	Floor:	Roof		
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	20.0	32.0	20.0	640	400
Exterior Walls	10.3	19.0	0.0	196	0
Floor:	0.0	31.0	40.0	0	0
Interior Corridor:	0.0	30.0	100.0	0	0
Deck	4.0	25.0	60.0	100	240

DL = 936 plf

LL = 240 plf
 Lr = 400 plf

Stud Height:	8.93 ft	Floor:	4th		
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	10.3	19.0	0.0	196	0
Floor:	1.0	31.0	40.0	31	40
Interior Corridor:	0.0	30.0	100.0	0	0
Deck	3.5	25.0	60.0	88	210

DL = 1250 plf

LL = 490 plf
 Lr = 400 plf

Stud Height:	8.93 ft	Floor:	3rd		
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	10.2	19.0	0.0	194	0
Floor:	1.0	31.0	40.0	31	40
Interior Corridor:	0.0	30.0	100.0	0	0
Deck	3.5	25.0	60.0	88	210

DL = 1562 plf

LL = 740 plf
 Lr = 400 plf

Stud Height:	8.93 ft	Floor:	2nd		
	Trib. Width (ft.)	Dead Load (psf)	Live Load (psf)	Dead Load (plf)	Live Load (plf)
Roof	0.0	32.0	20.0	0	0
Exterior Walls	10.2	19.0	0.0	194	0
Floor:	1.0	31.0	40.0	31	40
Interior Corridor:	0.0	30.0	100.0	0	0
Deck	3.5	25.0	60.0	88	210

DL = 1875 plf

LL = 990 plf
 Lr = 400 plf

Max D/C = 0.75

BY ACM DATE 02/06/19
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PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 17-234

Legacy of Livermore

Kattera

STUDWALL ANALYSIS

6" Exterior Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

Roof

Stud Size: 2 x 6

Wood Grade: NO. 2

Spacing: 16 " o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 9.92 ft
 Ie/d: 21.64 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 936 plf
 Floor Live Load 240 plf
 Roof Live Load 400 plf
 Earthquake 5 psf
 Wind Load 24.22 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	fb (psi)	Fb (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)	L / δ
1. D + RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + W	1.6	397	630	900	1.00	1.30	1.15	2153	0.29	0.211	563.5
4. D + 0.75FL + 0.75EQ	1.6	61	98	900	1.00	1.30	1.15	2153	0.05	0.044	2730
5. D + 0.75FL + 0.75RL + 0.75W	1.6	298	472	900	1.00	1.30	1.15	2153	0.22	0.211	563.5

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	fc (psi)	Fc (psi)	C _M	C _F	Fc* (psi)	FcE (psi)	C _p	F'c (psi)	D/C
1. D + RL	1.25	1781	216	1350	1.00	1.10	1856	1018	0.47	867	0.25
2. D + 0.75FL + 0.75RL	1.25	1888	229	1350	1.00	1.10	1856	1018	0.47	867	0.26
3. D + W	1.6	1248	151	1350	1.00	1.10	2376	1018	0.38	907	0.17
4. D + 0.75FL + 0.75EQ	1.6	1488	180	1350	1.00	1.10	2376	1018	0.38	907	0.20
5. D + 0.75FL + 0.75RL + 0.75W	1.6	1888	229	1350	1.00	1.10	2376	1018	0.38	907	0.25

CONCLUSION

Load Combination	(fc / F'c) ²	fb / F'b (1 - fc / FcE)	D/C
1. D + RL	0.06	0.00	0.25
2. D + 0.75FL + 0.75RL	0.07	0.00	0.26
3. D + W	0.03	0.34	0.37
4. D + 0.75FL + 0.75EQ	0.04	0.06	0.09
5. D + 0.75FL + 0.75RL + 0.75W	0.06	0.28	0.35

← Governs

Deflection = 0.211 " = L / 564 < L / 252 D/C = 0.45 ok
 Plate Bearing = 229 psi < 625 psi D/C = 0.37 ok

USE: 2 x 6 HEM FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.45

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 17-234

Legacy of Livermore

Katterra

STUDWALL ANALYSIS

6" Exterior Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

4th Floor

Stud Size: 2 x 6 Wood Grade: NO. 2 Spacing: 16" o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 8.93 ft
 le/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1250 plf
 Floor Live Load 490 plf
 Roof Live Load 400 plf
 Earthquake 5 psf
 Wind Load 24.22 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F'b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.30	1.15	1346	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + W	1.6	322	510	900	1.00	1.30	1.15	2153	0.24	0.139	772.5
4. D + 0.75FL + 0.75EQ	1.6	50	79	900	1.00	1.30	1.15	2153	0.04	0.029	3742
5. D + 0.75FL + 0.75RL + 0.75W	1.6	241	383	900	1.00	1.30	1.15	2153	0.18	0.139	772.5

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + FL	1.00	2320	281	1350	1.00	1.10	1485	1257	0.63	937	0.30
2. D + 0.75FL + 0.75RL	1.25	2557	310	1350	1.00	1.10	1856	1257	0.55	1013	0.31
3. D + W	1.6	1667	202	1350	1.00	1.10	2376	1257	0.45	1078	0.19
4. D + 0.75FL + 0.75EQ	1.6	2157	261	1350	1.00	1.10	2376	1257	0.45	1078	0.24
5. D + 0.75FL + 0.75RL + 0.75W	1.6	2557	310	1350	1.00	1.10	2376	1257	0.45	1078	0.29

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F'b (1 - f _c / F' _c E)	D/C
1. D + FL	0.09	0.00	0.30
2. D + 0.75FL + 0.75RL	0.09	0.00	0.31
3. D + W	0.04	0.28	0.32
4. D + 0.75FL + 0.75EQ	0.06	0.05	0.11
5. D + 0.75FL + 0.75RL + 0.75W	0.08	0.24	0.32

← Governs

Deflection = 0.139 " = L / 772 < L / 252 D/C = 0.33 ok
 Plate Bearing = 310 psi < 625 psi D/C = 0.50 ok

USE: 2 x 6 HEM FIR NO. 2 STUDS @ 16 " o.c. **OK**
 Max D/C = 0.50

BY ACM DATE 02/06/19
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 17-234

Legacy of Livermore

Katerra

STUDWALL ANALYSIS

6" Exterior Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

3rd Floor

Stud Size: 2 x 6 Wood Grade: NO. 2 Spacing: 16 " o.c.

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: 8.93 ft
 Ie/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi
 FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load 1562 plf
 Floor Live Load 740 plf
 Roof Live Load 400 plf
 Earthquake 5 psf
 Wind Load 24.22 psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.30	1.15	1346	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + W	1.6	322	510	900	1.00	1.30	1.15	2153	0.24	0.139	772.5
4. D + 0.75FL + 0.75EQ	1.6	50	79	900	1.00	1.30	1.15	2153	0.04	0.029	3742
5. D + 0.75FL + 0.75RL + 0.75W	1.6	241	383	900	1.00	1.30	1.15	2153	0.18	0.139	772.5

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + FL	1.00	3070	372	1350	1.00	1.10	1485	1257	0.63	937	0.40
2. D + 0.75FL + 0.75RL	1.25	3223	391	1350	1.00	1.10	1856	1257	0.55	1013	0.39
3. D + W	1.6	2083	252	1350	1.00	1.10	2376	1257	0.45	1078	0.23
4. D + 0.75FL + 0.75EQ	1.6	2823	342	1350	1.00	1.10	2376	1257	0.45	1078	0.32
5. D + 0.75FL + 0.75RL + 0.75W	1.6	3223	391	1350	1.00	1.10	2376	1257	0.45	1078	0.36

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c E)	D/C
1. D + FL	0.16	0.00	0.40
2. D + 0.75FL + 0.75RL	0.15	0.00	0.39
3. D + W	0.05	0.30	0.35
4. D + 0.75FL + 0.75EQ	0.10	0.05	0.15
5. D + 0.75FL + 0.75RL + 0.75W	0.13	0.26	0.39

← Governs

Deflection = 0.139 " = L / 772 < L / 252 D/C = 0.33 ok
 Plate Bearing = 391 psi < 625 psi D/C = 0.63 ok

USE: 2 x 6 HEM FIR NO. 2 STUDS @ 16 " o.c. OK
 Max D/C = 0.63

BY **ACM** DATE **02/06/19**
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. **17-234**

Legacy of Livermore

Katerra

STUDWALL ANALYSIS

6" Exterior Wall (Nominal)-4 story

KMC ver 1.3

Reference Building Code: CBC 2013

Unit: TYP

2nd Floor

Stud Size: **2 x 6** Wood Grade: **NO. 2** Spacing: **16" o.c.**

SECTION PROPERTIES

Width: 1.5 in
 Depth: 5.5 in
 Area: 8.25 in²
 Sx: 7.56 in³
 Stud Height: **8.93** ft
 Ie/d: 19.48 < 50 ok

HEM FIR NO. 2 MATERIAL PROPERTIES*

Fb: 900 psi
 Fc: 1350 psi
 E'min: 580000 psi
 c: 0.8 (sawn lumber)
 E': 1600000 psi

FcL: 625 psi (bearing on plates)

LOADING CRITERIA

Dead Load **1875** plf
 Floor Live Load **990** plf
 Roof Live Load **400** plf
 Earthquake **5** psf
 Wind Load **24.22** psf

* Design capacities based of '05 NDS Specifications

Note: Minimum 5 psf lateral load as required per 2013 CBC Section 1607.14

DESIGN AND ANALYSIS

Load Combinations	B E N D I N G										
	C _D	M (lb-ft)	f _b (psi)	F _b (psi)	C _M	C _F	C _r	F' _b (psi)	D/C	δ (in)	L / δ
1. D + FL	1.00	0	0	900	1.00	1.30	1.15	1346	0.00	-	-
2. D + 0.75FL + 0.75RL	1.25	0	0	900	1.00	1.30	1.15	1682	0.00	-	-
3. D + W	1.6	322	510	900	1.00	1.30	1.15	2153	0.24	0.139	772.5
4. D + 0.75FL + 0.75EQ	1.6	50	79	900	1.00	1.30	1.15	2153	0.04	0.029	3742
5. D + 0.75FL + 0.75RL + 0.75W	1.6	241	383	900	1.00	1.30	1.15	2153	0.18	0.139	772.5

Load Combinations	C O M P R E S S I O N / B U C K L I N G										
	C _D	P (lb)	f _c (psi)	F _c (psi)	C _M	C _F	F _c * (psi)	F _c E (psi)	C _p	F' _c (psi)	D/C
1. D + FL	1.00	3819	463	1350	1.00	1.10	1485	1257	0.63	937	0.49
2. D + 0.75FL + 0.75RL	1.25	3889	471	1350	1.00	1.10	1856	1257	0.55	1013	0.47
3. D + W	1.6	2499	303	1350	1.00	1.10	2376	1257	0.45	1078	0.28
4. D + 0.75FL + 0.75EQ	1.6	3489	423	1350	1.00	1.10	2376	1257	0.45	1078	0.39
5. D + 0.75FL + 0.75RL + 0.75W	1.6	3889	471	1350	1.00	1.10	2376	1257	0.45	1078	0.44

CONCLUSION

Load Combination	(f _c / F' _c) ²	f _b / F' _b (1 - f _c / F' _c E)	D/C
1. D + FL	0.24	0.00	0.49
2. D + 0.75FL + 0.75RL	0.22	0.00	0.47
3. D + W	0.08	0.31	0.39
4. D + 0.75FL + 0.75EQ	0.15	0.06	0.21
5. D + 0.75FL + 0.75RL + 0.75W	0.19	0.28	0.48

← Governs

Deflection = 0.139 " = L / 772 < L / 252 D/C = 0.33 ok
 Plate Bearing = 471 psi < 625 psi D/C = 0.75 ok

USE: **2 x 6** **HEM FIR NO. 2** **STUDS @ 16 " o.c.** **OK**
 Max D/C = 0.75

BY: EJK DATE: 2/6/19
CHKD. BY: _____ DATE: _____



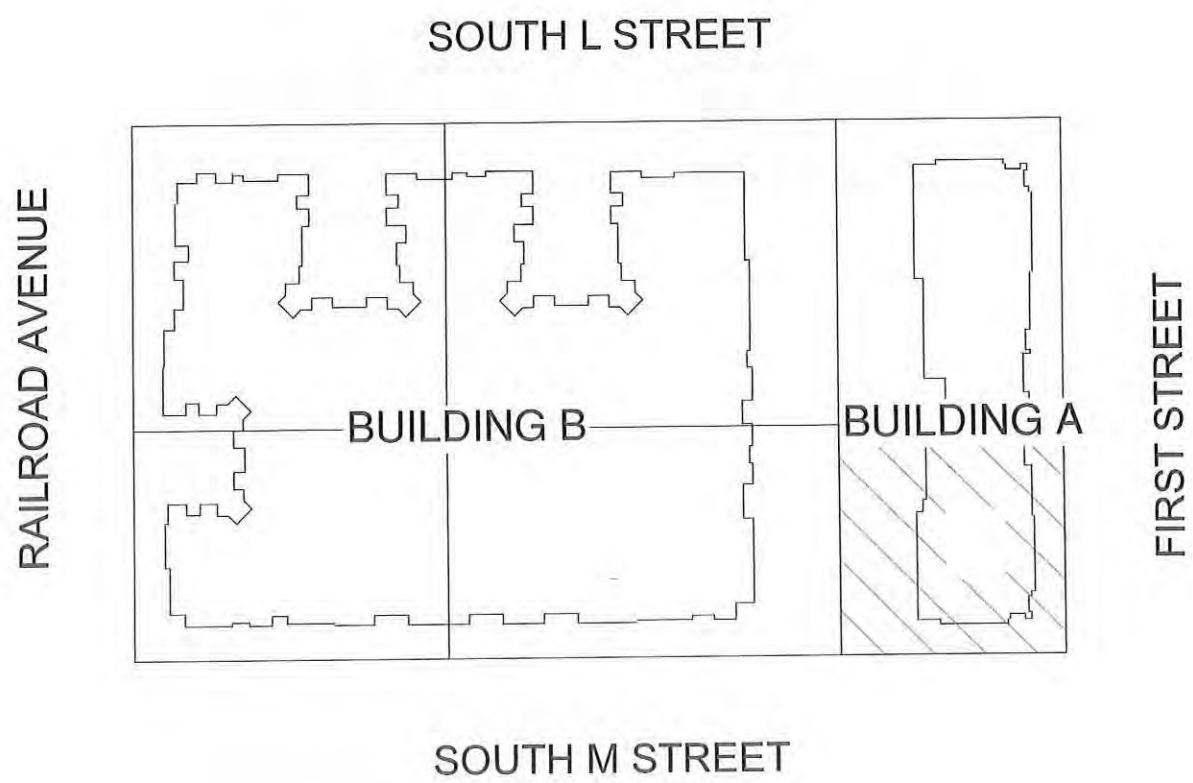
SHEET NO: _____ OF _____
JOB NO: 18-234

LEGACY AT LIVERMORE

KATERRA

WOOD SUPERSTRUCTURE LATERAL SYSTEM

THE WOOD SUPERSTRUCTURE LATERAL SYSTEM ANALYSIS CONSIST OF 2 BUILDINGS. BUILDING A IS A 2 STORY BUILDING WITH OVER A 1 STORY RETAIL PODIUM. BUILDING B IS A 4 STORY WOOD STRUCTURE WRAPPING AROUND A CONCRETE PARKING GARAGE. ROOF IS FRAMED WITH LOW SLOPED TRUSSES WITH BUILT-IN MANSARDS AND FLOOR IS FRAMED WITH 11-7/8 I-JOISTS. ALL FLOORS WERE ANALYZED AS RIGID DIAPHRAGMS DUE TO CONSISTENT PLATE HEIGHTS AND LOW SLOPE ROOF TRUSSES.



BY ACM DATE 2/6/2019
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

 SHEET NO. _____ OF _____
 JOB NO. 18-234
LEGACY LIVERMORE**KATERRA****LATERAL ANALYSIS****Seismic Loads**

Element	Area (ft ²)	Unit Weight (psf)	Weight (lbs)
Elements Tributary to Roof Level			
10.25 Low Sloped Roof	16846	18.0	303228
Mansard Over Low Slope Roof	5258	26.0	136708
	0	0.0	0
Interior Studwalls	9167	9.5	87090
Exterior Studwalls*	3241	19.0	61584
Interior Corridor Studwalls	2440	14.0	34153
	0	0.0 (PLF)	0
Party Walls	2051	12.0	24615
Windows	972	8.0	7779
* 25% Ext. Walls Considered Windows			
Total Weight Tributary to Roof:			655157 lbs
Area:			22104 sq ft
Elements Tributary to 3rd floor Level			
9.83333 Low Sloped Roof	0	18.0	0
Mansard Over Low Slope Roof	0	26.0	0
Floor Framing	18510	30.0	555300
Private Balcony	1218	25.0	30450
Corridor	1128	30.0	33840
Interior Studwalls	17589	9.5	167099
Exterior Studwalls*	6219	19.0	118160
Interior Corridor Studwalls	4681	14.0	65529
	0	0.0 (PLF)	0
Party Walls	4019	12.0	48230
Windows	2073	8.0	16584
* 25% Ext. Walls Considered Windows			
Total Weight Tributary to 3rd floor:			1035193 lbs
Area:			20856 sq ft

29.64

12.01818

49.64

Total Weight of Structure (W) = 1690350

Seismic Forces in the North/South Direction

$$S_{DS} = 1.010$$

$$E_h = p \cdot V = 0.155 \text{ (LRFD)}$$

$$E_v = 0.2 \cdot S_{DS} \cdot D = 0.202 \text{ (LRFD)}$$

$$V = (E_h) \cdot W / 1.4 = 187,146 \text{ lbs (ASD)}$$

**See Design Criteria for calculation of Base Shear Coefficients

Seismic Forces in the East/West Direction

$$S_{DS} = 1.010$$

$$E_h = p \cdot V = 0.155 \text{ (LRFD)}$$

$$E_v = 0.2 \cdot S_{DS} \cdot D = 0.202 \text{ (LRFD)}$$

$$V = (E_h) \cdot W / 1.4 = 187,146 \text{ lbs (ASD)}$$



BY ACM DATE 2/6/2019
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 18-234

LEGACY LIVERMORE

KATERRA

LATERAL ANALYSIS

Distribution of Forces

Level	Weight, W (lbs)	Cum W (lbs)	Height, h (ft)	W*h	% W*h (%)	Fx (lbs)	Cum Fx (lbs)	Fx Area Load (psf)
Roof	655157	655157	21.0	13758291	55%	103462	103462	4.7
3rd floor	1035193	1690350	10.8	11128323	45%	83684	187146	4.0

Total	1690350			24886614	100%	187146		
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Wind Loads

Level	Elevation (ft)	Wind Pressure (psf)
Roof	21.0	14.0
3rd floor	10.8	14.0

Diaphragm Level	North/South		East/West	
	Area	Force	Area	Force
Roof	772 sf	10803 lbs	2974 sf	41642 lbs
3rd floor	0 sf	0 lbs	0 sf	0 lbs

Governing Lateral Loads

Level	North/South		Governing		East/West		Governing	
	Wind (lb)	Seismic (lb)	Load		Wind (lb)	Seismic (lb)	Load	
Roof	10803	103462	(SEISMIC)		41642	103462	(SEISMIC)	
3rd floor	10803	187146	(SEISMIC)		41642	187146	(SEISMIC)	

Diaphragm Forces**

Level	Upper (lbs)	Actual (lbs)	Lower (lbs)	Diaphragm (lbs)	Fpx (psf)	Diaph Factor, λ
Roof	189060	103462	94530	103462	4.7	1.00
3rd floor	298727	114611	149364	149364	7.2	0.80

$S_{DS} = 1.01$
 $I = 1.00$

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level,**Area at base = 22104 ft²

Story Shear Center of Mass Diaphragm Dimensions

Vx = 103 k

Xm = 192.4'

X = 73.5'

Accidental Eccentricity (5%)

x-dir. Eac. = 3.7' <--- E/W

Vy = 103 k

Ym = 184.5'

Y = 283.3'

y-dir. Eac. = 14.2' <--- N/S

N/S	Building	Location		Angle	Length		Kx	Ky	Kx * Y	Ky * X	X Bar	Y Bar	Kx*y^2	Ky*x^2	h/w
	Line	X	Y	(degrees)	(ft)										
	60.0-AK.4	155.6347	157.9976	0	6.5	0.00	6.50	0	1012	-39.9'	-26.9'	0.0E+00	1.0E+04	1.42	
	60.0-AF.3	155.7389	221.9036	0	6.5	0.00	6.50	0	1012	-39.8'	37.0'	0.0E+00	1.0E+04	1.42	
	60.3-AC.7	157.2598	266.6797	0	6	0.00	6.00	0	944	-38.3'	81.8'	0.0E+00	8.8E+03	1.54	
	61.7-A.8	167.291	49.24989	0	12	0.00	12.00	0	2007	-28.2'	-135.6'	0.0E+00	9.6E+03	0.77	
	61.7-AA.8	167.291	319.8074	0	12	0.00	12.00	0	2007	-28.2'	134.9'	0.0E+00	9.6E+03	0.77	
	63.1-A.8	177.9316	49.25029	0	0	0.00	0.00	0	0	-17.6'	-135.6'	0.0E+00	0.0E+00	#DIV/0!	
	63.1-AA.8	177.9316	319.7518	0	0	0.00	0.00	0	0	-17.6'	134.9'	0.0E+00	0.0E+00	#DIV/0!	
	63.1-AH.8	178.4212	204.2225	0	10.5	0.00	10.50	0	1873	-17.1'	19.3'	0.0E+00	3.1E+03	0.88	
	64.1-AM.3	188.9733	124.279	0	13	0.00	13.00	0	2457	-6.5'	-60.6'	0.0E+00	5.6E+02	0.71	
	64.1-AQ.3	188.9733	86.53967	0	13	0.00	13.00	0	2457	-6.5'	-98.4'	0.0E+00	5.6E+02	0.71	
	64.1-AQ.9	188.9733	104.3562	0	5	0.00	5.00	0	945	-6.5'	-80.5'	0.0E+00	2.1E+02	1.85	
	64.1-AK.3	188.9733	155.258	0	18	0.00	18.00	0	3402	-6.5'	-29.6'	0.0E+00	7.7E+02	0.51	
	64.1-AH.0	188.9733	181.6746	0	26	0.00	26.00	0	4913	-6.5'	-3.2'	0.0E+00	1.1E+03	0.36	
	64.2-AF.2	189.0774	219.164	0	18	0.00	18.00	0	3403	-6.4'	34.3'	0.0E+00	7.5E+02	0.51	
	64.2-AF.9	189.0774	238.4765	0	13	0.00	13.00	0	2458	-6.4'	53.6'	0.0E+00	5.4E+02	0.71	
	64.3-AA.8	190.0514	319.7783	0	0	0.00	0.00	0	0	-5.5'	134.9'	0.0E+00	0.0E+00	#DIV/0!	
	64.3-A.8	190.0723	49.19821	0	0	0.00	0.00	0	0	-5.4'	-135.7'	0.0E+00	0.0E+00	#DIV/0!	
	64.5-AC.6	190.6191	263.7435	0	18	0.00	18.00	0	3431	-4.9'	78.8'	0.0E+00	4.3E+02	0.51	
	64.5-AB.6	190.6191	283.056	0	13	0.00	13.00	0	2478	-4.9'	98.2'	0.0E+00	3.1E+02	0.71	
	68.1-AK.2	194.6295	153.0604	0	18	0.00	18.00	0	3503	-0.9'	-31.8'	0.0E+00	1.4E+01	0.51	
	68.1-AJ.0	194.6295	178.8833	0	26	0.00	26.00	0	5060	-0.9'	-6.0'	0.0E+00	2.0E+01	0.36	
	68.1-AH.8	194.6295	204.7062	0	18	0.00	18.00	0	3503	-0.9'	19.8'	0.0E+00	1.4E+01	0.51	
	68.1-AQ.2	194.6295	85.94604	0	13	0.00	13.00	0	2530	-0.9'	-99.0'	0.0E+00	1.0E+01	0.71	
	68.1-AQ.9	194.6295	105.2585	0	18	0.00	18.00	0	3503	-0.9'	-79.6'	0.0E+00	1.4E+01	0.51	
	68.2-AM.9	195.9264	140.2427	0	5	0.00	5.00	0	980	0.4'	-44.7'	0.0E+00	8.6E-01	1.85	
	68.2-AM.2	195.9264	122.0397	0	13	0.00	13.00	0	2547	0.4'	-62.9'	0.0E+00	2.2E+00	0.71	
	68.2-AE.0	195.9264	242.7476	0	26	0.00	26.00	0	5094	0.4'	57.8'	0.0E+00	4.5E+00	0.36	
	68.2-AB.2	195.9264	275.5885	0	8.5	0.00	8.50	0	1665	0.4'	90.7'	0.0E+00	1.5E+00	1.09	
	68.2-AB.8	195.9264	286.3574	0	5	0.00	5.00	0	980	0.4'	101.5'	0.0E+00	8.6E-01	1.85	
	71.3-AF.2	206.4785	219.8859	0	11	0.00	11.00	0	2271	11.0'	35.0'	0.0E+00	1.3E+03	0.84	
	71.4-A.8	207.2129	49.25029	0	0	0.00	0.00	0	0	11.7'	-135.6'	0.0E+00	0.0E+00	#DIV/0!	
	71.4-AA.8	207.2129	319.7778	0	0	0.00	0.00	0	0	11.7'	134.9'	0.0E+00	0.0E+00	#DIV/0!	
	72.8-A.8	217.8535	49.22593	0	12	0.00	12.00	0	2614	22.3'	-135.7'	0.0E+00	6.0E+03	0.77	
	72.8-AA.8	217.8535	319.7465	0	12	0.00	12.00	0	2614	22.3'	134.8'	0.0E+00	6.0E+03	0.77	
	74.0-A.8	227.8848	60.60498	0	5.5	0.00	5.50	0	1253	32.4'	-124.3'	0.0E+00	5.8E+03	1.68	
	74.0-AA.5	227.8848	308.357	0	6	0.00	6.00	0	1367	32.4'	123.5'	0.0E+00	6.3E+03	1.54	
	74.0-AH.7	227.9681	201.9249	0	6	0.00	6.00	0	1368	32.5'	17.0'	0.0E+00	6.3E+03	1.54	
	74.0-AK.3	228.0514	155.7583	0	6	0.00	6.00	0	1368	32.5'	-29.1'	0.0E+00	6.4E+03	1.54	
	74.0-AQ.8	228.0514	102.4706	0	8.5	0.00	8.50	0	1938	32.5'	-82.4'	0.0E+00	9.0E+03	1.09	
	74.0-AC.1	229.1608	256.377	0	6	0.00	6.00	0	1375	33.6'	71.5'	0.0E+00	6.8E+03	1.54	
	74.0-AM.4	229.1816	128.565	0	6	0.00	6.00	0	1375	33.7'	-56.3'	0.0E+00	6.8E+03	1.54	
	74.0-AM.9	229.1816	140.2494	0	6	0.00	6.00	0	1375	33.7'	-44.6'	0.0E+00	6.8E+03	1.54	
	74.0-A.3	229.2441	229.1182	0	6	0.00	6.00	0	1375	33.7'	44.2'	0.0E+00	6.8E+03	1.54	
	.0-.0														
	.0-.0														
	.0-.0														
	.0-.0														
	.0-.0														
E/W	A.9-72.2	214.4785	42.86291	90.00	20	20.00	0.00	857	0	19.0'	-142.0'	4.0E+05	0.0E+00	0.46	
	A.9-71.0	203.2754	42.86291	90.00	5.5	5.50	0.00	236	0	7.8'	-142.0'	1.1E+05	0.0E+00	1.68	
	A.9-63.5	181.9285	42.86291	90.00	3.5	3.50	0.00	150	0	-13.6'	-142.0'	7.1E+04	0.0E+00	2.00	
	A.9-62.0	171.4618	42.87333	90.00	5.5	5.50	0.00	236	0	-24.1'	-142.0'	1.1E+05	0.0E+00	1.68	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level.**

A.8-62.0	171.4618	55.87333	90.00	15	15.00	0.00	838	0	-24.1'	-129.0'	2.5E+05	0.0E+00	0.62
A.8-61.2	160.9145	71.49288	90.00	0	0.00	0.00	0	0	-34.6'	-113.4'	0.0E+00	0.0E+00	#DIV/0!
A.8-73.7	224.4603	71.51372	90.00	0	0.00	0.00	0	0	28.9'	-113.4'	0.0E+00	0.0E+00	#DIV/0!
AQ.0-71.5	208.3537	79.67521	90.00	26	26.00	0.00	2072	0	12.8'	-105.2'	2.9E+05	0.0E+00	0.36
AQ.0-62.9	176.1738	79.67521	90.00	26	26.00	0.00	2072	0	-19.3'	-105.2'	2.9E+05	0.0E+00	0.36
AQ.9-73.5	223.1165	103.7065	90.00	9	9.00	0.00	933	0	27.6'	-81.2'	5.9E+04	0.0E+00	1.03
AP.1-62.7	175.1654	108.175	90.00	19.5	19.50	0.00	2109	0	-20.3'	-76.7'	1.1E+05	0.0E+00	0.47
AN.1-72.0	213.6756	115.1752	90.00	19.5	19.50	0.00	2246	0	18.2'	-69.7'	9.5E+04	0.0E+00	0.47
AL.1-72.7	217.2571	143.5812	90.00	20.5	20.50	0.00	2943	0	21.7'	-41.3'	3.5E+04	0.0E+00	0.45
AL.9-61.6	166.9209	145.3414	90.00	22	22.00	0.00	3198	0	-28.6'	-39.6'	3.4E+04	0.0E+00	0.42
AK.3-73.5	223.1165	154.5708	90.00	0	0.00	0.00	0	0	27.6'	-30.3'	0.0E+00	0.0E+00	#DIV/0!
AK.3-61.1	160.4863	156.8101	90.00	0	0.00	0.00	0	0	-35.0'	-28.1'	0.0E+00	0.0E+00	#DIV/0!
AJ.0-71.9	212.0878	179.0812	90.00	19	19.00	0.00	3403	0	16.6'	-5.8'	6.4E+02	0.0E+00	0.49
AH.0-62.0	171.515	181.3205	90.00	19	19.00	0.00	3445	0	-24.0'	-3.6'	2.4E+02	0.0E+00	0.49
AH.8-73.5	223.1165	203.1124	90.00	0	0.00	0.00	0	0	27.6'	18.2'	0.0E+00	0.0E+00	#DIV/0!
AG.0-61.6	167.0462	209.7265	90.00	22	22.00	0.00	4614	0	-28.5'	24.8'	1.4E+04	0.0E+00	0.42

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level.**

AF.0-72.7	217.2534	214.102	90.00	20.5	20.50	0.00	4389	0	21.7'	29.2'	1.7E+04	0.0E+00	0.45
AF.2-61.1	160.5904	220.7161	90.00	0	0.00	0.00	0	0	-34.9'	35.8'	0.0E+00	0.0E+00	#DIV/0!
AE.1-72.0	213.3856	242.9872	90.00	19	19.00	0.00	4617	0	17.9'	58.1'	6.4E+04	0.0E+00	0.49
AD.1-62.9	176.2293	245.3203	90.00	19.5	19.50	0.00	4784	0	-19.3'	60.4'	7.1E+04	0.0E+00	0.47
AC.4-68.8	201.2086	260.3932	90.00	0	0.00	0.00	0	0	5.7'	75.5'	0.0E+00	0.0E+00	#DIV/0!
AC.7-61.3	162.1321	265.2956	90.00	9	9.00	0.00	2388	0	-33.4'	80.4'	5.8E+04	0.0E+00	1.03
AB.0-72.7	217.23	271.3932	90.00	31	31.00	0.00	8413	0	21.7'	86.5'	2.3E+05	0.0E+00	0.30
AB.3-62.3	173.2025	289.3268	90.00	25.5	25.50	0.00	7378	0	-22.3'	104.4'	2.8E+05	0.0E+00	0.36
AB.3-71.5	208.5045	289.3268	90.00	24.5	24.50	0.00	7089	0	13.0'	104.4'	2.7E+05	0.0E+00	0.38
AB.5-73.7	224.4583	297.4883	90.00	0	0.00	0.00	0	0	28.9'	112.6'	0.0E+00	0.0E+00	#DIV/0!
AB.8-71.4	207.0045	313.1183	90.00	15	15.00	0.00	4697	0	11.5'	128.2'	2.5E+05	0.0E+00	0.62
AA.8-71.4	207.0045	326.1183	90.00	9	9.00	0.00	2935	0	11.5'	141.2'	1.8E+05	0.0E+00	1.03
AA.8-73.1	219.916	326.1392	90.00	5	5.00	0.00	1631	0	24.4'	141.2'	1.0E+05	0.0E+00	1.85
AA.8-62.0	171.4745	326.1392	90.00	13	13.00	0.00	4240	0	-24.0'	141.2'	2.6E+05	0.0E+00	0.71

S	443	432	81910	84461	3.6E+06	1.3E+05
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Center of Rigidity	Eccentricity + Eac.	Eccentricity - Eac.	Rotational Stiffness
Xr = 195.5'	Ex = 0.54'	Ex = -6.81'	Jr = 3.78E+06
Yr = 184.9'	Ey = 13.76'	Ey = -14.56'	

	Building	X - Direction				Y - Direction				2:1/3.5:1							D/C
		Direct	+Eac.	-Eac.	Total	Direct	+Eac.	-Eac.	Total	Maximum	Shear	Capacity	SW Type	SW Type	Capacity		
			Torsional	Torsional	Shear		Torsional	Torsional	Shear							Y-Dir.	
N/S	Line	Shear	Shear	Shear	X-Dir.	Shear	Shear	Shear	Y-Dir.	Shear	(lb/ft)	Reduction	Min Req.	Used	(plf)		
	60.0-AK.4	0.0 k	0.0 k	0.0 k	0.0 k	1.6 k	0.0 k	0.0 k	1.6 k	1.61 k	247	1.00	6	4	510	0.48	
	60.0-AF.3	0.0 k	0.0 k	0.0 k	0.0 k	1.6 k	0.0 k	0.0 k	1.6 k	1.60 k	247	1.00	6	4	510	0.48	
	60.3-AC.7	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	0.0 k	0.0 k	1.5 k	1.48 k	247	1.00	6	4	510	0.48	
	61.7-A.8	0.0 k	0.0 k	0.0 k	0.0 k	2.9 k	0.0 k	0.1 k	2.9 k	2.94 k	245	1.00	6	4	510	0.48	
	61.7-AA.8	0.0 k	0.0 k	0.0 k	0.0 k	2.9 k	0.0 k	0.1 k	2.9 k	2.94 k	245	1.00	6	4	510	0.48	
	63.1-A.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!	
	63.1-AA.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!	
	63.1-AH.8	0.0 k	0.0 k	0.0 k	0.0 k	2.5 k	0.0 k	0.0 k	2.5 k	2.55 k	243	1.00	6	4	510	0.47	
	64.1-AM.3	0.0 k	0.0 k	0.0 k	0.0 k	3.1 k	0.0 k	0.0 k	3.1 k	3.13 k	241	1.00	6	4	510	0.47	
	64.1-AQ.3	0.0 k	0.0 k	0.0 k	0.0 k	3.1 k	0.0 k	0.0 k	3.1 k	3.13 k	241	1.00	6	4	510	0.47	
	64.1-AQ.9	0.0 k	0.0 k	0.0 k	0.0 k	1.2 k	0.0 k	0.0 k	1.2 k	1.20 k	241	1.00	6	4	510	0.47	
	64.1-AK.3	0.0 k	0.0 k	0.0 k	0.0 k	4.3 k	0.0 k	0.0 k	4.3 k	4.33 k	241	1.00	6	4	510	0.47	
	64.1-AH.0	0.0 k	0.0 k	0.0 k	0.0 k	6.2 k	0.0 k	0.0 k	6.3 k	6.26 k	241	1.00	6	4	510	0.47	
	64.2-AF.2	0.0 k	0.0 k	0.0 k	0.0 k	4.3 k	0.0 k	0.0 k	4.3 k	4.33 k	241	1.00	6	4	510	0.47	
	64.2-AF.9	0.0 k	0.0 k	0.0 k	0.0 k	3.1 k	0.0 k	0.0 k	3.1 k	3.13 k	241	1.00	6	4	510	0.47	
	64.3-AA.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!	
	64.3-A.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!	
	64.5-AC.6	0.0 k	0.0 k	0.0 k	0.0 k	4.3 k	0.0 k	0.0 k	4.3 k	4.33 k	240	1.00	6	4	510	0.47	
	64.5-AB.6	0.0 k	0.0 k	0.0 k	0.0 k	3.1 k	0.0 k	0.0 k	3.1 k	3.13 k	240	1.00	6	4	510	0.47	
	68.1-AK.2	0.0 k	0.0 k	0.0 k	0.0 k	4.3 k	0.0 k	0.0 k	4.3 k	4.31 k	240	1.00	6	4	510	0.47	
	68.1-AJ.0	0.0 k	0.0 k	0.0 k	0.0 k	6.2 k	0.0 k	0.0 k	6.2 k	6.23 k	240	1.00	6	4	510	0.47	
	68.1-AH.8	0.0 k	0.0 k	0.0 k	0.0 k	4.3 k	0.0 k	0.0 k	4.3 k	4.31 k	240	1.00	6	4	510	0.47	
	68.1-AQ.2	0.0 k	0.0 k	0.0 k	0.0 k	3.1 k	0.0 k	0.0 k	3.1 k	3.12 k	240	1.00	6	4	510	0.47	
	68.1-AQ.9	0.0 k	0.0 k	0.0 k	0.0 k	4.3 k	0.0 k	0.0 k	4.3 k	4.31 k	240	1.00	6	4	510	0.47	
	68.2-AM.9	0.0 k	0.0 k	0.0 k	0.0 k	1.2 k	0.0 k	0.0 k	1.2 k	1.20 k	240	1.00	6	4	510	0.47	
	68.2-AM.2	0.0 k	0.0 k	0.0 k	0.0 k	3.1 k	0.0 k	0.0 k	3.1 k	3.11 k	240	1.00	6	4	510	0.47	
	68.2-AE.0	0.0 k	0.0 k	0.0 k	0.0 k	6.2 k	0.0 k	0.0 k	6.2 k	6.23 k	240	1.00	6	4	510	0.47	
	68.2-AB.2	0.0 k	0.0 k	0.0 k	0.0 k	2.0 k	0.0 k	0.0 k	2.0 k	2.04 k	240	1.00	6	4	510	0.47	
	68.2-AB.8	0.0 k	0.0 k	0.0 k	0.0 k	1.2 k	0.0 k	0.0 k	1.2 k	1.20 k	240	1.00	6	4	510	0.47	
	71.3-AF.2	0.0 k	0.0 k	0.0 k	0.0 k	2.6 k	0.0 k	0.0 k	2.6 k	2.64 k	240	1.00	6	4	510	0.47	
	71.4-A.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!	
	71.4-AA.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!	
	72.8-A.8	0.0 k	0.0 k	0.0 k	0.0 k	2.9 k	0.0 k	-0.1 k	2.9 k	2.88 k	240	1.00	6	4	510	0.47	
	72.8-AA.8	0.0 k	0.0 k	0.0 k	0.0 k	2.9 k	0.0 k	-0.1 k	2.9 k	2.88 k	240	1.00	6	4	510	0.47	
	74.0-A.8	0.0 k	0.0 k	0.0 k	0.0 k	1.3 k	0.0 k	0.0 k	1.3 k	1.32 k	240	1.00	6	4	510	0.47	
	74.0-AA.5	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	0.0 k	0.0 k	1.4 k	1.44 k	240	1.00	6	4	510	0.47	
	74.0-AH.7	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	0.0 k	0.0 k	1.4 k	1.44 k	240	1.00	6	4	510	0.47	
	74.0-AK.3	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	0.0 k	0.0 k	1.4 k	1.44 k	240	1.00	6	4	510	0.47	
	74.0-AQ.8	0.0 k	0.0 k	0.0 k	0.0 k	2.0 k	0.0 k	-0.1 k	2.0 k	2.04 k	240	1.00	6	4	510	0.47	
	74.0-AC.1	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	0.0 k	0.0 k	1.4 k	1.44 k	240	1.00	6	4	510	0.47	
	74.0-AM.4	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	0.0 k	0.0 k	1.4 k	1.44 k	240	1.00	6	4	510	0.47	
	74.0-AM.9	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	0.0 k	0.0 k	1.4 k	1.44 k	240	1.00	6	4	510	0.47	
	74.0-A.3	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	0.0 k	0.0 k	1.4 k	1.44 k	240	1.00	6	4	510	0.47	
														4			
														4			
														4			
														4			
E/W	A.9-72.2	4.7 k	-1.1 k	1.1 k	5.8 k	0.0 k	0.0 k	0.0 k	0.0 k	5.80 k	290	1.00	6	4	510	0.57	
	A.9-71.0	1.3 k	-0.3 k	0.3 k	1.6 k	0.0 k	0.0 k	0.0 k	0.0 k	1.60 k	290	1.00	6	4	510	0.57	
	A.9-63.5	0.8 k	-0.2 k	0.2 k	1.0 k	0.0 k	0.0 k	0.0 k	0.0 k	1.02 k	290	1.00	6	4	510	0.57	
	A.9-62.0	1.3 k	-0.3 k	0.3 k	1.6 k	0.0 k	0.0 k	0.0 k	0.0 k	1.60 k	290	1.00	6	4	510	0.57	
	A.8-62.0	3.5 k	-0.7 k	0.8 k	4.3 k	0.0 k	0.0 k	0.0 k	0.0 k	4.27 k	285	1.00	6	4	510	0.56	
	A.8-61.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!	
	A.8-73.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!	
	AQ.0-71.5	6.1 k	-1.0 k	1.1 k	7.2 k	0.0 k	0.0 k	0.0 k	0.0 k	7.16 k	276	1.00	6	4	510	0.54	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level.**

AQ.0-62.9	6.1 k	-1.0 k	1.1 k	7.2 k	0.0 k	0.0 k	0.0 k	0.0 k	7.16 k	276	1.00	6	4	510	0.54
AQ.9-73.5	2.1 k	-0.3 k	0.3 k	2.4 k	0.0 k	0.0 k	0.0 k	0.0 k	2.39 k	266	1.00	6	4	510	0.52
AP.1-62.7	4.6 k	-0.6 k	0.6 k	5.2 k	0.0 k	0.0 k	0.0 k	0.0 k	5.15 k	264	1.00	6	4	510	0.52
AN.1-72.0	4.6 k	-0.5 k	0.5 k	5.1 k	0.0 k	0.0 k	0.0 k	0.0 k	5.10 k	261	1.00	6	4	510	0.51
AL.1-72.7	4.8 k	-0.3 k	0.3 k	5.1 k	0.0 k	0.0 k	0.0 k	0.0 k	5.13 k	250	1.00	6	4	510	0.49
AL.9-61.6	5.1 k	-0.3 k	0.3 k	5.5 k	0.0 k	0.0 k	0.0 k	0.0 k	5.49 k	249	1.00	6	4	510	0.49
AK.3-73.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
AK.3-61.1	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
AJ.0-71.9	4.4 k	0.0 k	0.0 k	4.5 k	0.0 k	0.0 k	0.0 k	0.0 k	4.48 k	236	1.00	6	4	510	0.46
AH.0-62.0	4.4 k	0.0 k	0.0 k	4.5 k	0.0 k	0.0 k	0.0 k	0.0 k	4.46 k	235	1.00	6	4	510	0.46
AH.8-73.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OFCHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level.**

AG.0-61.6	5.1 k	0.2 k	-0.2 k	5.3 k	0.0 k	0.0 k	0.0 k	0.0 k	5.34 k	243	1.00	6	4	510	0.48
AF.0-72.7	4.8 k	0.2 k	-0.2 k	5.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.01 k	245	1.00	6	4	510	0.48
AF.2-61.1	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
AE.1-72.0	4.4 k	0.4 k	-0.4 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.85 k	255	1.00	6	4	510	0.50
AD.1-62.9	4.6 k	0.4 k	-0.5 k	5.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.00 k	256	1.00	6	4	510	0.50
AC.4-68.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
AC.7-61.3	2.1 k	0.3 k	-0.3 k	2.4 k	0.0 k	0.0 k	0.0 k	0.0 k	2.37 k	264	1.00	6	4	510	0.52
AB.0-72.7	7.2 k	1.0 k	-1.1 k	8.3 k	0.0 k	0.0 k	0.0 k	0.0 k	8.25 k	266	1.00	6	4	510	0.52
AB.3-62.3	6.0 k	1.0 k	-1.1 k	7.0 k	0.0 k	0.0 k	0.0 k	0.0 k	6.96 k	273	1.00	6	4	510	0.54
AB.3-71.5	5.7 k	1.0 k	-1.0 k	6.7 k	0.0 k	0.0 k	0.0 k	0.0 k	6.69 k	273	1.00	6	4	510	0.54
AB.5-73.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
AB.8-71.4	3.5 k	0.7 k	-0.8 k	4.2 k	0.0 k	0.0 k	0.0 k	0.0 k	4.23 k	282	1.00	6	4	510	0.55
AA.8-71.4	2.1 k	0.5 k	-0.5 k	2.6 k	0.0 k	0.0 k	0.0 k	0.0 k	2.58 k	287	1.00	6	4	510	0.56
AA.8-73.1	1.2 k	0.3 k	-0.3 k	1.4 k	0.0 k	0.0 k	0.0 k	0.0 k	1.43 k	287	1.00	6	4	510	0.56
AA.8-62.0	3.0 k	0.7 k	-0.7 k	3.7 k	0.0 k	0.0 k	0.0 k	0.0 k	3.73 k	287	1.00	6	4	510	0.56

S 103.5 k 0.0 k 0.0 k 117.3 k 103.5 k 0.0 k 0.0 k 104.0 k 221.2 k

Check for Torsional Irregularity

	Building			Max Defl.					
	Line	ΔX^+	ΔX^-	ΔY^+	ΔY^-	Ratio			
E/W	A.9-72.2	0.180	0.290			1.2	< 1.2	OK	bottom top
	AA.8-62.0	0.287	0.177			1.2	< 1.2	OK	
N/S	60.0-AK.4			0.239	0.247	1.0	< 1.2	OK	
	74.0-A.3			0.240	0.233	1.0	< 1.2	OK	
	Average	0.233	0.234	0.239	0.240				

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level,****Tiedown Calculations - Roof Framing Level,**

Typ Fir Ht = 10.25'

Typ Plate Ht = 9.26'

N/S	Building Line	Element		Wall Thk (4x/6x)	Height (ft)	Moment (k-ft)	D. L. w (k/ft)	Uplift Above (kip)	Incr. Uplift (kip)	Total Uplift (kip)	Current TD Level	Tiedown Capacity		Demand to Capacity	TD End Post Area (sq.in)	TD Δ_s @ load in (LRFD)
		Length (ft)	Shear (kip)									Incr. (kip)	Total (kip)			
	60.0-AK.4	6.50	1.605	6x	10.25	16	0.00	0.00	2.99	2.99	2	10.51	10.51	0.28	16.82	0.080
	60.0-AF.3	6.50	1.605	6x	10.25	16	0.00	0.00	2.99	2.99	2	10.51	10.51	0.28	16.82	0.080
	60.3-AC.7	6.00	1.480	6x	10.25	15	0.00	0.00	3.03	3.03	2	10.51	10.51	0.29	16.82	0.081
	61.7-A.8	12.00	2.937	6x	10.25	30	0.00	0.00	2.74	2.74	2	10.51	10.51	0.26	16.82	0.073
	61.7-AA.8	12.00	2.937	6x	10.25	30	0.00	0.00	2.74	2.74	2	10.51	10.51	0.26	16.82	0.073
	63.1-A.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	63.1-AA.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	63.1-AH.8	10.50	2.548	6x	10.25	26	0.00	0.00	2.75	2.75	2	10.51	10.51	0.26	16.82	0.073
	64.1-AM.3	13.00	3.129	6x	10.25	32	0.00	0.00	2.67	2.67	2	10.51	10.51	0.25	16.82	0.071
	64.1-AQ.3	13.00	3.129	6x	10.25	32	0.00	0.00	2.67	2.67	2	10.51	10.51	0.25	16.82	0.071
	64.1-AQ.9	5.00	1.204	6x	10.25	12	0.00	0.00	3.08	3.08	2	10.51	10.51	0.29	16.82	0.082
	64.1-AK.3	18.00	4.333	6x	10.25	44	0.00	0.00	2.61	2.61	2	10.51	10.51	0.25	16.82	0.070
	64.1-AH.0	26.00	6.259	6x	10.25	64	0.00	0.00	2.57	2.57	2	10.51	10.51	0.24	16.82	0.068
	64.2-AF.2	18.00	4.333	6x	10.25	44	0.00	0.00	2.61	2.61	2	10.51	10.51	0.25	16.82	0.070
	64.2-AF.9	13.00	3.129	6x	10.25	32	0.00	0.00	2.67	2.67	2	10.51	10.51	0.25	16.82	0.071
	64.3-AA.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	64.3-A.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	64.5-AC.6	18.00	4.327	6x	10.25	44	0.00	0.00	2.61	2.61	2	10.51	10.51	0.25	16.82	0.070
	64.5-AB.6	13.00	3.125	6x	10.25	32	0.00	0.00	2.67	2.67	2	10.51	10.51	0.25	16.82	0.071
	68.1-AK.2	18.00	4.314	6x	10.25	44	0.00	0.00	2.60	2.60	2	10.51	10.51	0.25	16.82	0.069
	68.1-AJ.0	26.00	6.231	6x	10.25	64	0.00	0.00	2.55	2.55	2	10.51	10.51	0.24	16.82	0.068
	68.1-AH.8	18.00	4.314	6x	10.25	44	0.00	0.00	2.60	2.60	2	10.51	10.51	0.25	16.82	0.069
	68.1-AQ.2	13.00	3.116	6x	10.25	32	0.00	0.00	2.66	2.66	2	10.51	10.51	0.25	16.82	0.071
	68.1-AQ.9	18.00	4.314	6x	10.25	44	0.00	0.00	2.60	2.60	2	10.51	10.51	0.25	16.82	0.069
	68.2-AM.9	5.00	1.198	6x	10.25	12	0.00	0.00	3.07	3.07	2	10.51	10.51	0.29	16.82	0.082
	68.2-AM.2	13.00	3.114	6x	10.25	32	0.00	0.00	2.66	2.66	2	10.51	10.51	0.25	16.82	0.071
	68.2-AE.0	26.00	6.227	6x	10.25	64	0.00	0.00	2.55	2.55	2	10.51	10.51	0.24	16.82	0.068
	68.2-AB.2	8.50	2.036	6x	10.25	21	0.00	0.00	2.78	2.78	2	10.51	10.51	0.26	16.82	0.074
	68.2-AB.8	5.00	1.198	6x	10.25	12	0.00	0.00	3.07	3.07	2	10.51	10.51	0.29	16.82	0.082
	71.3-AF.2	11.00	2.636	6x	10.25	27	0.00	0.00	2.70	2.70	2	10.51	10.51	0.26	16.82	0.072
	71.4-A.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	71.4-AA.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	72.8-A.8	12.00	2.878	6x	10.25	29	0.00	0.00	2.68	2.68	2	10.51	10.51	0.26	16.82	0.071
	72.8-AA.8	12.00	2.878	6x	10.25	29	0.00	0.00	2.68	2.68	2	10.51	10.51	0.26	16.82	0.071
	74.0-A.8	5.50	1.320	6x	10.25	14	0.00	0.00	3.01	3.01	2	10.51	10.51	0.29	16.82	0.080
	74.0-AA.5	6.00	1.440	6x	10.25	15	0.00	0.00	2.95	2.95	2	10.51	10.51	0.28	16.82	0.079
	74.0-AH.7	6.00	1.440	6x	10.25	15	0.00	0.00	2.95	2.95	2	10.51	10.51	0.28	16.82	0.079
	74.0-AK.3	6.00	1.440	6x	10.25	15	0.00	0.00	2.95	2.95	2	10.51	10.51	0.28	16.82	0.079
	74.0-AQ.8	8.50	2.040	6x	10.25	21	0.00	0.00	2.79	2.79	2	10.51	10.51	0.27	16.82	0.074
	74.0-AC.1	6.00	1.440	6x	10.25	15	0.00	0.00	2.95	2.95	2	10.51	10.51	0.28	16.82	0.079
	74.0-AM.4	6.00	1.440	6x	10.25	15	0.00	0.00	2.95	2.95	2	10.51	10.51	0.28	16.82	0.079
	74.0-AM.9	6.00	1.440	6x	10.25	15	0.00	0.00	2.95	2.95	2	10.51	10.51	0.28	16.82	0.079
	74.0-A.3	6.00	1.440	6x	10.25	15	0.00	0.00	2.95	2.95	2	10.51	10.51	0.28	16.82	0.079

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OFCHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level.**

E/W	A.9-72.2	20.00	5.804	6x	10.25	59	0.00	0.00	3.13	3.13	2	10.51	10.51	0.30	16.82	0.083
	A.9-71.0	5.50	1.596	6x	10.25	16	0.00	0.00	3.64	3.64	2	10.51	10.51	0.35	16.82	0.097
	A.9-63.5	3.50	1.016	6x	10.25	10	0.00	0.00	4.16	4.16	2	10.51	10.51	0.40	16.82	0.111
	A.9-62.0	5.50	1.596	6x	10.25	16	0.00	0.00	3.64	3.64	2	10.51	10.51	0.35	16.82	0.097
	A.8-61.2	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	A.8-73.7	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	AQ.0-71.5	26.00	7.163	6x	10.25	73	0.00	0.00	2.94	2.94	2	10.51	10.51	0.28	16.82	0.078
	AQ.0-62.9	26.00	7.163	6x	10.25	73	0.00	0.00	2.94	2.94	2	10.51	10.51	0.28	16.82	0.078
	AQ.9-73.5	9.00	2.393	6x	10.25	25	0.00	0.00	3.07	3.07	2	10.51	10.51	0.29	16.82	0.082
	AP.1-62.7	19.50	5.151	6x	10.25	53	0.00	0.00	2.85	2.85	2	10.51	10.51	0.27	16.82	0.076
	AN.1-72.0	19.50	5.096	6x	10.25	52	0.00	0.00	2.82	2.82	2	10.51	10.51	0.27	16.82	0.075
	AL.1-72.7	20.50	5.125	6x	10.25	53	0.00	0.00	2.69	2.69	2	10.51	10.51	0.26	16.82	0.072
	AL.9-61.6	22.00	5.485	6x	10.25	56	0.00	0.00	2.68	2.68	2	10.51	10.51	0.25	16.82	0.071
	AK.3-73.5	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	AK.3-61.1	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	AJ.0-71.9	19.00	4.481	6x	10.25	46	0.00	0.00	2.55	2.55	2	10.51	10.51	0.24	16.82	0.068
	AH.0-62.0	19.00	4.465	6x	10.25	46	0.00	0.00	2.54	2.54	2	10.51	10.51	0.24	16.82	0.068
	AH.8-73.5	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	AG.0-61.6	22.00	5.344	6x	10.25	55	0.00	0.00	2.61	2.61	2	10.51	10.51	0.25	16.82	0.069
	AF.0-72.7	20.50	5.013	6x	10.25	51	0.00	0.00	2.64	2.64	2	10.51	10.51	0.25	16.82	0.070
	AF.2-61.1	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	AE.1-72.0	19.00	4.853	6x	10.25	50	0.00	0.00	2.76	2.76	2	10.51	10.51	0.26	16.82	0.074
	AD.1-62.9	19.50	4.998	6x	10.25	51	0.00	0.00	2.77	2.77	2	10.51	10.51	0.26	16.82	0.074
	AC.4-68.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	AC.7-61.3	9.00	2.375	6x	10.25	24	0.00	0.00	3.04	3.04	2	10.51	10.51	0.29	16.82	0.081
	AB.0-72.7	31.00	8.251	6x	10.25	85	0.00	0.00	2.82	2.82	2	10.51	10.51	0.27	16.82	0.075
	AB.3-62.3	25.50	6.959	6x	10.25	71	0.00	0.00	2.91	2.91	2	10.51	10.51	0.28	16.82	0.078
	AB.3-71.5	24.50	6.686	6x	10.25	69	0.00	0.00	2.92	2.92	2	10.51	10.51	0.28	16.82	0.078
	AB.5-73.7	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	2	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	AB.8-71.4	15.00	4.228	6x	10.25	43	0.00	0.00	3.10	3.10	2	10.51	10.51	0.29	16.82	0.082
	AA.8-71.4	9.00	2.581	6x	10.25	26	0.00	0.00	3.31	3.31	2	10.51	10.51	0.31	16.82	0.088
	AA.8-73.1	5.00	1.434	6x	10.25	15	0.00	0.00	3.67	3.67	2	10.51	10.51	0.35	16.82	0.098
	AA.8-62.0	13.00	3.728	6x	10.25	38	0.00	0.00	3.18	3.18	2	10.51	10.51	0.30	16.82	0.085

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level.**Area at base = 20856 ft²

Story Shear	Center of Mass	Diaphragm Dimensions	Accidental Eccentricity (5%)
Vx = 187 k	Xm = 192.4'	X = 73.5'	x-dir. Eac. = 3.7' <--- E/W
Vy = 187 k	Ym = 184.5'	Y = 283.3'	y-dir. Eac. = 14.2' <--- N/S

Building	Location		Angle	Length									h/w	
Line	X	Y	(degrees)	(ft)	Kx	Ky	Kx * Y	Ky * X	X Bar	Y Bar	Kx*y^2	Ky*x^2	ratio	
60.0-AK.4	155.6'	158.0'	0.0'	6.5'	0.00	6.50	0	1012	-39.9'	-26.9'	0.0E+00	1.0E+04	1.42	
60.0-AF.3	155.7'	221.9'	0.0'	6.5'	0.00	6.50	0	1012	-39.8'	37.0'	0.0E+00	1.0E+04	1.42	
60.3-AC.7	157.3'	266.7'	0.0'	6.0'	0.00	6.00	0	944	-38.3'	81.8'	0.0E+00	8.8E+03	1.54	
61.7-A.8	167.3'	49.2'	0.0'	12.0'	0.00	12.00	0	2007	-28.2'	-135.6'	0.0E+00	9.6E+03	0.77	
61.7-AA.8	167.3'	319.8'	0.0'	12.0'	0.00	12.00	0	2007	-28.2'	134.9'	0.0E+00	9.6E+03	0.77	
63.1-A.8	177.9'	49.3'	0.0'	0.0'	0.00	0.00	0	0	-17.6'	-135.6'	0.0E+00	0.0E+00	#DIV/0!	
63.1-AA.8	177.9'	319.8'	0.0'	0.0'	0.00	0.00	0	0	-17.6'	134.9'	0.0E+00	0.0E+00	#DIV/0!	
63.1-AH.8	178.4'	204.2'	0.0'	10.5'	0.00	10.50	0	1873	-17.1'	19.3'	0.0E+00	3.1E+03	0.88	
64.1-AM.3	189.0'	124.3'	0.0'	13.0'	0.00	13.00	0	2457	-6.5'	-60.6'	0.0E+00	5.6E+02	0.71	
64.1-AQ.3	189.0'	86.5'	0.0'	13.0'	0.00	13.00	0	2457	-6.5'	-98.4'	0.0E+00	5.6E+02	0.71	
64.1-AQ.9	189.0'	104.4'	0.0'	5.0'	0.00	5.00	0	945	-6.5'	-80.5'	0.0E+00	2.1E+02	1.85	
64.1-AK.3	189.0'	155.3'	0.0'	18.0'	0.00	18.00	0	3402	-6.5'	-29.6'	0.0E+00	7.7E+02	0.51	
64.1-AH.0	189.0'	181.7'	0.0'	26.0'	0.00	26.00	0	4913	-6.5'	-3.2'	0.0E+00	1.1E+03	0.36	
64.2-AF.2	189.1'	219.2'	0.0'	18.0'	0.00	18.00	0	3403	-6.4'	34.3'	0.0E+00	7.5E+02	0.51	
64.2-AF.9	189.1'	238.5'	0.0'	13.0'	0.00	13.00	0	2458	-6.4'	53.6'	0.0E+00	5.4E+02	0.71	
64.3-AA.8	190.1'	319.8'	0.0'	0.0'	0.00	0.00	0	0	-5.5'	134.9'	0.0E+00	0.0E+00	#DIV/0!	
64.3-A.8	190.1'	49.2'	0.0'	0.0'	0.00	0.00	0	0	-5.4'	-135.7'	0.0E+00	0.0E+00	#DIV/0!	
64.5-AC.6	190.6'	263.7'	0.0'	18.0'	0.00	18.00	0	3431	-4.9'	78.8'	0.0E+00	4.3E+02	0.51	
64.5-AB.6	190.6'	283.1'	0.0'	13.0'	0.00	13.00	0	2478	-4.9'	98.2'	0.0E+00	3.1E+02	0.71	
68.1-AK.2	194.6'	153.1'	0.0'	18.0'	0.00	18.00	0	3503	-0.9'	-31.8'	0.0E+00	1.4E+01	0.51	
68.1-AJ.0	194.6'	178.9'	0.0'	26.0'	0.00	26.00	0	5060	-0.9'	-6.0'	0.0E+00	2.0E+01	0.36	
68.1-AH.8	194.6'	204.7'	0.0'	18.0'	0.00	18.00	0	3503	-0.9'	19.8'	0.0E+00	1.4E+01	0.51	
68.1-AQ.2	194.6'	85.9'	0.0'	13.0'	0.00	13.00	0	2530	-0.9'	-99.0'	0.0E+00	1.0E+01	0.71	
68.1-AQ.9	194.6'	105.3'	0.0'	18.0'	0.00	18.00	0	3503	-0.9'	-79.6'	0.0E+00	1.4E+01	0.51	
68.2-AM.9	195.9'	140.2'	0.0'	5.0'	0.00	5.00	0	980	0.4'	-44.7'	0.0E+00	8.6E-01	1.85	
68.2-AM.2	195.9'	122.0'	0.0'	13.0'	0.00	13.00	0	2547	0.4'	-62.9'	0.0E+00	2.2E+00	0.71	
68.2-AE.0	195.9'	242.7'	0.0'	26.0'	0.00	26.00	0	5094	0.4'	57.8'	0.0E+00	4.5E+00	0.36	
68.2-AB.2	195.9'	275.6'	0.0'	8.5'	0.00	8.50	0	1665	0.4'	90.7'	0.0E+00	1.5E+00	1.09	
68.2-AB.8	195.9'	286.4'	0.0'	5.0'	0.00	5.00	0	980	0.4'	101.5'	0.0E+00	8.6E-01	1.85	
71.3-AF.2	206.5'	219.9'	0.0'	11.0'	0.00	11.00	0	2271	11.0'	35.0'	0.0E+00	1.3E+03	0.84	
71.4-A.8	207.2'	49.3'	0.0'	0.0'	0.00	0.00	0	0	11.7'	-135.6'	0.0E+00	0.0E+00	#DIV/0!	
71.4-AA.8	207.2'	319.8'	0.0'	0.0'	0.00	0.00	0	0	11.7'	134.9'	0.0E+00	0.0E+00	#DIV/0!	
72.8-A.8	217.9'	49.2'	0.0'	12.0'	0.00	12.00	0	2614	22.3'	-135.7'	0.0E+00	6.0E+03	0.77	
72.8-AA.8	217.9'	319.7'	0.0'	12.0'	0.00	12.00	0	2614	22.3'	134.8'	0.0E+00	6.0E+03	0.77	
74.0-A.8	227.9'	60.6'	0.0'	5.5'	0.00	5.50	0	1253	32.4'	-124.3'	0.0E+00	5.8E+03	1.68	
74.0-AA.5	227.9'	308.4'	0.0'	6.0'	0.00	6.00	0	1367	32.4'	123.5'	0.0E+00	6.3E+03	1.54	
74.0-AH.7	228.0'	201.9'	0.0'	6.0'	0.00	6.00	0	1368	32.5'	17.0'	0.0E+00	6.3E+03	1.54	
74.0-AK.3	228.1'	155.8'	0.0'	6.0'	0.00	6.00	0	1368	32.5'	-29.1'	0.0E+00	6.4E+03	1.54	
74.0-AQ.8	228.1'	102.5'	0.0'	8.5'	0.00	8.50	0	1938	32.5'	-82.4'	0.0E+00	9.0E+03	1.09	
74.0-AC.1	229.2'	256.4'	0.0'	6.0'	0.00	6.00	0	1375	33.6'	71.5'	0.0E+00	6.8E+03	1.54	
74.0-AM.4	229.2'	128.6'	0.0'	6.0'	0.00	6.00	0	1375	33.7'	-56.3'	0.0E+00	6.8E+03	1.54	
74.0-AM.9	229.2'	140.2'	0.0'	6.0'	0.00	6.00	0	1375	33.7'	-44.6'	0.0E+00	6.8E+03	1.54	
74.0-A.3	229.2'	229.1'	0.0'	6.0'	0.00	6.00	0	1375	33.7'	44.2'	0.0E+00	6.8E+03	1.54	
A.9-72.2	214.5'	42.9'	90.0'	20.0'	20.00	0.00	857	0	19.0'	-142.0'	4.0E+05	0.0E+00	0.46	
A.9-71.0	203.3'	42.9'	90.0'	5.5'	5.50	0.00	236	0	7.8'	-142.0'	1.1E+05	0.0E+00	1.68	
A.9-63.5	181.9'	42.9'	90.0'	3.5'	3.50	0.00	150	0	-13.6'	-142.0'	7.1E+04	0.0E+00	2.00	
A.9-62.0	171.5'	42.9'	90.0'	5.5'	5.50	0.00	236	0	-24.1'	-142.0'	1.1E+05	0.0E+00	1.68	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level**

A.8-62.0	171.5'	55.9'	90.0'	15.0'	15.00	0.00	838	0	-24.1'	-129.0'	2.5E+05	0.0E+00	0.62
A.8-61.2	160.9'	71.5'	90.0'	0.0'	0.00	0.00	0	0	-34.6'	-113.4'	0.0E+00	0.0E+00	#DIV/0!
A.8-73.7	224.5'	71.5'	90.0'	0.0'	0.00	0.00	0	0	28.9'	-113.4'	0.0E+00	0.0E+00	#DIV/0!
AQ.0-71.5	208.4'	79.7'	90.0'	26.0'	26.00	0.00	2072	0	12.8'	-105.2'	2.9E+05	0.0E+00	0.36
AQ.0-62.9	176.2'	79.7'	90.0'	26.0'	26.00	0.00	2072	0	-19.3'	-105.2'	2.9E+05	0.0E+00	0.36
AQ.9-73.5	223.1'	103.7'	90.0'	9.0'	9.00	0.00	933	0	27.6'	-81.2'	5.9E+04	0.0E+00	1.03
AP.1-62.7	175.2'	108.2'	90.0'	19.5'	19.50	0.00	2109	0	-20.3'	-76.7'	1.1E+05	0.0E+00	0.47
AN.1-72.0	213.7'	115.2'	90.0'	19.5'	19.50	0.00	2246	0	18.2'	-69.7'	9.5E+04	0.0E+00	0.47
AL.1-72.7	217.3'	143.6'	90.0'	20.5'	20.50	0.00	2943	0	21.7'	-41.3'	3.5E+04	0.0E+00	0.45
AL.9-61.6	166.9'	145.3'	90.0'	22.0'	22.00	0.00	3198	0	-28.6'	-39.6'	3.4E+04	0.0E+00	0.42
AK.3-73.5	223.1'	154.6'	90.0'	0.0'	0.00	0.00	0	0	27.6'	-30.3'	0.0E+00	0.0E+00	#DIV/0!
AK.3-61.1	160.5'	156.8'	90.0'	0.0'	0.00	0.00	0	0	-35.0'	-28.1'	0.0E+00	0.0E+00	#DIV/0!
AJ.0-71.9	212.1'	179.1'	90.0'	19.0'	19.00	0.00	3403	0	16.6'	-5.8'	6.4E+02	0.0E+00	0.49
AH.0-62.0	171.5'	181.3'	90.0'	19.0'	19.00	0.00	3445	0	-24.0'	-3.6'	2.4E+02	0.0E+00	0.49
AH.8-73.5	223.1'	203.1'	90.0'	0.0'	0.00	0.00	0	0	27.6'	18.2'	0.0E+00	0.0E+00	#DIV/0!
AG.0-61.6	167.0'	209.7'	90.0'	22.0'	22.00	0.00	4614	0	-28.5'	24.8'	1.4E+04	0.0E+00	0.42

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level.**

AF.0-72.7	217.3'	214.1'	90.0'	20.5'	20.50	0.00	4389	0	21.7'	29.2'	1.7E+04	0.0E+00	0.45
AF.2-61.1	160.6'	220.7'	90.0'	0.0'	0.00	0.00	0	0	-34.9'	35.8'	0.0E+00	0.0E+00	#DIV/0!
AE.1-72.0	213.4'	243.0'	90.0'	19.0'	19.00	0.00	4617	0	17.9'	58.1'	6.4E+04	0.0E+00	0.49
AD.1-62.9	176.2'	245.3'	90.0'	19.5'	19.50	0.00	4784	0	-19.3'	60.4'	7.1E+04	0.0E+00	0.47
AC.4-68.8	201.2'	260.4'	90.0'	0.0'	0.00	0.00	0	0	5.7'	75.5'	0.0E+00	0.0E+00	#DIV/0!
AC.7-61.3	162.1'	265.3'	90.0'	9.0'	9.00	0.00	2388	0	-33.4'	80.4'	5.8E+04	0.0E+00	1.03
AB.0-72.7	217.2'	271.4'	90.0'	31.0'	31.00	0.00	8413	0	21.7'	86.5'	2.3E+05	0.0E+00	0.30
AB.3-62.3	173.2'	289.3'	90.0'	25.5'	25.50	0.00	7378	0	-22.3'	104.4'	2.8E+05	0.0E+00	0.36
AB.3-71.5	208.5'	289.3'	90.0'	24.5'	24.50	0.00	7089	0	13.0'	104.4'	2.7E+05	0.0E+00	0.38
AB.5-73.7	224.5'	297.5'	90.0'	0.0'	0.00	0.00	0	0	28.9'	112.6'	0.0E+00	0.0E+00	#DIV/0!
AB.8-71.4	207.0'	313.1'	90.0'	15.0'	15.00	0.00	4697	0	11.5'	128.2'	2.5E+05	0.0E+00	0.62
AA.8-71.4	207.0'	326.1'	90.0'	9.0'	9.00	0.00	2935	0	11.5'	141.2'	1.8E+05	0.0E+00	1.03
AA.8-73.1	219.9'	326.1'	90.0'	5.0'	5.00	0.00	1631	0	24.4'	141.2'	1.0E+05	0.0E+00	1.85
AA.8-62.0	171.5'	326.1'	90.0'	13.0'	13.00	0.00	4240	0	-24.0'	141.2'	2.6E+05	0.0E+00	0.71
S							443	432	81910	84461		3.6E+06	1.3E+05

Center of Rigidity

Xr = 195.5'

Yr = 184.9'

Eccentricity + Eac.

Ex = 0.54'

Ey = 13.76'

Eccentricity - Eac.

Ex = -6.81'

Ey = -14.56'

Rotational Stiffness

Jr = 3.78E+06

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level**

AQ.0-62.9	11.0 k	-1.9 k	2.0 k	13.0 k	0.0 k	0.0 k	0.0 k	0.0 k	12.96 k	498	1.00	4	3	665	0.75
AQ.9-73.5	3.8 k	-0.5 k	0.5 k	4.3 k	0.0 k	0.0 k	0.0 k	0.0 k	4.33 k	481	1.00	4	3	665	0.72
AP.1-62.7	8.2 k	-1.0 k	1.1 k	9.3 k	0.0 k	0.0 k	0.0 k	0.0 k	9.32 k	478	1.00	4	3	665	0.72
AN.1-72.0	8.2 k	-0.9 k	1.0 k	9.2 k	0.0 k	0.0 k	0.0 k	0.0 k	9.22 k	473	1.00	4	3	665	0.71
AL.1-72.7	8.7 k	-0.6 k	0.6 k	9.3 k	0.0 k	0.0 k	0.0 k	0.0 k	9.27 k	452	1.00	4	3	665	0.68
AL.9-61.6	9.3 k	-0.6 k	0.6 k	9.9 k	0.0 k	0.0 k	0.0 k	0.0 k	9.92 k	451	1.00	4	3	665	0.68
AK.3-73.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	3	#DIV/0!	#DIV/0!
AK.3-61.1	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	3	#DIV/0!	#DIV/0!
AJ.0-71.9	8.0 k	-0.1 k	0.1 k	8.1 k	0.0 k	0.0 k	0.0 k	0.0 k	8.11 k	427	1.00	4	3	665	0.64
AH.0-62.0	8.0 k	0.0 k	0.0 k	8.1 k	0.0 k	0.0 k	0.0 k	0.0 k	8.08 k	425	1.00	4	3	665	0.64
AH.8-73.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	3	#DIV/0!	#DIV/0!

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE **STRUCTURAL ENGINEERS**JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level.**

AG.0-61.6	9.3 k	0.4 k	-0.4 k	9.7 k	0.0 k	0.0 k	0.0 k	0.0 k	9.67 k	439	1.00	4	3	665	0.66
AF.0-72.7	8.7 k	0.4 k	-0.4 k	9.1 k	0.0 k	0.0 k	0.0 k	0.0 k	9.07 k	442	1.00	4	3	665	0.67
AF.2-61.1	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	3	#DIV/0!	#DIV/0!
AE.1-72.0	8.0 k	0.8 k	-0.8 k	8.8 k	0.0 k	0.0 k	0.0 k	0.0 k	8.78 k	462	1.00	4	3	665	0.69
AD.1-62.9	8.2 k	0.8 k	-0.8 k	9.0 k	0.0 k	0.0 k	0.0 k	0.0 k	9.04 k	464	1.00	4	3	665	0.70
AC.4-68.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	3	#DIV/0!	#DIV/0!
AC.7-61.3	3.8 k	0.5 k	-0.5 k	4.3 k	0.0 k	0.0 k	0.0 k	0.0 k	4.30 k	477	1.00	4	3	665	0.72
AB.0-72.7	13.1 k	1.8 k	-1.9 k	14.9 k	0.0 k	0.0 k	0.0 k	0.0 k	14.92 k	481	1.00	4	3	665	0.72
AB.3-62.3	10.8 k	1.8 k	-1.9 k	12.6 k	0.0 k	0.0 k	0.0 k	0.0 k	12.59 k	494	1.00	4	3	665	0.74
AB.3-71.5	10.4 k	1.7 k	-1.8 k	12.1 k	0.0 k	0.0 k	0.0 k	0.0 k	12.09 k	494	1.00	4	3	665	0.74
AB.5-73.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	3	#DIV/0!	#DIV/0!
AB.8-71.4	6.3 k	1.3 k	-1.4 k	7.6 k	0.0 k	0.0 k	0.0 k	0.0 k	7.65 k	510	1.00	4	3	665	0.77
AA.8-71.4	3.8 k	0.9 k	-0.9 k	4.7 k	0.0 k	0.0 k	0.0 k	0.0 k	4.67 k	519	1.00	3	3	665	0.78
AA.8-73.1	2.1 k	0.5 k	-0.5 k	2.6 k	0.0 k	0.0 k	0.0 k	0.0 k	2.59 k	519	1.00	3	3	665	0.78
AA.8-62.0	5.5 k	1.3 k	-1.3 k	6.7 k	0.0 k	0.0 k	0.0 k	0.0 k	6.74 k	519	1.00	3	3	665	0.78

S 187.1 k 0.0 k 0.0 k 212.1 k 187.1 k 0.0 k 0.0 k 188.1 k 400.2 k

Check for Torsional Irregularity

	Building				Max Defl.		
	Line	$\Delta X+$	$\Delta X-$	$\Delta Y+$	$\Delta Y-$	Ratio	
E/W	A.9-72.2	0.326	0.525			1.2	< 1.2 OK
	AA.8-62.0	0.519	0.321			1.2	< 1.2 OK
N/S	60.0-AK.4			0.432	0.447	1.0	< 1.2 OK
	74.0-A.3			0.434	0.422	1.0	< 1.2 OK
	Average	0.422	0.423	0.433	0.434		

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level****Tiedown Calculations - 3rd Floor Framing Level**

Typ Flr Ht = 10.25'

Typ Plate Ht = 9.26'

Building Line	Element		Wall Thk (4x/6x)	Height (ft)	Moment (k-ft)	D. L. w (k/ft)	Uplift Above (kip)	Incr. Uplift (kip)	Total Uplift (kip)	Current TD Level	Tiedown Capacity		Demand to Capacity	TD End Post Area (sq.in)	TD Δ_e @ load in (LRFD)
	Length (ft)	Shear (kip)									Incr. (kip)	Total (kip)			
60.0-AK.4	6.50	2.903	6x	10.25	30	0.00	2.99	5.41	8.40	1	12.27	22.78	0.44	36.45	0.103
60.0-AF.3	6.50	2.903	6x	10.25	30	0.00	2.99	5.41	8.40	1	12.27	22.78	0.44	36.45	0.103
60.3-AC.7	6.00	2.677	6x	10.25	27	0.00	3.03	5.49	8.52	1	12.27	22.78	0.45	36.45	0.105
61.7-A.8	12.00	5.313	6x	10.25	54	0.00	2.74	4.95	7.69	1	12.27	22.78	0.40	36.45	0.094
61.7-AA.8	12.00	5.313	6x	10.25	54	0.00	2.74	4.95	7.69	1	12.27	22.78	0.40	36.45	0.094
63.1-A.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
63.1-AA.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
63.1-AH.8	10.50	4.609	6x	10.25	47	0.00	2.75	4.97	7.72	1	12.27	22.78	0.41	36.45	0.095
64.1-AM.3	13.00	5.660	6x	10.25	58	0.00	2.67	4.83	7.51	1	12.27	22.78	0.39	36.45	0.092
64.1-AQ.3	13.00	5.660	6x	10.25	58	0.00	2.67	4.83	7.51	1	12.27	22.78	0.39	36.45	0.092
64.1-AQ.9	5.00	2.177	6x	10.25	22	0.00	3.08	5.58	8.66	1	12.27	22.78	0.45	36.45	0.106
64.1-AK.3	18.00	7.837	6x	10.25	80	0.00	2.61	4.73	7.34	1	12.27	22.78	0.39	36.45	0.090
64.1-AH.0	26.00	11.321	6x	10.25	116	0.00	2.57	4.64	7.21	1	12.27	22.78	0.38	36.45	0.089
64.2-AF.2	18.00	7.837	6x	10.25	80	0.00	2.61	4.73	7.34	1	12.27	22.78	0.39	36.45	0.090
64.2-AF.9	13.00	5.660	6x	10.25	58	0.00	2.67	4.83	7.51	1	12.27	22.78	0.39	36.45	0.092
64.3-AA.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
64.3-A.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
64.5-AC.6	18.00	7.827	6x	10.25	80	0.00	2.61	4.72	7.33	1	12.27	22.78	0.38	36.45	0.090
64.5-AB.6	13.00	5.653	6x	10.25	58	0.00	2.67	4.83	7.50	1	12.27	22.78	0.39	36.45	0.092
68.1-AK.2	18.00	7.803	6x	10.25	80	0.00	2.60	4.70	7.31	1	12.27	22.78	0.38	36.45	0.090
68.1-AJ.0	26.00	11.271	6x	10.25	116	0.00	2.55	4.62	7.18	1	12.27	22.78	0.38	36.45	0.088
68.1-AH.8	18.00	7.803	6x	10.25	80	0.00	2.60	4.70	7.31	1	12.27	22.78	0.38	36.45	0.090
68.1-AQ.2	13.00	5.636	6x	10.25	58	0.00	2.66	4.81	7.47	1	12.27	22.78	0.39	36.45	0.092
68.1-AQ.9	18.00	7.803	6x	10.25	80	0.00	2.60	4.70	7.31	1	12.27	22.78	0.38	36.45	0.090
68.2-AM.9	5.00	2.166	6x	10.25	22	0.00	3.07	5.55	8.62	1	12.27	22.78	0.45	36.45	0.106
68.2-AM.2	13.00	5.632	6x	10.25	58	0.00	2.66	4.81	7.47	1	12.27	22.78	0.39	36.45	0.092
68.2-AE.0	26.00	11.264	6x	10.25	115	0.00	2.55	4.62	7.17	1	12.27	22.78	0.38	36.45	0.088
68.2-AB.2	8.50	3.682	6x	10.25	38	0.00	2.78	5.03	7.81	1	12.27	22.78	0.41	36.45	0.096
68.2-AB.8	5.00	2.166	6x	10.25	22	0.00	3.07	5.55	8.62	1	12.27	22.78	0.45	36.45	0.106
71.3-AF.2	11.00	4.768	6x	10.25	49	0.00	2.70	4.89	7.59	1	12.27	22.78	0.40	36.45	0.093
71.4-A.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
71.4-AA.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
72.8-A.8	12.00	5.206	6x	10.25	53	0.00	2.68	4.85	7.53	1	12.27	22.78	0.40	36.45	0.093
72.8-AA.8	12.00	5.206	6x	10.25	53	0.00	2.68	4.85	7.53	1	12.27	22.78	0.40	36.45	0.093
74.0-A.8	5.50	2.387	6x	10.25	24	0.00	3.01	5.44	8.44	1	12.27	22.78	0.44	36.45	0.104
74.0-AA.5	6.00	2.604	6x	10.25	27	0.00	2.95	5.34	8.29	1	12.27	22.78	0.44	36.45	0.102
74.0-AH.7	6.00	2.604	6x	10.25	27	0.00	2.95	5.34	8.29	1	12.27	22.78	0.44	36.45	0.102
74.0-AK.3	6.00	2.604	6x	10.25	27	0.00	2.95	5.34	8.29	1	12.27	22.78	0.44	36.45	0.102
74.0-AQ.8	8.50	3.690	6x	10.25	38	0.00	2.79	5.04	7.83	1	12.27	22.78	0.41	36.45	0.096
74.0-AC.1	6.00	2.605	6x	10.25	27	0.00	2.95	5.34	8.29	1	12.27	22.78	0.44	36.45	0.102
74.0-AM.4	6.00	2.605	6x	10.25	27	0.00	2.95	5.34	8.29	1	12.27	22.78	0.44	36.45	0.102
74.0-AM.9	6.00	2.605	6x	10.25	27	0.00	2.95	5.34	8.29	1	12.27	22.78	0.44	36.45	0.102
74.0-A.3	6.00	2.605	6x	10.25	27	0.00	2.95	5.34	8.29	1	12.27	22.78	0.44	36.45	0.102

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level.**

A.9-72.2	20.00	10.498	6x	10.25	108	0.00	3.13	5.66	8.79	1	12.27	22.78	0.46	36.45	0.108
A.9-71.0	5.50	2.887	6x	10.25	30	0.00	3.64	6.58	10.21	1	12.27	22.78	0.54	36.45	0.126
A.9-63.5	3.50	1.837	6x	10.25	19	0.00	4.16	7.53	11.70	1	12.27	22.78	0.61	36.45	0.144
A.9-62.0	5.50	2.887	6x	10.25	30	0.00	3.64	6.58	10.21	1	12.27	22.78	0.54	36.45	0.126
A.8-61.2	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
A.8-73.7	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
AQ.0-71.5	26.00	12.957	6x	10.25	133	0.00	2.94	5.31	8.25	1	12.27	22.78	0.43	36.45	0.101
AQ.0-62.9	26.00	12.957	6x	10.25	133	0.00	2.94	5.31	8.25	1	12.27	22.78	0.43	36.45	0.101
AQ.9-73.5	9.00	4.329	6x	10.25	44	0.00	3.07	5.55	8.61	1	12.27	22.78	0.45	36.45	0.106
AP.1-62.7	19.50	9.317	6x	10.25	95	0.00	2.85	5.16	8.02	1	12.27	22.78	0.42	36.45	0.099
AN.1-72.0	19.50	9.218	6x	10.25	94	0.00	2.82	5.11	7.93	1	12.27	22.78	0.42	36.45	0.097
AL.1-72.7	20.50	9.271	6x	10.25	95	0.00	2.69	4.87	7.57	1	12.27	22.78	0.40	36.45	0.093
AL.9-61.6	22.00	9.922	6x	10.25	102	0.00	2.68	4.84	7.52	1	12.27	22.78	0.39	36.45	0.092
AK.3-73.5	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
AK.3-61.1	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
AJ.0-71.9	19.00	8.106	6x	10.25	83	0.00	2.55	4.62	7.17	1	12.27	22.78	0.38	36.45	0.088
AH.0-62.0	19.00	8.076	6x	10.25	83	0.00	2.54	4.60	7.14	1	12.27	22.78	0.37	36.45	0.088
AH.8-73.5	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
AG.0-61.6	22.00	9.666	6x	10.25	99	0.00	2.61	4.72	7.33	1	12.27	22.78	0.38	36.45	0.090
AF.0-72.7	20.50	9.068	6x	10.25	93	0.00	2.64	4.77	7.40	1	12.27	22.78	0.39	36.45	0.091
AF.2-61.1	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
AE.1-72.0	19.00	8.779	6x	10.25	90	0.00	2.76	5.00	7.76	1	12.27	22.78	0.41	36.45	0.095
AD.1-62.9	19.50	9.041	6x	10.25	93	0.00	2.77	5.01	7.78	1	12.27	22.78	0.41	36.45	0.096
AC.4-68.8	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
AC.7-61.3	9.00	4.295	6x	10.25	44	0.00	3.04	5.50	8.55	1	12.27	22.78	0.45	36.45	0.105
AB.0-72.7	31.00	14.924	6x	10.25	153	0.00	2.82	5.10	7.92	1	12.27	22.78	0.42	36.45	0.097
AB.3-62.3	25.50	12.588	6x	10.25	129	0.00	2.91	5.27	8.18	1	12.27	22.78	0.43	36.45	0.101
AB.3-71.5	24.50	12.094	6x	10.25	124	0.00	2.92	5.28	8.19	1	12.27	22.78	0.43	36.45	0.101
AB.5-73.7	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	12.27	22.78	#DIV/0!	36.45	#DIV/0!
AB.8-71.4	15.00	7.648	6x	10.25	78	0.00	3.10	5.60	8.69	1	12.27	22.78	0.46	36.45	0.107
AA.8-71.4	9.00	4.669	6x	10.25	48	0.00	3.31	5.98	9.29	1	12.27	22.78	0.49	36.45	0.114
AA.8-73.1	5.00	2.594	6x	10.25	27	0.00	3.67	6.65	10.32	1	12.27	22.78	0.54	36.45	0.127
AA.8-62.0	13.00	6.744	6x	10.25	69	0.00	3.18	5.76	8.94	1	12.27	22.78	0.47	36.45	0.110

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Tiedown Summary**

Building	Element Length		Level 5	Level 4	Override	CTDS	Demand to
Line	(ft)	Type	Run	Run	Run	Run	Capacity
60.0-AK.4	6.50	2	21	21	21	21	0.44
60.0-AF.3	6.50	2	21	21	21	21	0.44
60.3-AC.7	6.00	2	21	21	21	21	0.45
61.7-A.8	12.00	2	21	21	21	21	0.40
61.7-AA.8	12.00	2	21	21	21	21	0.40
63.1-A.8	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
63.1-AA.8	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
63.1-AH.8	10.50	2	21	21	21	21	0.41
64.1-AM.3	13.00	2	21	21	21	21	0.39
64.1-AQ.3	13.00	2	21	21	21	21	0.39
64.1-AQ.9	5.00	2	21	21	21	21	0.45
64.1-AK.3	18.00	2	21	21	21	21	0.39
64.1-AH.0	26.00	2	21	21	21	21	0.38
64.2-AF.2	18.00	2	21	21	21	21	0.39
64.2-AF.9	13.00	2	21	21	21	21	0.39
64.3-AA.8	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
64.3-A.8	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
64.5-AC.6	18.00	2	21	21	21	21	0.38
64.5-AB.6	13.00	2	21	21	21	21	0.39
68.1-AK.2	18.00	2	21	21	21	21	0.38
68.1-AJ.0	26.00	2	21	21	21	21	0.38
68.1-AH.8	18.00	2	21	21	21	21	0.38
68.1-AQ.2	13.00	2	21	21	21	21	0.39
68.1-AQ.9	18.00	2	21	21	21	21	0.38
68.2-AM.9	5.00	2	21	21	21	21	0.45
68.2-AM.2	13.00	2	21	21	21	21	0.39
68.2-AE.0	26.00	2	21	21	21	21	0.38
68.2-AB.2	8.50	2	21	21	21	21	0.41
68.2-AB.8	5.00	2	21	21	21	21	0.45
71.3-AF.2	11.00	2	21	21	21	21	0.40
71.4-A.8	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
71.4-AA.8	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
72.8-A.8	12.00	2	21	21	21	21	0.40
72.8-AA.8	12.00	2	21	21	21	21	0.40
74.0-A.8	5.50	2	21	21	21	21	0.44
74.0-AA.5	6.00	2	21	21	21	21	0.44
74.0-AH.7	6.00	2	21	21	21	21	0.44
74.0-AK.3	6.00	2	21	21	21	21	0.44
74.0-AQ.8	8.50	2	21	21	21	21	0.41
74.0-AC.1	6.00	2	21	21	21	21	0.44
74.0-AM.4	6.00	2	21	21	21	21	0.44
74.0-AM.9	6.00	2	21	21	21	21	0.44
74.0-A.3	6.00	2	21	21	21	21	0.44

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA**

A.9-72.2	20.00	2	21	21	21	21	0.46
A.9-71.0	5.50	2	21	21	21	21	0.54
A.9-63.5	3.50	2	21	21	21	21	0.61
A.9-62.0	5.50	2	21	21	21	21	0.54
A.8-61.2	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
A.8-73.7	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
AQ.0-71.5	26.00	2	21	21	21	21	0.43
AQ.0-62.9	26.00	2	21	21	21	21	0.43
AQ.9-73.5	9.00	2	21	21	21	21	0.45
AP.1-62.7	19.50	2	21	21	21	21	0.42
AN.1-72.0	19.50	2	21	21	21	21	0.42
AL.1-72.7	20.50	2	21	21	21	21	0.40
AL.9-61.6	22.00	2	21	21	21	21	0.39
AK.3-73.5	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
AK.3-61.1	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
AJ.0-71.9	19.00	2	21	21	21	21	0.38
AH.0-62.0	19.00	2	21	21	21	21	0.37
AH.8-73.5	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
AG.0-61.6	22.00	2	21	21	21	21	0.38
AF.0-72.7	20.50	2	21	21	21	21	0.39
AF.2-61.1	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
AE.1-72.0	19.00	2	21	21	21	21	0.41
AD.1-62.9	19.50	2	21	21	21	21	0.41
AC.4-68.8	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
AC.7-61.3	9.00	2	21	21	21	21	0.45
AB.0-72.7	31.00	2	21	21	21	21	0.42
AB.3-62.3	25.50	2	21	21	21	21	0.43
AB.3-71.5	24.50	2	21	21	21	21	0.43
AB.5-73.7	0.00	2	#VALUE!	#VALUE!	21	21	#DIV/0!
AB.8-71.4	15.00	2	21	21	21	21	0.46
AA.8-71.4	9.00	2	21	21	21	21	0.49
AA.8-73.1	5.00	2	21	21	21	21	0.54
AA.8-62.0	13.00	2	21	21	21	21	0.47

BY **ACM** DATE **02/06/19****PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. **18-234****LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level,****Shearwall Drift Calculations - Roof Framing Level,**

$$\delta_{sw} = \frac{8vh^3}{EAb} + \frac{vh}{G_t I_t} + 0.75he_n + \frac{h}{b}\Delta_a \quad (C4.3.2-1)$$

$$C_d = 4$$

$$I = 1.0$$

$$E = 1600000 \text{ psi (DF\#2)}$$

$$\text{Lumber Type} = \text{Dry}$$

$$\text{Allowable Story Drift} = 2.46 \text{ in}$$

Sheath Type	Gvtv
OSB	83500
Ply	35000
Ply S1	45500

N/S	Building Line	SW	Plate	LRFD					Wall anch.							
		Length	Height, h	Shear	Nail Spac.	e _n	Sheath	Double	bending	shear	nail slip	slip	Total Defl	Amplified		
		(ft)	(ft)	(plf)	in	in	Type	Shear?	8vh ³ /EAb	vh/G _t I _y	0.75he _n	h ² Δ _a /b				
									in	in	in	in	in	in	defl, in	d/c
	60.0-AK.4	6.50'	9.26'	346	4	0.0024	Ply S1	No	0.0126	0.0704	0.0166	0.1135	0.2130	0.8522		
	60.0-AF.3	6.50'	9.26'	346	4	0.0024	Ply S1	No	0.0126	0.0704	0.0166	0.1135	0.2130	0.8521		
	60.3-AC.7	6.00'	9.26'	345	4	0.0024	Ply S1	No	0.0136	0.0703	0.0165	0.1247	0.2251	0.9005		
	61.7-A.8	12.00'	9.26'	343	4	0.0023	Ply S1	No	0.0067	0.0697	0.0161	0.0563	0.1489	0.5955		
	61.7-AA.8	12.00'	9.26'	343	4	0.0023	Ply S1	No	0.0067	0.0697	0.0161	0.0563	0.1489	0.5955		
	63.1-A.8															
	63.1-AA.8															
	63.1-AH.8	10.50'	9.26'	340	4	0.0023	Ply S1	No	0.0076	0.0691	0.0157	0.0646	0.1571	0.6283		
	64.1-AM.3	13.00'	9.26'	337	4	0.0022	Ply S1	No	0.0061	0.0686	0.0153	0.0507	0.1407	0.5628		
	64.1-AQ.3	13.00'	9.26'	337	4	0.0022	Ply S1	No	0.0061	0.0686	0.0153	0.0507	0.1407	0.5628		
	64.1-AQ.9	5.00'	9.26'	337	4	0.0022	Ply S1	No	0.0159	0.0686	0.0153	0.1522	0.2519	1.0078		
	64.1-AK.3	18.00'	9.26'	337	4	0.0022	Ply S1	No	0.0044	0.0686	0.0153	0.0358	0.1241	0.4963		
	64.1-AH.0	26.00'	9.26'	337	4	0.0022	Ply S1	No	0.0031	0.0686	0.0153	0.0243	0.1113	0.4451		
	64.2-AF.2	18.00'	9.26'	337	4	0.0022	Ply S1	No	0.0044	0.0686	0.0153	0.0358	0.1241	0.4963		
	64.2-AF.9	13.00'	9.26'	337	4	0.0022	Ply S1	No	0.0061	0.0686	0.0153	0.0507	0.1407	0.5628		
	64.3-AA.8															
	64.3-A.8															
	64.5-AC.6	18.00'	9.26'	337	4	0.0022	Ply S1	No	0.0044	0.0685	0.0152	0.0358	0.1239	0.4955		
	64.5-AB.6	13.00'	9.26'	337	4	0.0022	Ply S1	No	0.0061	0.0685	0.0152	0.0507	0.1405	0.5619		
	68.1-AK.2	18.00'	9.26'	336	4	0.0022	Ply S1	No	0.0044	0.0683	0.0151	0.0356	0.1234	0.4936		
	68.1-AJ.0	26.00'	9.26'	336	4	0.0022	Ply S1	No	0.0030	0.0683	0.0151	0.0242	0.1106	0.4425		
	68.1-AH.8	18.00'	9.26'	336	4	0.0022	Ply S1	No	0.0044	0.0683	0.0151	0.0356	0.1234	0.4936		
	68.1-AQ.2	13.00'	9.26'	336	4	0.0022	Ply S1	No	0.0061	0.0683	0.0151	0.0505	0.1399	0.5597		
	68.1-AQ.9	18.00'	9.26'	336	4	0.0022	Ply S1	No	0.0044	0.0683	0.0151	0.0356	0.1234	0.4936		
	68.2-AM.9	5.00'	9.26'	335	4	0.0022	Ply S1	No	0.0158	0.0682	0.0150	0.1514	0.2505	1.0020		
	68.2-AM.2	13.00'	9.26'	335	4	0.0022	Ply S1	No	0.0061	0.0682	0.0150	0.0505	0.1398	0.5593		
	68.2-AE.0	26.00'	9.26'	335	4	0.0022	Ply S1	No	0.0030	0.0682	0.0150	0.0242	0.1105	0.4421		
	68.2-AB.2	8.50'	9.26'	335	4	0.0022	Ply S1	No	0.0093	0.0682	0.0150	0.0807	0.1733	0.6933		
	68.2-AB.8	5.00'	9.26'	335	4	0.0022	Ply S1	No	0.0158	0.0682	0.0150	0.1514	0.2505	1.0020		
	71.3-AF.2	11.00'	9.26'	336	4	0.0022	Ply S1	No	0.0072	0.0683	0.0151	0.0606	0.1511	0.6046		
	71.4-A.8															
	71.4-AA.8															
	72.8-A.8	12.00'	9.26'	336	4	0.0022	Ply S1	No	0.0066	0.0683	0.0151	0.0551	0.1452	0.5806		
	72.8-AA.8	12.00'	9.26'	336	4	0.0022	Ply S1	No	0.0066	0.0683	0.0151	0.0551	0.1452	0.5806		
	74.0-A.8	5.50'	9.26'	336	4	0.0022	Ply S1	No	0.0144	0.0684	0.0151	0.1348	0.2328	0.9310		
	74.0-AA.5	6.00'	9.26'	336	4	0.0022	Ply S1	No	0.0132	0.0684	0.0151	0.1214	0.2181	0.8723		
	74.0-AH.7	6.00'	9.26'	336	4	0.0022	Ply S1	No	0.0132	0.0684	0.0151	0.1214	0.2181	0.8723		
	74.0-AK.3	6.00'	9.26'	336	4	0.0022	Ply S1	No	0.0132	0.0684	0.0151	0.1214	0.2181	0.8723		
	74.0-AQ.8	8.50'	9.26'	336	4	0.0022	Ply S1	No	0.0093	0.0684	0.0151	0.0809	0.1737	0.6949		
	74.0-AC.1	6.00'	9.26'	336	4	0.0022	Ply S1	No	0.0132	0.0684	0.0151	0.1214	0.2181	0.8724		
	74.0-AM.4	6.00'	9.26'	336	4	0.0022	Ply S1	No	0.0132	0.0684	0.0151	0.1214	0.2181	0.8724		
	74.0-AM.9	6.00'	9.26'	336	4	0.0022	Ply S1	No	0.0132	0.0684	0.0151	0.1214	0.2181	0.8724		
	74.0-A.3	6.00'	9.26'	336	4	0.0022	Ply S1	No	0.0132	0.0684	0.0151	0.1214	0.2181	0.8724		

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - Roof Framing Level.**

E/W	A.9-72.2	20.00'	9.26'	406	4	0.0041	Ply S1	No	0.0048	0.0827	0.0282	0.0386	0.1543	0.6171
	A.9-71.0	5.50'	9.26'	406	4	0.0041	Ply S1	No	0.0174	0.0827	0.0282	0.1631	0.2914	1.1654
	A.9-63.5	3.50'	9.26'	406	4	0.0041	Ply S1	No	0.0274	0.0827	0.0282	0.2935	0.4318	1.7271
	A.9-62.0	5.50'	9.26'	406	4	0.0041	Ply S1	No	0.0174	0.0827	0.0282	0.1631	0.2914	1.1654
	A.8-61.2													
	A.8-73.7													
	AQ.0-71.5	26.00'	9.26'	386	4	0.0034	Ply S1	No	0.0035	0.0785	0.0238	0.0279	0.1336	0.5346
	AQ.0-62.9	26.00'	9.26'	386	4	0.0034	Ply S1	No	0.0035	0.0785	0.0238	0.0279	0.1336	0.5346
	AQ.9-73.5	9.00'	9.26'	372	4	0.0030	Ply S1	No	0.0098	0.0758	0.0212	0.0841	0.1908	0.7630
	AP.1-62.7	19.50'	9.26'	370	4	0.0030	Ply S1	No	0.0045	0.0753	0.0207	0.0361	0.1366	0.5462
	AN.1-72.0	19.50'	9.26'	366	4	0.0029	Ply S1	No	0.0044	0.0745	0.0200	0.0357	0.1346	0.5385
	AL.1-72.7	20.50'	9.26'	350	4	0.0025	Ply S1	No	0.0040	0.0712	0.0173	0.0324	0.1250	0.5000
	AL.9-61.6	22.00'	9.26'	349	4	0.0025	Ply S1	No	0.0037	0.0710	0.0171	0.0300	0.1219	0.4878
	AK.3-73.5													
	AK.3-61.1													
	AJ.0-71.9	19.00'	9.26'	330	4	0.0021	Ply S1	No	0.0041	0.0672	0.0143	0.0331	0.1187	0.4749
	AH.0-62.0	19.00'	9.26'	329	4	0.0020	Ply S1	No	0.0041	0.0669	0.0141	0.0330	0.1182	0.4726
	AH.8-73.5													
	AG.0-61.6	22.00'	9.26'	340	4	0.0023	Ply S1	No	0.0036	0.0692	0.0157	0.0292	0.1178	0.4714
	AF.0-72.7	20.50'	9.26'	342	4	0.0023	Ply S1	No	0.0039	0.0697	0.0161	0.0317	0.1214	0.4857
	AF.2-61.1													
	AE.1-72.0	19.00'	9.26'	358	4	0.0027	Ply S1	No	0.0044	0.0728	0.0186	0.0359	0.1317	0.5267
	AD.1-62.9	19.50'	9.26'	359	4	0.0027	Ply S1	No	0.0043	0.0730	0.0188	0.0350	0.1312	0.5247
	AC.4-68.8													
	AC.7-61.3	9.00'	9.26'	369	4	0.0030	Ply S1	No	0.0097	0.0752	0.0206	0.0834	0.1889	0.7556
	AB.0-72.7	31.00'	9.26'	373	4	0.0031	Ply S1	No	0.0028	0.0758	0.0212	0.0224	0.1223	0.4893
	AB.3-62.3	25.50'	9.26'	382	4	0.0033	Ply S1	No	0.0035	0.0778	0.0230	0.0282	0.1325	0.5300
	AB.3-71.5	24.50'	9.26'	382	4	0.0033	Ply S1	No	0.0037	0.0778	0.0230	0.0294	0.1338	0.5354
	AB.5-73.7													
	AB.8-71.4	15.00'	9.26'	395	4	0.0037	Ply S1	No	0.0062	0.0803	0.0256	0.0509	0.1631	0.6522
	AA.8-71.4	9.00'	9.26'	401	4	0.0039	Ply S1	No	0.0105	0.0817	0.0271	0.0906	0.2100	0.8400
	AA.8-73.1	5.00'	9.26'	401	4	0.0039	Ply S1	No	0.0190	0.0817	0.0271	0.1813	0.3091	1.2363
	AA.8-62.0	13.00'	9.26'	401	4	0.0039	Ply S1	No	0.0073	0.0817	0.0271	0.0604	0.1765	0.7062

NS Average Drift: 0.6837 D/C= 0.28

EW Average Drift : 0.6912 D/C= 0.28

Allowable Drift : 2.46

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level.****Shearwall Drift Calculations - 3rd Floor Framing Level.**

$$\delta_{sw} = \frac{8vh^3}{EAh} + \frac{vh}{G_v f_v} + 0.75he_n + \frac{h}{b}\Delta_a \quad (C4.3.2-1)$$

C_d = 4

I = 1.0

E = 1600000 psi (DF#2)

Lumber Type = Dry

Allowable Story Drift = 2.46 in

Sheath Type	Gvtv
OSB	83500
Ply	35000
Ply S1	45500

Building	SW Length (ft)	Plate Height, h (ft)	LRFD Shear (plf)	Nail Spac. in	e _n in	Sheath Type	Double Shear?	Wall anch.				Total Defl in	Amplified defl, in	d/c
								bending 8vh ³ /EAb in	shear vh/G _v f _v in	nail slip 0.75he _n in	slip h*Δ _a /b in			
60.0-AK.4	6.50'	9.26'	625	3	0.0065	Ply S1	No	0.0105	0.1273	0.0451	0.1471	0.3300	1.3199	
60.0-AF.3	6.50'	9.26'	625	3	0.0065	Ply S1	No	0.0105	0.1273	0.0451	0.1471	0.3299	1.3198	
60.3-AC.7	6.00'	9.26'	625	3	0.0065	Ply S1	No	0.0113	0.1271	0.0449	0.1616	0.3450	1.3800	
61.7-A.8	12.00'	9.26'	620	3	0.0063	Ply S1	No	0.0056	0.1261	0.0438	0.0729	0.2485	0.9940	
61.7-AA.8	12.00'	9.26'	620	3	0.0063	Ply S1	No	0.0056	0.1261	0.0438	0.0729	0.2485	0.9940	
63.1-A.8	0.00'													
63.1-AA.8	0.00'													
63.1-AH.8	10.50'	9.26'	615	3	0.0061	Ply S1	No	0.0064	0.1251	0.0426	0.0837	0.2578	1.0311	
64.1-AM.3	13.00'	9.26'	610	3	0.0060	Ply S1	No	0.0051	0.1241	0.0415	0.0657	0.2364	0.9456	
64.1-AQ.3	13.00'	9.26'	610	3	0.0060	Ply S1	No	0.0051	0.1241	0.0415	0.0657	0.2364	0.9456	
64.1-AQ.9	5.00'	9.26'	610	3	0.0060	Ply S1	No	0.0133	0.1241	0.0415	0.1972	0.3760	1.5041	
64.1-AK.3	18.00'	9.26'	610	3	0.0060	Ply S1	No	0.0037	0.1241	0.0415	0.0464	0.2156	0.8626	
64.1-AH.0	26.00'	9.26'	610	3	0.0060	Ply S1	No	0.0026	0.1241	0.0415	0.0316	0.1997	0.7986	
64.2-AF.2	18.00'	9.26'	610	3	0.0060	Ply S1	No	0.0037	0.1240	0.0415	0.0464	0.2156	0.8625	
64.2-AF.9	13.00'	9.26'	610	3	0.0060	Ply S1	No	0.0051	0.1240	0.0415	0.0657	0.2364	0.9455	
64.3-AA.8														
64.3-A.8														
64.5-AC.6	18.00'	9.26'	609	3	0.0059	Ply S1	No	0.0037	0.1239	0.0413	0.0463	0.2152	0.8610	
64.5-AB.6	13.00'	9.26'	609	3	0.0059	Ply S1	No	0.0051	0.1239	0.0413	0.0656	0.2360	0.9439	
68.1-AK.2	18.00'	9.26'	607	3	0.0059	Ply S1	No	0.0037	0.1235	0.0409	0.0462	0.2143	0.8571	
68.1-AJ.0	26.00'	9.26'	607	3	0.0059	Ply S1	No	0.0025	0.1235	0.0409	0.0314	0.1984	0.7935	
68.1-AH.8	18.00'	9.26'	607	3	0.0059	Ply S1	No	0.0037	0.1235	0.0409	0.0462	0.2143	0.8571	
68.1-AQ.2	13.00'	9.26'	607	3	0.0059	Ply S1	No	0.0051	0.1235	0.0409	0.0654	0.2349	0.9398	
68.1-AQ.9	18.00'	9.26'	607	3	0.0059	Ply S1	No	0.0037	0.1235	0.0409	0.0462	0.2143	0.8571	
68.2-AM.9	5.00'	9.26'	607	3	0.0059	Ply S1	No	0.0132	0.1234	0.0408	0.1962	0.3737	1.4947	
68.2-AM.2	13.00'	9.26'	607	3	0.0059	Ply S1	No	0.0051	0.1234	0.0408	0.0654	0.2347	0.9389	
68.2-AE.0	26.00'	9.26'	607	3	0.0059	Ply S1	No	0.0025	0.1234	0.0408	0.0314	0.1982	0.7927	
68.2-AB.2	8.50'	9.26'	607	3	0.0059	Ply S1	No	0.0078	0.1234	0.0408	0.1046	0.2767	1.1066	
68.2-AB.8	5.00'	9.26'	607	3	0.0059	Ply S1	No	0.0132	0.1234	0.0408	0.1962	0.3737	1.4947	
71.3-AF.2	11.00'	9.26'	607	3	0.0059	Ply S1	No	0.0060	0.1235	0.0409	0.0785	0.2490	0.9958	
71.4-A.8														
71.4-AA.8														
72.8-A.8	12.00'	9.26'	607	3	0.0059	Ply S1	No	0.0055	0.1236	0.0410	0.0714	0.2415	0.9662	
72.8-AA.8	12.00'	9.26'	607	3	0.0059	Ply S1	No	0.0055	0.1236	0.0410	0.0714	0.2415	0.9662	
74.0-A.8	5.50'	9.26'	608	3	0.0059	Ply S1	No	0.0120	0.1237	0.0411	0.1747	0.3515	1.4061	
74.0-AA.5	6.00'	9.26'	608	3	0.0059	Ply S1	No	0.0110	0.1237	0.0411	0.1573	0.3331	1.3322	
74.0-AH.7	6.00'	9.26'	608	3	0.0059	Ply S1	No	0.0110	0.1237	0.0411	0.1573	0.3331	1.3322	
74.0-AK.3	6.00'	9.26'	608	3	0.0059	Ply S1	No	0.0110	0.1237	0.0411	0.1573	0.3331	1.3322	
74.0-AQ.8	8.50'	9.26'	608	3	0.0059	Ply S1	No	0.0078	0.1237	0.0411	0.1048	0.2774	1.1096	
74.0-AC.1	6.00'	9.26'	608	3	0.0059	Ply S1	No	0.0110	0.1237	0.0411	0.1573	0.3331	1.3324	
74.0-AM.4	6.00'	9.26'	608	3	0.0059	Ply S1	No	0.0110	0.1237	0.0411	0.1573	0.3331	1.3324	
74.0-AM.9	6.00'	9.26'	608	3	0.0059	Ply S1	No	0.0110	0.1237	0.0411	0.1573	0.3331	1.3324	
74.0-A.3	6.00'	9.26'	608	3	0.0059	Ply S1	No	0.0110	0.1237	0.0411	0.1573	0.3331	1.3324	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**LEGACY LIVERMORE****KATERRA****Lateral Analysis - 3rd Floor Framing Level.**

A.9-72.2	20.00'	9.26'	735	3	0.0110	Ply S1	No	0.0040	0.1496	0.0765	0.0500	0.2801	1.1206
A.9-71.0	5.50'	9.26'	735	3	0.0110	Ply S1	No	0.0146	0.1496	0.0765	0.2113	0.4520	1.8079
A.9-63.5	3.50'	9.26'	735	3	0.0110	Ply S1	No	0.0229	0.1496	0.0765	0.3804	0.6293	2.5173
A.9-62.0	5.50'	9.26'	735	3	0.0110	Ply S1	No	0.0146	0.1496	0.0765	0.2113	0.4520	1.8078
A.8-61.2													
A.8-73.7													
AQ.0-71.5	26.00'	9.26'	698	3	0.0093	Ply S1	No	0.0029	0.1420	0.0646	0.0361	0.2456	0.9824
AQ.0-62.9	26.00'	9.26'	698	3	0.0093	Ply S1	No	0.0029	0.1420	0.0646	0.0361	0.2456	0.9824
AQ.9-73.5	9.00'	9.26'	673	3	0.0083	Ply S1	No	0.0082	0.1371	0.0575	0.1089	0.3116	1.2465
AP.1-62.7	19.50'	9.26'	669	3	0.0081	Ply S1	No	0.0037	0.1361	0.0562	0.0468	0.2429	0.9716
AN.1-72.0	19.50'	9.26'	662	3	0.0078	Ply S1	No	0.0037	0.1347	0.0543	0.0463	0.2390	0.9560
AL.1-72.7	20.50'	9.26'	633	3	0.0068	Ply S1	No	0.0034	0.1289	0.0470	0.0420	0.2212	0.8849
AL.9-61.6	22.00'	9.26'	631	3	0.0067	Ply S1	No	0.0031	0.1285	0.0466	0.0389	0.2171	0.8683
AK.3-73.5													
AK.3-61.1													
AJ.0-71.9	19.00'	9.26'	597	3	0.0056	Ply S1	No	0.0034	0.1216	0.0388	0.0429	0.2067	0.8270
AH.0-62.0	19.00'	9.26'	595	3	0.0055	Ply S1	No	0.0034	0.1211	0.0383	0.0428	0.2056	0.8225
AH.8-73.5													
AG.0-61.6	22.00'	9.26'	615	3	0.0062	Ply S1	No	0.0030	0.1252	0.0427	0.0379	0.2089	0.8355
AF.0-72.7	20.50'	9.26'	619	3	0.0063	Ply S1	No	0.0033	0.1260	0.0437	0.0411	0.2141	0.8565
AF.2-61.1													
AE.1-72.0	19.00'	9.26'	647	3	0.0073	Ply S1	No	0.0037	0.1316	0.0504	0.0465	0.2323	0.9291
AD.1-62.9	19.50'	9.26'	649	3	0.0073	Ply S1	No	0.0036	0.1321	0.0510	0.0454	0.2321	0.9284
AC.4-68.8													
AC.7-61.3	9.00'	9.26'	668	3	0.0081	Ply S1	No	0.0081	0.1360	0.0560	0.1081	0.3082	1.2328
AB.0-72.7	31.00'	9.26'	674	3	0.0083	Ply S1	No	0.0024	0.1372	0.0577	0.0291	0.2263	0.9051
AB.3-62.3	25.50'	9.26'	691	3	0.0090	Ply S1	No	0.0030	0.1406	0.0626	0.0365	0.2427	0.9708
AB.3-71.5	24.50'	9.26'	691	3	0.0090	Ply S1	No	0.0031	0.1406	0.0626	0.0381	0.2444	0.9775
AB.5-73.7													
AB.8-71.4	15.00'	9.26'	714	3	0.0100	Ply S1	No	0.0052	0.1453	0.0696	0.0660	0.2860	1.1441
AA.8-71.4	9.00'	9.26'	726	3	0.0106	Ply S1	No	0.0088	0.1478	0.0736	0.1175	0.3477	1.3907
AA.8-73.1	5.00'	9.26'	726	3	0.0106	Ply S1	No	0.0158	0.1478	0.0736	0.2349	0.4722	1.8888
AA.8-62.0	13.00'	9.26'	726	3	0.0106	Ply S1	No	0.0061	0.1478	0.0736	0.0783	0.3058	1.2233

NS Average Drift: 1.0976 D/C= 0.45

EW Average Drift : 1.1631 D/C= 0.47

Allowable Drift : 2.46

BY **ACM** DATE **02/06/19** SHEET NO. _____ OF _____
 CHKD. BY _____ DATE _____ **PEOPLES ASSOCIATES** JOB NO. _____ **18-234**
 Legacy

Flexible Diaphragm Analysis - High Roof Framing Level,

Collector Design

Fpx = 4.68 psf

Diaph Factor, λ = 1.00

Building Line	SW Length	SW Shear (lbs)	Diaph Force (lbs)	Diaph 1 Cap. (plf)	Diaph 1 L (ft)	COLLECTOR DESIGN		Remain. Force (lb)	Collector Req'd?	+ 25% for Irregular	Adj. V (lb)	Diaph 1b Cap (plf)	Diaph 2b Cap (plf)	Collector L Req (ft)
						Diaph 2 Cap. (plf)	Diaph 2 L (ft)							
60.0-AK.4	6.5	1605	1605	215	20.5	0	20.5	0	No					
60.0-AF.3	6.5	1605	1605	215	12.0	0	12.0	0	No					
60.3-AC.7	6.0	1480	1480	215	20.0	0	20.0	0	No					
61.7-A.8	12.0	2937	2937	215	12.0	215	12.0	0	No					
61.7-AA.8	12.0	2937	2937	215	12.0	215	12.0	0	No					
63.1-A.8								0	No					
63.1-AA.8								0	No					
63.1-AH.8	10.5	2548	2548	215	10.5	215	10.5	0	No					
64.1-AM.3	13.0	3129	3129	215	17.0	14	17.0	0	No					
64.1-AQ.3	13.0	3129	3129	215	17.0	14	17.0	0	No					
64.1-AQ.9	5.0	1204	1204	215	8.0	14	8.0	0	No					
64.1-AK.3	18.0	4333	4333	215	19.0	14	19.0	0	No					
64.1-AH.0	26.0	6259	6259	215	27.5	14	27.5	0	No					
64.2-AF.2	18.0	4333	4333	215	19.0	14	19.0	0	No					
64.2-AF.9	13.0	3129	3129	215	14.0	14	14.0	0	No					
64.3-AA.8								0	No					
64.3-A.8								0	No					
64.5-AC.6	18.0	4327	4327	215	19.0	14	19.0	0	No					
64.5-AB.6	13.0	3125	3125	215	14.0	14	14.0	0	No					
68.1-AK.2	18.0	4314	4314	215	19.0	14	19.0	0	No					
68.1-AJ.0	26.0	6231	6231	215	28.0	14	28.0	0	No					
68.1-AH.8	18.0	4314	4314	215	19.0	14	19.0	0	No					
68.1-AQ.2	13.0	3116	3116	215	14.0	14	14.0	0	No					
68.1-AQ.9	18.0	4314	4314	215	19.0	14	19.0	0	No					
68.2-AM.9	5.0	1198	1198	215	6.0	14	6.0	0	No					
68.2-AM.2	13.0	3114	3114	215	14.0	14	14.0	0	No					
68.2-AE.0	26.0	6227	6227	215	27.5	14	27.5	0	No					
68.2-AB.2	8.5	2036	2036	215	9.5	14	9.5	0	No					
68.2-AB.8	5.0	1198	1198	215	6.0	14	6.0	0	No					
71.3-AF.2	11.0	2636	2636	215	12.0	14	12.0	0	No					
71.4-A.8								0	No					
71.4-AA.8								0	No					
72.8-A.8	12.0	2878	2878	215	12.0	215	12.0	0	No					
72.8-AA.8	12.0	2878	2878	215	12.0	215	12.0	0	No					
74.0-A.8	5.5	1320	1320	215	5.5	215	5.5	0	No					
74.0-AA.5	6.0	1440	1440	215	6.0	215	6.0	0	No					
74.0-AH.7	6.0	1440	1440	215	6.0	215	6.0	0	No					
74.0-AK.3	6.0	1440	1440	215	6.0	215	6.0	0	No					
74.0-AQ.8	8.5	2040	2040	215	8.5	215	8.5	0	No					
74.0-AC.1	6.0	1440	1440	215	6.0	215	6.0	0	No					
74.0-AM.4	6.0	1440	1440	215	6.0	215	6.0	0	No					
74.0-AM.9	6.0	1440	1440	215	6.0	215	6.0	0	No					
74.0-A.3	6.0	1440	1440	215	6.0	215	6.0	0	No					
.0-0								0	No					
.0-0								0	No					
.0-0								0	No					
.0-0								0	No					
.0-0								0	No					
A.9-72.2	20.0	5804	5804	215	34.0	0	34.0	0	No					
A.9-71.0	5.5	1596	1596	215	11.5	0	11.5	0	No					

BY ACM	DATE 02/06/19	SHEET NO. _____	OF _____
CHKD. BY _____	DATE _____	PEOPLES ASSOCIATES	JOB NO. 18-234
Katerra Legacy			

Rigid Diaphragm Analysis - Roof Floor Framing Level.

Collector Design

Fpx = 7.16 psf
 Diaph Factor, λ_{abv} = 1.00
 Diaph Factor, λ = 0.80

Building Line	SW Length	SW Shear (lbs)	Diaph Force (lbs)	COLLECTOR DESIGN							Collector Req'd?	+ 25% for Irregular	Adj. V (lb)	Diaph 1b Cap (plf)	Diaph 2b Cap (plf)	Collector L Req (ft)
				Diaph 1 Cap. (plf)	Diaph 1 L (ft)	Diaph 2 Cap. (plf)	Diaph 2 L (ft)	Remain. Force (lb)								
60.0-AK.4	6.5	2903	712	215	20.5	0	20.5	0	No							
60.0-AF.3	6.5	2903	712	215	6.5	0	6.5	0	No							
60.3-AC.7	6.0	2677	657	215	6.0	0	6.0	0	No							
61.7-A.8	12.0	5313	1303	215	12.0	215	12.0	0	No							
61.7-AA.8	12.0	5313	1303	215	12.0	215	12.0	0	No							
								0								
								0								
63.1-AH.8	10.5	4609	1131	215	10.5	215	10.5	0	No							
64.1-AM.3	13.0	5660	1388	215	13.0	21	13.0	0	No							
64.1-AQ.3	13.0	5660	1388	215	13.0	21	13.0	0	No							
64.1-AQ.9	5.0	2177	534	215	5.0	21	5.0	0	No							
64.1-AK.3	18.0	7837	1922	215	18.0	21	18.0	0	No							
64.1-AH.0	26.0	11321	2777	215	26.0	21	26.0	0	No							
64.2-AF.2	18.0	7837	1922	215	18.0	21	18.0	0	No							
64.2-AF.9	13.0	5660	1388	215	13.0	21	13.0	0	No							
								0								
								0								
64.5-AC.6	18.0	7827	1920	215	18.0	21	18.0	0	No							
64.5-AB.6	13.0	5653	1387	215	13.0	21	13.0	0	No							
68.1-AK.2	18.0	7803	1914	215	18.0	21	18.0	0	No							
68.1-AJ.0	26.0	11271	2765	215	26.0	21	26.0	0	No							
68.1-AH.8	18.0	7803	1914	215	18.0	21	18.0	0	No							
68.1-AQ.2	13.0	5636	1382	215	13.0	21	13.0	0	No							
68.1-AQ.9	18.0	7803	1914	215	18.0	21	18.0	0	No							
68.2-AM.9	5.0	2166	531	215	5.0	21	5.0	0	No							
68.2-AM.2	13.0	5632	1381	215	13.0	21	13.0	0	No							
68.2-AE.0	26.0	11264	2763	215	26.0	21	26.0	0	No							
68.2-AB.2	8.5	3682	903	215	8.5	21	8.5	0	No							
68.2-AB.8	5.0	2166	531	215	5.0	21	5.0	0	No							
71.3-AF.2	11.0	4768	1170	215	11.0	21	11.0	0	No							
								0								
								0								
								0								
72.8-A.8	12.0	5206	1277	215	12.0	215	12.0	0	No							
72.8-AA.8	12.0	5206	1277	215	12.0	215	12.0	0	No							
74.0-A.8	5.5	2387	586	215	5.5	215	5.5	0	No							
74.0-AA.5	6.0	2604	639	215	6.0	215	6.0	0	No							
74.0-AH.7	6.0	2604	639	215	6.0	215	6.0	0	No							
74.0-AK.3	6.0	2604	639	215	6.0	215	6.0	0	No							
74.0-AQ.8	8.5	3690	905	215	8.5	215	8.5	0	No							
74.0-AC.1	6.0	2605	639	215	6.0	215	6.0	0	No							
74.0-AM.4	6.0	2605	639	215	6.0	215	6.0	0	No							
74.0-AM.9	6.0	2605	639	215	6.0	215	6.0	0	No							
74.0-A.3	6.0	2605	639	215	6.0	215	6.0	0	No							
								0								
								0								
								0								
								0								
								0								
A.9-72.2	20.0	10498	2575	215	20.0	0	20.0	0	No							
A.9-71.0	5.5	2887	708	215	5.5	0	5.5	0	No							

BY ACM DATE 02/06/19 SHEET NO. _____ OF _____
 CHKD. BY _____ DATE _____ **PEOPLES ASSOCIATES** JOB NO. 18-234
Katerra Legacy

Rigid Diaphragm Analysis - Roof Floor Framing Level.

Collector Design

Fpx = 7.16 psf
 Diaph Factor, λ_{abv} = 1.00
 Diaph Factor, λ = 0.80

Building Line	SW Length	SW Shear (lbs)	Diaph Force (lbs)	COLLECTOR DESIGN							Collector Req'd?	+ 25% for Irregular	Adj. V (lb)	Diaph 1b Cap (plf)	Diaph 2b Cap (plf)	Collector L Req (ft)
				Diaph 1 Cap. (plf)	Diaph 1 L (ft)	Diaph 2 Cap. (plf)	Diaph 2 L (ft)	Remain. Force (lb)								
A.9-63.5	3.5	1837	451	215	3.5	0	3.5	0	No							
A.9-62.0	5.5	2887	708	215	5.5	0	5.5	0	No							
A.8-62.0	15.0	7733	1897	215	15.0	215	15.0	0	No							
								0								
								0								
AQ.0-71.5	26.0	12957	3178	215	26.0	215	26.0	0	No							
AQ.0-62.9	26.0	12957	3178	215	26.0	215	26.0	0	No							
AQ.9-73.5	9.0	4329	1062	215	9.0	215	9.0	0	No							
AP.1-62.7	19.5	9317	2285	215	19.5	215	19.5	0	No							
AN.1-72.0	19.5	9218	2261	215	19.5	215	19.5	0	No							
AL.1-72.7	20.5	9271	2274	215	20.5	215	20.5	0	No							
AL.9-61.6	22.0	9922	2434	215	22.0	215	22.0	0	No							
								0								
								0								
AJ.0-71.9	19.0	8106	1988	215	19.0	215	19.0	0	No							
AH.0-62.0	19.0	8076	1981	215	19.0	215	19.0	0	No							
								0								
AG.0-61.6	22.0	9666	2371	215	22.0	215	22.0	0	No							
AF.0-72.7	20.5	9068	2224	215	20.5	215	20.5	0	No							
								0								
AE.1-72.0	19.0	8779	2153	215	19.0	215	19.0	0	No							
AD.1-62.9	19.5	9041	2218	215	19.5	215	19.5	0	No							
								0								
AC.7-61.3	9.0	4295	1054	215	9.0	215	9.0	0	No							
AB.0-72.7	31.0	14924	3660	215	31.0	215	31.0	0	No							
AB.3-62.3	25.5	12588	3087	215	25.5	215	25.5	0	No							
AB.3-71.5	24.5	12094	2966	215	24.5	215	24.5	0	No							
								0								
AB.8-71.4	15.0	7648	1876	215	15.0	215	15.0	0	No							
AA.8-71.4	9.0	4669	1145	215	9.0	0	9.0	0	No							
AA.8-73.1	5.0	2594	636	215	5.0	0	5.0	0	No							
AA.8-62.0	13.0	6744	1654	215	13.0	0	13.0	0	No							
0	0.0	0	0	215	0.0	0	0.0	0	No							

BY ACM
CHKD. BY _____DATE 2/6/2019
DATE _____**PEOPLES ASSOCIATES**
STRUCTURAL ENGINEERSSHEET NO. _____ OF _____
JOB NO. 18-234**Legacy Livermore****Katerra****LATERAL ANALYSIS****Seismic Loads**

Element	Area (ft ²)	Unit Weight (psf)	Weight (lbs)	
Elements Tributary to Roof Level				
Low Slope Roof	39898	18.0	718164	
Masard Over Low Slope Roof	22532	26.0	585832	
	0	0.0	0	
Interior Studwalls	25548	9.5	242707	
Exterior Studwalls*	8633	19.0	164028	
Interior Corridor Studwalls	7786	14.0	109006	
	0	0.0 (PLF)	0	
Party Walls	5725	12.0	68696	
Windows	2878	8.0	23022	
* 30% Ext. Walls Considered Windows				
Total Weight Tributary to Roof:			1911455 lbs	
Area:			62430 sq ft	30.62
Elements Tributary to 4th Floor Level				
Low Slope Roof	0	18.0	0	
Masard Over Low Slope Roof	4297	26.0	111722	
Unit Floor Framing	46344	30.0	1390320	
Private Deck	3526	25.0	88150	
Interior Corridor	7943	30.0	238290	
Interior Studwalls	53323	9.5	506569	
Exterior Studwalls*	18297	19.0	347645	
Interior Corridor Studwalls	16032	14.0	224452	
		0.0 (PLF)	0	
Party Walls	14007	12.0	168080	
Windows	6099	8.0	48792	
* 30% Ext. Walls Considered Windows				
Total Weight Tributary to 4th Floor:			3124019 lbs	
Area:			62110 sq ft	50.30
Elements Tributary to 3rd Floor Level				
Low Slope Roof	0	18.0	0	
Masard Over Low Slope Roof	0	26.0	0	
Unit Floor Framing	50542	30.0	1516260	
Private Deck	3656	25.0	91400	
Interior Corridor	6998	30.0	209940	
Interior Studwalls	53349	9.5	506813	
Exterior Studwalls*	18179	19.0	345401	
Interior Corridor Studwalls	16873	14.0	237618	1264191
		0.0 (PLF)	0	
Party Walls	14530	12.0	174359	
Windows	6060	8.0	48477	
* 30% Ext. Walls Considered Windows				
Total Weight Tributary to 3rd Floor:			3130268 lbs	
Area:			61196 sq ft	51.15
Elements Tributary to 2nd Floor Level				
Low Slope Roof	0	18.0	0	
Masard Over Low Slope Roof	0	26.0	0	
Unit Floor Framing	45220	30.0	1356600	
Private Deck	3071	25.0	76775	
Interior Corridor	7362	30.0	220860	
Interior Studwalls	50125	9.5	476188	
Exterior Studwalls*	18179	19.0	345401	
Interior Corridor Studwalls	17770	14.0	248775	
	0	0.0 (PLF)	0	1248084
Party Walls	14810	12.0	177719	
Windows	6060	8.0	48477	
* 20% Ext. Walls Considered Windows				
Total Weight Tributary to 2nd Floor:			2950796 lbs	
Area:			55653 sq ft	53.02
Total Weight of Structure (W) =				11116538

ASD Forces in the North/South Direction

$$S_{DS} = 1.010$$

$$E_h = p * V = 0.173 \quad (\text{LRFD})$$

$$E_v = 0.2 * S_{DS} * D = 0.202 \quad (\text{LRFD})$$

$$V = (E_h) * W / 1.4 = 1,373,686 \text{ lbs (ASD)}$$

**See Design Criteria for calculation of Base Shear Coefficients

ASD Forces in the East/West Direction

$$S_{DS} = 1.010$$

$$E_h = p * V = 0.173 \quad (\text{LRFD})$$

$$E_v = 0.2 * S_{DS} * D = 0.202 \quad (\text{LRFD})$$

$$V = (E_h) * W / 1.4 = 1,373,686 \text{ lbs (ASD)}$$

BY ACM DATE 2/6/2019
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
 JOB NO. 18-234

Legacy Livermore

Katerra

LATERAL ANALYSIS

Distribution of Forces

Level	Weight, W (lbs)	Cum W (lbs)	Height, h (ft)	W*h	% W*h (%)	Fx (lbs)	Cum Fx (lbs)	Fx Area Load (psf)
Roof	1911455	1911455	38.9	74355582	28%	384543	384543	6.2
4th Floor	3124019	5035474	30.9	96532197	36%	499234	883777	8.0
3rd Floor	3130268	8165742	20.6	64483519	24%	333488	1217266	5.4
2nd Floor	2950796	11116538	10.3	30245661	11%	156421	1373686	2.8
Total	11116538			265616960	100%	1373686		

Wind Loads

Level	Elevation (ft)	Wind Pressure (psf)
Roof	38.9	14.0
4th Floor	30.9	14.0
3rd Floor	20.6	14.0
2nd Floor	10.3	14.0

Diaphragm Level	North/South		East/West	
	Area	Force	Area	Force
Roof	3369 sf	47173 lbs	2576 sf	36060 lbs
4th Floor	0 sf	0 lbs	0 sf	0 lbs
3rd Floor	0 sf	0 lbs	3802 sf	53231 lbs
2nd Floor	3793 sf	53102 lbs	2899 sf	40592 lbs

Governing Lateral Loads

Level	North/South		Governing		East/West		Governing	
	Wind (lb)	Seismic (lb)	Wind (lb)	Seismic (lb)	Wind (lb)	Seismic (lb)	Wind (lb)	Seismic (lb)
Roof	47173	384543 (SEISMIC)	36060	384543 (SEISMIC)	36060	883777 (SEISMIC)	883777	883777 (SEISMIC)
4th Floor	47173	883777 (SEISMIC)	36060	883777 (SEISMIC)	89291	1217266 (SEISMIC)	1217266	1217266 (SEISMIC)
3rd Floor	47173	1217266 (SEISMIC)	89291	1217266 (SEISMIC)	129883	1373686 (SEISMIC)	1373686	1373686 (SEISMIC)
2nd Floor	100274	1373686 (SEISMIC)	129883	1373686 (SEISMIC)				

Diaphragm Forces**

Level	Upper (lbs)	Actual (lbs)	Lower (lbs)	Diaphragm (lbs)	Fpx (psf)	Diaph Factor, λ
Roof	551591	384543	275796	384543	6.2	1.00
4th Floor	901503	548297	450751	548297	8.8	0.62
3rd Floor	903306	466628	451653	466628	7.6	0.38
2nd Floor	851515	364634	425758	425758	7.7	0.31

S_{DS} = 1.01
 I = 1.00

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Katerra

Lateral Analysis - Roof Framing Level.Area at base = 62430 ft²

Story Shear	Center of Mass	Diaphragm Dimensions	Accidental Eccentricity (5%)	
Vx = 385 k	Xm = -139.1'	X = 368.3'	x-dir. Eac. = 18.4'	<--- E/W 183.8'
Vy = 385 k	Ym = 182.1'	Y = 281.5'	y-dir. Eac. = 14.1'	<--- N/S -140.8'

Building Line	Location X	Location Y	Angle (degrees)	Length (ft)	Kx	Ky	Kx * Y	Ky * X	X Bar	Y Bar	Kx*y^2	Ky*x^2	h/w ratio
N/S	29.0-H.5	-313.4'	193.1'	360.00	4.00	0.00	0	-1254	-173.4'	2.3'	0.0E+00	1.2E+05	2.32
	29.0-P.7	-312.9'	94.1'	360.00	11.50	0.00	0	-3598	-172.9'	-96.7'	0.0E+00	3.4E+05	0.81
	29.0-U.3	-310.5'	54.6'	180.00	8.00	0.00	0	-2484	-170.4'	-136.3'	0.0E+00	2.3E+05	1.16
	29.0-A.9	-305.5'	282.8'	360.00	5.00	0.00	0	-1527	-165.4'	91.9'	0.0E+00	1.4E+05	1.85
	29.0-PL A.7	-305.5'	303.1'	180.00	5.50	0.00	0	-1680	-165.4'	112.2'	0.0E+00	1.5E+05	1.68
	29.0-P.1	-299.9'	114.8'	360.00	6.50	0.00	0	-1949	-159.9'	-76.0'	0.0E+00	1.7E+05	1.42
	29.0-J.0	-299.9'	178.4'	360.00	6.50	0.00	0	-1949	-159.9'	-12.5'	0.0E+00	1.7E+05	1.42
	29.0-H.4	-280.1'	194.1'	360.00	18.00	0.00	0	-5041	-140.1'	3.2'	0.0E+00	3.5E+05	0.51
	29.0-P.6	-280.0'	97.8'	360.00	18.50	0.00	0	-5181	-140.0'	-93.0'	0.0E+00	3.6E+05	0.50
	27.9-U.2	-271.3'	61.8'	360.00	19.00	0.00	0	-5155	-131.3'	-129.0'	0.0E+00	3.3E+05	0.49
	27.1-E.0	-269.3'	236.2'	180.00	37.00	0.00	0	-9965	-129.3'	45.3'	0.0E+00	6.2E+05	0.25
	27.1-H.5	-269.3'	236.2'	180.00	5.50	0.00	0	-1481	-129.3'	45.3'	0.0E+00	9.2E+04	1.68
	27.1-P.5	-269.3'	236.2'	180.00	5.50	0.00	0	-1481	-129.3'	45.3'	0.0E+00	9.2E+04	1.68
	27.1-C.4	-269.3'	265.8'	180.00	8.00	0.00	0	-2155	-129.3'	75.0'	0.0E+00	1.3E+05	1.16
	27.1-A.8	-269.3'	284.2'	180.00	8.50	0.00	0	-2289	-129.3'	93.3'	0.0E+00	1.4E+05	1.09
	27.1-PL A.7	-269.3'	305.4'	180.00	18.00	0.00	0	-4848	-129.3'	114.5'	0.0E+00	3.0E+05	0.51
	26.0-E.2	-263.2'	231.0'	360.00	21.00	0.00	0	-5528	-123.2'	40.2'	0.0E+00	3.2E+05	0.44
	26.0-C.9	-263.2'	257.4'	360.00	23.50	0.00	0	-6186	-123.2'	66.6'	0.0E+00	3.6E+05	0.39
	26.0-B.5	-263.2'	277.0'	180.00	0.00	0.00	0	0	-123.2'	86.1'	0.0E+00	0.0E+00	#DIV/0!
	26.0-PL A.6	-263.2'	309.2'	360.00	21.00	0.00	0	-5528	-123.2'	118.3'	0.0E+00	3.2E+05	0.44
	25.6-P.5	-254.1'	101.6'	225.00	25.00	0.00	0	-6352	-114.1'	-89.3'	0.0E+00	3.3E+05	0.37
	25.4-U.3	-247.1'	53.5'	360.00	8.50	0.00	0	-2100	-107.0'	-137.4'	0.0E+00	9.7E+04	1.09
	25.3-E.3	-246.3'	229.5'	315.00	25.00	0.00	0	-6158	-106.3'	38.6'	0.0E+00	2.8E+05	0.37
	25.0-H.5	-237.5'	192.5'	180.00	28.50	0.00	0	-6768	-97.5'	1.7'	0.0E+00	2.7E+05	0.32
	25.0-L.0	-237.4'	145.8'	360.00	10.50	0.00	0	-2493	-97.4'	-45.0'	0.0E+00	1.0E+05	0.88
	25.0-K.0	-237.4'	164.8'	360.00	18.50	0.00	0	-4393	-97.4'	-26.1'	0.0E+00	1.8E+05	0.50
	25.0-P.5	-237.4'	102.4'	180.00	22.00	0.00	0	-5224	-97.4'	-88.4'	0.0E+00	2.1E+05	0.42
	25.0-N.1	-237.4'	127.0'	180.00	18.50	0.00	0	-4393	-97.4'	-63.9'	0.0E+00	1.8E+05	0.50
	24.2-U.2	-236.2'	63.8'	180.00	29.50	0.00	0	-6968	-96.2'	-127.0'	0.0E+00	2.7E+05	0.31
	22.6-B.2	-226.9'	280.3'	180.00	4.00	0.00	0	-908	-86.9'	89.5'	0.0E+00	3.0E+04	2.32
	22.1-E.4	-221.1'	226.1'	180.00	24.50	0.00	0	-5417	-81.1'	35.2'	0.0E+00	1.6E+05	0.38
	21.0-E.4	-209.1'	226.1'	180.00	8.50	0.00	0	-1777	-69.1'	35.2'	0.0E+00	4.1E+04	1.09
	21.0-U.2	-207.4'	59.4'	180.00	32.50	0.00	0	-6739	-67.3'	-131.4'	0.0E+00	1.5E+05	0.28
	20.0-E.4	-196.7'	227.6'	360.00	24.50	0.00	0	-4818	-56.6'	36.7'	0.0E+00	7.9E+04	0.38
	19.5-E.5	-185.2'	225.8'	360.00	8.50	0.00	0	-1574	-45.2'	35.0'	0.0E+00	1.7E+04	1.09
	18.8-E.5	-173.2'	225.8'	360.00	25.00	0.00	0	-4329	-33.2'	35.0'	0.0E+00	2.7E+04	0.37
	18.2-U.2	-172.3'	61.4'	360.00	24.50	0.00	0	-4222	-32.3'	-129.4'	0.0E+00	2.6E+04	0.38
	17.2-PL A.7	-143.6'	302.9'	360.00	7.00	0.00	0	-1005	-3.6'	112.1'	0.0E+00	9.0E+01	1.32
	17.3-E.3	-147.5'	229.5'	225.00	25.00	0.00	0	-3688	-7.5'	38.6'	0.0E+00	1.4E+03	0.37
	17.0-U.2	-136.8'	59.4'	180.00	32.50	0.00	0	-4446	3.2'	-131.4'	0.0E+00	3.3E+02	0.28
	15.8-PL A.6	-131.8'	308.0'	180.00	23.00	0.00	0	-3030	8.3'	117.2'	0.0E+00	1.6E+03	0.40
	15.2-E.2	-130.6'	231.0'	360.00	21.00	0.00	0	-2742	9.5'	40.2'	0.0E+00	1.9E+03	0.44
	15.2-C.7	-130.6'	259.8'	360.00	29.50	0.00	0	-3851	9.5'	69.0'	0.0E+00	2.6E+03	0.31
	15.2-A.6	-130.6'	285.3'	180.00	11.50	0.00	0	-1501	9.5'	94.5'	0.0E+00	1.0E+03	0.81
	13.8-C.7	-124.2'	259.8'	360.00	29.50	0.00	0	-3664	15.8'	69.0'	0.0E+00	7.4E+03	0.31
	13.8-A.6	-124.2'	285.3'	180.00	11.50	0.00	0	-1428	15.8'	94.4'	0.0E+00	2.9E+03	0.81
	13.8-E.2	-124.2'	230.6'	360.00	22.00	0.00	0	-2732	15.8'	39.8'	0.0E+00	5.5E+03	0.42
	13.2-PL A.6	-122.9'	309.2'	180.00	23.50	0.00	0	-2889	17.1'	118.3'	0.0E+00	6.9E+03	0.39
	12.0-U.2	-113.3'	61.4'	360.00	24.50	0.00	0	-2776	26.7'	-129.4'	0.0E+00	1.7E+04	0.38
	11.8-E.3	-107.2'	229.5'	135.00	25.00	0.00	0	-2680	32.8'	38.7'	0.0E+00	2.7E+04	0.37
	11.0-U.2	-89.8'	59.4'	180.00	32.50	0.00	0	-2919	50.2'	-131.4'	0.0E+00	8.2E+04	0.28
	10.0-E.5	-81.6'	225.8'	360.00	25.00	0.00	0	-2040	58.4'	35.0'	0.0E+00	8.5E+04	0.37
	9.5-S.5	-77.6'	225.8'	360.00	8.50	0.00	0	-660	62.4'	35.0'	0.0E+00	3.3E+04	1.09

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OFCHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - Roof Framing Level**

9.2-E.5	-69.1'	225.8'	360.00	8.50	0.00	8.50	0	-587	70.9'	35.0'	0.0E+00	4.3E+04	1.09
9.0-U.2	-66.3'	61.4'	180.00	24.50	0.00	24.50	0	-1624	73.7'	-129.5'	0.0E+00	1.3E+05	0.38
7.9-E.4	-58.2'	227.6'	180.00	24.50	0.00	24.50	0	-1426	81.8'	36.7'	0.0E+00	1.6E+05	0.38
7.3-E.0	-55.1'	227.6'	180.00	6.50	0.00	8.50	0	-469	84.9'	36.7'	0.0E+00	6.1E+04	1.09
8.0-E.4	-46.6'	227.6'	180.00	8.50	0.00	8.50	0	-396	93.4'	36.7'	0.0E+00	7.4E+04	1.09
7.0-U.2	-42.8'	59.5'	180.00	32.50	0.00	32.50	0	-1390	97.2'	-131.4'	0.0E+00	3.1E+05	0.28
6.0-E.5	-34.1'	225.8'	180.00	25.00	0.00	25.00	0	-853	105.9'	35.0'	0.0E+00	2.8E+05	0.37
5.6-B.5	-27.9'	277.5'	180.00	4.50	0.00	4.50	0	-126	112.1'	86.7'	0.0E+00	5.7E+04	2.06
5.0-E.5	-22.9'	277.5'	180.00	5.50	0.00	5.50	0	-126	117.1'	86.7'	0.0E+00	7.5E+04	1.68
4.9-D.9	-17.4'	238.7'	180.00	8.00	0.00	8.00	0	-139	122.6'	47.9'	0.0E+00	1.2E+05	1.16
4.8-B.5	1.4'	277.5'	180.00	6.50	0.00	6.50	0	9	141.4'	86.7'	0.0E+00	1.3E+05	1.42
4.6-E.3	-8.2'	229.8'	180.00	25.00	0.00	25.00	0	-205	131.8'	39.0'	0.0E+00	4.3E+05	0.37
4.0-PL A.6	8.4'	308.8'	180.00	0.00	0.00	0.00	0	0	148.4'	117.9'	0.0E+00	0.0E+00	#DIV/0!
4.0-K.5	8.4'	308.8'	180.00	34.50	0.00	34.50	0	291	148.4'	117.9'	0.0E+00	2.6E+05	0.27
4.0-E.2	8.5'	232.7'	180.00	21.50	0.00	21.50	0	182	148.5'	41.9'	0.0E+00	4.7E+05	0.43
4.0-C.9	8.5'	257.6'	180.00	23.50	0.00	23.50	0	199	148.5'	66.7'	0.0E+00	5.2E+05	0.39
1.7-U.2	16.9'	62.5'	360.00	31.00	0.00	31.00	0	523	156.9'	-128.4'	0.0E+00	7.6E+05	0.30
1.0-C.3	17.7'	268.2'	180.00	9.00	0.00	9.00	0	159	157.7'	77.4'	0.0E+00	2.2E+05	1.03
1.0-E.9	17.8'	215.4'	180.00	6.50	0.00	6.50	0	116	157.8'	24.5'	0.0E+00	1.6E+05	1.42
1.0-N.9	17.9'	119.3'	180.00	25.00	0.00	25.00	0	448	157.9'	-71.6'	0.0E+00	6.2E+05	0.37
1.0-P.8	17.9'	92.8'	180.00	19.00	0.00	19.00	0	340	157.9'	-98.1'	0.0E+00	4.7E+05	0.49
1.0-K.0	17.9'	163.6'	360.00	7.00	0.00	7.00	0	125	157.9'	-27.3'	0.0E+00	1.7E+05	1.32
1.0-L.0	17.9'	145.9'	360.00	20.00	0.00	20.00	0	358	157.9'	-44.9'	0.0E+00	5.0E+05	0.46
0.5-PL A.6	36.8'	308.4'	180.00	0.00	0.00	0.00	0	0	176.8'	117.6'	0.0E+00	0.0E+00	#DIV/0!
0.3-U.4	44.8'	49.5'	180.00	6.00	0.00	6.00	0	269	184.8'	-141.4'	0.0E+00	2.0E+05	1.54
0.1-U.3	52.3'	56.2'	180.00	4.50	0.00	4.50	0	235	192.3'	-134.6'	0.0E+00	1.7E+05	2.06
0.1-R.0	52.3'	83.1'	180.00	4.50	0.00	4.50	0	235	192.3'	-107.8'	0.0E+00	1.7E+05	2.06
0.0-K.0	54.2'	164.9'	180.00	4.00	0.00	4.00	0	217	194.2'	-25.9'	0.0E+00	1.5E+05	1.03
0.0-K.5	54.2'	155.3'	180.00	4.00	0.00	4.00	0	217	194.2'	-35.6'	0.0E+00	1.5E+05	1.03
0.0-P.7	54.2'	96.2'	180.00	4.00	0.00	4.00	0	217	194.2'	-94.7'	0.0E+00	1.5E+05	1.03
0.0-P.4	54.2'	105.8'	180.00	4.00	0.00	4.00	0	217	194.2'	-85.0'	0.0E+00	1.5E+05	1.03
4.0-P.4	54.2'	105.8'	180.00	0.00	0.00	0.00	0	0	194.2'	-85.0'	0.0E+00	0.0E+00	#DIV/0!
4.0-P.4	54.2'	105.8'	180.00	0.00	0.00	0.00	0	0	194.2'	-85.0'	0.0E+00	0.0E+00	#DIV/0!

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - Roof Framing Level.**

E/W	U.4-29.0	-287.6'	42.7'	270.00	6.00	6.00	0.00	256	0	-147.6'	-148.1'	1.3E+05	0.0E+00	1.54
	U.4-19.9	-195.1'	42.7'	270.00	7.00	7.00	0.00	299	0	-55.1'	-148.1'	1.5E+05	0.0E+00	1.32
	U.4-17.4	-149.1'	42.7'	450.00	6.00	6.00	0.00	256	0	-9.1'	-148.1'	1.3E+05	0.0E+00	1.54
	U.4-11.0	-89.3'	42.8'	90.00	7.50	7.50	0.00	321	0	50.8'	-148.1'	1.6E+05	0.0E+00	1.23
	U.4-4.0	32.4'	44.3'	450.00	5.50	5.50	0.00	244	0	172.5'	-146.6'	1.2E+05	0.0E+00	1.68
	U.5-4.0	32.4'	47.3'	450.00	6.00	6.00	0.00	284	0	172.5'	-143.6'	1.2E+05	0.0E+00	1.54
	U.3-29.0	-296.1'	53.8'	270.00	8.00	8.00	0.00	431	0	-156.1'	-137.0'	1.5E+05	0.0E+00	1.16
	U.0-4.0	10.0'	76.0'	270.00	18.00	18.00	0.00	1368	0	150.0'	-114.8'	2.4E+05	0.0E+00	0.51
	U.0-9.0	-66.1'	76.1'	270.00	26.00	26.00	0.00	1979	0	73.9'	-114.7'	3.4E+05	0.0E+00	0.36
	U.0-12.0	-113.1'	76.1'	270.00	26.00	26.00	0.00	1979	0	26.9'	-114.7'	3.4E+05	0.0E+00	0.36
	U.0-11.0	-89.6'	76.1'	270.00	12.50	12.50	0.00	952	0	50.4'	-114.7'	1.6E+05	0.0E+00	0.74
	U.0-20.1	-198.4'	76.1'	270.00	18.00	18.00	0.00	1370	0	-58.4'	-114.7'	2.4E+05	0.0E+00	0.51
	U.0-18.1	-172.1'	76.1'	270.00	26.00	26.00	0.00	1979	0	-32.1'	-114.7'	3.4E+05	0.0E+00	0.36
	U.0-17.2	-142.6'	76.1'	270.00	24.50	24.50	0.00	1865	0	-2.6'	-114.7'	3.2E+05	0.0E+00	0.38
	U.0-7.2	-46.0'	76.1'	270.00	5.50	5.50	0.00	419	0	94.0'	-114.7'	7.2E+04	0.0E+00	1.68
	T.0-29.5	-296.7'	78.9'	90.00	29.50	29.50	0.00	2328	0	-156.6'	-111.9'	3.7E+05	0.0E+00	0.31
	S.2-1.5	-262.5'	79.0'	90.00	13.00	13.00	0.00	1027	0	-122.5'	-111.8'	1.6E+05	0.0E+00	0.71
	S.2-25.2	-242.6'	79.0'	90.00	13.00	13.00	0.00	1027	0	-102.6'	-111.8'	1.6E+05	0.0E+00	0.71
	R.1-4.0	41.2'	83.0'	270.00	21.50	21.50	0.00	1785	0	181.2'	-107.8'	2.5E+05	0.0E+00	0.43
	Q.0-28.4	-275.4'	84.6'	90.00	9.50	9.50	0.00	804	0	-135.4'	-106.3'	1.1E+05	0.0E+00	0.97
	Q.0-25.7	-255.7'	84.6'	90.00	21.00	21.00	0.00	1776	0	-115.7'	-106.3'	2.4E+05	0.0E+00	0.44
	P.8-29.0	-306.5'	91.4'	90.00	12.00	12.00	0.00	1096	0	-166.5'	-99.5'	1.2E+05	0.0E+00	0.77
	P.3-4.0	43.5'	107.7'	270.00	8.50	8.50	0.00	916	0	183.5'	-83.1'	5.9E+04	0.0E+00	1.09
	P.0-4.0	33.1'	118.5'	450.00	29.50	29.50	0.00	3496	0	173.1'	-72.3'	1.5E+05	0.0E+00	0.31
	N.0-25.5	-250.7'	127.2'	450.00	24.50	24.50	0.00	3117	0	-110.7'	-63.6'	9.9E+04	0.0E+00	0.38
	M.0-4.0	35.2'	142.0'	450.00	33.50	33.50	0.00	4757	0	175.3'	-48.8'	8.0E+04	0.0E+00	0.28
	L.1-25.5	-250.3'	145.5'	450.00	24.00	24.00	0.00	3493	0	-110.3'	-45.3'	4.9E+04	0.0E+00	0.39
	K.0-25.5	-250.7'	164.5'	450.00	24.50	24.50	0.00	4030	0	-110.7'	-26.4'	1.7E+04	0.0E+00	0.38
	J.8-4.0	36.1'	166.8'	270.00	8.50	8.50	0.00	1418	0	176.1'	-24.1'	4.9E+03	0.0E+00	1.09
	H.6-25.7	-254.4'	190.5'	315.00	25.00	25.00	0.00	4762	0	-114.4'	-0.4'	3.7E+00	0.0E+00	0.37
	H.1-29.0	-304.5'	203.5'	450.00	11.00	11.00	0.00	2239	0	-164.5'	12.7'	1.8E+03	0.0E+00	0.84
	H.0-28.4	-275.4'	207.1'	450.00	9.50	9.50	0.00	1967	0	-135.4'	16.2'	2.5E+03	0.0E+00	0.97
	H.0-25.7	-255.7'	207.1'	90.00	21.00	21.00	0.00	4349	0	-115.7'	16.2'	5.5E+03	0.0E+00	0.44
	F.6-8.0	-57.9'	212.8'	270.00	26.00	26.00	0.00	5533	0	82.1'	22.0'	1.3E+04	0.0E+00	0.36
	F.6-25.3	-245.0'	212.8'	270.00	21.00	21.00	0.00	4469	0	-105.0'	22.0'	1.0E+04	0.0E+00	0.44
	F.6-22.1	-222.0'	212.8'	450.00	16.00	16.00	0.00	3405	0	-82.0'	22.0'	7.7E+03	0.0E+00	0.58
	F.6-20.0	-196.9'	212.8'	270.00	26.00	26.00	0.00	5533	0	-56.9'	22.0'	1.3E+04	0.0E+00	0.36
	F.6-18.0	-171.7'	212.8'	270.00	16.00	16.00	0.00	3405	0	-31.7'	22.0'	7.7E+03	0.0E+00	0.58
	F.6-17.3	-148.8'	212.8'	270.00	21.00	21.00	0.00	4469	0	-8.8'	22.0'	1.0E+04	0.0E+00	0.44
	F.6-11.9	-109.6'	212.8'	270.00	28.50	28.50	0.00	6065	0	30.4'	22.0'	1.4E+04	0.0E+00	0.32
	F.6-10.2	-83.1'	212.8'	270.00	16.00	16.00	0.00	3405	0	56.9'	22.0'	7.7E+03	0.0E+00	0.58
	F.6-5.9	-32.7'	212.8'	90.00	16.00	16.00	0.00	3405	0	107.3'	22.0'	7.7E+03	0.0E+00	0.58
	F.6-4.5	-5.9'	212.8'	90.00	29.00	29.00	0.00	6172	0	134.1'	22.0'	1.4E+04	0.0E+00	0.32
	F.5-4.0	35.3'	212.9'	90.00	33.00	33.00	0.00	7026	0	175.3'	22.1'	1.6E+04	0.0E+00	0.28
	E.9-29.0	-295.2'	215.3'	270.00	24.50	24.50	0.00	5274	0	-155.2'	24.4'	1.5E+04	0.0E+00	0.38
	E.7-4.1	4.6'	220.6'	90.00	7.00	7.00	0.00	1545	0	144.6'	29.8'	6.2E+03	0.0E+00	1.32
	E.4-29.0	-308.6'	226.8'	270.00	0.00	0.00	0.00	0	0	-168.6'	36.0'	0.0E+00	0.0E+00	#DIV/0!
	D.8-29.0	-295.2'	240.0'	270.00	9.50	9.50	0.00	2280	0	-155.2'	49.1'	2.3E+04	0.0E+00	0.97
	D.6-4.6	-9.1'	243.4'	90.00	5.50	5.50	0.00	1339	0	130.9'	52.6'	1.5E+04	0.0E+00	1.68
	D.2-29.0	-284.9'	250.8'	270.00	30.00	30.00	0.00	7523	0	-144.9'	59.9'	1.1E+05	0.0E+00	0.31
	D.0-17.2	-143.5'	255.4'	90.00	25.00	25.00	0.00	6385	0	-3.5'	64.6'	1.0E+05	0.0E+00	0.37
	D.0-11.9	-111.1'	255.4'	450.00	25.00	25.00	0.00	6385	0	28.9'	64.6'	1.0E+05	0.0E+00	0.37
	D.0-4.5	-4.6'	255.4'	90.00	25.00	25.00	0.00	6386	0	135.5'	64.6'	1.0E+05	0.0E+00	0.37
	D.0-25.5	-249.9'	255.4'	450.00	25.50	25.50	0.00	6513	0	-109.9'	64.6'	1.1E+05	0.0E+00	0.36
	C.1-29.0	-283.3'	270.3'	90.00	27.00	27.00	0.00	7298	0	-143.2'	79.5'	1.7E+05	0.0E+00	0.34
	C.0-4.0	23.5'	273.1'	90.00	17.50	17.50	0.00	4779	0	163.5'	82.2'	1.2E+05	0.0E+00	0.53
	B.2-29.0	-283.2'	280.0'	90.00	27.00	27.00	0.00	7560	0	-143.2'	89.1'	2.1E+05	0.0E+00	0.34
	B.2-17.6	-157.3'	280.1'	90.00	8.50	8.50	0.00	2381	0	-17.3'	89.3'	6.8E+04	0.0E+00	1.09
	B.2-11.4	-98.6'	280.1'	450.00	8.50	8.50	0.00	2381	0	41.4'	89.3'	6.8E+04	0.0E+00	1.09
	B.2-4.9	-17.1'	280.2'	90.00	8.50	8.50	0.00	2381	0	122.9'	89.3'	6.8E+04	0.0E+00	1.09
	B.2-25.0	-237.6'	280.2'	270.00	8.50	8.50	0.00	2382	0	-97.6'	89.3'	6.8E+04	0.0E+00	1.09
	B.0-4.0	23.5'	281.7'	90.00	17.50	17.50	0.00	4930	0	163.5'	90.9'	1.4E+05	0.0E+00	0.53

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Katerra

Lateral Analysis - Roof Framing Level

A.0-11.8	-108.1'	290.9'	450.00	28.00	28.00	0.00	8145	0	31.9'	100.1'	2.8E+05	0.0E+00	0.33
A.0-17.3	-146.6'	290.9'	90.00	28.00	28.00	0.00	8145	0	-6.6'	100.1'	2.8E+05	0.0E+00	0.33
A.0-4.7	-11.7'	291.4'	90.00	37.00	37.00	0.00	10780	0	128.3'	100.5'	3.7E+05	0.0E+00	0.25
A.0-25.2	-243.4'	291.4'	270.00	32.00	32.00	0.00	9324	0	-103.4'	100.5'	3.2E+05	0.0E+00	0.29
PL A.8-5.6	-28.5'	301.9'	90.00	0.00	0.00	0.00	0	0	111.5'	111.0'	0.0E+00	0.0E+00	#DIV/0!
PL A.7-29.0	-299.2'	305.7'	270.00	9.00	9.00	0.00	2751	0	-159.2'	114.9'	1.2E+05	0.0E+00	1.03
PL A.5-17.9	-169.4'	310.7'	450.00	7.00	7.00	0.00	2175	0	-29.4'	119.8'	1.0E+05	0.0E+00	1.32
PL A.5-10.5	-85.5'	310.7'	270.00	7.00	7.00	0.00	2175	0	54.5'	119.8'	1.0E+05	0.0E+00	1.32
PL A.5-5.6	-28.5'	310.7'	90.00	0.00	0.00	0.00	0	0	111.5'	119.9'	0.0E+00	0.0E+00	#DIV/0!
PL A.5-22.5	-226.3'	310.7'	450.00	7.00	7.00	0.00	2175	0	-86.3'	119.9'	1.0E+05	0.0E+00	1.32
PL A.2-4.0	21.7'	324.3'	90.00	0.00	0.00	0.00	0	0	161.8'	133.4'	0.0E+00	0.0E+00	#DIV/0!
PL A.2-5.0	44.4'	324.3'	90.00	0.00	0.00	0.00	0	0	184.4'	133.4'	0.0E+00	0.0E+00	#DIV/0!
PL A.2-11.7	-105.4'	324.3'	270.00	11.00	11.00	0.00	3568	0	34.6'	133.5'	2.0E+05	0.0E+00	0.84
PL A.2-10.7	-87.2'	324.3'	270.00	11.00	11.00	0.00	3568	0	52.8'	133.5'	2.0E+05	0.0E+00	0.84
S					1267	1350	241804	-188946			8.6E+06	1.5E+07	

Center of Rigidity

Xr = -140.0'

Yr = 190.8'

Eccentricity + Eac.

Ex = 19.36'

Ey = 5.38'

Eccentricity - Eac.

Ex = -17.47'

Ey = -22.77'

Rotational Stiffness

Jr = 2.37E+07

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Katerra

Lateral Analysis - Roof Framing Level.**Lateral Design: Rigid Diaphragm - Roof Framing Level.**

	Building Line	X - Direction			Y - Direction						2:1/3.5:1						D/C
		Direct Shear	Torsional Shear	Torsional X-Dir.	Direct Shear	Torsional Shear	Torsional Y-Dir.	Maximum Shear (lb/ft)	Shear Reduction	SW Type Min Req.	SW Type Used	Capacity (plf)					
															+Eac.	-Eac.	
N/S	29.0-H.5	0.0 k	0.0 k	0.0 k	0.0 k	1.1 k	-0.2 k	0.2 k	1.3 k	1.34 k	334	0.86	4	4	441	0.76	
	29.0-P.7	0.0 k	0.0 k	0.0 k	0.0 k	3.3 k	-0.6 k	0.6 k	3.8 k	3.84 k	334	1.00	4	4	510	0.65	
	29.0-U.3	0.0 k	0.0 k	0.0 k	0.0 k	2.3 k	-0.4 k	0.4 k	2.7 k	2.67 k	333	1.00	4	4	510	0.65	
	29.0-A.9	0.0 k	0.0 k	0.0 k	0.0 k	1.4 k	-0.3 k	0.2 k	1.7 k	1.66 k	332	1.00	4	4	510	0.65	
	29.0-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	1.6 k	-0.3 k	0.3 k	1.8 k	1.82 k	332	1.00	4	4	510	0.65	
	29.0-P.1	0.0 k	0.0 k	0.0 k	0.0 k	1.9 k	-0.3 k	0.3 k	2.1 k	2.15 k	330	1.00	4	4	510	0.65	
	29.0-J.0	0.0 k	0.0 k	0.0 k	0.0 k	1.9 k	-0.3 k	0.3 k	2.1 k	2.15 k	330	1.00	4	4	510	0.65	
	29.0-H.4	0.0 k	0.0 k	0.0 k	0.0 k	5.1 k	-0.8 k	0.7 k	5.8 k	5.84 k	325	1.00	6	4	510	0.64	
	29.0-P.6	0.0 k	0.0 k	0.0 k	0.0 k	5.3 k	-0.8 k	0.7 k	6.0 k	6.00 k	325	1.00	6	4	510	0.64	
	27.9-U.2	0.0 k	0.0 k	0.0 k	0.0 k	5.4 k	-0.8 k	0.7 k	6.1 k	6.12 k	322	1.00	6	4	510	0.63	
	27.1-E.0	0.0 k	0.0 k	0.0 k	0.0 k	10.5 k	-1.5 k	1.4 k	11.9 k	11.90 k	322	1.00	6	4	510	0.63	
	27.1-H.5	0.0 k	0.0 k	0.0 k	0.0 k	1.6 k	-0.2 k	0.2 k	1.8 k	1.77 k	322	1.00	6	4	510	0.63	
	27.1-P.5	0.0 k	0.0 k	0.0 k	0.0 k	1.6 k	-0.2 k	0.2 k	1.8 k	1.77 k	322	1.00	6	4	510	0.63	
	27.1-C.4	0.0 k	0.0 k	0.0 k	0.0 k	2.3 k	-0.3 k	0.3 k	2.6 k	2.57 k	322	1.00	6	4	510	0.63	
	27.1-A.8	0.0 k	0.0 k	0.0 k	0.0 k	2.4 k	-0.3 k	0.3 k	2.7 k	2.73 k	322	1.00	6	4	510	0.63	
	27.1-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	5.1 k	-0.7 k	0.7 k	5.8 k	5.79 k	322	1.00	6	4	510	0.63	
	26.0-E.2	0.0 k	0.0 k	0.0 k	0.0 k	6.0 k	-0.8 k	0.7 k	6.7 k	6.72 k	320	1.00	6	4	510	0.63	
	26.0-C.9	0.0 k	0.0 k	0.0 k	0.0 k	6.7 k	-0.9 k	0.8 k	7.5 k	7.52 k	320	1.00	6	4	510	0.63	
	26.0-B.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!		
	26.0-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	6.0 k	-0.8 k	0.7 k	6.7 k	6.72 k	320	1.00	6	4	510	0.63	
	25.6-P.5	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	-0.9 k	0.8 k	7.9 k	7.93 k	317	1.00	6	4	510	0.62	
	25.4-U.3	0.0 k	0.0 k	0.0 k	0.0 k	2.4 k	-0.3 k	0.3 k	2.7 k	2.68 k	315	1.00	6	4	510	0.62	
	25.3-E.3	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	-0.8 k	0.8 k	7.9 k	7.88 k	315	1.00	6	4	510	0.62	
	25.0-H.5	0.0 k	0.0 k	0.0 k	0.0 k	8.1 k	-0.9 k	0.8 k	8.9 k	8.91 k	313	1.00	6	4	510	0.61	
	25.0-L.0	0.0 k	0.0 k	0.0 k	0.0 k	3.0 k	-0.3 k	0.3 k	3.3 k	3.28 k	313	1.00	6	4	510	0.61	
	25.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	5.3 k	-0.6 k	0.5 k	5.8 k	5.78 k	313	1.00	6	4	510	0.61	
	25.0-P.5	0.0 k	0.0 k	0.0 k	0.0 k	6.3 k	-0.7 k	0.6 k	6.9 k	6.88 k	313	1.00	6	4	510	0.61	
	25.0-N.1	0.0 k	0.0 k	0.0 k	0.0 k	5.3 k	-0.6 k	0.5 k	5.8 k	5.78 k	313	1.00	6	4	510	0.61	
	24.2-U.2	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	-0.9 k	0.8 k	9.2 k	9.21 k	312	1.00	6	4	510	0.61	
	22.6-B.2	0.0 k	0.0 k	0.0 k	0.0 k	1.1 k	-0.1 k	0.1 k	1.2 k	1.24 k	310	0.86	4	4	441	0.70	
	22.1-E.4	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	-0.6 k	0.6 k	7.5 k	7.54 k	308	1.00	6	4	510	0.60	
	21.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	2.4 k	-0.2 k	0.2 k	2.6 k	2.59 k	304	1.00	6	4	510	0.60	
	21.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	9.3 k	-0.7 k	0.6 k	9.9 k	9.88 k	304	1.00	6	4	510	0.60	
	20.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	-0.4 k	0.4 k	7.4 k	7.37 k	301	1.00	6	4	510	0.59	
	19.5-E.5	0.0 k	0.0 k	0.0 k	0.0 k	2.4 k	-0.1 k	0.1 k	2.5 k	2.53 k	298	1.00	6	4	510	0.58	
	18.8-E.5	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	-0.3 k	0.2 k	7.4 k	7.36 k	294	1.00	6	4	510	0.58	
	18.2-U.2	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	-0.2 k	0.2 k	7.2 k	7.21 k	294	1.00	6	4	510	0.58	
	17.2-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	2.0 k	0.0 k	0.0 k	2.0 k	2.00 k	286	1.00	6	4	510	0.56	
	17.3-E.3	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	-0.1 k	0.1 k	7.2 k	7.18 k	287	1.00	6	4	510	0.56	
	17.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	9.3 k	0.0 k	0.0 k	9.3 k	9.29 k	286	1.00	6	4	510	0.56	
	15.8-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	6.6 k	0.1 k	-0.1 k	6.6 k	6.61 k	288	1.00	6	4	510	0.56	
	15.2-E.2	0.0 k	0.0 k	0.0 k	0.0 k	6.0 k	0.1 k	-0.1 k	6.0 k	6.05 k	288	1.00	6	4	510	0.56	
	15.2-C.7	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	0.1 k	-0.1 k	8.5 k	8.49 k	288	1.00	6	4	510	0.56	
	15.2-A.6	0.0 k	0.0 k	0.0 k	0.0 k	3.3 k	0.0 k	0.0 k	3.3 k	3.31 k	288	1.00	6	4	510	0.56	
	13.8-C.7	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	0.1 k	-0.1 k	8.6 k	8.55 k	290	1.00	6	4	510	0.57	
	13.8-A.6	0.0 k	0.0 k	0.0 k	0.0 k	3.3 k	0.1 k	-0.1 k	3.3 k	3.33 k	290	1.00	6	4	510	0.57	
	13.8-E.2	0.0 k	0.0 k	0.0 k	0.0 k	6.3 k	0.1 k	-0.1 k	6.4 k	6.38 k	290	1.00	6	4	510	0.57	
	13.2-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	6.7 k	0.1 k	-0.1 k	6.8 k	6.82 k	290	1.00	6	4	510	0.57	
	12.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	0.2 k	-0.2 k	7.2 k	7.19 k	293	1.00	6	4	510	0.58	
	11.8-E.3	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	0.3 k	-0.2 k	7.4 k	7.38 k	295	1.00	6	4	510	0.58	
	11.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	9.3 k	0.5 k	-0.5 k	9.8 k	9.77 k	301	1.00	6	4	510	0.59	
	10.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	0.5 k	-0.4 k	7.6 k	7.58 k	303	1.00	6	4	510	0.59	
	9.5-S.5	0.0 k	0.0 k	0.0 k	0.0 k	2.4 k	0.2 k	-0.2 k	2.6 k	2.59 k	305	1.00	6	4	510	0.60	
	9.2-E.5	0.0 k	0.0 k	0.0 k	0.0 k	2.4 k	0.2 k	-0.2 k	2.6 k	2.61 k	307	1.00	6	4	510	0.60	
	9.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	0.6 k	-0.5 k	7.5 k	7.55 k	308	1.00	6	4	510	0.60	
	7.9-E.4	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	0.6 k	-0.6 k	7.6 k	7.61 k	311	1.00	6	4	510	0.61	
	7.3-E.0	0.0 k	0.0 k	0.0 k	0.0 k	2.4 k	0.2 k	-0.2 k	2.6 k	2.65 k	312	1.00	6	4	510	0.61	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore**

Kattera

Lateral Analysis - Roof Framing Level.

8.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	2.4 k	0.2 k	-0.2 k	2.7 k	2.67 k	314	1.00	6	4	510	0.62
7.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	9.3 k	1.0 k	-0.9 k	10.3 k	10.25 k	315	1.00	6	4	510	0.62
6.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	0.8 k	-0.7 k	8.0 k	7.95 k	318	1.00	6	4	510	0.62
5.6-B.5	0.0 k	0.0 k	0.0 k	0.0 k	1.3 k	0.2 k	-0.1 k	1.4 k	1.44 k	320	0.97	6	4	496	0.65
5.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	1.6 k	0.2 k	-0.2 k	1.8 k	1.77 k	322	1.00	6	4	510	0.63
4.9-D.9	0.0 k	0.0 k	0.0 k	0.0 k	2.3 k	0.3 k	-0.3 k	2.6 k	2.59 k	323	1.00	6	4	510	0.63
4.8-B.5	0.0 k	0.0 k	0.0 k	0.0 k	1.9 k	0.3 k	-0.3 k	2.1 k	2.14 k	329	1.00	4	4	510	0.65
4.6-E.3	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	1.0 k	-0.9 k	8.2 k	8.16 k	326	1.00	6	4	510	0.64
4.0-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
4.0-K.5	0.0 k	0.0 k	0.0 k	0.0 k	9.8 k	1.6 k	-1.4 k	11.4 k	11.44 k	331	1.00	4	4	510	0.65
4.0-E.2	0.0 k	0.0 k	0.0 k	0.0 k	6.1 k	1.0 k	-0.9 k	7.1 k	7.13 k	331	1.00	4	4	510	0.65
4.0-C.9	0.0 k	0.0 k	0.0 k	0.0 k	6.7 k	1.1 k	-1.0 k	7.8 k	7.79 k	331	1.00	4	4	510	0.65
1.7-U.2	0.0 k	0.0 k	0.0 k	0.0 k	8.8 k	1.5 k	-1.4 k	10.4 k	10.36 k	334	1.00	4	4	510	0.66
1.0-C.3	0.0 k	0.0 k	0.0 k	0.0 k	2.6 k	0.4 k	-0.4 k	3.0 k	3.01 k	334	1.00	4	4	510	0.66
1.0-E.9	0.0 k	0.0 k	0.0 k	0.0 k	1.9 k	0.3 k	-0.3 k	2.2 k	2.17 k	334	1.00	4	4	510	0.66
1.0-N.9	0.0 k	0.0 k	0.0 k	0.0 k	7.1 k	1.2 k	-1.1 k	8.4 k	8.36 k	334	1.00	4	4	510	0.66
1.0-P.8	0.0 k	0.0 k	0.0 k	0.0 k	5.4 k	0.9 k	-0.8 k	6.4 k	6.35 k	334	1.00	4	4	510	0.66
1.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	2.0 k	0.3 k	-0.3 k	2.3 k	2.34 k	334	1.00	4	4	510	0.66
1.0-L.0	0.0 k	0.0 k	0.0 k	0.0 k	5.7 k	1.0 k	-0.9 k	6.7 k	6.69 k	334	1.00	4	4	510	0.66
0.5-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
0.3-U.4	0.0 k	0.0 k	0.0 k	0.0 k	1.7 k	0.3 k	-0.3 k	2.1 k	2.06 k	343	1.00	4	4	510	0.67
0.1-U.3	0.0 k	0.0 k	0.0 k	0.0 k	1.3 k	0.3 k	-0.2 k	1.6 k	1.55 k	345	0.97	4	4	496	0.70
0.1-R.0	0.0 k	0.0 k	0.0 k	0.0 k	1.3 k	0.3 k	-0.2 k	1.6 k	1.55 k	345	0.97	4	4	496	0.70

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - Roof Framing Level.**

0.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	1.1 k	0.2 k	-0.2 k	1.4 k	1.38 k	346	1.00	4	4	510	0.68
0.0-K.5	0.0 k	0.0 k	0.0 k	0.0 k	1.1 k	0.2 k	-0.2 k	1.4 k	1.38 k	346	1.00	4	4	510	0.68
0.0-P.7	0.0 k	0.0 k	0.0 k	0.0 k	1.1 k	0.2 k	-0.2 k	1.4 k	1.38 k	346	1.00	4	4	510	0.68
0.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	1.1 k	0.2 k	-0.2 k	1.4 k	1.38 k	346	1.00	4	4	510	0.68
4.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
4.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
U.4-29.0	1.8 k	-0.1 k	0.3 k	2.1 k	0.0 k	0.0 k	0.0 k	0.0 k	2.15 k	358	1.00	4	4	510	0.70
U.4-19.9	2.1 k	-0.1 k	0.4 k	2.5 k	0.0 k	0.0 k	0.0 k	0.0 k	2.51 k	358	1.00	4	4	510	0.70
U.4-17.4	1.8 k	-0.1 k	0.3 k	2.1 k	0.0 k	0.0 k	0.0 k	0.0 k	2.15 k	358	1.00	4	4	510	0.70
U.4-11.0	2.3 k	-0.1 k	0.4 k	2.7 k	0.0 k	0.0 k	0.0 k	0.0 k	2.69 k	358	1.00	4	4	510	0.70
U.4-4.0	1.7 k	-0.1 k	0.3 k	2.0 k	0.0 k	0.0 k	0.0 k	0.0 k	1.97 k	358	1.00	4	4	510	0.70
U.3-29.0	2.4 k	-0.1 k	0.4 k	2.8 k	0.0 k	0.0 k	0.0 k	0.0 k	2.83 k	354	1.00	4	4	510	0.69
U.0-4.0	5.5 k	-0.2 k	0.8 k	6.2 k	0.0 k	0.0 k	0.0 k	0.0 k	6.23 k	346	1.00	4	4	510	0.68
U.0-9.0	7.9 k	-0.3 k	1.1 k	9.0 k	0.0 k	0.0 k	0.0 k	0.0 k	8.99 k	346	1.00	4	4	510	0.68
U.0-12.0	7.9 k	-0.3 k	1.1 k	9.0 k	0.0 k	0.0 k	0.0 k	0.0 k	8.99 k	346	1.00	4	4	510	0.68
U.0-11.0	3.8 k	-0.1 k	0.5 k	4.3 k	0.0 k	0.0 k	0.0 k	0.0 k	4.32 k	346	1.00	4	4	510	0.68
U.0-20.1	5.5 k	-0.2 k	0.8 k	6.2 k	0.0 k	0.0 k	0.0 k	0.0 k	6.22 k	346	1.00	4	4	510	0.68
U.0-18.1	7.9 k	-0.3 k	1.1 k	9.0 k	0.0 k	0.0 k	0.0 k	0.0 k	8.99 k	346	1.00	4	4	510	0.68
U.0-17.2	7.4 k	-0.2 k	1.0 k	8.5 k	0.0 k	0.0 k	0.0 k	0.0 k	8.47 k	346	1.00	4	4	510	0.68
U.0-7.2	1.7 k	-0.1 k	0.2 k	1.9 k	0.0 k	0.0 k	0.0 k	0.0 k	1.90 k	346	1.00	4	4	510	0.68
T.0-29.5	9.0 k	-0.3 k	1.2 k	10.2 k	0.0 k	0.0 k	0.0 k	0.0 k	10.17 k	345	1.00	4	4	510	0.68
S.2-1.5	3.9 k	-0.1 k	0.5 k	4.5 k	0.0 k	0.0 k	0.0 k	0.0 k	4.48 k	345	1.00	4	4	510	0.68
S.2-25.2	3.9 k	-0.1 k	0.5 k	4.5 k	0.0 k	0.0 k	0.0 k	0.0 k	4.48 k	345	1.00	4	4	510	0.68
R.1-4.0	6.5 k	-0.2 k	0.9 k	7.4 k	0.0 k	0.0 k	0.0 k	0.0 k	7.38 k	343	1.00	4	4	510	0.67
Q.0-28.4	2.9 k	-0.1 k	0.4 k	3.3 k	0.0 k	0.0 k	0.0 k	0.0 k	3.26 k	343	1.00	4	4	510	0.67
Q.0-25.7	6.4 k	-0.2 k	0.8 k	7.2 k	0.0 k	0.0 k	0.0 k	0.0 k	7.20 k	343	1.00	4	4	510	0.67
P.8-29.0	3.6 k	-0.1 k	0.4 k	4.1 k	0.0 k	0.0 k	0.0 k	0.0 k	4.08 k	340	1.00	4	4	510	0.67
P.3-4.0	2.6 k	-0.1 k	0.3 k	2.8 k	0.0 k	0.0 k	0.0 k	0.0 k	2.84 k	334	1.00	4	4	510	0.66
P.0-4.0	9.0 k	-0.2 k	0.8 k	9.7 k	0.0 k	0.0 k	0.0 k	0.0 k	9.74 k	330	1.00	4	4	510	0.65
N.0-25.5	7.4 k	-0.1 k	0.6 k	8.0 k	0.0 k	0.0 k	0.0 k	0.0 k	8.01 k	327	1.00	4	4	510	0.64
M.0-4.0	10.2 k	-0.1 k	0.6 k	10.8 k	0.0 k	0.0 k	0.0 k	0.0 k	10.77 k	322	1.00	6	4	510	0.63
L.1-25.5	7.3 k	-0.1 k	0.4 k	7.7 k	0.0 k	0.0 k	0.0 k	0.0 k	7.69 k	320	1.00	6	4	510	0.63
K.0-25.5	7.4 k	-0.1 k	0.2 k	7.7 k	0.0 k	0.0 k	0.0 k	0.0 k	7.67 k	313	1.00	6	4	510	0.61
J.8-4.0	2.6 k	0.0 k	0.1 k	2.7 k	0.0 k	0.0 k	0.0 k	0.0 k	2.66 k	312	1.00	6	4	510	0.61
H.6-25.7	7.6 k	0.0 k	0.0 k	7.6 k	0.0 k	0.0 k	0.0 k	0.0 k	7.59 k	304	1.00	6	4	510	0.60
H.1-29.0	3.3 k	0.0 k	-0.1 k	3.4 k	0.0 k	0.0 k	0.0 k	0.0 k	3.35 k	305	1.00	6	4	510	0.60
H.0-28.4	2.9 k	0.0 k	-0.1 k	2.9 k	0.0 k	0.0 k	0.0 k	0.0 k	2.90 k	305	1.00	6	4	510	0.60
H.0-25.7	6.4 k	0.0 k	-0.1 k	6.4 k	0.0 k	0.0 k	0.0 k	0.0 k	6.40 k	305	1.00	6	4	510	0.60
F.6-8.0	7.9 k	0.0 k	-0.2 k	7.9 k	0.0 k	0.0 k	0.0 k	0.0 k	7.94 k	305	1.00	6	4	510	0.60
F.6-25.3	6.4 k	0.0 k	-0.2 k	6.4 k	0.0 k	0.0 k	0.0 k	0.0 k	6.41 k	305	1.00	6	4	510	0.60
F.6-22.1	4.9 k	0.0 k	-0.1 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.89 k	305	1.00	6	4	510	0.60
F.6-20.0	7.9 k	0.0 k	-0.2 k	7.9 k	0.0 k	0.0 k	0.0 k	0.0 k	7.94 k	305	1.00	6	4	510	0.60
F.6-18.0	4.9 k	0.0 k	-0.1 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.89 k	305	1.00	6	4	510	0.60
F.6-17.3	6.4 k	0.0 k	-0.2 k	6.4 k	0.0 k	0.0 k	0.0 k	0.0 k	6.41 k	305	1.00	6	4	510	0.60
F.6-11.9	8.6 k	0.1 k	-0.2 k	8.7 k	0.0 k	0.0 k	0.0 k	0.0 k	8.70 k	305	1.00	6	4	510	0.60
F.6-10.2	4.9 k	0.0 k	-0.1 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.89 k	305	1.00	6	4	510	0.60
F.6-5.9	4.9 k	0.0 k	-0.1 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.89 k	305	1.00	6	4	510	0.60
F.6-4.5	8.8 k	0.1 k	-0.2 k	8.9 k	0.0 k	0.0 k	0.0 k	0.0 k	8.86 k	305	1.00	6	4	510	0.60
F.5-4.0	10.0 k	0.1 k	-0.3 k	10.1 k	0.0 k	0.0 k	0.0 k	0.0 k	10.08 k	305	1.00	6	4	510	0.60
E.9-29.0	7.4 k	0.1 k	-0.2 k	7.5 k	0.0 k	0.0 k	0.0 k	0.0 k	7.49 k	306	1.00	6	4	510	0.60
E.7-4.1	2.1 k	0.0 k	-0.1 k	2.1 k	0.0 k	0.0 k	0.0 k	0.0 k	2.14 k	306	1.00	6	4	510	0.60
E.4-29.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
D.8-29.0	2.9 k	0.0 k	-0.2 k	2.9 k	0.0 k	0.0 k	0.0 k	0.0 k	2.92 k	308	1.00	6	4	510	0.60
D.6-4.6	1.7 k	0.0 k	-0.1 k	1.7 k	0.0 k	0.0 k	0.0 k	0.0 k	1.69 k	308	1.00	6	4	510	0.60
D.2-29.0	9.1 k	0.2 k	-0.7 k	9.3 k	0.0 k	0.0 k	0.0 k	0.0 k	9.26 k	309	1.00	6	4	510	0.61
D.0-17.2	7.6 k	0.1 k	-0.6 k	7.7 k	0.0 k	0.0 k	0.0 k	0.0 k	7.73 k	309	1.00	6	4	510	0.61
D.0-11.9	7.6 k	0.1 k	-0.6 k	7.7 k	0.0 k	0.0 k	0.0 k	0.0 k	7.73 k	309	1.00	6	4	510	0.61
D.0-4.5	7.6 k	0.1 k	-0.6 k	7.7 k	0.0 k	0.0 k	0.0 k	0.0 k	7.73 k	309	1.00	6	4	510	0.61
D.0-25.5	7.7 k	0.1 k	-0.6 k	7.9 k	0.0 k	0.0 k	0.0 k	0.0 k	7.88 k	309	1.00	6	4	510	0.61
C.1-29.0	8.2 k	0.2 k	-0.8 k	8.4 k	0.0 k	0.0 k	0.0 k	0.0 k	8.38 k	310	1.00	6	4	510	0.61
C.0-4.0	5.3 k	0.1 k	-0.5 k	5.4 k	0.0 k	0.0 k	0.0 k	0.0 k	5.44 k	311	1.00	6	4	510	0.61
B.2-29.0	8.2 k	0.2 k	-0.9 k	8.4 k	0.0 k	0.0 k	0.0 k	0.0 k	8.40 k	311	1.00	6	4	510	0.61

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OFCHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - Roof Framing Level.**

B.2-17.6	2.6 k	0.1 k	-0.3 k	2.6 k	0.0 k	0.0 k	0.0 k	0.0 k	2.65 k	311	1.00	6	4	510	0.61
B.2-11.4	2.6 k	0.1 k	-0.3 k	2.6 k	0.0 k	0.0 k	0.0 k	0.0 k	2.65 k	311	1.00	6	4	510	0.61
B.2-4.9	2.6 k	0.1 k	-0.3 k	2.6 k	0.0 k	0.0 k	0.0 k	0.0 k	2.65 k	311	1.00	6	4	510	0.61
B.2-25.0	2.6 k	0.1 k	-0.3 k	2.6 k	0.0 k	0.0 k	0.0 k	0.0 k	2.65 k	311	1.00	6	4	510	0.61
B.0-4.0	5.3 k	0.1 k	-0.6 k	5.4 k	0.0 k	0.0 k	0.0 k	0.0 k	5.45 k	311	1.00	6	4	510	0.61
A.0-11.8	8.5 k	0.2 k	-1.0 k	8.7 k	0.0 k	0.0 k	0.0 k	0.0 k	8.74 k	312	1.00	6	4	510	0.61
A.0-17.3	8.5 k	0.2 k	-1.0 k	8.7 k	0.0 k	0.0 k	0.0 k	0.0 k	8.74 k	312	1.00	6	4	510	0.61
A.0-4.7	11.2 k	0.3 k	-1.4 k	11.6 k	0.0 k	0.0 k	0.0 k	0.0 k	11.55 k	312	1.00	6	4	510	0.61
A.0-25.2	9.7 k	0.3 k	-1.2 k	10.0 k	0.0 k	0.0 k	0.0 k	0.0 k	9.99 k	312	1.00	6	4	510	0.61
PL A.8-5.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
PL A.7-29.0	2.7 k	0.1 k	-0.4 k	2.8 k	0.0 k	0.0 k	0.0 k	0.0 k	2.82 k	314	1.00	6	4	510	0.61
PL A.5-17.9	2.1 k	0.1 k	-0.3 k	2.2 k	0.0 k	0.0 k	0.0 k	0.0 k	2.20 k	314	1.00	6	4	510	0.62
PL A.5-10.5	2.1 k	0.1 k	-0.3 k	2.2 k	0.0 k	0.0 k	0.0 k	0.0 k	2.20 k	314	1.00	6	4	510	0.62
PL A.5-5.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
PL A.5-22.5	2.1 k	0.1 k	-0.3 k	2.2 k	0.0 k	0.0 k	0.0 k	0.0 k	2.20 k	314	1.00	6	4	510	0.62
PL A.2-4.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
PL A.2-5.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4	#DIV/0!	#DIV/0!
PL A.2-11.7	3.3 k	0.1 k	-0.5 k	3.5 k	0.0 k	0.0 k	0.0 k	0.0 k	3.47 k	315	1.00	6	4	510	0.62
PL A.2-10.7	3.3 k	0.1 k	-0.5 k	3.5 k	0.0 k	0.0 k	0.0 k	0.0 k	3.47 k	315	1.00	6	4	510	0.62
0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	1.00	#DIV/0!	4	510	#DIV/0!
S	382.7 k	0.1 k	-0.3 k	403.2 k	384.5 k	0.0 k	0.0 k	421.3 k	824.5 k						

Check for Torsional Irregularity

	Building	Max Defl.				Ratio		
		Line	$\Delta X+$	$\Delta X-$	$\Delta Y+$	$\Delta Y-$		
E/W	PL A.2-10.7		0.315	0.254		1.0	< 1.2	OK
	K.0-25.5		0.301	0.313		1.1	< 1.2	OK
N/S	29.0-H.5				0.231	0.334	1.1	< 1.2 OK
	10.0-E.5				0.303	0.268	1.1	< 1.2 OK
	Average		0.308	0.284	0.267	0.301		

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Katterra

Lateral Analysis - Roof Framing Level,Tiedown Calculations - Roof Framing Level,

Typ Flr Ht = 10.25'

Typ Plate Ht = 9.26'

N/S	Building Line	Element	Element	Wall Thk (4x/6x)	Height (ft)	Moment (k-ft)	D. L. w (k/ft)	Uplift Above (kip)	Incr. Uplift (kip)	Total Uplift (kip)	Current TD Level	Tiedown	Tiedown	Demand to Capacity	TD End Post Area (sq.in)	TD Δ _u @ load in (LRFD)
		Length	Shear									Capacity	Capacity			
		(ft)	(kip)									(kip)	(kip)			
	29.0-H.5	4.00	1.336	6x	10.25	14	0.00	0.00	4.56	4.56	4	10.51	10.51	0.43	16.82	0.122
	29.0-P.7	11.50	3.839	6x	10.25	39	0.00	0.00	3.75	3.75	4	10.51	10.51	0.36	16.82	0.100
	29.0-U.3	8.00	2.665	6x	10.25	27	0.00	0.00	3.90	3.90	4	10.51	10.51	0.37	16.82	0.104
	29.0-A.9	5.00	1.659	6x	10.25	17	0.00	0.00	4.25	4.25	4	10.51	10.51	0.40	16.82	0.113
	29.0-PL A.7	5.50	1.825	6x	10.25	19	0.00	0.00	4.16	4.16	4	10.51	10.51	0.40	16.82	0.111
	29.0-P.1	6.50	2.146	6x	10.25	22	0.00	0.00	4.00	4.00	4	10.51	10.51	0.38	16.82	0.107
	29.0-J.0	6.50	2.146	6x	10.25	22	0.00	0.00	4.00	4.00	4	10.51	10.51	0.38	16.82	0.107
	29.0-H.4	18.00	5.842	6x	10.25	60	0.00	0.00	3.52	3.52	4	10.51	10.51	0.34	16.82	0.094
	29.0-H.4															
	29.0-P.6	18.50	6.004	6x	10.25	62	0.00	0.00	3.52	3.52	4	10.51	10.51	0.33	16.82	0.094
	29.0-P.6															
	27.9-U.2	19.00	6.120	6x	10.25	63	0.00	0.00	3.48	3.48	4	10.51	10.51	0.33	16.82	0.093
	27.9-U.2															
	27.1-E.0	37.00	11.896	6x	10.25	122	0.00	0.00	3.39	3.39	4	10.51	10.51	0.32	16.82	0.090
	27.1-H.5	5.50	1.768	6x	10.25	18	0.00	0.00	4.03	4.03	4	10.51	10.51	0.38	16.82	0.107
	27.1-P.5	5.50	1.768	6x	10.25	18	0.00	0.00	4.03	4.03	4	10.51	10.51	0.38	16.82	0.107
	27.1-C.4	8.00	2.572	6x	10.25	26	0.00	0.00	3.77	3.77	4	10.51	10.51	0.36	16.82	0.100
	27.1-A.8	8.50	2.733	6x	10.25	28	0.00	0.00	3.74	3.74	4	10.51	10.51	0.36	16.82	0.100
	27.1-PL A.7	18.00	5.787	6x	10.25	59	0.00	0.00	3.49	3.49	4	10.51	10.51	0.33	16.82	0.093
	26.0-E.2	21.00	6.716	6x	10.25	69	0.00	0.00	3.44	3.44	4	10.51	10.51	0.33	16.82	0.092
	26.0-C.9	23.50	7.515	6x	10.25	77	0.00	0.00	3.42	3.42	4	10.51	10.51	0.33	16.82	0.091
	26.0-B.5	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	4	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	26.0-PL A.6	21.00	6.716	6x	10.25	69	0.00	0.00	3.44	3.44	4	10.51	10.51	0.33	16.82	0.092
	26.0-PL A.6															
	25.6-P.5	25.00	7.930	6x	10.25	81	0.00	0.00	3.39	3.39	4	10.51	10.51	0.32	16.82	0.090
	25.4-U.3	8.50	2.679	6x	10.25	27	0.00	0.00	3.66	3.66	4	10.51	10.51	0.35	16.82	0.098
	25.3-E.3	25.00	7.875	6x	10.25	81	0.00	0.00	3.36	3.36	4	10.51	10.51	0.32	16.82	0.090
	25.0-H.5	28.50	8.907	6x	10.25	91	0.00	0.00	3.32	3.32	4	10.51	10.51	0.32	16.82	0.088
	25.0-L.0	10.50	3.281	6x	10.25	34	0.00	0.00	3.54	3.54	4	10.51	10.51	0.34	16.82	0.094
	25.0-K.0	18.50	5.781	6x	10.25	59	0.00	0.00	3.39	3.39	4	10.51	10.51	0.32	16.82	0.090
	25.0-P.5	22.00	6.875	6x	10.25	70	0.00	0.00	3.36	3.36	4	10.51	10.51	0.32	16.82	0.089
	25.0-N.1	18.50	5.781	6x	10.25	59	0.00	0.00	3.39	3.39	4	10.51	10.51	0.32	16.82	0.090
	24.2-U.2	29.50	9.209	6x	10.25	94	0.00	0.00	3.31	3.31	4	10.51	10.51	0.32	16.82	0.088
	24.2-U.2															
	22.6-B.2	4.00	1.238	6x	10.25	13	0.00	0.00	4.23	4.23	4	10.51	10.51	0.40	16.82	0.113
	22.1-E.4	24.50	7.543	6x	10.25	77	0.00	0.00	3.29	3.29	4	10.51	10.51	0.31	16.82	0.088
	22.1-E.4															
	21.0-E.4	8.50	2.588	6x	10.25	27	0.00	0.00	3.54	3.54	4	10.51	10.51	0.34	16.82	0.094
	21.0-U.2	32.50	9.880	6x	10.25	101	0.00	0.00	3.21	3.21	4	8.47	8.47	0.38	16.50	0.106
	20.0-E.4	24.50	7.374	6x	10.25	76	0.00	0.00	3.22	3.22	4	8.47	8.47	0.38	16.50	0.106
	20.0-E.4															
	19.5-E.5	8.50	2.531	6x	10.25	26	0.00	0.00	3.46	3.46	4	8.47	8.47	0.41	16.50	0.114
	18.8-E.5	25.00	7.358	6x	10.25	75	0.00	0.00	3.14	3.14	4	8.47	8.47	0.37	16.50	0.104
	18.8-E.5															
	18.2-U.2	24.50	7.205	6x	10.25	74	0.00	0.00	3.14	3.14	4	10.51	10.51	0.30	16.82	0.084
	17.2-PL A.7	7.00	2.002	6x	10.25	21	0.00	0.00	3.42	3.42	4	10.51	10.51	0.33	16.82	0.091
	17.3-E.3	25.00	7.177	6x	10.25	74	0.00	0.00	3.07	3.07	4	10.51	10.51	0.29	16.82	0.082
	17.0-U.2	32.50	9.294	6x	10.25	95	0.00	0.00	3.02	3.02	4	10.51	10.51	0.29	16.82	0.081
	17.0-U.2															
	15.8-PL A.6	23.00	6.613	6x	10.25	68	0.00	0.00	3.08	3.08	4	10.51	10.51	0.29	16.82	0.082
	15.2-E.2	21.00	6.046	6x	10.25	62	0.00	0.00	3.10	3.10	4	10.51	10.51	0.29	16.82	0.083
	15.2-C.7	29.50	8.494	6x	10.25	87	0.00	0.00	3.05	3.05	4	10.51	10.51	0.29	16.82	0.081
	15.2-A.6	11.50	3.311	6x	10.25	34	0.00	0.00	3.23	3.23	4	10.51	10.51	0.31	16.82	0.086
	13.8-C.7	29.50	8.552	6x	10.25	88	0.00	0.00	3.08	3.08	4	10.51	10.51	0.29	16.82	0.082

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OFCHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Kattera****Lateral Analysis - Roof Framing Level**

	13.8-A.6	11.50	3.334	6x	10.25	34	0.00	0.00	3.25	3.25	4	10.51	10.51	0.31	16.82	0.087
	13.8-E.2	22.00	6.378	6x	10.25	65	0.00	0.00	3.11	3.11	4	10.51	10.51	0.30	16.82	0.083
	13.2-PL A.6	23.50	6.822	6x	10.25	70	0.00	0.00	3.11	3.11	4	10.51	10.51	0.30	16.82	0.083
	12.0-U.2	24.50	7.186	6x	10.25	74	0.00	0.00	3.13	3.13	4	10.51	10.51	0.30	16.82	0.084
	12.0-U.2															
	11.8-E.3	25.00	7.381	6x	10.25	76	0.00	0.00	3.15	3.15	4	10.51	10.51	0.30	16.82	0.084
	11.8-E.3															
	11.0-U.2	32.50	9.772	6x	10.25	100	0.00	0.00	3.18	3.18	4	10.51	10.51	0.30	16.82	0.085
	11.0-U.2															
	10.0-E.5	25.00	7.582	6x	10.25	78	0.00	0.00	3.24	3.24	4	10.51	10.51	0.31	16.82	0.086
	10.0-E.5															
	9.5-S.5	8.50	2.588	6x	10.25	27	0.00	0.00	3.54	3.54	4	10.51	10.51	0.34	16.82	0.094
	9.2-E.5	8.50	2.611	6x	10.25	27	0.00	0.00	3.57	3.57	4	10.51	10.51	0.34	16.82	0.095
	9.0-U.2	24.50	7.547	6x	10.25	77	0.00	0.00	3.29	3.29	4	10.51	10.51	0.31	16.82	0.088
	9.0-U.2															
	7.9-E.4	24.50	7.610	6x	10.25	78	0.00	0.00	3.32	3.32	4	10.51	10.51	0.32	16.82	0.088
	7.9-E.4															
	7.3-E.0	8.50	2.648	6x	10.25	27	0.00	0.00	3.62	3.62	4	10.51	10.51	0.34	16.82	0.096
	8.0-E.4	8.50	2.671	6x	10.25	27	0.00	0.00	3.65	3.65	4	10.51	10.51	0.35	16.82	0.097
	7.0-U.2	32.50	10.251	6x	10.25	105	0.00	0.00	3.34	3.34	4	10.51	10.51	0.32	16.82	0.089
	7.0-U.2															
	6.0-E.5	25.00	7.953	6x	10.25	82	0.00	0.00	3.40	3.40	4	10.51	10.51	0.32	16.82	0.090
	6.0-E.5															
	5.6-B.5	4.50	1.440	6x	10.25	15	0.00	0.00	4.22	4.22	4	10.51	10.51	0.40	16.82	0.112
	5.0-E.5	5.50	1.769	6x	10.25	18	0.00	0.00	4.03	4.03	4	10.51	10.51	0.38	16.82	0.107
	4.9-D.9	8.00	2.587	6x	10.25	27	0.00	0.00	3.79	3.79	4	10.51	10.51	0.36	16.82	0.101
	4.8-B.5	6.50	2.140	6x	10.25	22	0.00	0.00	3.99	3.99	4	10.51	10.51	0.38	16.82	0.106
	4.6-E.3	25.00	8.157	6x	10.25	84	0.00	0.00	3.48	3.48	4	10.51	10.51	0.33	16.82	0.093
	4.0-PL A.6															
	4.0-K.5	34.50	11.436	6x	10.25	117	0.00	0.00	3.50	3.50	4	10.51	10.51	0.33	16.82	0.093
	4.0-E.2	21.50	7.127	6x	10.25	73	0.00	0.00	3.56	3.56	4	10.51	10.51	0.34	16.82	0.095
	4.0-C.9	23.50	7.790	6x	10.25	80	0.00	0.00	3.55	3.55	4	10.51	10.51	0.34	16.82	0.095
	1.7-U.2	31.00	10.358	6x	10.25	106	0.00	0.00	3.54	3.54	4	10.51	10.51	0.34	16.82	0.094
	1.7-U.2															
	1.0-C.3	9.00	3.010	6x	10.25	31	0.00	0.00	3.86	3.86	4	10.51	10.51	0.37	16.82	0.103
	1.0-E.9	6.50	2.174	6x	10.25	22	0.00	0.00	4.05	4.05	4	10.51	10.51	0.39	16.82	0.108
	1.0-N.9	25.00	8.361	6x	10.25	86	0.00	0.00	3.57	3.57	4	10.51	10.51	0.34	16.82	0.095
	1.0-P.8	19.00	6.355	6x	10.25	65	0.00	0.00	3.62	3.62	4	10.51	10.51	0.34	16.82	0.096
	1.0-K.0	7.00	2.341	6x	10.25	24	0.00	0.00	4.00	4.00	4	10.51	10.51	0.38	16.82	0.107
	1.0-L.0	20.00	6.689	6x	10.25	69	0.00	0.00	3.61	3.61	4	10.51	10.51	0.34	16.82	0.096
	0.5-PL A.6															
	0.3-U.4	6.00	2.057	6x	10.25	21	0.00	0.00	4.22	4.22	4	10.51	10.51	0.40	16.82	0.112
	0.1-U.3	4.50	1.554	6x	10.25	16	0.00	0.00	4.55	4.55	4	10.51	10.51	0.43	16.82	0.121
	0.1-R.0	4.50	1.554	6x	10.25	16	0.00	0.00	4.55	4.55	4	10.51	10.51	0.43	16.82	0.121
	0.0-K.0	4.00	1.383	6x	10.25	14	0.00	0.00	4.73	4.73	4	10.51	10.51	0.45	16.82	0.126
E/W	0.0-K.5	4.00	1.383	6x	10.25	14	0.00	0.00	4.73	4.73	4	10.51	10.51	0.45	16.82	0.126
	0.0-P.7	4.00	1.383	6x	10.25	14	0.00	0.00	4.73	4.73	4	10.51	10.51	0.45	16.82	0.126
	0.0-P.4	4.00	1.383	6x	10.25	14	0.00	0.00	4.73	4.73	4	10.51	10.51	0.45	16.82	0.126
	4.0-P.4	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	4	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	4.0-P.4	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	4	10.51	10.51	#DIV/0!	16.82	#DIV/0!
	U.4-29.0	6.00	2.149	6x	10.25	22	0.00	0.00	4.41	4.41	4	10.51	10.51	0.42	16.82	0.117
	U.4-19.9	7.00	2.507	6x	10.25	26	0.00	0.00	4.28	4.28	4	10.51	10.51	0.41	16.82	0.114
	U.4-17.4	6.00	2.149	6x	10.25	22	0.00	0.00	4.41	4.41	4	10.51	10.51	0.42	16.82	0.117
	U.4-11.0	7.50	2.686	6x	10.25	28	0.00	0.00	4.24	4.24	4	10.51	10.51	0.40	16.82	0.113
	U.4-4.0	5.50	1.967	6x	10.25	20	0.00	0.00	4.48	4.48	4	10.51	10.51	0.43	16.82	0.119
	U.3-29.0	8.00	2.832	6x	10.25	29	0.00	0.00	4.15	4.15	4	10.51	10.51	0.39	16.82	0.110
	U.0-4.0	18.00	6.225	6x	10.25	64	0.00	0.00	3.75	3.75	4	10.51	10.51	0.36	16.82	0.100
	U.0-9.0	26.00	8.991	6x	10.25	92	0.00	0.00	3.69	3.69	4	10.51	10.51	0.35	16.82	0.098
	U.0-12.0	26.00	8.991	6x	10.25	92	0.00	0.00	3.69	3.69	4	10.51	10.51	0.35	16.82	0.098
	U.0-11.0	12.50	4.323	6x	10.25	44	0.00	0.00	3.85	3.85	4	10.51	10.51	0.37	16.82	0.103
	U.0-20.1	18.00	6.225	6x	10.25	64	0.00	0.00	3.75	3.75	4	10.51	10.51	0.36	16.82	0.100
	U.0-18.1	26.00	8.991	6x	10.25	92	0.00	0.00	3.69	3.69	4	10.51	10.51	0.35	16.82	0.098

JOB NO. 18-234

Legacy Livermore

Katerra

Lateral Analysis - Roof Framing Level,

U.0-17.2	24.50	8.472	6x	10.25	87	0.00	0.00	3.70	3.70	4	10.51	10.51	0.35	16.82	0.098
U.0-7.2	5.50	1.902	6x	10.25	19	0.00	0.00	4.33	4.33	4	10.51	10.51	0.41	16.82	0.115
T.0-29.5	29.50	10.171	6x	10.25	104	0.00	0.00	3.66	3.66	4	10.51	10.51	0.35	16.82	0.097
S.2-1.5	13.00	4.482	6x	10.25	46	0.00	0.00	3.83	3.83	4	10.51	10.51	0.36	16.82	0.102
S.2-25.2	13.00	4.482	6x	10.25	46	0.00	0.00	3.83	3.83	4	10.51	10.51	0.36	16.82	0.102
R.1-4.0	21.50	7.380	6x	10.25	76	0.00	0.00	3.69	3.69	4	10.51	10.51	0.35	16.82	0.098
Q.0-28.4	9.50	3.256	6x	10.25	33	0.00	0.00	3.93	3.93	4	10.51	10.51	0.37	16.82	0.105
Q.0-25.7	21.00	7.197	6x	10.25	74	0.00	0.00	3.69	3.69	4	10.51	10.51	0.35	16.82	0.098
P.8-29.0	12.00	4.082	6x	10.25	42	0.00	0.00	3.80	3.80	4	10.51	10.51	0.36	16.82	0.101
P.3-4.0	8.50	2.840	6x	10.25	29	0.00	0.00	3.88	3.88	4	10.51	10.51	0.37	16.82	0.103
P.0-4.0	29.50	9.740	6x	10.25	100	0.00	0.00	3.50	3.50	4	10.51	10.51	0.33	16.82	0.099
P.0-4.0															
N.0-25.5	24.50	8.011	6x	10.25	82	0.00	0.00	3.49	3.49	4	10.51	10.51	0.33	16.82	0.093
N.0-25.5															
M.0-4.0	33.50	10.771	6x	10.25	110	0.00	0.00	3.40	3.40	4	10.51	10.51	0.32	16.82	0.090
M.0-4.0															
L.1-25.5	24.00	7.685	6x	10.25	79	0.00	0.00	3.42	3.42	4	10.51	10.51	0.33	16.82	0.091
L.1-25.5															
K.0-25.5	24.50	7.674	6x	10.25	79	0.00	0.00	3.35	3.35	4	10.51	10.51	0.32	16.82	0.089
K.0-25.5															
J.8-4.0	8.50	2.655	6x	10.25	27	0.00	0.00	3.63	3.63	4	10.51	10.51	0.35	16.82	0.097
H.6-25.7	25.00	7.591	6x	10.25	78	0.00	0.00	3.24	3.24	4	10.51	10.51	0.31	16.82	0.086
H.1-29.0	11.00	3.351	6x	10.25	34	0.00	0.00	3.43	3.43	4	10.51	10.51	0.33	16.82	0.091
H.0-28.4	9.50	2.897	6x	10.25	30	0.00	0.00	3.49	3.49	4	10.51	10.51	0.33	16.82	0.093
H.0-25.7	21.00	6.403	6x	10.25	66	0.00	0.00	3.28	3.28	4	10.51	10.51	0.31	16.82	0.087
F.6-8.0	26.00	7.941	6x	10.25	81	0.00	0.00	3.26	3.26	4	10.51	10.51	0.31	16.82	0.087
F.6-25.3	21.00	6.414	6x	10.25	66	0.00	0.00	3.29	3.29	4	10.51	10.51	0.31	16.82	0.088
F.6-22.1	16.00	4.887	6x	10.25	50	0.00	0.00	3.34	3.34	4	10.51	10.51	0.32	16.82	0.089
F.6-20.0	26.00	7.941	6x	10.25	81	0.00	0.00	3.26	3.26	4	10.51	10.51	0.31	16.82	0.087
F.6-18.0	16.00	4.887	6x	10.25	50	0.00	0.00	3.34	3.34	4	10.51	10.51	0.32	16.82	0.089
F.6-17.3	21.00	6.414	6x	10.25	66	0.00	0.00	3.29	3.29	4	10.51	10.51	0.31	16.82	0.088
F.6-11.9	28.50	8.704	6x	10.25	89	0.00	0.00	3.24	3.24	4	10.51	10.51	0.31	16.82	0.086
F.6-10.2	16.00	4.887	6x	10.25	50	0.00	0.00	3.34	3.34	4	10.51	10.51	0.32	16.82	0.089
F.6-5.9	16.00	4.887	6x	10.25	50	0.00	0.00	3.34	3.34	4	10.51	10.51	0.32	16.82	0.089
F.6-4.5	29.00	8.857	6x	10.25	91	0.00	0.00	3.24	3.24	4	10.51	10.51	0.31	16.82	0.086
F.5-4.0	33.00	10.079	6x	10.25	103	0.00	0.00	3.23	3.23	4	10.51	10.51	0.31	16.82	0.086
E.9-29.0	24.50	7.488	6x	10.25	77	0.00	0.00	3.27	3.27	4	10.51	10.51	0.31	16.82	0.087
E.9-29.0															
E.7-4.1	7.00	2.143	6x	10.25	22	0.00	0.00	3.66	3.66	4	10.51	10.51	0.35	16.82	0.098
E.4-29.0	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	4	10.51	10.51	#DIV/0!	16.82	#DIV/0!
D.8-29.0	9.50	2.924	6x	10.25	30	0.00	0.00	3.53	3.53	4	10.51	10.51	0.34	16.82	0.094
D.6-4.6	5.50	1.694	6x	10.25	17	0.00	0.00	3.86	3.86	4	10.51	10.51	0.37	16.82	0.103
D.2-29.0	30.00	9.262	6x	10.25	95	0.00	0.00	3.27	3.27	4	10.51	10.51	0.31	16.82	0.087
D.2-29.0															
D.0-17.2	25.00	7.728	6x	10.25	79	0.00	0.00	3.30	3.30	4	10.51	10.51	0.31	16.82	0.088
D.0-17.2															
D.0-11.9	25.00	7.728	6x	10.25	79	0.00	0.00	3.30	3.30	4	10.51	10.51	0.31	16.82	0.088
D.0-11.9															
D.0-4.5	25.00	7.728	6x	10.25	79	0.00	0.00	3.30	3.30	4	10.51	10.51	0.31	16.82	0.088
D.0-4.5															
D.0-25.5	25.50	7.883	6x	10.25	81	0.00	0.00	3.30	3.30	4	10.51	10.51	0.31	16.82	0.088
D.0-25.5															
C.1-29.0	27.00	8.381	6x	10.25	86	0.00	0.00	3.30	3.30	4	10.51	10.51	0.31	16.82	0.088
C.0-4.0	17.50	5.437	6x	10.25	56	0.00	0.00	3.38	3.38	4	10.51	10.51	0.32	16.82	0.090
B.2-29.0	27.00	8.404	6x	10.25	86	0.00	0.00	3.31	3.31	4	10.51	10.51	0.32	16.82	0.088
B.2-17.6	8.50	2.646	6x	10.25	27	0.00	0.00	3.62	3.62	4	10.51	10.51	0.34	16.82	0.096
B.2-11.4	8.50	2.646	6x	10.25	27	0.00	0.00	3.62	3.62	4	10.51	10.51	0.34	16.82	0.096
B.2-4.9	8.50	2.646	6x	10.25	27	0.00	0.00	3.62	3.62	4	10.51	10.51	0.34	16.82	0.096
B.2-25.0	8.50	2.646	6x	10.25	27	0.00	0.00	3.62	3.62	4	10.51	10.51	0.34	16.82	0.096
B.0-4.0	17.50	5.450	6x	10.25	56	0.00	0.00	3.39	3.39	4	10.51	10.51	0.32	16.82	0.090
A.0-11.8	28.00	8.742	6x	10.25	90	0.00	0.00	3.32	3.32	4	10.51	10.51	0.32	16.82	0.088
A.0-11.8															

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - Roof Framing Level.**

A.0-17.3	28.00	8.742	6x	10.25	90	0.00	0.00	3.32	3.32	4	10.51	10.51	0.32	16.82	0.088
A.0-17.3															
A.0-4.7	37.00	11.553	6x	10.25	118	0.00	0.00	3.29	3.29	4	10.51	10.51	0.31	16.82	0.088
A.0-25.2	32.00	9.992	6x	10.25	102	0.00	0.00	3.30	3.30	4	10.51	10.51	0.31	16.82	0.088
PL A.8-5.6															
PL A.7-29.0	9.00	2.822	6x	10.25	29	0.00	0.00	3.62	3.62	4	10.51	10.51	0.34	16.82	0.096
PL A.5-17.9	7.00	2.198	6x	10.25	23	0.00	0.00	3.75	3.75	4	10.51	10.51	0.36	16.82	0.100
PL A.5-10.5	7.00	2.198	6x	10.25	23	0.00	0.00	3.75	3.75	4	10.51	10.51	0.36	16.82	0.100
PL A.5-5.6															
PL A.5-22.5	7.00	2.198	6x	10.25	23	0.00	0.00	3.75	3.75	4	10.51	10.51	0.36	16.82	0.100
PL A.2-4.0															
PL A.2-5.0															
PL A.2-11.7	11.00	3.466	6x	10.25	36	0.00	0.00	3.55	3.55	4	10.51	10.51	0.34	16.82	0.095
PL A.2-10.7	11.00	3.466	6x	10.25	36	0.00	0.00	3.55	3.55	4	10.51	10.51	0.34	16.82	0.095

BY ACM DATE 02/06/19

PEOPLES ASSOCIATES

SHEET NO. OF

CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234

Legacy Livermore

Katerra

Lateral Analysis -4th Floor Framing Level.

Area at base = 62110 ft²

Story Shear	Center of Mass	Diaphragm Dimensions	Accidental Eccentricity (5%)
Vx = 884 k	Xm = -134.3'	X = 368.3'	x-dir. Eac. = 18.4' <--- E/W
Vy = 884 k	Ym = 185.5'	Y = 281.5'	y-dir. Eac. = 14.1' <--- N/S

Building	Location		Angle	Length									h/w	
Line	X	Y	(degrees)	(ft)	Kx	Ky	Kx * Y	Ky * X	X Bar	Y Bar	Kx*y^2	Ky*x^2	ratio	
29.0-H.5	-313.4'	193.1'	360.0'	4.0'	0.00	4.00	0	-1254	-175.6'	-1.0'	0.0E+00	1.2E+05	2.32	
29.0-P.7	-312.9'	94.1'	360.0'	11.5'	0.00	11.50	0	-3598	-175.1'	-100.0'	0.0E+00	3.5E+05	0.81	
29.0-U.3	-310.5'	54.6'	180.0'	8.0'	0.00	8.00	0	-2484	-172.7'	-139.6'	0.0E+00	2.4E+05	1.16	
29.0-A.9	-305.5'	282.8'	360.0'	5.0'	0.00	5.00	0	-1527	-167.7'	88.6'	0.0E+00	1.4E+05	1.85	
29.0-PL A.7	-305.5'	303.1'	180.0'	5.5'	0.00	5.50	0	-1680	-167.7'	108.9'	0.0E+00	1.5E+05	1.68	
29.0-P.1	-299.9'	114.8'	360.0'	6.5'	0.00	6.50	0	-1949	-162.1'	-79.3'	0.0E+00	1.7E+05	1.42	
29.0-J.0	-299.9'	178.4'	360.0'	6.5'	0.00	6.50	0	-1949	-162.1'	-15.8'	0.0E+00	1.7E+05	1.42	
29.0-H.4	-280.1'	194.1'	360.0'	18.0'	0.00	18.00	0	-5041	-142.3'	-0.1'	0.0E+00	3.6E+05	0.51	
29.0-P.6	-280.0'	97.8'	360.0'	18.5'	0.00	18.50	0	-5181	-142.3'	-96.3'	0.0E+00	3.7E+05	0.50	
27.9-U.2	-271.3'	61.8'	360.0'	19.0'	0.00	19.00	0	-5155	-133.5'	-132.3'	0.0E+00	3.4E+05	0.49	
27.1-E.0	-269.3'	236.2'	180.0'	37.0'	0.00	37.00	0	-9965	-131.5'	42.0'	0.0E+00	6.4E+05	0.25	
27.1-H.5	-269.3'	236.2'	180.0'	5.5'	0.00	5.50	0	-1481	-131.5'	42.0'	0.0E+00	9.5E+04	1.68	
27.1-P.5	-269.3'	236.2'	180.0'	5.5'	0.00	5.50	0	-1481	-131.5'	42.0'	0.0E+00	9.5E+04	1.68	
27.1-C.4	-269.3'	265.8'	180.0'	8.0'	0.00	8.00	0	-2155	-131.5'	71.7'	0.0E+00	1.4E+05	1.16	
27.1-A.8	-269.3'	284.2'	180.0'	8.5'	0.00	8.50	0	-2289	-131.5'	90.0'	0.0E+00	1.5E+05	1.09	
27.1-PL A.7	-269.3'	305.4'	180.0'	18.0'	0.00	18.00	0	-4848	-131.5'	111.2'	0.0E+00	3.1E+05	0.51	
28.0-E.2	-263.2'	231.0'	360.0'	21.0'	0.00	21.00	0	-5528	-125.4'	36.9'	0.0E+00	3.3E+05	0.44	
26.0-C.9	-263.2'	257.4'	360.0'	23.5'	0.00	23.50	0	-6186	-125.4'	63.3'	0.0E+00	3.7E+05	0.39	
26.0-B.5	-263.2'	277.0'	180.0'	0.0'	0.00	0.00	0	0	-125.4'	82.8'	0.0E+00	0.0E+00	#DIV/0!	
26.0-PL A.6	-263.2'	309.2'	360.0'	21.0'	0.00	21.00	0	-5528	-125.4'	115.0'	0.0E+00	3.3E+05	0.44	
25.6-P.5	-254.1'	101.6'	225.0'	25.0'	0.00	25.00	0	-6352	-116.3'	-92.6'	0.0E+00	3.4E+05	0.37	
25.4-U.3	-247.1'	53.5'	360.0'	8.5'	0.00	8.50	0	-2100	-109.3'	-140.7'	0.0E+00	1.0E+05	1.09	
25.3-E.3	-246.3'	229.5'	315.0'	25.0'	0.00	25.00	0	-6158	-108.5'	35.3'	0.0E+00	2.9E+05	0.37	
25.0-H.5	-237.5'	192.5'	180.0'	28.5'	0.00	28.50	0	-6768	-99.7'	-1.6'	0.0E+00	2.8E+05	0.32	
25.0-L.0	-237.4'	145.8'	360.0'	10.5'	0.00	10.50	0	-2493	-99.6'	-48.3'	0.0E+00	1.0E+05	0.88	
25.0-K.0	-237.4'	164.8'	360.0'	18.5'	0.00	18.50	0	-4393	-99.6'	-29.4'	0.0E+00	1.8E+05	0.50	
25.0-P.5	-237.4'	102.4'	180.0'	22.0'	0.00	22.00	0	-5224	-99.6'	-91.7'	0.0E+00	2.2E+05	0.42	
25.0-N.1	-237.4'	127.0'	180.0'	18.5'	0.00	18.50	0	-4393	-99.6'	-67.2'	0.0E+00	1.8E+05	0.50	
24.2-U.2	-236.2'	63.8'	180.0'	29.5'	0.00	29.50	0	-6968	-98.4'	-130.3'	0.0E+00	2.9E+05	0.31	
22.6-B.2	-226.9'	280.3'	180.0'	4.0'	0.00	4.00	0	-908	-89.1'	86.2'	0.0E+00	3.2E+04	2.32	
22.1-E.4	-221.1'	226.1'	180.0'	24.5'	0.00	24.50	0	-5417	-83.3'	31.9'	0.0E+00	1.7E+05	0.38	
21.0-E.4	-209.1'	226.1'	180.0'	8.5'	0.00	8.50	0	-1777	-71.3'	31.9'	0.0E+00	4.3E+04	1.09	
21.0-U.2	-207.4'	59.4'	180.0'	32.5'	0.00	32.50	0	-6739	-69.6'	-134.7'	0.0E+00	1.6E+05	0.28	
20.0-E.4	-196.7'	227.6'	360.0'	24.5'	0.00	24.50	0	-4818	-58.9'	33.4'	0.0E+00	8.5E+04	0.38	
19.5-E.5	-185.2'	225.8'	360.0'	8.5'	0.00	8.50	0	-1574	-47.4'	31.7'	0.0E+00	1.9E+04	1.09	
18.8-E.5	-173.2'	225.8'	360.0'	25.0'	0.00	25.00	0	-4329	-35.4'	31.7'	0.0E+00	3.1E+04	0.37	
18.2-U.2	-172.3'	61.4'	360.0'	24.5'	0.00	24.50	0	-4222	-34.5'	-132.7'	0.0E+00	2.9E+04	0.38	
17.2-PL A.7	-143.6'	302.9'	360.0'	7.0'	0.00	7.00	0	-1005	-5.8'	108.8'	0.0E+00	2.4E+02	1.32	
17.3-E.3	-147.5'	229.5'	225.0'	25.0'	0.00	25.00	0	-3688	-9.7'	35.3'	0.0E+00	2.4E+03	0.37	
17.0-U.2	-136.8'	59.4'	180.0'	32.5'	0.00	32.50	0	-4446	1.0'	-134.7'	0.0E+00	3.1E+01	0.28	
15.8-PL A.6	-131.8'	308.0'	180.0'	23.0'	0.00	23.00	0	-3030	6.0'	113.9'	0.0E+00	8.4E+02	0.40	
15.2-E.2	-130.6'	231.0'	360.0'	21.0'	0.00	21.00	0	-2742	7.2'	36.9'	0.0E+00	1.1E+03	0.44	
15.2-C.7	-130.6'	259.8'	360.0'	29.5'	0.00	29.50	0	-3851	7.2'	65.7'	0.0E+00	1.5E+03	0.31	
15.2-A.6	-130.6'	285.3'	180.0'	11.5'	0.00	11.50	0	-1501	7.2'	91.2'	0.0E+00	6.0E+02	0.81	
13.8-C.7	-124.2'	259.8'	360.0'	29.5'	0.00	29.50	0	-3664	13.6'	65.7'	0.0E+00	5.4E+03	0.31	
13.8-A.6	-124.2'	285.3'	180.0'	11.5'	0.00	11.50	0	-1428	13.6'	91.1'	0.0E+00	2.1E+03	0.81	
13.8-E.2	-124.2'	230.6'	360.0'	22.0'	0.00	22.00	0	-2732	13.6'	36.5'	0.0E+00	4.1E+03	0.42	
13.2-PL A.6	-122.9'	309.2'	180.0'	23.5'	0.00	23.50	0	-2889	14.9'	115.1'	0.0E+00	5.2E+03	0.39	
12.0-U.2	-113.3'	61.4'	360.0'	24.5'	0.00	24.50	0	-2776	24.5'	-132.7'	0.0E+00	1.5E+04	0.38	
11.8-E.3	-107.2'	229.5'	135.0'	25.0'	0.00	25.00	0	-2680	30.6'	35.4'	0.0E+00	2.3E+04	0.37	
11.0-U.2	-89.8'	59.4'	180.0'	32.5'	0.00	32.50	0	-2919	48.0'	-134.7'	0.0E+00	7.5E+04	0.28	
10.0-E.5	-81.6'	225.8'	360.0'	25.0'	0.00	25.00	0	-2040	56.2'	31.7'	0.0E+00	7.9E+04	0.37	
9.5-S.5	-77.6'	225.8'	360.0'	8.5'	0.00	8.50	0	-660	60.2'	31.7'	0.0E+00	3.1E+04	1.09	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

9.2-E.5	-69.1'	225.8'	360.0'	8.5'	0.00	8.50	0	-587	68.7'	31.7'	0.0E+00	4.0E+04	1.09
9.0-U.2	-66.3'	61.4'	180.0'	24.5'	0.00	24.50	0	-1624	71.5'	-132.8'	0.0E+00	1.3E+05	0.38
7.9-E.4	-58.2'	227.6'	180.0'	24.5'	0.00	24.50	0	-1426	79.6'	33.4'	0.0E+00	1.6E+05	0.38
7.3-E.0	-55.1'	227.6'	180.0'	8.5'	0.00	8.50	0	-469	82.7'	33.4'	0.0E+00	5.8E+04	1.09
8.0-E.4	-46.6'	227.6'	180.0'	8.5'	0.00	8.50	0	-396	91.2'	33.4'	0.0E+00	7.1E+04	1.09
7.0-U.2	-42.8'	59.5'	180.0'	32.5'	0.00	32.50	0	-1390	95.0'	-134.7'	0.0E+00	2.9E+05	0.28
6.0-E.5	-34.1'	225.8'	180.0'	25.0'	0.00	25.00	0	-853	103.7'	31.7'	0.0E+00	2.7E+05	0.37
5.6-B.5	-27.9'	277.5'	180.0'	4.5'	0.00	4.50	0	-126	109.9'	83.4'	0.0E+00	5.4E+04	2.06
5.0-E.5	-22.9'	277.5'	180.0'	5.5'	0.00	5.50	0	-126	114.9'	83.4'	0.0E+00	7.3E+04	1.68
4.9-D.9	-17.4'	238.7'	180.0'	8.0'	0.00	8.00	0	-139	120.4'	44.6'	0.0E+00	1.2E+05	1.16
4.8-B.5	1.4'	277.5'	180.0'	6.5'	0.00	6.50	0	9	139.2'	83.4'	0.0E+00	1.3E+05	1.42
4.6-E.3	-8.2'	229.8'	180.0'	25.0'	0.00	25.00	0	-205	129.6'	35.7'	0.0E+00	4.2E+05	0.37
4.0-PL A.6	8.4'	308.8'	180.0'	20.5'	0.00	20.50	0	173	146.2'	114.6'	0.0E+00	4.4E+05	0.45
4.0-K.5	8.4'	308.8'	180.0'	34.5'	0.00	34.50	0	291	146.2'	114.6'	0.0E+00	7.4E+05	0.27
4.0-E.2	8.5'	232.7'	180.0'	21.5'	0.00	21.50	0	182	146.3'	38.6'	0.0E+00	4.6E+05	0.43
4.0-C.9	8.5'	257.6'	180.0'	23.5'	0.00	23.50	0	199	146.3'	63.4'	0.0E+00	5.0E+05	0.39
1.7-U.2	16.9'	62.5'	360.0'	31.0'	0.00	31.00	0	523	154.7'	-131.7'	0.0E+00	7.4E+05	0.30
1.0-C.3	17.7'	268.2'	180.0'	9.0'	0.00	9.00	0	159	155.5'	74.1'	0.0E+00	2.2E+05	1.03
1.0-E.9	17.8'	215.4'	180.0'	6.5'	0.00	6.50	0	116	155.6'	21.2'	0.0E+00	1.6E+05	1.42
1.0-N.9	17.9'	119.3'	180.0'	25.0'	0.00	25.00	0	448	155.7'	-74.9'	0.0E+00	6.1E+05	0.37
1.0-P.8	17.9'	92.8'	180.0'	19.0'	0.00	19.00	0	340	155.7'	-101.4'	0.0E+00	4.6E+05	0.49
1.0-K.0	17.9'	163.6'	360.0'	7.0'	0.00	7.00	0	125	155.7'	-30.6'	0.0E+00	1.7E+05	1.32
1.0-L.0	17.9'	145.9'	360.0'	20.0'	0.00	20.00	0	358	155.7'	-48.2'	0.0E+00	4.8E+05	0.46
0.5-PL A.6	36.8'	308.4'	180.0'	0.0'	0.00	0.00	0	0	174.6'	114.3'	0.0E+00	0.0E+00	#DIV/0!
0.3-U.4	44.8'	49.5'	180.0'	6.0'	0.00	6.00	0	269	182.6'	-144.7'	0.0E+00	2.0E+05	1.54
0.1-U.3	52.3'	56.2'	180.0'	4.5'	0.00	4.50	0	235	190.1'	-137.9'	0.0E+00	1.6E+05	2.06
0.1-R.0	52.3'	83.1'	180.0'	4.5'	0.00	4.50	0	235	190.1'	-111.1'	0.0E+00	1.6E+05	2.06
0.0-K.0	54.2'	164.9'	180.0'	4.0'	0.00	4.00	0	217	192.0'	-29.2'	0.0E+00	1.5E+05	1.03
0.0-K.5	54.2'	155.3'	180.0'	4.0'	0.00	4.00	0	217	192.0'	-38.9'	0.0E+00	1.5E+05	1.03
0.0-P.7	54.2'	96.2'	180.0'	4.0'	0.00	4.00	0	217	192.0'	-98.0'	0.0E+00	1.5E+05	1.03
0.0-P.4	54.2'	105.8'	180.0'	4.0'	0.00	4.00	0	217	192.0'	-88.3'	0.0E+00	1.5E+05	1.03
4.0-P.4	54.2'	105.8'	180.0'	0.0'	0.00	0.00	0	0	192.0'	-88.3'	0.0E+00	0.0E+00	#DIV/0!
4.0-P.4	54.2'	105.8'	180.0'	0.0'	0.00	0.00	0	0	192.0'	-88.3'	0.0E+00	0.0E+00	#DIV/0!

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore**

Katerra

Lateral Analysis -4th Floor Framing Level.

U.4-29.0	-287.6'	42.7'	270.0'	6.0'	6.00	0.00	256	0	-149.8'	-151.4'	1.4E+05	0.0E+00	1.54
U.4-19.9	-195.1'	42.7'	270.0'	7.0'	7.00	0.00	299	0	-57.3'	-151.4'	1.6E+05	0.0E+00	1.32
U.4-17.4	-149.1'	42.7'	450.0'	6.0'	6.00	0.00	256	0	-11.3'	-151.4'	1.4E+05	0.0E+00	1.54
U.4-11.0	-89.3'	42.8'	90.0'	7.5'	7.50	0.00	321	0	48.5'	-151.4'	1.7E+05	0.0E+00	1.23
U.4-4.0	32.4'	44.3'	450.0'	5.5'	5.50	0.00	244	0	170.2'	-149.9'	1.2E+05	0.0E+00	1.68
U.5-4.0	32.4'	47.3'	450.0'	6.0'	6.00	0.00	284	0	170.2'	-146.9'	1.3E+05	0.0E+00	1.54
U.3-29.0	-296.1'	53.8'	270.0'	8.0'	8.00	0.00	431	0	-158.3'	-140.3'	1.6E+05	0.0E+00	1.16
U.0-4.0	10.0'	76.0'	270.0'	18.0'	18.00	0.00	1368	0	147.8'	-118.1'	2.5E+05	0.0E+00	0.51
U.0-9.0	-66.1'	76.1'	270.0'	26.0'	26.00	0.00	1979	0	71.7'	-118.0'	3.6E+05	0.0E+00	0.36
U.0-12.0	-113.1'	76.1'	270.0'	26.0'	26.00	0.00	1979	0	24.7'	-118.0'	3.6E+05	0.0E+00	0.36
U.0-11.0	-89.6'	76.1'	270.0'	12.5'	12.50	0.00	952	0	48.2'	-118.0'	1.7E+05	0.0E+00	0.74
U.0-20.1	-198.4'	76.1'	270.0'	18.0'	18.00	0.00	1370	0	-60.6'	-118.0'	2.5E+05	0.0E+00	0.51
U.0-18.1	-172.1'	76.1'	270.0'	26.0'	26.00	0.00	1979	0	-34.3'	-118.0'	3.6E+05	0.0E+00	0.36
U.0-17.2	-142.6'	76.1'	270.0'	24.5'	24.50	0.00	1865	0	-4.8'	-118.0'	3.4E+05	0.0E+00	0.38
U.0-7.2	-46.0'	76.1'	270.0'	5.5'	5.50	0.00	419	0	91.8'	-118.0'	7.7E+04	0.0E+00	1.68
T.0-29.5	-296.7'	78.9'	90.0'	29.5'	29.50	0.00	2328	0	-158.9'	-115.2'	3.9E+05	0.0E+00	0.31
S.2-1.5	-262.5'	79.0'	90.0'	13.0'	13.00	0.00	1027	0	-124.7'	-115.1'	1.7E+05	0.0E+00	0.71
S.2-25.2	-242.6'	79.0'	90.0'	13.0'	13.00	0.00	1027	0	-104.8'	-115.1'	1.7E+05	0.0E+00	0.71
R.1-4.0	41.2'	83.0'	270.0'	21.5'	21.50	0.00	1785	0	179.0'	-111.1'	2.7E+05	0.0E+00	0.43
Q.0-28.4	-275.4'	84.6'	90.0'	9.5'	9.50	0.00	804	0	-137.6'	-109.5'	1.1E+05	0.0E+00	0.97
Q.0-25.7	-255.7'	84.6'	90.0'	21.0'	21.00	0.00	1776	0	-117.9'	-109.5'	2.5E+05	0.0E+00	0.44
P.8-29.0	-306.5'	91.4'	90.0'	12.0'	12.00	0.00	1096	0	-168.7'	-102.8'	1.3E+05	0.0E+00	0.77
P.3-4.0	43.5'	107.7'	270.0'	8.5'	8.50	0.00	916	0	181.3'	-86.4'	6.3E+04	0.0E+00	1.09
P.0-4.0	33.1'	118.5'	450.0'	29.5'	29.50	0.00	3496	0	170.9'	-75.6'	1.7E+05	0.0E+00	0.31
N.0-25.5	-250.7'	127.2'	450.0'	24.5'	24.50	0.00	3117	0	-112.9'	-66.9'	1.1E+05	0.0E+00	0.38
M.0-4.0	35.2'	142.0'	450.0'	33.5'	33.50	0.00	4757	0	173.0'	-52.1'	9.1E+04	0.0E+00	0.28
L.1-25.5	-250.3'	145.5'	450.0'	24.0'	24.00	0.00	3493	0	-112.5'	-48.6'	5.7E+04	0.0E+00	0.39
K.0-25.5	-250.7'	164.5'	450.0'	24.5'	24.50	0.00	4030	0	-112.9'	-29.6'	2.2E+04	0.0E+00	0.38
J.8-4.0	36.1'	166.8'	270.0'	8.5'	8.50	0.00	1418	0	173.9'	-27.4'	6.4E+03	0.0E+00	1.09
H.6-25.0	-254.4'	190.5'	315.0'	25.0'	25.00	0.00	4762	0	-116.6'	-3.7'	3.4E+02	0.0E+00	0.37
H.1-29.0	-304.5'	203.5'	450.0'	11.0'	11.00	0.00	2239	0	-166.7'	9.4'	9.7E+02	0.0E+00	0.84
H.0-28.4	-275.4'	207.1'	450.0'	9.5'	9.50	0.00	1967	0	-137.6'	12.9'	1.6E+03	0.0E+00	0.97
H.0-25.7	-255.7'	207.1'	90.0'	21.0'	21.00	0.00	4349	0	-117.9'	12.9'	3.5E+03	0.0E+00	0.44
F.6-8.0	-57.9'	212.8'	270.0'	26.0'	26.00	0.00	5533	0	79.9'	18.7'	9.1E+03	0.0E+00	0.36
F.6-25.3	-245.0'	212.8'	270.0'	21.0'	21.00	0.00	4469	0	-107.2'	18.7'	7.3E+03	0.0E+00	0.44
F.6-22.1	-222.0'	212.8'	450.0'	16.0'	16.00	0.00	3405	0	-84.2'	18.7'	5.6E+03	0.0E+00	0.58
F.6-20.0	-196.9'	212.8'	270.0'	26.0'	26.00	0.00	5533	0	-59.1'	18.7'	9.1E+03	0.0E+00	0.36
F.6-18.0	-171.7'	212.8'	270.0'	16.0'	16.00	0.00	3405	0	-33.9'	18.7'	5.6E+03	0.0E+00	0.58
F.6-17.3	-148.8'	212.8'	270.0'	21.0'	21.00	0.00	4469	0	-11.0'	18.7'	7.3E+03	0.0E+00	0.44
F.6-11.9	-109.6'	212.8'	270.0'	28.5'	28.50	0.00	6065	0	28.2'	18.7'	9.9E+03	0.0E+00	0.32
F.6-10.2	-83.1'	212.8'	270.0'	16.0'	16.00	0.00	3405	0	54.7'	18.7'	5.6E+03	0.0E+00	0.58
F.6-5.9	-32.7'	212.8'	90.0'	16.0'	16.00	0.00	3405	0	105.1'	18.7'	5.6E+03	0.0E+00	0.58
F.6-4.5	-5.9'	212.8'	90.0'	29.0'	29.00	0.00	6172	0	131.9'	18.7'	1.0E+04	0.0E+00	0.32
F.5-4.0	35.3'	212.9'	90.0'	33.0'	33.00	0.00	7026	0	173.0'	18.8'	1.2E+04	0.0E+00	0.28
E.9-29.0	-295.2'	215.3'	270.0'	24.5'	24.50	0.00	5274	0	-157.4'	21.1'	1.1E+04	0.0E+00	0.38
E.7-4.1	4.6'	220.6'	90.0'	7.0'	7.00	0.00	1545	0	142.4'	26.5'	4.9E+03	0.0E+00	1.32
E.4-29.0	-308.6'	226.8'	270.0'	0.0'	0.00	0.00	0	0	-170.8'	32.7'	0.0E+00	0.0E+00	#DIV/0!
D.8-29.0	-295.2'	240.0'	270.0'	9.5'	9.50	0.00	2280	0	-157.4'	45.8'	2.0E+04	0.0E+00	0.97
D.6-4.6	-9.1'	243.4'	90.0'	5.5'	5.50	0.00	1339	0	128.6'	49.3'	1.3E+04	0.0E+00	1.68
D.2-29.0	-284.9'	250.8'	270.0'	30.0'	30.00	0.00	7523	0	-147.1'	56.6'	9.6E+04	0.0E+00	0.31
D.0-17.2	-143.5'	255.4'	90.0'	25.0'	25.00	0.00	6385	0	-5.7'	61.3'	9.4E+04	0.0E+00	0.37
D.0-11.9	-111.1'	255.4'	450.0'	25.0'	25.00	0.00	6385	0	26.7'	61.3'	9.4E+04	0.0E+00	0.37
D.0-4.5	-4.6'	255.4'	90.0'	25.0'	25.00	0.00	6386	0	133.2'	61.3'	9.4E+04	0.0E+00	0.37
D.0-25.5	-249.9'	255.4'	450.0'	25.5'	25.50	0.00	6513	0	-112.1'	61.3'	9.6E+04	0.0E+00	0.36
C.1-29.0	-283.3'	270.3'	90.0'	27.0'	27.00	0.00	7298	0	-145.5'	76.2'	1.6E+05	0.0E+00	0.34
C.0-4.0	23.5'	273.1'	90.0'	17.5'	17.50	0.00	4779	0	161.2'	79.0'	1.1E+05	0.0E+00	0.53
B.2-29.0	-283.2'	280.0'	90.0'	27.0'	27.00	0.00	7560	0	-145.4'	85.9'	2.0E+05	0.0E+00	0.34
B.2-17.6	-157.3'	280.1'	90.0'	8.5'	8.50	0.00	2381	0	-19.5'	86.0'	6.3E+04	0.0E+00	1.09
B.2-11.4	-98.6'	280.1'	450.0'	8.5'	8.50	0.00	2381	0	39.2'	86.0'	6.3E+04	0.0E+00	1.09
B.2-4.9	-17.1'	280.2'	90.0'	8.5'	8.50	0.00	2381	0	120.7'	86.0'	6.3E+04	0.0E+00	1.09
B.2-25.0	-237.6'	280.2'	270.0'	8.5'	8.50	0.00	2382	0	-99.9'	86.0'	6.3E+04	0.0E+00	1.09
B.0-4.0	23.5'	281.7'	90.0'	17.5'	17.50	0.00	4930	0	161.3'	87.6'	1.3E+05	0.0E+00	0.53

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

A.0-11.8	-108.1'	290.9'	450.0'	28.0'	28.00	0.00	8145	0	29.6'	96.8'	2.6E+05	0.0E+00	0.33
A.0-17.3	-146.6'	290.9'	90.0'	28.0'	28.00	0.00	8145	0	-8.8'	96.8'	2.6E+05	0.0E+00	0.33
A.0-4.7	-11.7'	291.4'	90.0'	37.0'	37.00	0.00	10780	0	126.1'	97.2'	3.5E+05	0.0E+00	0.25
A.0-25.2	-243.4'	291.4'	270.0'	32.0'	32.00	0.00	9324	0	-105.6'	97.2'	3.0E+05	0.0E+00	0.29
PL A.8-5.6	-28.5'	301.9'	90.0'	7.0'	7.00	0.00	2113	0	109.3'	107.7'	8.1E+04	0.0E+00	1.32
PL A.7-29.0	-299.2'	305.7'	270.0'	9.0'	9.00	0.00	2751	0	-161.4'	111.6'	1.1E+05	0.0E+00	1.03
PL A.5-17.9	-169.4'	310.7'	450.0'	7.0'	7.00	0.00	2175	0	-31.6'	116.5'	9.5E+04	0.0E+00	1.32
PL A.5-10.5	-85.5'	310.7'	270.0'	7.0'	7.00	0.00	2175	0	52.3'	116.5'	9.5E+04	0.0E+00	1.32
PL A.5-5.6	-28.5'	310.7'	90.0'	7.0'	7.00	0.00	2175	0	109.3'	116.6'	9.5E+04	0.0E+00	1.32
PL A.5-22.5	-226.3'	310.7'	450.0'	7.0'	7.00	0.00	2175	0	-88.5'	116.6'	9.5E+04	0.0E+00	1.32
PL A.2-4.0	21.7'	324.3'	90.0'	10.0'	10.00	0.00	3243	0	159.5'	130.1'	1.7E+05	0.0E+00	0.93
PL A.2-5.0	44.4'	324.3'	90.0'	10.0'	10.00	0.00	3243	0	182.2'	130.1'	1.7E+05	0.0E+00	0.93
PL A.2-11.7	-105.4'	324.3'	270.0'	11.0'	11.00	0.00	3568	0	32.4'	130.2'	1.9E+05	0.0E+00	0.84
PL A.2-10.7	-87.2'	324.3'	270.0'	11.0'	11.00	0.00	3568	0	50.6'	130.2'	1.9E+05	0.0E+00	0.84
0	0.0'	0.0'	0.0'	0.0'	0.00	0.00	0	0	137.8'	-194.1'	0.0E+00	0.0E+00	#DIV/0!
S					1301	1370	252578	-188773			9.1E+06	1.6E+07	

Center of Rigidity	Eccentricity + Eac.	Eccentricity - Eac.	Rotational Stiffness
Xr = -137.8'	Ex = 21.87'	Ex = -14.96'	Jr = 2.47E+07
Yr = 194.1'	Ey = 5.40'	Ey = -22.75'	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore**

Katterra

Lateral Analysis -4th Floor Framing Level.**Lateral Design: Rigid Diaphragm - 4th Floor Framing Level.**

Building Line	X - Direction				Y - Direction				2:1/3.5:1									
	Direct Shear	+Eac.		-Eac.		Total X-Dir.	+Eac.		-Eac.		Total Y-Dir.	Maximum Shear	Shear (lb/ft)	Capacity Reduction	SW Type Min Req.	SW Type Used	Capacity (plf)	D/C
		Torsional Shear	Torsional Shear	Torsional Shear	Torsional Shear		Torsional Shear	Torsional Shear										
29.0-H.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	2.6 k	-0.5 k	0.4 k	3.0 k	2.96 k	739	0.86	2	2	2	752	0.98	
29.0-P.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	-1.6 k	1.1 k	8.5 k	8.50 k	739	1.00	2	2	2	870	0.85	
29.0-U.3	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.2 k	-1.1 k	0.7 k	5.9 k	5.90 k	737	1.00	2	2	2	870	0.85	
29.0-A.9	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	3.2 k	-0.7 k	0.4 k	3.7 k	3.67 k	735	1.00	2	2	2	870	0.84	
29.0-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	-0.7 k	0.5 k	4.0 k	4.04 k	735	1.00	2	2	2	870	0.84	
29.0-P.1	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	4.2 k	-0.8 k	0.6 k	4.8 k	4.76 k	732	1.00	2	2	2	870	0.84	
29.0-J.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	4.2 k	-0.8 k	0.6 k	4.8 k	4.76 k	732	1.00	2	2	2	870	0.84	
29.0-H.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	11.6 k	-2.0 k	1.4 k	13.0 k	12.98 k	721	1.00	2	2	2	870	0.83	
29.0-P.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	11.9 k	-2.1 k	1.4 k	13.3 k	13.34 k	721	1.00	2	2	2	870	0.83	
27.9-U.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	12.3 k	-2.0 k	1.4 k	13.6 k	13.61 k	716	1.00	2	2	2	870	0.82	
27.1-E.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	23.9 k	-3.8 k	2.6 k	26.5 k	26.47 k	715	1.00	2	2	2	870	0.82	
27.1-H.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	-0.6 k	0.4 k	3.9 k	3.93 k	715	1.00	2	2	2	870	0.82	
27.1-P.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	-0.6 k	0.4 k	3.9 k	3.93 k	715	1.00	2	2	2	870	0.82	
27.1-C.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.2 k	-0.8 k	0.6 k	5.7 k	5.72 k	715	1.00	2	2	2	870	0.82	
27.1-A.8	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	-0.9 k	0.6 k	6.1 k	6.08 k	715	1.00	2	2	2	870	0.82	
27.1-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	11.6 k	-1.9 k	1.3 k	12.9 k	12.88 k	715	1.00	2	2	2	870	0.82	
26.0-E.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	13.5 k	-2.1 k	1.4 k	15.0 k	14.96 k	712	1.00	2	2	2	870	0.82	
26.0-C.9	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	15.2 k	-2.3 k	1.6 k	16.7 k	16.74 k	712	1.00	2	2	2	870	0.82	
26.0-B.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	#DIV/0!	#DIV/0!	#DIV/0!	2	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
26.0-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	13.5 k	-2.1 k	1.4 k	15.0 k	14.96 k	712	1.00	2	2	2	870	0.82	
25.6-P.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	-2.3 k	1.6 k	17.7 k	17.68 k	707	1.00	2	2	2	870	0.81	
25.4-U.3	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	-0.7 k	0.5 k	6.0 k	5.98 k	704	1.00	2	2	2	870	0.81	
25.3-E.3	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	-2.1 k	1.5 k	17.6 k	17.58 k	703	1.00	2	2	2	870	0.81	
25.0-H.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	18.4 k	-2.2 k	1.5 k	19.9 k	19.90 k	698	1.00	2	2	2	870	0.80	
25.0-L.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	6.8 k	-0.8 k	0.6 k	7.3 k	7.33 k	698	1.00	2	2	2	870	0.80	
25.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	11.9 k	-1.4 k	1.0 k	12.9 k	12.92 k	698	1.00	2	2	2	870	0.80	
25.0-P.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	14.2 k	-1.7 k	1.2 k	15.4 k	15.36 k	698	1.00	2	2	2	870	0.80	
25.0-N.1	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	11.9 k	-1.4 k	1.0 k	12.9 k	12.92 k	698	1.00	2	2	2	870	0.80	
24.2-U.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	19.0 k	-2.3 k	1.6 k	20.6 k	20.58 k	698	1.00	2	2	2	870	0.80	
22.6-B.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	2.6 k	-0.3 k	0.2 k	2.8 k	2.77 k	693	0.86	2	2	2	752	0.92	
22.1-E.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	15.8 k	-1.6 k	1.1 k	16.9 k	16.90 k	690	1.00	2	2	2	870	0.79	
21.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	-0.5 k	0.3 k	5.8 k	5.81 k	683	1.00	2	2	2	870	0.79	
21.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	21.0 k	-1.8 k	1.2 k	22.2 k	22.17 k	682	1.00	2	2	2	870	0.78	
20.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	15.8 k	-1.1 k	0.8 k	16.6 k	16.58 k	677	1.00	2	2	2	870	0.78	
19.5-E.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	-0.3 k	0.2 k	5.7 k	5.70 k	670	1.00	2	2	2	870	0.77	
18.8-E.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	-0.7 k	0.5 k	16.6 k	16.60 k	664	1.00	3	2	2	870	0.76	
18.2-U.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	15.8 k	-0.7 k	0.5 k	16.3 k	16.26 k	664	1.00	3	2	2	870	0.76	
17.2-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	4.5 k	0.0 k	0.0 k	4.5 k	4.54 k	648	1.00	3	2	2	870	0.75	
17.3-E.3	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	-0.2 k	0.1 k	16.3 k	16.26 k	650	1.00	3	2	2	870	0.75	
17.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	21.0 k	0.0 k	0.0 k	21.0 k	20.99 k	646	1.00	3	2	2	870	0.74	
15.8-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	14.8 k	0.1 k	-0.1 k	14.9 k	14.95 k	650	1.00	3	2	2	870	0.75	
15.2-E.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	13.5 k	0.1 k	-0.1 k	13.7 k	13.67 k	651	1.00	3	2	2	870	0.75	
15.2-C.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	19.0 k	0.2 k	-0.1 k	19.2 k	19.20 k	651	1.00	3	2	2	870	0.75	
15.2-A.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	0.1 k	0.0 k	7.5 k	7.48 k	651	1.00	3	2	2	870	0.75	
13.8-C.7	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	19.0 k	0.3 k	-0.2 k	19.3 k	19.34 k	656	1.00	3	2	2	870	0.75	
13.8-A.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	0.1 k	-0.1 k	7.5 k	7.54 k	656	1.00	3	2	2	870	0.75	
13.8-E.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	14.2 k	0.2 k	-0.2 k	14.4 k	14.43 k	656	1.00	3	2	2	870	0.75	
13.2-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	15.2 k	0.3 k	-0.2 k	15.4 k	15.43 k	657	1.00	3	2	2	870	0.75	
12.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	15.8 k	0.5 k	-0.3 k	16.3 k	16.27 k	664	1.00	3	2	2	870	0.76	
11.8-E.3	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	0.6 k	-0.4 k	16.7 k	16.72 k	669	1.00	2	2	2	870	0.77	
11.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	21.0 k	1.2 k	-0.8 k	22.2 k	22.18 k	683	1.00	2	2	2	870	0.78	
10.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	1.1 k	-0.8 k	17.2 k	17.23 k	689	1.00	2	2	2	870	0.79	
9.5-S.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	0.4 k	-0.3 k	5.9 k	5.88 k	692	1.00	2	2	2	870	0.80	
9.2-E.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	0.5 k	-0.3 k	5.9 k	5.94 k	699	1.00	2	2	2	870	0.80	
9.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	15.8 k	1.4 k	-0.9 k	17.2 k	17.17 k	701	1.00	2	2	2	870	0.81	
7.9-E.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	15.8 k	1.5 k	-1.0 k	17.3 k	17.33 k	707	1.00	2	2	2	870	0.81	
7.3-E.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	0.5 k	-0.4 k	6.0 k	6.03 k	710	1.00	2	2	2	870	0.82	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

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STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

8.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	0.6 k	-0.4 k	6.1 k	6.09 k	716	1.00	2	2	870	0.82
7.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	21.0 k	2.4 k	-1.7 k	23.4 k	23.38 k	719	1.00	2	2	870	0.83
6.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	2.0 k	-1.4 k	18.2 k	18.15 k	726	1.00	2	2	870	0.83
5.6-B.5	0.0 k	0.0 k	0.0 k	0.0 k	2.9 k	0.4 k	-0.3 k	3.3 k	3.29 k	731	0.97	2	2	846	0.86
5.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	0.5 k	-0.3 k	4.0 k	4.04 k	735	1.00	2	2	870	0.84
4.9-D.9	0.0 k	0.0 k	0.0 k	0.0 k	5.2 k	0.8 k	-0.5 k	5.9 k	5.91 k	739	1.00	2	2	870	0.85
4.8-B.5	0.0 k	0.0 k	0.0 k	0.0 k	4.2 k	0.7 k	-0.5 k	4.9 k	4.90 k	754	1.00	2	2	870	0.87
4.6-E.3	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	2.5 k	-1.7 k	18.7 k	18.66 k	746	1.00	2	2	870	0.86
4.0-PLA.6	0.0 k	0.0 k	0.0 k	0.0 k	13.2 k	2.3 k	-1.6 k	15.6 k	15.57 k	759	1.00	2	2	870	0.87
4.0-K.5	0.0 k	0.0 k	0.0 k	0.0 k	22.3 k	3.9 k	-2.7 k	26.2 k	26.20 k	759	1.00	2	2	870	0.87
4.0-E.2	0.0 k	0.0 k	0.0 k	0.0 k	13.9 k	2.5 k	-1.7 k	16.3 k	16.33 k	759	1.00	2	2	870	0.87
4.0-C.9	0.0 k	0.0 k	0.0 k	0.0 k	15.2 k	2.7 k	-1.8 k	17.8 k	17.85 k	759	1.00	2	2	870	0.87
1.7-U.2	0.0 k	0.0 k	0.0 k	0.0 k	20.0 k	3.7 k	-2.6 k	23.7 k	23.75 k	766	1.00	2	2	870	0.88
1.0-C.3	0.0 k	0.0 k	0.0 k	0.0 k	5.8 k	1.1 k	-0.7 k	6.9 k	6.90 k	767	1.00	2	2	870	0.88
1.0-E.9	0.0 k	0.0 k	0.0 k	0.0 k	4.2 k	0.8 k	-0.5 k	5.0 k	4.98 k	767	1.00	2	2	870	0.88
1.0-N.9	0.0 k	0.0 k	0.0 k	0.0 k	16.1 k	3.0 k	-2.1 k	19.2 k	19.17 k	767	1.00	2	2	870	0.88
1.0-P.8	0.0 k	0.0 k	0.0 k	0.0 k	12.3 k	2.3 k	-1.6 k	14.6 k	14.57 k	767	1.00	2	2	870	0.88
1.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	4.5 k	0.9 k	-0.6 k	5.4 k	5.37 k	767	1.00	2	2	870	0.88
1.0-L.0	0.0 k	0.0 k	0.0 k	0.0 k	12.9 k	2.4 k	-1.7 k	15.3 k	15.34 k	767	1.00	2	2	870	0.88
0.5-PLA.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2	#DIV/0!	#DIV/0!
0.3-U.4	0.0 k	0.0 k	0.0 k	0.0 k	3.9 k	0.9 k	-0.6 k	4.7 k	4.73 k	788	1.00	2	4 E.S.	1020	0.77
0.1-U.3	0.0 k	0.0 k	0.0 k	0.0 k	2.9 k	0.7 k	-0.5 k	3.6 k	3.57 k	794	0.97	2	4 E.S.	991	0.80
0.1-R.0	0.0 k	0.0 k	0.0 k	0.0 k	2.9 k	0.7 k	-0.5 k	3.6 k	3.57 k	794	0.97	2	4 E.S.	991	0.80

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

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STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

0.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	2.6 k	0.6 k	-0.4 k	3.2 k	3.18 k	795	1.00	2	4 E.S.	1020	0.78
0.0-K.5	0.0 k	0.0 k	0.0 k	0.0 k	2.6 k	0.6 k	-0.4 k	3.2 k	3.18 k	795	1.00	2	4 E.S.	1020	0.78
0.0-P.7	0.0 k	0.0 k	0.0 k	0.0 k	2.6 k	0.6 k	-0.4 k	3.2 k	3.18 k	795	1.00	2	4 E.S.	1020	0.78
0.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	2.6 k	0.6 k	-0.4 k	3.2 k	3.18 k	795	1.00	2	4 E.S.	1020	0.78
4.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4 E.S.	#DIV/0!	#DIV/0!
4.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	4 E.S.	#DIV/0!	#DIV/0!
U.4-29.0	4.1 k	-0.2 k	0.7 k	4.8 k	0.0 k	0.0 k	0.0 k	0.0 k	4.81 k	802	1.00	2	4 E.S.	1020	0.79
U.4-19.9	4.8 k	-0.2 k	0.9 k	5.6 k	0.0 k	0.0 k	0.0 k	0.0 k	5.62 k	802	1.00	2	4 E.S.	1020	0.79
U.4-17.4	4.1 k	-0.2 k	0.7 k	4.8 k	0.0 k	0.0 k	0.0 k	0.0 k	4.81 k	802	1.00	2	4 E.S.	1020	0.79
U.4-11.0	5.1 k	-0.2 k	0.9 k	6.0 k	0.0 k	0.0 k	0.0 k	0.0 k	6.02 k	802	1.00	2	4 E.S.	1020	0.79
U.4-4.0	3.7 k	-0.2 k	0.7 k	4.4 k	0.0 k	0.0 k	0.0 k	0.0 k	4.41 k	801	1.00	2	4 E.S.	1020	0.79
U.3-29.0	5.4 k	-0.2 k	0.9 k	6.3 k	0.0 k	0.0 k	0.0 k	0.0 k	6.35 k	793	1.00	2	4 E.S.	1020	0.78
U.0-4.0	12.2 k	-0.4 k	1.7 k	14.0 k	0.0 k	0.0 k	0.0 k	0.0 k	13.96 k	775	1.00	2	4 E.S.	1020	0.76
U.0-9.0	17.7 k	-0.6 k	2.5 k	20.2 k	0.0 k	0.0 k	0.0 k	0.0 k	20.16 k	775	1.00	2	4 E.S.	1020	0.76
U.0-12.0	17.7 k	-0.6 k	2.5 k	20.2 k	0.0 k	0.0 k	0.0 k	0.0 k	20.16 k	775	1.00	2	4 E.S.	1020	0.76
U.0-11.0	8.5 k	-0.3 k	1.2 k	9.7 k	0.0 k	0.0 k	0.0 k	0.0 k	9.69 k	775	1.00	2	4 E.S.	1020	0.76
U.0-20.1	12.2 k	-0.4 k	1.7 k	14.0 k	0.0 k	0.0 k	0.0 k	0.0 k	13.96 k	775	1.00	2	4 E.S.	1020	0.76
U.0-18.1	17.7 k	-0.6 k	2.5 k	20.2 k	0.0 k	0.0 k	0.0 k	0.0 k	20.16 k	775	1.00	2	4 E.S.	1020	0.76
U.0-17.2	16.6 k	-0.6 k	2.4 k	19.0 k	0.0 k	0.0 k	0.0 k	0.0 k	18.99 k	775	1.00	2	4 E.S.	1020	0.76
U.0-7.2	3.7 k	-0.1 k	0.5 k	4.3 k	0.0 k	0.0 k	0.0 k	0.0 k	4.26 k	775	1.00	2	4 E.S.	1020	0.76
T.0-29.5	20.0 k	-0.7 k	2.8 k	22.8 k	0.0 k	0.0 k	0.0 k	0.0 k	22.80 k	773	1.00	2	4 E.S.	1020	0.76
S.2-1.5	8.8 k	-0.3 k	1.2 k	10.0 k	0.0 k	0.0 k	0.0 k	0.0 k	10.05 k	773	1.00	2	4 E.S.	1020	0.76
S.2-25.2	8.8 k	-0.3 k	1.2 k	10.0 k	0.0 k	0.0 k	0.0 k	0.0 k	10.05 k	773	1.00	2	4 E.S.	1020	0.76
R.1-4.0	14.6 k	-0.5 k	1.9 k	16.5 k	0.0 k	0.0 k	0.0 k	0.0 k	16.55 k	770	1.00	2	4 E.S.	1020	0.75
Q.0-28.4	6.5 k	-0.2 k	0.8 k	7.3 k	0.0 k	0.0 k	0.0 k	0.0 k	7.30 k	768	1.00	2	2	870	0.88
Q.0-25.7	14.3 k	-0.4 k	1.9 k	16.1 k	0.0 k	0.0 k	0.0 k	0.0 k	16.14 k	768	1.00	2	2	870	0.88
P.8-29.0	8.2 k	-0.2 k	1.0 k	9.2 k	0.0 k	0.0 k	0.0 k	0.0 k	9.15 k	763	1.00	2	2	870	0.88
P.3-4.0	5.8 k	-0.1 k	0.6 k	6.4 k	0.0 k	0.0 k	0.0 k	0.0 k	6.37 k	750	1.00	2	2	870	0.86
P.0-4.0	20.0 k	-0.4 k	1.8 k	21.9 k	0.0 k	0.0 k	0.0 k	0.0 k	21.85 k	741	1.00	2	2	870	0.85
N.0-25.5	16.6 k	-0.3 k	1.3 k	18.0 k	0.0 k	0.0 k	0.0 k	0.0 k	17.98 k	734	1.00	2	2	870	0.84
M.0-4.0	22.8 k	-0.3 k	1.4 k	24.2 k	0.0 k	0.0 k	0.0 k	0.0 k	24.18 k	722	1.00	2	2	870	0.83
L.1-25.5	16.3 k	-0.2 k	0.9 k	17.3 k	0.0 k	0.0 k	0.0 k	0.0 k	17.25 k	719	1.00	2	2	870	0.83
K.0-25.5	16.6 k	-0.1 k	0.6 k	17.2 k	0.0 k	0.0 k	0.0 k	0.0 k	17.23 k	703	1.00	2	2	870	0.81
J.6-4.0	5.8 k	0.0 k	0.2 k	6.0 k	0.0 k	0.0 k	0.0 k	0.0 k	5.96 k	702	1.00	2	2	870	0.81
H.6-25.7	17.0 k	0.0 k	0.1 k	17.1 k	0.0 k	0.0 k	0.0 k	0.0 k	17.06 k	682	1.00	2	2	870	0.78
H.1-29.0	7.5 k	0.0 k	-0.1 k	7.5 k	0.0 k	0.0 k	0.0 k	0.0 k	7.49 k	681	1.00	2	2	870	0.78
H.0-28.4	6.5 k	0.0 k	-0.1 k	6.5 k	0.0 k	0.0 k	0.0 k	0.0 k	6.48 k	682	1.00	2	2	870	0.78
H.0-25.7	14.3 k	0.1 k	-0.2 k	14.3 k	0.0 k	0.0 k	0.0 k	0.0 k	14.32 k	682	1.00	2	2	870	0.78
F.6-8.0	17.7 k	0.1 k	-0.4 k	17.8 k	0.0 k	0.0 k	0.0 k	0.0 k	17.76 k	683	1.00	2	2	870	0.78
F.6-25.3	14.3 k	0.1 k	-0.3 k	14.3 k	0.0 k	0.0 k	0.0 k	0.0 k	14.34 k	683	1.00	2	2	870	0.78
F.6-22.1	10.9 k	0.1 k	-0.2 k	10.9 k	0.0 k	0.0 k	0.0 k	0.0 k	10.93 k	683	1.00	2	2	870	0.78
F.6-20.0	17.7 k	0.1 k	-0.4 k	17.8 k	0.0 k	0.0 k	0.0 k	0.0 k	17.76 k	683	1.00	2	2	870	0.78
F.6-18.0	10.9 k	0.1 k	-0.2 k	10.9 k	0.0 k	0.0 k	0.0 k	0.0 k	10.93 k	683	1.00	2	2	870	0.78
F.6-17.3	14.3 k	0.1 k	-0.3 k	14.3 k	0.0 k	0.0 k	0.0 k	0.0 k	14.34 k	683	1.00	2	2	870	0.78
F.6-11.9	19.4 k	0.1 k	-0.4 k	19.5 k	0.0 k	0.0 k	0.0 k	0.0 k	19.46 k	683	1.00	2	2	870	0.78
F.6-10.2	10.9 k	0.1 k	-0.2 k	10.9 k	0.0 k	0.0 k	0.0 k	0.0 k	10.93 k	683	1.00	2	2	870	0.78
F.6-5.9	10.9 k	0.1 k	-0.2 k	10.9 k	0.0 k	0.0 k	0.0 k	0.0 k	10.93 k	683	1.00	2	2	870	0.78
F.6-4.5	19.7 k	0.1 k	-0.4 k	19.8 k	0.0 k	0.0 k	0.0 k	0.0 k	19.80 k	683	1.00	2	2	870	0.78
F.5-4.0	22.4 k	0.1 k	-0.5 k	22.5 k	0.0 k	0.0 k	0.0 k	0.0 k	22.54 k	683	1.00	2	2	870	0.78
E.9-29.0	16.6 k	0.1 k	-0.4 k	16.7 k	0.0 k	0.0 k	0.0 k	0.0 k	16.74 k	683	1.00	2	2	870	0.79
E.7-4.1	4.8 k	0.0 k	-0.2 k	4.8 k	0.0 k	0.0 k	0.0 k	0.0 k	4.79 k	684	1.00	2	2	870	0.79
E.4-29.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2	#DIV/0!	#DIV/0!
D.8-29.0	6.5 k	0.1 k	-0.4 k	6.5 k	0.0 k	0.0 k	0.0 k	0.0 k	6.54 k	688	1.00	2	2	870	0.79
D.6-4.6	3.7 k	0.1 k	-0.2 k	3.8 k	0.0 k	0.0 k	0.0 k	0.0 k	3.79 k	689	1.00	2	2	870	0.79
D.2-29.0	20.4 k	0.3 k	-1.4 k	20.7 k	0.0 k	0.0 k	0.0 k	0.0 k	20.71 k	690	1.00	2	2	870	0.79
D.0-17.2	17.0 k	0.3 k	-1.2 k	17.3 k	0.0 k	0.0 k	0.0 k	0.0 k	17.28 k	691	1.00	2	2	870	0.79
D.0-11.9	17.0 k	0.3 k	-1.2 k	17.3 k	0.0 k	0.0 k	0.0 k	0.0 k	17.28 k	691	1.00	2	2	870	0.79
D.0-4.5	17.0 k	0.3 k	-1.2 k	17.3 k	0.0 k	0.0 k	0.0 k	0.0 k	17.28 k	691	1.00	2	2	870	0.79
D.0-25.5	17.3 k	0.3 k	-1.3 k	17.6 k	0.0 k	0.0 k	0.0 k	0.0 k	17.62 k	691	1.00	2	2	870	0.79
C.1-29.0	18.3 k	0.4 k	-1.7 k	18.7 k	0.0 k	0.0 k	0.0 k	0.0 k	18.74 k	694	1.00	2	2	870	0.80
C.0-4.0	11.9 k	0.3 k	-1.1 k	12.2 k	0.0 k	0.0 k	0.0 k	0.0 k	12.15 k	695	1.00	2	2	870	0.80
B.2-29.0	18.3 k	0.4 k	-1.9 k	18.8 k	0.0 k	0.0 k	0.0 k	0.0 k	18.79 k	696	1.00	2	2	870	0.80

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

B.2-17.6	5.8 k	0.1 k	-0.6 k	5.9 k	0.0 k	0.0 k	0.0 k	0.0 k	5.92 k	696	1.00	2	2	870	0.80
B.2-11.4	5.8 k	0.1 k	-0.6 k	5.9 k	0.0 k	0.0 k	0.0 k	0.0 k	5.92 k	696	1.00	2	2	870	0.80
B.2-4.9	5.8 k	0.1 k	-0.6 k	5.9 k	0.0 k	0.0 k	0.0 k	0.0 k	5.92 k	696	1.00	2	2	870	0.80
B.2-25.0	5.8 k	0.1 k	-0.6 k	5.9 k	0.0 k	0.0 k	0.0 k	0.0 k	5.92 k	696	1.00	2	2	870	0.80
B.0-4.0	11.9 k	0.3 k	-1.2 k	12.2 k	0.0 k	0.0 k	0.0 k	0.0 k	12.18 k	696	1.00	2	2	870	0.80
A.0-11.8	19.0 k	0.5 k	-2.2 k	19.5 k	0.0 k	0.0 k	0.0 k	0.0 k	19.54 k	698	1.00	2	2	870	0.80
A.0-17.3	19.0 k	0.5 k	-2.2 k	19.5 k	0.0 k	0.0 k	0.0 k	0.0 k	19.54 k	698	1.00	2	2	870	0.80
A.0-4.7	25.1 k	0.7 k	-2.9 k	25.8 k	0.0 k	0.0 k	0.0 k	0.0 k	25.83 k	698	1.00	2	2	870	0.80
A.0-25.2	21.7 k	0.6 k	-2.5 k	22.3 k	0.0 k	0.0 k	0.0 k	0.0 k	22.34 k	698	1.00	2	2	870	0.80
PL A.8-5.6	4.8 k	0.1 k	-0.6 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.90 k	700	1.00	2	2	870	0.80
PL A.7-29.0	6.1 k	0.2 k	-0.8 k	6.3 k	0.0 k	0.0 k	0.0 k	0.0 k	6.31 k	701	1.00	2	2	870	0.81
PL A.5-17.9	4.8 k	0.2 k	-0.7 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.91 k	702	1.00	2	2	870	0.81
PL A.5-10.5	4.8 k	0.2 k	-0.7 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.91 k	702	1.00	2	2	870	0.81
PL A.5-5.6	4.8 k	0.2 k	-0.7 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.91 k	702	1.00	2	2	870	0.81
PL A.5-22.5	4.8 k	0.2 k	-0.7 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.91 k	702	1.00	2	2	870	0.81
PL A.2-4.0	6.8 k	0.3 k	-1.1 k	7.0 k	0.0 k	0.0 k	0.0 k	0.0 k	7.04 k	704	1.00	2	2	870	0.81
PL A.2-5.0	6.8 k	0.3 k	-1.1 k	7.0 k	0.0 k	0.0 k	0.0 k	0.0 k	7.04 k	704	1.00	2	2	870	0.81
PL A.2-11.7	7.5 k	0.3 k	-1.2 k	7.7 k	0.0 k	0.0 k	0.0 k	0.0 k	7.75 k	704	1.00	2	2	870	0.81
PL A.2-10.7	7.5 k	0.3 k	-1.2 k	7.7 k	0.0 k	0.0 k	0.0 k	0.0 k	7.75 k	704	1.00	2	2	870	0.81
0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2	#DIV/0!	#DIV/0!
S	879.7 k	0.2 k	-0.7 k	926.5 k	883.8 k	0.0 k	0.0 k	966.8 k	1893.4 k						

Check for Torsional Irregularity

	Building	Max Defl.					
		Line	ΔX+	ΔX-	ΔY+	ΔY-	Ratio
E/W	PL A.2-10.7		0.704	0.573			1.0 < 1.2 OK
	K.0-25.5		0.674	0.703			1.1 < 1.2 OK
N/S	29.0-H.5				0.508	0.739	1.1 < 1.2 OK
	10.0-E.5				0.689	0.615	1.2 < 1.2 OK
	Average		0.689	0.638	0.598	0.677	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.****Tiedown Calculations - 4th Floor Framing Level.**

Typ Flr Ht = 10.25'

Typ Plate Ht = 9.26'

Building Line	Element Length (ft)	Element Shear (kip)	Wall Thk (4x6x)	Height (ft)	Moment (k-ft)	D. L. w (k/ft)	Uplift Above (kip)	Incr. Uplift (kip)	Total Uplift (kip)	Current TD Level	Tiedown Capacity		Demand to Capacity	TD End Post Area (sq.in)	TD Δ _a @ load in (LRFD)
											Incr. (kip)	Total (kip)			
29.0-H.5	4.00	2.956	6x	10.25	30	0.00	4.56	10.10	14.66	3	14.46	22.78	0.70	36.45	0.180
29.0-P.7	11.50	8.496	6x	10.25	87	0.00	3.75	8.29	12.04	3	12.27	22.78	0.68	36.45	0.148
29.0-U.3	8.00	5.899	6x	10.25	60	0.00	3.90	8.64	12.54	3	12.27	22.78	0.70	36.45	0.154
29.0-A.9	5.00	3.674	6x	10.25	38	0.00	4.25	9.41	13.66	3	12.27	22.78	0.77	36.45	0.168
29.0-PL A.7	5.50	4.041	6x	10.25	41	0.00	4.16	9.20	13.36	3	12.27	22.78	0.75	36.45	0.164
29.0-P.1	6.50	4.757	6x	10.25	49	0.00	4.00	8.86	12.86	3	12.27	22.78	0.72	36.45	0.158
29.0-J.0	6.50	4.757	6x	10.25	49	0.00	4.00	8.86	12.86	3	12.27	22.78	0.72	36.45	0.158
29.0-H.4	18.00	12.981	6x	10.25	133	0.00	3.52	7.83	11.35	3	12.27	22.78	0.64	36.45	0.140
29.0-H.4	18.00														
29.0-P.6	18.50	13.342	6x	10.25	137	0.00	3.52	7.81	11.33	3	12.27	22.78	0.64	36.45	0.139
29.0-P.6	18.50														
27.9-U.2	19.00	13.613	6x	10.25	140	0.00	3.48	7.75	11.24	3	12.27	22.78	0.63	36.45	0.138
27.9-U.2	19.00														
27.1-E.0	37.00	26.471	6x	10.25	271	0.00	3.39	7.54	10.92	3	12.27	22.78	0.61	36.45	0.134
27.1-H.5	5.50	3.935	6x	10.25	40	0.00	4.03	8.96	12.99	3	12.27	22.78	0.73	36.45	0.160
27.1-P.5	5.50	3.935	6x	10.25	40	0.00	4.03	8.96	12.99	3	12.27	22.78	0.73	36.45	0.160
27.1-C.4	8.00	5.723	6x	10.25	59	0.00	3.77	8.38	12.15	3	12.27	22.78	0.68	36.45	0.149
27.1-A.8	8.50	6.081	6x	10.25	62	0.00	3.74	8.31	12.05	3	12.27	22.78	0.68	36.45	0.148
27.1-PL A.7	18.00	12.878	6x	10.25	132	0.00	3.49	7.76	11.25	3	12.27	22.78	0.63	36.45	0.138
26.0-E.2	21.00	14.956	6x	10.25	153	0.00	3.44	7.66	11.11	3	12.27	22.78	0.62	36.45	0.137
26.0-C.9	23.50	16.736	6x	10.25	172	0.00	3.42	7.62	11.05	3	12.27	22.78	0.62	36.45	0.136
26.0-B.5	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	3	12.27	22.78	#DIV/0!	36.45	#DIV/0!
26.0-PL A.6	21.00	14.956	6x	10.25	153	0.00	3.44	7.66	11.11	3	12.27	22.78	0.62	36.45	0.137
26.0-PL A.6	21.00														
25.6-P.5	25.00	17.682	6x	10.25	181	0.00	3.39	7.55	10.94	3	12.27	22.78	0.62	36.45	0.134
25.4-U.3	8.50	5.980	6x	10.25	61	0.00	3.66	8.17	11.83	3	12.27	22.78	0.67	36.45	0.145
25.3-E.3	25.00	17.578	6x	10.25	180	0.00	3.36	7.51	10.87	3	12.27	22.78	0.61	36.45	0.134
25.0-H.5	28.50	19.904	6x	10.25	204	0.00	3.32	7.42	10.74	3	12.27	22.78	0.60	36.45	0.132
25.0-L.0	10.50	7.333	6x	10.25	75	0.00	3.54	7.91	11.45	3	12.27	22.78	0.64	36.45	0.141
25.0-K.0	18.50	12.920	6x	10.25	132	0.00	3.39	7.57	10.95	3	12.27	22.78	0.62	36.45	0.135
25.0-P.5	22.00	15.364	6x	10.25	157	0.00	3.36	7.50	10.86	3	12.27	22.78	0.61	36.45	0.133
25.0-N.1	18.50	12.920	6x	10.25	132	0.00	3.39	7.57	10.95	3	12.27	22.78	0.62	36.45	0.135
24.2-U.2	29.50	20.583	6x	10.25	211	0.00	3.31	7.40	10.71	3	12.27	22.78	0.60	36.45	0.132
24.2-U.2	29.50														
22.6-B.2	4.00	2.771	6x	10.25	28	0.00	4.23	9.47	13.70	3	14.46	22.78	0.65	36.45	0.168
22.1-E.4	24.50	16.896	6x	10.25	173	0.00	3.29	7.37	10.66	3	12.27	22.78	0.60	36.45	0.131
22.1-E.4	24.50														
21.0-E.4	8.50	5.807	6x	10.25	60	0.00	3.54	7.94	11.47	3	14.46	22.78	0.55	36.45	0.141
21.0-U.2	32.50	22.175	6x	10.25	227	0.00	3.21	7.22	10.43	3	10.51	18.98	0.69	30.37	0.154
20.0-E.4	24.50	16.576	6x	10.25	170	0.00	3.22	7.23	10.45	3	10.51	18.98	0.69	30.37	0.154
20.0-E.4	24.50														
19.5-E.5	8.50	5.699	6x	10.25	58	0.00	3.46	7.79	11.25	3	10.51	18.98	0.74	30.37	0.166
18.8-E.5	25.00	16.600	6x	10.25	170	0.00	3.14	7.09	10.23	3	10.51	18.98	0.67	30.37	0.151
18.8-E.5	25.00														
18.2-U.2	24.50	16.257	6x	10.25	167	0.00	3.14	7.09	10.23	3	12.27	22.78	0.58	36.45	0.126
17.2-PL A.7	7.00	4.537	6x	10.25	47	0.00	3.42	7.75	11.17	3	12.27	22.78	0.63	36.45	0.137
17.3-E.3	25.00	16.257	6x	10.25	167	0.00	3.07	6.94	10.01	3	12.27	22.78	0.57	36.45	0.123
17.0-U.2	32.50	20.990	6x	10.25	215	0.00	3.02	6.83	9.85	3	12.27	22.78	0.56	36.45	0.121
17.0-U.2	32.50														
15.8-PL A.6	23.00	14.946	6x	10.25	153	0.00	3.08	6.96	10.04	3	12.27	22.78	0.57	36.45	0.123
15.2-E.2	21.00	13.666	6x	10.25	140	0.00	3.10	7.00	10.10	3	12.27	22.78	0.57	36.45	0.124
15.2-C.7	29.50	19.197	6x	10.25	197	0.00	3.05	6.90	9.96	3	12.27	22.78	0.56	36.45	0.122
15.2-A.6	11.50	7.484	6x	10.25	77	0.00	3.23	7.31	10.54	3	12.27	22.78	0.60	36.45	0.130
13.8-C.7	29.50	19.344	6x	10.25	198	0.00	3.08	6.96	10.03	3	12.27	22.78	0.57	36.45	0.123

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

13.8-A.6	11.50	7.541	6x	10.25	77	0.00	3.25	7.36	10.62	3	12.27	22.78	0.60	36.45	0.130
13.8-E.2	22.00	14.426	6x	10.25	148	0.00	3.11	7.04	10.15	3	12.27	22.78	0.57	36.45	0.125
13.2-PL A.6	23.50	15.433	6x	10.25	158	0.00	3.11	7.03	10.14	3	12.27	22.78	0.57	36.45	0.125
12.0-U.2	24.50	16.274	6x	10.25	167	0.00	3.13	7.10	10.23	3	12.27	22.78	0.58	36.45	0.126
12.0-U.2	24.50														
11.8-E.3	25.00	16.725	6x	10.25	171	0.00	3.15	7.14	10.30	3	12.27	22.78	0.58	36.45	0.127
11.8-E.3	25.00														
11.0-U.2	32.50	22.185	6x	10.25	227	0.00	3.18	7.22	10.40	3	12.27	22.78	0.59	36.45	0.128
11.0-U.2	32.50														
10.0-E.5	25.00	17.225	6x	10.25	177	0.00	3.24	7.36	10.59	3	12.27	22.78	0.60	36.45	0.130
10.0-E.5	25.00														
9.5-S.5	8.50	5.883	6x	10.25	60	0.00	3.54	8.04	11.58	3	12.27	22.78	0.66	36.45	0.142
9.2-E.5	8.50	5.940	6x	10.25	61	0.00	3.57	8.12	11.69	3	12.27	22.78	0.66	36.45	0.144
9.0-U.2	24.50	17.174	6x	10.25	176	0.00	3.29	7.49	10.78	3	12.27	22.78	0.61	36.45	0.133
9.0-U.2	24.50														
7.9-E.4	24.50	17.329	6x	10.25	178	0.00	3.32	7.56	10.88	3	12.27	22.78	0.62	36.45	0.134
7.9-E.4	24.50														
7.3-E.0	8.50	6.032	6x	10.25	62	0.00	3.62	8.24	11.86	3	12.27	22.78	0.67	36.45	0.146
8.0-E.4	8.50	6.089	6x	10.25	62	0.00	3.65	8.32	11.97	3	12.27	22.78	0.68	36.45	0.147
7.0-U.2	32.50	23.379	6x	10.25	240	0.00	3.34	7.61	10.94	3	12.27	22.78	0.62	36.45	0.135
7.0-U.2	32.50														
6.0-E.5	25.00	18.153	6x	10.25	186	0.00	3.40	7.75	11.15	3	12.27	22.78	0.63	36.45	0.137
6.0-E.5	25.00														
5.6-B.5	4.50	3.289	6x	10.25	34	0.00	4.22	9.63	13.85	3	14.46	22.78	0.67	36.45	0.170
5.0-E.5	5.50	4.042	6x	10.25	41	0.00	4.03	9.21	13.24	3	12.27	22.78	0.75	36.45	0.163
4.9-D.9	8.00	5.913	6x	10.25	61	0.00	3.79	8.66	12.45	3	12.27	22.78	0.71	36.45	0.153
4.8-B.5	6.50	4.900	6x	10.25	50	0.00	3.99	9.13	13.12	3	12.27	22.78	0.74	36.45	0.161
4.6-E.3	25.00	18.660	6x	10.25	191	0.00	3.48	7.97	11.45	3	12.27	22.78	0.65	36.45	0.141
4.0-PL A.6	20.50	15.567	6x	10.25	160	0.00	0.00	8.18	8.18	3	12.27	12.27	0.67	19.63	0.187
4.0-K.5	34.50	26.199	6x	10.25	269	0.00	3.50	8.02	11.52	3	12.27	22.78	0.65	36.45	0.142
4.0-E.2	21.50	16.328	6x	10.25	167	0.00	3.56	8.16	11.73	3	12.27	22.78	0.67	36.45	0.144
4.0-C.9	23.50	17.847	6x	10.25	183	0.00	3.55	8.13	11.68	3	12.27	22.78	0.66	36.45	0.144
1.7-U.2	31.00	23.745	6x	10.25	243	0.00	3.54	8.11	11.65	3	12.27	22.78	0.66	36.45	0.143
1.7-U.2	31.00														
1.0-C.3	9.00	6.900	6x	10.25	71	0.00	3.86	8.84	12.70	3	12.27	22.78	0.72	36.45	0.156
1.0-E.9	6.50	4.984	6x	10.25	51	0.00	4.05	9.29	13.34	3	12.27	22.78	0.76	36.45	0.164
1.0-N.9	25.00	19.170	6x	10.25	196	0.00	3.57	8.19	11.76	3	12.27	22.78	0.67	36.45	0.145
1.0-P.8	19.00	14.569	6x	10.25	149	0.00	3.62	8.30	11.91	3	12.27	22.78	0.68	36.45	0.146
1.0-K.0	7.00	5.368	6x	10.25	55	0.00	4.00	9.17	13.17	3	12.27	22.78	0.75	36.45	0.162
1.0-L.0	20.00	15.336	6x	10.25	157	0.00	3.61	8.27	11.88	3	12.27	22.78	0.67	36.45	0.146
0.5-PL A.6															
0.3-U.4	6.00	4.727	6x	10.25	48	0.00	4.22	9.69	13.91	3	12.27	22.78	0.79	36.45	0.171
0.1-U.3	4.50	3.572	6x	10.25	37	0.00	4.55	10.46	15.01	3	14.46	22.78	0.72	36.45	0.184
0.1-R.0	4.50	3.572	6x	10.25	37	0.00	4.55	10.46	15.01	3	14.46	22.78	0.72	36.45	0.184
0.0-K.0	4.00	3.181	6x	10.25	33	0.00	4.73	10.87	15.59	3	14.46	22.78	0.75	36.45	0.192
0.0-K.5	4.00	3.181	6x	10.25	33	0.00	4.73	10.87	15.59	3	14.46	22.78	0.75	36.45	0.192
0.0-P.7	4.00	3.181	6x	10.25	33	0.00	4.73	10.87	15.59	3	14.46	22.78	0.75	36.45	0.192
0.0-P.4	4.00	3.181	6x	10.25	33	0.00	4.73	10.87	15.59	3	14.46	22.78	0.75	36.45	0.192
4.0-P.4	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	3	12.27	22.78	#DIV/0!	36.45	#DIV/0!
4.0-P.4	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	3	12.27	22.78	#DIV/0!	36.45	#DIV/0!
U.4-29.0	6.00	4.815	6x	10.25	49	0.00	4.41	9.87	14.28	3	14.46	22.78	0.68	36.45	0.175
U.4-19.9	7.00	5.617	6x	10.25	58	0.00	4.28	9.60	13.88	3	12.27	22.78	0.78	36.45	0.171
U.4-17.4	6.00	4.815	6x	10.25	49	0.00	4.41	9.87	14.28	3	14.46	22.78	0.68	36.45	0.175
U.4-11.0	7.50	6.018	6x	10.25	62	0.00	4.24	9.49	13.73	3	12.27	22.78	0.77	36.45	0.169
U.4-4.0	5.50	4.407	6x	10.25	45	0.00	4.48	10.04	14.52	3	14.46	22.78	0.69	36.45	0.178
U.3-29.0	8.00	6.347	6x	10.25	65	0.00	4.15	9.29	13.44	3	12.27	22.78	0.76	36.45	0.165
U.0-4.0	18.00	13.957	6x	10.25	143	0.00	3.75	8.42	12.17	3	12.27	22.78	0.69	36.45	0.150
U.0-9.0	26.00	20.158	6x	10.25	207	0.00	3.69	8.26	11.95	3	12.27	22.78	0.67	36.45	0.147
U.0-12.0	26.00	20.157	6x	10.25	207	0.00	3.69	8.26	11.95	3	12.27	22.78	0.67	36.45	0.147
U.0-11.0	12.50	9.691	6x	10.25	99	0.00	3.85	8.64	12.49	3	12.27	22.78	0.70	36.45	0.154
U.0-20.1	18.00	13.955	6x	10.25	143	0.00	3.75	8.41	12.17	3	12.27	22.78	0.69	36.45	0.150
U.0-18.1	26.00	20.157	6x	10.25	207	0.00	3.69	8.26	11.95	3	12.27	22.78	0.67	36.45	0.147

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

A.0-17.3	28.00	19.544	6x	10.25	200	0.00	3.32	7.42	10.74	3	12.27	22.78	0.60	36.45	0.132
A.0-17.3	28.00														
A.0-4.7	37.00	25.829	6x	10.25	265	0.00	3.29	7.35	10.64	3	12.27	22.78	0.60	36.45	0.131
A.0-25.2	32.00	22.338	6x	10.25	229	0.00	3.30	7.39	10.69	3	12.27	22.78	0.60	36.45	0.131
PL A.8-5.6	7.00	4.901	6x	10.25	50	0.00	0.00	8.37	8.37	3	12.27	12.27	0.68	19.63	0.191
PL A.7-29.0	9.00	6.308	6x	10.25	65	0.00	3.62	8.08	11.70	3	12.27	22.78	0.66	36.45	0.144
PL A.5-17.9	7.00	4.913	6x	10.25	50	0.00	3.75	8.39	12.15	3	12.27	22.78	0.68	36.45	0.149
PL A.5-10.5	7.00	4.913	6x	10.25	50	0.00	3.75	8.39	12.15	3	12.27	22.78	0.68	36.45	0.149
PL A.5-5.6	7.00	4.913	6x	10.25	50	0.00	0.00	8.39	8.39	3	12.27	12.27	0.68	19.63	0.192
PL A.5-22.5	7.00	4.913	6x	10.25	50	0.00	3.75	8.39	12.15	3	12.27	22.78	0.68	36.45	0.149
PL A.2-4.0	10.00	7.044	6x	10.25	72	0.00	0.00	8.02	8.02	2	12.27	12.27	0.65	19.63	0.183
PL A.2-5.0	10.00	7.044	6x	10.25	72	0.00	0.00	8.02	8.02	2	12.27	12.27	0.65	19.63	0.183
PL A.2-11.7	11.00	7.749	6x	10.25	79	0.00	3.55	7.94	11.50	3	12.27	22.78	0.65	36.45	0.141
PL A.2-10.7	11.00	7.749	6x	10.25	79	0.00	3.55	7.94	11.50	3	12.27	22.78	0.65	36.45	0.141

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore**

Kattera

Lateral Analysis - 3rd Floor Framing Level.Area at base = 61196 ft²

Story Shear	Center of Mass	Diaphragm Dimensions	Accidental Eccentricity (5%)
Vx = 1217 k	Xm = -133.2'	X = 368.3'	x-dir. Eac. = 18.4' <--- E/W
Vy = 1217 k	Ym = 186.2'	Y = 281.5'	y-dir. Eac. = 14.1' <--- N/S

Building	Location		Angle	Length	Diaphragm Dimensions				Accidental Eccentricity (5%)				h/w
Line	X	Y	(degrees)	(ft)	Kx	Ky	Kx * Y	Ky * X	X Bar	Y Bar	Kx*y^2	Ky*x^2	ratio
29.0-H.5	-313.4'	193.1'	360.0'	4.0'	0.00	4.00	0	-1254	-178.7'	0.0'	0.0E+00	1.3E+05	2.32
29.0-P.7	-312.9'	94.1'	360.0'	11.5'	0.00	11.50	0	-3598	-178.2'	-99.0'	0.0E+00	3.7E+05	0.81
29.0-U.3	-310.5'	54.6'	180.0'	8.0'	0.00	8.00	0	-2484	-175.8'	-138.5'	0.0E+00	2.5E+05	1.16
29.0-A.9	-305.5'	282.8'	360.0'	5.0'	0.00	5.00	0	-1527	-170.8'	89.7'	0.0E+00	1.5E+05	1.85
29.0-PL A.7	-305.5'	303.1'	180.0'	5.5'	0.00	5.50	0	-1680	-170.8'	109.9'	0.0E+00	1.6E+05	1.68
29.0-P.1	-299.9'	114.8'	360.0'	6.5'	0.00	6.50	0	-1949	-165.2'	-78.3'	0.0E+00	1.8E+05	1.42
29.0-J.0	-299.9'	178.4'	360.0'	6.5'	0.00	6.50	0	-1949	-165.2'	-14.8'	0.0E+00	1.8E+05	1.42
29.0-H.4	-280.1'	194.1'	360.0'	18.0'	0.00	18.00	0	-5041	-145.4'	0.9'	0.0E+00	3.8E+05	0.51
29.0-P.6	-280.0'	97.8'	360.0'	18.5'	0.00	18.50	0	-5181	-145.4'	-95.3'	0.0E+00	3.9E+05	0.50
27.9-U.2	-271.3'	61.8'	360.0'	19.0'	0.00	19.00	0	-5155	-136.6'	-131.3'	0.0E+00	3.5E+05	0.49
27.1-E.0	-269.3'	236.2'	180.0'	37.0'	0.00	37.00	0	-9965	-134.7'	43.1'	0.0E+00	6.7E+05	0.25
27.1-H.5	-269.3'	236.2'	180.0'	5.5'	0.00	5.50	0	-1481	-134.7'	43.1'	0.0E+00	1.0E+05	1.68
27.1-P.5	-269.3'	236.2'	180.0'	5.5'	0.00	5.50	0	-1481	-134.7'	43.1'	0.0E+00	1.0E+05	1.68
27.1-C.4	-269.3'	265.8'	180.0'	8.0'	0.00	8.00	0	-2155	-134.7'	72.7'	0.0E+00	1.5E+05	1.16
27.1-A.8	-269.3'	284.2'	180.0'	8.5'	0.00	8.50	0	-2289	-134.7'	91.0'	0.0E+00	1.5E+05	1.09
27.1-PL A.7	-269.3'	305.4'	180.0'	18.0'	0.00	18.00	0	-4848	-134.7'	112.3'	0.0E+00	3.3E+05	0.51
26.0-E.2	-263.2'	231.0'	360.0'	21.0'	0.00	21.00	0	-5528	-128.6'	37.9'	0.0E+00	3.5E+05	0.44
26.0-C.9	-263.2'	257.4'	360.0'	23.5'	0.00	23.50	0	-6186	-128.6'	64.3'	0.0E+00	3.9E+05	0.39
26.0-B.5	-263.2'	277.0'	180.0'	0.0'	0.00	0.00	0	0	-128.6'	83.8'	0.0E+00	0.0E+00	#DIV/0!
26.0-PL A.6	-263.2'	309.2'	360.0'	21.0'	0.00	21.00	0	-5528	-128.6'	116.0'	0.0E+00	3.5E+05	0.44
25.6-P.5	-254.1'	101.6'	225.0'	25.0'	0.00	25.00	0	-6352	-119.4'	-91.6'	0.0E+00	3.6E+05	0.37
25.4-U.3	-247.1'	53.5'	360.0'	8.5'	0.00	8.50	0	-2100	-112.4'	-139.7'	0.0E+00	1.1E+05	1.09
25.3-E.3	-246.3'	229.5'	315.0'	25.0'	0.00	25.00	0	-6158	-111.6'	36.3'	0.0E+00	3.1E+05	0.37
25.0-H.5	-237.5'	192.5'	180.0'	28.5'	0.00	28.50	0	-6768	-102.8'	-0.6'	0.0E+00	3.0E+05	0.32
25.0-L.0	-237.4'	145.8'	360.0'	10.5'	0.00	10.50	0	-2493	-102.8'	-47.3'	0.0E+00	1.1E+05	0.88
25.0-K.0	-237.4'	164.8'	360.0'	18.5'	0.00	18.50	0	-4393	-102.8'	-28.4'	0.0E+00	2.0E+05	0.50
25.0-P.5	-237.4'	102.4'	180.0'	22.0'	0.00	22.00	0	-5224	-102.8'	-90.7'	0.0E+00	2.3E+05	0.42
25.0-N.1	-237.4'	127.0'	180.0'	18.5'	0.00	18.50	0	-4393	-102.8'	-66.2'	0.0E+00	2.0E+05	0.50
24.2-U.2	-236.2'	63.8'	180.0'	29.5'	0.00	29.50	0	-6968	-101.6'	-129.3'	0.0E+00	3.0E+05	0.31
22.6-B.2	-226.9'	280.3'	180.0'	4.0'	0.00	4.00	0	-908	-92.3'	87.2'	0.0E+00	3.4E+04	2.32
22.1-E.4	-221.1'	226.1'	180.0'	24.5'	0.00	24.50	0	-5417	-86.4'	32.9'	0.0E+00	1.8E+05	0.38
21.0-E.4	-209.1'	226.1'	180.0'	8.5'	0.00	8.50	0	-1777	-74.4'	32.9'	0.0E+00	4.7E+04	1.09
21.0-U.2	-207.4'	59.4'	180.0'	32.5'	0.00	32.50	0	-6739	-72.7'	-133.7'	0.0E+00	1.7E+05	0.28
20.0-E.4	-196.7'	227.6'	360.0'	24.5'	0.00	24.50	0	-4818	-62.0'	34.4'	0.0E+00	9.4E+04	0.38
19.5-E.5	-185.2'	225.8'	360.0'	8.5'	0.00	8.50	0	-1574	-50.5'	32.7'	0.0E+00	2.2E+04	1.09
18.8-E.5	-173.2'	225.8'	360.0'	25.0'	0.00	25.00	0	-4329	-38.5'	32.7'	0.0E+00	3.7E+04	0.37
18.2-U.2	-172.3'	61.4'	360.0'	24.5'	0.00	24.50	0	-4222	-37.6'	-131.7'	0.0E+00	3.5E+04	0.38
17.2-PL A.7	-143.6'	302.9'	360.0'	7.0'	0.00	7.00	0	-1005	-8.9'	109.8'	0.0E+00	5.6E+02	1.32
17.3-E.3	-147.5'	229.5'	225.0'	25.0'	0.00	25.00	0	-3688	-12.9'	36.3'	0.0E+00	4.1E+03	0.37
17.0-U.2	-136.8'	59.4'	180.0'	32.5'	0.00	32.50	0	-4446	-2.1'	-133.7'	0.0E+00	1.5E+02	0.28
15.8-PL A.6	-131.8'	308.0'	180.0'	23.0'	0.00	23.00	0	-3030	2.9'	114.9'	0.0E+00	1.9E+02	0.40
15.2-E.2	-130.6'	231.0'	360.0'	21.0'	0.00	21.00	0	-2742	4.1'	37.9'	0.0E+00	3.5E+02	0.44
15.2-C.7	-130.6'	259.8'	360.0'	29.5'	0.00	29.50	0	-3851	4.1'	66.7'	0.0E+00	5.0E+02	0.31
15.2-A.6	-130.6'	285.3'	180.0'	11.5'	0.00	11.50	0	-1501	4.1'	92.2'	0.0E+00	1.9E+02	0.81
13.8-C.7	-124.2'	259.8'	360.0'	29.5'	0.00	29.50	0	-3664	10.5'	66.7'	0.0E+00	3.2E+03	0.31
13.8-A.6	-124.2'	285.3'	180.0'	11.5'	0.00	11.50	0	-1428	10.5'	92.1'	0.0E+00	1.3E+03	0.81
13.8-E.2	-124.2'	230.6'	360.0'	22.0'	0.00	22.00	0	-2732	10.5'	37.5'	0.0E+00	2.4E+03	0.42
13.2-PL A.6	-122.9'	309.2'	180.0'	23.5'	0.00	23.50	0	-2889	11.7'	116.1'	0.0E+00	3.2E+03	0.39
12.0-U.2	-113.3'	61.4'	360.0'	24.5'	0.00	24.50	0	-2776	21.4'	-131.7'	0.0E+00	1.1E+04	0.38
11.8-E.3	-107.2'	229.5'	135.0'	25.0'	0.00	25.00	0	-2680	27.5'	36.4'	0.0E+00	1.9E+04	0.37
11.0-U.2	-89.8'	59.4'	180.0'	32.5'	0.00	32.50	0	-2919	44.9'	-133.7'	0.0E+00	6.5E+04	0.28
10.0-E.5	-81.6'	225.8'	360.0'	25.0'	0.00	25.00	0	-2040	53.1'	32.7'	0.0E+00	7.0E+04	0.37
9.5-S.5	-77.6'	225.8'	360.0'	8.5'	0.00	8.50	0	-660	57.1'	32.7'	0.0E+00	2.8E+04	1.09

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Kattera

Lateral Analysis - 3rd Floor Framing Level.

9.2-E.5	-69.1'	225.8'	360.0'	8.5'	0.00	8.50	0	-587	65.6'	32.7'	0.0E+00	3.7E+04	1.09
9.0-U.2	-66.3'	61.4'	180.0'	24.5'	0.00	24.50	0	-1624	68.4'	-131.8'	0.0E+00	1.1E+05	0.38
7.9-E.4	-58.2'	227.6'	180.0'	24.5'	0.00	24.50	0	-1426	76.5'	34.4'	0.0E+00	1.4E+05	0.38
7.3-E.0	-55.1'	227.6'	180.0'	8.5'	0.00	8.50	0	-469	79.5'	34.4'	0.0E+00	5.4E+04	1.09
8.0-E.4	-46.6'	227.6'	180.0'	8.5'	0.00	8.50	0	-396	88.0'	34.4'	0.0E+00	6.6E+04	1.09
7.0-U.2	-42.8'	59.5'	180.0'	32.5'	0.00	32.50	0	-1390	91.9'	-133.7'	0.0E+00	2.7E+05	0.28
6.0-E.5	-34.1'	225.8'	180.0'	25.0'	0.00	25.00	0	-853	100.5'	32.7'	0.0E+00	2.5E+05	0.37
5.6-B.5	-27.9'	277.5'	180.0'	4.5'	0.00	4.50	0	-126	106.8'	84.4'	0.0E+00	5.1E+04	2.06
5.0-E.5	-22.9'	277.5'	180.0'	5.5'	0.00	5.50	0	-126	111.8'	84.4'	0.0E+00	6.9E+04	1.68
4.9-D.9	-17.4'	238.7'	180.0'	8.0'	0.00	8.00	0	-139	117.2'	45.6'	0.0E+00	1.1E+05	1.16
4.8-B.5	1.4'	277.5'	180.0'	6.5'	0.00	6.50	0	9	136.1'	84.4'	0.0E+00	1.2E+05	1.42
4.6-E.3	-8.2'	229.8'	180.0'	25.0'	0.00	25.00	0	-205	126.5'	36.7'	0.0E+00	4.0E+05	0.37
4.0-PL A.6	8.4'	308.8'	180.0'	20.5'	0.00	20.50	0	173	143.1'	115.6'	0.0E+00	4.2E+05	0.45
4.0-K.5	8.4'	308.8'	180.0'	34.5'	0.00	34.50	0	291	143.1'	115.6'	0.0E+00	7.1E+05	0.27
4.0-E.2	8.5'	232.7'	180.0'	21.5'	0.00	21.50	0	182	143.1'	39.6'	0.0E+00	4.4E+05	0.43
4.0-C.9	8.5'	257.6'	180.0'	23.5'	0.00	23.50	0	199	143.1'	64.4'	0.0E+00	4.8E+05	0.39
1.7-U.2	16.9'	62.5'	360.0'	31.0'	0.00	31.00	0	523	151.5'	-130.7'	0.0E+00	7.1E+05	0.30
1.0-C.3	17.7'	268.2'	180.0'	9.0'	0.00	9.00	0	159	152.4'	75.1'	0.0E+00	2.1E+05	1.03
1.0-E.9	17.8'	215.4'	180.0'	6.5'	0.00	6.50	0	116	152.4'	22.3'	0.0E+00	1.5E+05	1.42
1.0-N.9	17.9'	119.3'	180.0'	25.0'	0.00	25.00	0	448	152.6'	-73.9'	0.0E+00	5.8E+05	0.37
1.0-P.8	17.9'	92.8'	180.0'	19.0'	0.00	19.00	0	340	152.6'	-100.3'	0.0E+00	4.4E+05	0.49
1.0-K.0	17.9'	163.6'	360.0'	7.0'	0.00	7.00	0	125	152.6'	-29.6'	0.0E+00	1.6E+05	1.32
1.0-L.0	17.9'	145.9'	360.0'	20.0'	0.00	20.00	0	358	152.6'	-47.2'	0.0E+00	4.7E+05	0.46
0.5-PL A.6	36.8'	308.4'	180.0'	6.3'	0.00	6.25	0	230	171.5'	115.3'	0.0E+00	1.8E+05	1.48
0.3-U.4	44.8'	49.5'	180.0'	6.0'	0.00	6.00	0	269	179.5'	-143.7'	0.0E+00	1.9E+05	1.54
0.1-U.3	52.3'	56.2'	180.0'	4.5'	0.00	4.50	0	235	187.0'	-136.9'	0.0E+00	1.6E+05	2.06
0.1-R.0	52.3'	83.1'	180.0'	4.5'	0.00	4.50	0	235	187.0'	-110.1'	0.0E+00	1.6E+05	2.06
0.0-K.0	54.2'	164.9'	180.0'	4.0'	0.00	4.00	0	217	188.8'	-28.2'	0.0E+00	1.4E+05	1.03
0.0-K.5	54.2'	155.3'	180.0'	4.0'	0.00	4.00	0	217	188.9'	-37.9'	0.0E+00	1.4E+05	1.03
0.0-P.7	54.2'	96.2'	180.0'	4.0'	0.00	4.00	0	217	188.9'	-97.0'	0.0E+00	1.4E+05	1.03
0.0-P.4	54.2'	105.8'	180.0'	4.0'	0.00	4.00	0	217	188.9'	-87.3'	0.0E+00	1.4E+05	1.03
4.0-P.4	54.2'	105.8'	180.0'	8.5'	0.00	8.50	0	461	188.9'	-87.3'	0.0E+00	3.0E+05	1.09
4.0-P.4	54.2'	105.8'	180.0'	8.5'	0.00	8.50	0	461	188.9'	-87.3'	0.0E+00	3.0E+05	1.09

BY	<u>ACM</u>	DATE	<u>02/06/19</u>	PEOPLES ASSOCIATES	SHEET NO.	<u> </u>	OF	<u> </u>
CHKD. BY	<u> </u>	DATE	<u> </u>	STRUCTURAL ENGINEERS	JOB NO.	<u>18-234</u>		

Legacy Livermore

Katerra

Lateral Analysis - 3rd Floor Framing Level

U.4-29.0	-287.6'	42.7'	270.0'	6.0'	6.00	0.00	256	0	-152.9'	-150.4'	1.4E+05	0.0E+00	1.54
U.4-19.9	-195.1'	42.7'	270.0'	7.0'	7.00	0.00	299	0	-60.4'	-150.4'	1.6E+05	0.0E+00	1.32
U.4-17.4	-149.1'	42.7'	450.0'	6.0'	6.00	0.00	256	0	-14.4'	-150.4'	1.4E+05	0.0E+00	1.54
U.4-11.0	-89.3'	42.8'	90.0'	7.5'	7.50	0.00	321	0	45.4'	-150.4'	1.7E+05	0.0E+00	1.23
U.4-4.0	32.4'	44.3'	450.0'	5.5'	5.50	0.00	244	0	167.1'	-148.9'	1.2E+05	0.0E+00	1.68
U.5-4.0	32.4'	47.3'	450.0'	6.0'	6.00	0.00	284	0	167.1'	-145.9'	1.3E+05	0.0E+00	1.54
U.3-29.0	-296.1'	53.8'	270.0'	8.0'	8.00	0.00	431	0	-161.5'	-139.3'	1.6E+05	0.0E+00	1.16
U.0-4.0	10.0'	76.0'	270.0'	18.0'	18.00	0.00	1368	0	144.7'	-117.1'	2.5E+05	0.0E+00	0.51
U.0-9.0	-66.1'	76.1'	270.0'	26.0'	26.00	0.00	1979	0	68.6'	-117.0'	3.6E+05	0.0E+00	0.36
U.0-12.0	-113.1'	76.1'	270.0'	26.0'	26.00	0.00	1979	0	21.6'	-117.0'	3.6E+05	0.0E+00	0.36
U.0-11.0	-89.6'	76.1'	270.0'	12.5'	12.50	0.00	952	0	45.1'	-117.0'	1.7E+05	0.0E+00	0.74
U.0-20.1	-198.4'	76.1'	270.0'	18.0'	18.00	0.00	1370	0	-63.8'	-117.0'	2.5E+05	0.0E+00	0.51
U.0-18.1	-172.1'	76.1'	270.0'	26.0'	26.00	0.00	1979	0	-37.4'	-117.0'	3.6E+05	0.0E+00	0.36
U.0-17.2	-142.6'	76.1'	270.0'	24.5'	24.50	0.00	1865	0	-8.0'	-117.0'	3.4E+05	0.0E+00	0.38
U.0-7.2	-46.0'	76.1'	270.0'	5.5'	5.50	0.00	419	0	88.7'	-117.0'	7.5E+04	0.0E+00	1.68
T.0-29.5	-296.7'	78.9'	90.0'	29.5'	29.50	0.00	2328	0	-162.0'	-114.2'	3.8E+05	0.0E+00	0.31
S.2-1.5	-262.5'	79.0'	90.0'	13.0'	13.00	0.00	1027	0	-127.8'	-114.1'	1.7E+05	0.0E+00	0.71
S.2-25.2	-242.6'	79.0'	90.0'	13.0'	13.00	0.00	1027	0	-107.9'	-114.1'	1.7E+05	0.0E+00	0.71
R.1-4.0	41.2'	83.0'	270.0'	21.5'	21.50	0.00	1785	0	175.9'	-110.1'	2.6E+05	0.0E+00	0.43
Q.0-28.4	-275.4'	84.6'	90.0'	9.5'	9.50	0.00	804	0	-140.7'	-108.5'	1.1E+05	0.0E+00	0.97
Q.0-25.7	-255.7'	84.6'	90.0'	21.0'	21.00	0.00	1776	0	-121.0'	-108.5'	2.5E+05	0.0E+00	0.44
P.8-29.0	-306.5'	91.4'	90.0'	12.0'	12.00	0.00	1096	0	-171.9'	-101.8'	1.2E+05	0.0E+00	0.77
P.3-4.0	43.5'	107.7'	270.0'	8.5'	8.50	0.00	916	0	178.1'	-85.4'	6.2E+04	0.0E+00	1.09
P.0-4.0	33.1'	118.5'	450.0'	29.5'	29.50	0.00	3496	0	167.8'	-74.6'	1.6E+05	0.0E+00	0.31
N.0-25.5	-250.7'	127.2'	450.0'	24.5'	24.50	0.00	3117	0	-116.0'	-65.9'	1.1E+05	0.0E+00	0.38
M.0-4.0	35.2'	142.0'	450.0'	33.5'	33.50	0.00	4757	0	169.9'	-51.1'	8.8E+04	0.0E+00	0.28
L.1-25.5	-250.3'	145.5'	450.0'	24.0'	24.00	0.00	3493	0	-115.6'	-47.6'	5.4E+04	0.0E+00	0.39
K.0-25.5	-250.7'	164.5'	450.0'	24.5'	24.50	0.00	4030	0	-116.0'	-28.6'	2.0E+04	0.0E+00	0.38
J.8-4.0	36.1'	166.8'	270.0'	8.5'	8.50	0.00	1418	0	170.7'	-26.4'	5.9E+03	0.0E+00	1.09
H.6-25.7	-254.4'	190.5'	315.0'	25.0'	25.00	0.00	4762	0	-119.7'	-2.7'	1.8E+02	0.0E+00	0.37
H.1-29.0	-304.5'	203.5'	450.0'	11.0'	11.00	0.00	2239	0	-169.9'	10.4'	1.2E+03	0.0E+00	0.84
H.0-28.4	-275.4'	207.1'	450.0'	9.5'	9.50	0.00	1967	0	-140.7'	14.0'	1.8E+03	0.0E+00	0.97
H.0-25.7	-255.7'	207.1'	90.0'	21.0'	21.00	0.00	4349	0	-121.0'	14.0'	4.1E+03	0.0E+00	0.44
F.6-8.0	-57.9'	212.8'	270.0'	26.0'	26.00	0.00	5533	0	76.8'	19.7'	1.0E+04	0.0E+00	0.36
F.6-25.3	-245.0'	212.8'	270.0'	21.0'	21.00	0.00	4469	0	-110.3'	19.7'	8.1E+03	0.0E+00	0.44
F.6-22.1	-222.0'	212.8'	450.0'	16.0'	16.00	0.00	3405	0	-87.3'	19.7'	6.2E+03	0.0E+00	0.58
F.6-20.0	-196.9'	212.8'	270.0'	26.0'	26.00	0.00	5533	0	-62.2'	19.7'	1.0E+04	0.0E+00	0.36
F.6-18.0	-171.7'	212.8'	270.0'	16.0'	16.00	0.00	3405	0	-37.0'	19.7'	6.2E+03	0.0E+00	0.58
F.6-17.3	-148.8'	212.8'	270.0'	21.0'	21.00	0.00	4469	0	-14.1'	19.7'	8.1E+03	0.0E+00	0.44
F.6-11.9	-109.6'	212.8'	270.0'	28.5'	28.50	0.00	6065	0	25.0'	19.7'	1.1E+04	0.0E+00	0.32
F.6-10.2	-83.1'	212.8'	270.0'	16.0'	16.00	0.00	3405	0	51.6'	19.7'	6.2E+03	0.0E+00	0.58
F.6-5.9	-32.7'	212.8'	90.0'	16.0'	16.00	0.00	3405	0	102.0'	19.7'	6.2E+03	0.0E+00	0.58
F.6-4.5	-5.9'	212.8'	90.0'	29.0'	29.00	0.00	6172	0	128.8'	19.7'	1.1E+04	0.0E+00	0.32
F.5-4.0	35.3'	212.9'	90.0'	33.0'	33.00	0.00	7026	0	169.9'	19.8'	1.3E+04	0.0E+00	0.28
E.9-29.0	-295.2'	215.3'	270.0'	24.5'	24.50	0.00	5274	0	-160.5'	22.1'	1.2E+04	0.0E+00	0.38
E.7-4.1	4.6'	220.6'	90.0'	7.0'	7.00	0.00	1545	0	139.3'	27.5'	5.3E+03	0.0E+00	1.32
E.4-29.0	-308.6'	226.8'	270.0'	0.0'	0.00	0.00	0	0	-173.9'	33.7'	0.0E+00	0.0E+00	#DIV/0!
D.8-29.0	-295.2'	240.0'	270.0'	9.5'	9.50	0.00	2280	0	-160.5'	46.8'	2.1E+04	0.0E+00	0.97
D.6-4.6	-9.1'	243.4'	90.0'	5.5'	5.50	0.00	1339	0	125.5'	50.3'	1.4E+04	0.0E+00	1.68
D.2-29.0	-284.9'	250.8'	270.0'	30.0'	30.00	0.00	7523	0	-150.2'	57.6'	1.0E+05	0.0E+00	0.31
D.0-17.2	-143.5'	255.4'	90.0'	25.0'	25.00	0.00	6385	0	-8.8'	62.3'	9.7E+04	0.0E+00	0.37
D.0-11.9	-111.1'	255.4'	450.0'	25.0'	25.00	0.00	6385	0	23.6'	62.3'	9.7E+04	0.0E+00	0.37
D.0-4.5	-4.6'	255.4'	90.0'	25.0'	25.00	0.00	6386	0	130.1'	62.3'	9.7E+04	0.0E+00	0.37
D.0-25.5	-249.9'	255.4'	450.0'	25.5'	25.50	0.00	6513	0	-115.2'	62.3'	9.9E+04	0.0E+00	0.36
C.1-29.0	-283.3'	270.3'	90.0'	27.0'	27.00	0.00	7298	0	-148.6'	77.2'	1.6E+05	0.0E+00	0.34
C.0-4.0	23.5'	273.1'	90.0'	17.5'	17.50	0.00	4779	0	158.1'	80.0'	1.1E+05	0.0E+00	0.53
B.2-29.0	-283.2'	280.0'	90.0'	27.0'	27.00	0.00	7560	0	-148.6'	86.9'	2.0E+05	0.0E+00	0.34
B.2-17.6	-157.3'	280.1'	90.0'	8.5'	8.50	0.00	2381	0	-22.6'	87.0'	6.4E+04	0.0E+00	1.09
B.2-11.4	-98.6'	280.1'	450.0'	8.5'	8.50	0.00	2381	0	36.0'	87.0'	6.4E+04	0.0E+00	1.09
B.2-4.9	-17.1'	280.2'	90.0'	8.5'	8.50	0.00	2381	0	117.6'	87.0'	6.4E+04	0.0E+00	1.09
B.2-25.0	-237.6'	280.2'	270.0'	8.5'	8.50	0.00	2382	0	-103.0'	87.1'	6.4E+04	0.0E+00	1.09
B.0-4.0	23.5'	281.7'	90.0'	17.5'	17.50	0.00	4930	0	158.1'	88.6'	1.4E+05	0.0E+00	0.53

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Katerra

Lateral Analysis - 3rd Floor Framing Level.

A.0-11.8	-108.1'	290.9'	450.0'	28.0'	28.00	0.00	8145	0	26.5'	97.8'	2.7E+05	0.0E+00	0.33
A.0-17.3	-146.6'	290.9'	90.0'	28.0'	28.00	0.00	8145	0	-11.9'	97.8'	2.7E+05	0.0E+00	0.33
A.0-4.7	-11.7'	291.4'	90.0'	37.0'	37.00	0.00	10780	0	123.0'	98.2'	3.6E+05	0.0E+00	0.25
A.0-25.2	-243.4'	291.4'	270.0'	32.0'	32.00	0.00	9324	0	-108.7'	98.2'	3.1E+05	0.0E+00	0.29
PL A.8-5.6	-28.5'	301.9'	90.0'	7.0'	7.00	0.00	2113	0	106.2'	108.7'	8.3E+04	0.0E+00	1.32
PL A.7-29.0	-299.2'	305.7'	270.0'	9.0'	9.00	0.00	2751	0	-164.5'	112.6'	1.1E+05	0.0E+00	1.03
PL A.5-17.9	-169.4'	310.7'	450.0'	7.0'	7.00	0.00	2175	0	-34.7'	117.6'	9.7E+04	0.0E+00	1.32
PL A.5-10.5	-85.5'	310.7'	270.0'	7.0'	7.00	0.00	2175	0	49.1'	117.6'	9.7E+04	0.0E+00	1.32
PL A.5-5.6	-28.5'	310.7'	90.0'	7.0'	7.00	0.00	2175	0	106.2'	117.6'	9.7E+04	0.0E+00	1.32
PL A.5-22.5	-226.3'	310.7'	450.0'	7.0'	7.00	0.00	2175	0	-91.6'	117.6'	9.7E+04	0.0E+00	1.32
PL A.2-4.0	21.7'	324.3'	90.0'	5.0'	5.00	0.00	1621	0	156.4'	131.1'	8.6E+04	0.0E+00	1.85
PL A.2-5.0	44.4'	324.3'	90.0'	5.0'	5.00	0.00	1621	0	179.1'	131.1'	8.6E+04	0.0E+00	1.85
PL A.2-11.7	-105.4'	324.3'	270.0'	11.0'	11.00	0.00	3568	0	29.2'	131.2'	1.9E+05	0.0E+00	0.84
PL A.2-10.7	-87.2'	324.3'	270.0'	11.0'	11.00	0.00	3568	0	47.4'	131.2'	1.9E+05	0.0E+00	0.84
0	0.0'	0.0'	0.0'	0.0'	0.00	0.00	0	0	134.7'	-193.1'	0.0E+00	0.0E+00	#DIV/0!
S					1291	1393	249335	-187621			9.0E+06	1.6E+07	

Center of Rigidity
 Xr = -134.7'
 Yr = 193.1'

Eccentricity + Eac.
 Ex = 19.85'
 Ey = 7.19'

Eccentricity - Eac.
 Ex = -16.98'
 Ey = -20.96'

Rotational Stiffness
 Jr = 2.54E+07

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.****Lateral Design: Rigid Diaphragm - 3rd Floor Framing Level.**

Building Line	X - Direction				Y - Direction				2:1/3.5:1							D/C
	Direct Shear	+Eac. -Eac.		Total Shear X-Dir.	Direct Shear	+Eac. -Eac.		Total Shear Y-Dir.	Maximum Shear	Shear (lb/ft)	Capacity Reduction	SW Type Min Req.	SW Type Used	Capacity (plf)		
		Torsional Shear	Torsional Shear			Torsional Shear	Torsional Shear									
29.0-H.5	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	-0.7 k	0.6 k	4.1 k	4.08 k	1019	0.86	3 E.S.	3 E.S.	1149	0.89	
29.0-P.7	0.0 k	0.0 k	0.0 k	0.0 k	10.0 k	-2.0 k	1.7 k	11.7 k	11.72 k	1019	1.00	3 E.S.	3 E.S.	1330	0.77	
29.0-U.3	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	-1.3 k	1.1 k	8.1 k	8.14 k	1017	1.00	3 E.S.	3 E.S.	1330	0.76	
29.0-A.9	0.0 k	0.0 k	0.0 k	0.0 k	4.4 k	-0.8 k	0.7 k	5.1 k	5.06 k	1013	1.00	3 E.S.	3 E.S.	1330	0.76	
29.0-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	4.8 k	-0.9 k	0.8 k	5.6 k	5.57 k	1013	1.00	3 E.S.	3 E.S.	1330	0.76	
29.0-P.1	0.0 k	0.0 k	0.0 k	0.0 k	5.7 k	-1.0 k	0.9 k	6.6 k	6.55 k	1008	1.00	3 E.S.	3 E.S.	1330	0.76	
29.0-J.0	0.0 k	0.0 k	0.0 k	0.0 k	5.7 k	-1.0 k	0.9 k	6.6 k	6.55 k	1008	1.00	3 E.S.	3 E.S.	1330	0.76	
29.0-H.4	0.0 k	0.0 k	0.0 k	0.0 k	15.7 k	-2.5 k	2.1 k	17.9 k	17.86 k	992	1.00	3 E.S.	3 E.S.	1330	0.75	
29.0-P.6	0.0 k	0.0 k	0.0 k	0.0 k	16.2 k	-2.6 k	2.2 k	18.4 k	18.36 k	992	1.00	3 E.S.	3 E.S.	1330	0.75	
27.9-U.2	0.0 k	0.0 k	0.0 k	0.0 k	16.6 k	-2.5 k	2.1 k	18.7 k	18.72 k	985	1.00	3 E.S.	3 E.S.	1330	0.74	
27.1-E.0	0.0 k	0.0 k	0.0 k	0.0 k	32.3 k	-4.7 k	4.1 k	36.4 k	36.39 k	983	1.00	3 E.S.	3 E.S.	1330	0.74	
27.1-H.5	0.0 k	0.0 k	0.0 k	0.0 k	4.8 k	-0.7 k	0.6 k	5.4 k	5.41 k	983	1.00	3 E.S.	3 E.S.	1330	0.74	
27.1-P.5	0.0 k	0.0 k	0.0 k	0.0 k	4.8 k	-0.7 k	0.6 k	5.4 k	5.41 k	983	1.00	3 E.S.	3 E.S.	1330	0.74	
27.1-C.4	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	-1.0 k	0.9 k	7.9 k	7.87 k	983	1.00	3 E.S.	3 E.S.	1330	0.74	
27.1-A.8	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	-1.1 k	0.9 k	8.4 k	8.36 k	983	1.00	3 E.S.	3 E.S.	1330	0.74	
27.1-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	15.7 k	-2.3 k	2.0 k	17.7 k	17.70 k	983	1.00	3 E.S.	3 E.S.	1330	0.74	
26.0-E.2	0.0 k	0.0 k	0.0 k	0.0 k	18.3 k	-2.6 k	2.2 k	20.5 k	20.55 k	978	1.00	4 E.S.	3 E.S.	1330	0.74	
26.0-C.9	0.0 k	0.0 k	0.0 k	0.0 k	20.5 k	-2.9 k	2.5 k	23.0 k	22.99 k	978	1.00	4 E.S.	3 E.S.	1330	0.74	
26.0-B.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	3 E.S.	#DIV/0!	#DIV/0!	
26.0-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	18.3 k	-2.6 k	2.2 k	20.5 k	20.55 k	978	1.00	4 E.S.	3 E.S.	1330	0.74	
25.6-P.5	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	-2.8 k	2.4 k	24.3 k	24.28 k	971	1.00	4 E.S.	3 E.S.	1330	0.73	
25.4-U.3	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	-0.9 k	0.8 k	8.2 k	8.20 k	965	1.00	4 E.S.	3 E.S.	1330	0.73	
25.3-E.3	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	-2.7 k	2.3 k	24.1 k	24.12 k	965	1.00	4 E.S.	3 E.S.	1330	0.73	
25.0-H.5	0.0 k	0.0 k	0.0 k	0.0 k	24.9 k	-2.8 k	2.4 k	27.3 k	27.29 k	957	1.00	4 E.S.	3 E.S.	1330	0.72	
25.0-L.0	0.0 k	0.0 k	0.0 k	0.0 k	9.2 k	-1.0 k	0.9 k	10.1 k	10.05 k	957	1.00	4 E.S.	3 E.S.	1330	0.72	
25.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	16.2 k	-1.8 k	1.5 k	17.7 k	17.71 k	957	1.00	4 E.S.	3 E.S.	1330	0.72	
25.0-P.5	0.0 k	0.0 k	0.0 k	0.0 k	19.2 k	-2.2 k	1.8 k	21.1 k	21.06 k	957	1.00	4 E.S.	3 E.S.	1330	0.72	
25.0-N.1	0.0 k	0.0 k	0.0 k	0.0 k	16.2 k	-1.8 k	1.5 k	17.7 k	17.71 k	957	1.00	4 E.S.	3 E.S.	1330	0.72	
24.2-U.2	0.0 k	0.0 k	0.0 k	0.0 k	25.8 k	-2.9 k	2.4 k	28.2 k	28.22 k	956	1.00	4 E.S.	3 E.S.	1330	0.72	
22.6-B.2	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	-0.4 k	0.3 k	3.8 k	3.80 k	949	0.86	3 E.S.	3 E.S.	1149	0.83	
22.1-E.4	0.0 k	0.0 k	0.0 k	0.0 k	21.4 k	-2.0 k	1.7 k	23.1 k	23.13 k	944	1.00	4 E.S.	3 E.S.	1330	0.71	
21.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	-0.6 k	0.5 k	7.9 k	7.94 k	934	1.00	4 E.S.	3 E.S.	1330	0.70	
21.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	28.4 k	-2.3 k	1.9 k	30.3 k	30.32 k	933	1.00	4 E.S.	3 E.S.	1330	0.70	
20.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	21.4 k	-1.4 k	1.2 k	22.6 k	22.64 k	924	1.00	4 E.S.	3 E.S.	1330	0.69	
19.5-E.5	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	-0.4 k	0.3 k	7.8 k	7.78 k	915	1.00	4 E.S.	3 E.S.	1330	0.69	
18.8-E.5	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	-0.9 k	0.8 k	22.6 k	22.63 k	905	1.00	4 E.S.	3 E.S.	1330	0.68	
18.2-U.2	0.0 k	0.0 k	0.0 k	0.0 k	21.4 k	-0.9 k	0.8 k	22.2 k	22.16 k	904	1.00	4 E.S.	3 E.S.	1330	0.68	
17.2-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	6.1 k	-0.1 k	0.1 k	6.2 k	6.17 k	881	1.00	4 E.S.	3 E.S.	1330	0.66	
17.3-E.3	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	-0.3 k	0.3 k	22.1 k	22.10 k	884	1.00	4 E.S.	3 E.S.	1330	0.66	
17.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	28.4 k	-0.1 k	0.1 k	28.5 k	28.45 k	875	1.00	4 E.S.	3 E.S.	1330	0.66	
15.8-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	20.1 k	0.1 k	-0.1 k	20.2 k	20.16 k	876	1.00	4 E.S.	3 E.S.	1330	0.66	
15.2-E.2	0.0 k	0.0 k	0.0 k	0.0 k	18.3 k	0.1 k	-0.1 k	18.4 k	18.43 k	878	1.00	4 E.S.	3 E.S.	1330	0.66	
15.2-C.7	0.0 k	0.0 k	0.0 k	0.0 k	25.8 k	0.1 k	-0.1 k	25.9 k	25.89 k	878	1.00	4 E.S.	3 E.S.	1330	0.66	
15.2-A.6	0.0 k	0.0 k	0.0 k	0.0 k	10.0 k	0.0 k	0.0 k	10.1 k	10.09 k	878	1.00	4 E.S.	3 E.S.	1330	0.66	
13.8-C.7	0.0 k	0.0 k	0.0 k	0.0 k	25.8 k	0.3 k	-0.3 k	26.1 k	26.07 k	884	1.00	4 E.S.	3 E.S.	1330	0.66	
13.8-A.6	0.0 k	0.0 k	0.0 k	0.0 k	10.0 k	0.1 k	-0.1 k	10.2 k	10.16 k	884	1.00	4 E.S.	3 E.S.	1330	0.66	
13.8-E.2	0.0 k	0.0 k	0.0 k	0.0 k	19.2 k	0.2 k	-0.2 k	19.4 k	19.44 k	884	1.00	4 E.S.	3 E.S.	1330	0.66	
13.2-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	20.5 k	0.3 k	-0.2 k	20.8 k	20.79 k	885	1.00	4 E.S.	3 E.S.	1330	0.67	
12.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	21.4 k	0.5 k	-0.4 k	21.9 k	21.90 k	894	1.00	4 E.S.	3 E.S.	1330	0.67	
11.8-E.3	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	0.7 k	-0.6 k	22.5 k	22.50 k	900	1.00	4 E.S.	3 E.S.	1330	0.68	
11.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	28.4 k	1.4 k	-1.2 k	29.8 k	29.78 k	916	1.00	4 E.S.	3 E.S.	1330	0.69	
10.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	1.3 k	-1.1 k	23.1 k	23.11 k	924	1.00	4 E.S.	3 E.S.	1330	0.69	
9.5-S.5	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	0.5 k	-0.4 k	7.9 k	7.89 k	928	1.00	4 E.S.	3 E.S.	1330	0.70	
9.2-E.5	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	0.5 k	-0.5 k	8.0 k	7.96 k	936	1.00	4 E.S.	3 E.S.	1330	0.70	
9.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	21.4 k	1.6 k	-1.4 k	23.0 k	23.00 k	939	1.00	4 E.S.	3 E.S.	1330	0.71	
7.9-E.4	0.0 k	0.0 k	0.0 k	0.0 k	21.4 k	1.8 k	-1.5 k	23.2 k	23.19 k	947	1.00	4 E.S.	3 E.S.	1330	0.71	
7.3-E.0	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	0.6 k	-0.6 k	8.1 k	8.07 k	949	1.00	4 E.S.	3 E.S.	1330	0.71	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE **STRUCTURAL ENGINEERS**JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.**

8.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	0.7 k	-0.6 k	8.1 k	8.14 k	958	1.00	4 E.S.	3 E.S.	1330	0.72
7.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	28.4 k	2.8 k	-2.4 k	31.2 k	31.24 k	961	1.00	4 E.S.	3 E.S.	1330	0.72
6.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	2.4 k	-2.0 k	24.2 k	24.24 k	969	1.00	4 E.S.	3 E.S.	1330	0.73
5.6-B.5	0.0 k	0.0 k	0.0 k	0.0 k	3.9 k	0.5 k	-0.4 k	4.4 k	4.39 k	975	0.97	4 E.S.	3 E.S.	1293	0.75
5.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	4.8 k	0.6 k	-0.5 k	5.4 k	5.39 k	980	1.00	3 E.S.	3 E.S.	1330	0.74
4.9-D.9	0.0 k	0.0 k	0.0 k	0.0 k	7.0 k	0.9 k	-0.8 k	7.9 k	7.88 k	985	1.00	3 E.S.	3 E.S.	1330	0.74
4.8-B.5	0.0 k	0.0 k	0.0 k	0.0 k	5.7 k	0.8 k	-0.7 k	6.5 k	6.52 k	1003	1.00	3 E.S.	3 E.S.	1330	0.75
4.6-E.3	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	3.0 k	-2.6 k	24.9 k	24.85 k	994	1.00	3 E.S.	3 E.S.	1330	0.75
4.0-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	17.9 k	2.8 k	-2.4 k	20.7 k	20.71 k	1010	1.00	3 E.S.	3 E.S.	1330	0.76
4.0-K.5	0.0 k	0.0 k	0.0 k	0.0 k	30.1 k	4.7 k	-4.0 k	34.8 k	34.85 k	1010	1.00	3 E.S.	3 E.S.	1330	0.76
4.0-E.2	0.0 k	0.0 k	0.0 k	0.0 k	18.8 k	2.9 k	-2.5 k	21.7 k	21.72 k	1010	1.00	3 E.S.	3 E.S.	1330	0.76
4.0-C.9	0.0 k	0.0 k	0.0 k	0.0 k	20.5 k	3.2 k	-2.7 k	23.7 k	23.74 k	1010	1.00	3 E.S.	3 E.S.	1330	0.76
1.7-U.2	0.0 k	0.0 k	0.0 k	0.0 k	27.1 k	4.5 k	-3.8 k	31.6 k	31.56 k	1018	1.00	3 E.S.	3 E.S.	1330	0.77
1.0-C.3	0.0 k	0.0 k	0.0 k	0.0 k	7.9 k	1.3 k	-1.1 k	9.2 k	9.17 k	1019	1.00	3 E.S.	3 E.S.	1330	0.77
1.0-E.9	0.0 k	0.0 k	0.0 k	0.0 k	5.7 k	0.9 k	-0.8 k	6.6 k	6.62 k	1019	1.00	3 E.S.	3 E.S.	1330	0.77
1.0-N.9	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	3.6 k	-3.1 k	25.5 k	25.48 k	1019	1.00	3 E.S.	3 E.S.	1330	0.77
1.0-P.8	0.0 k	0.0 k	0.0 k	0.0 k	16.6 k	2.8 k	-2.4 k	19.4 k	19.36 k	1019	1.00	3 E.S.	3 E.S.	1330	0.77
1.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	6.1 k	1.0 k	-0.9 k	7.1 k	7.13 k	1019	1.00	3 E.S.	3 E.S.	1330	0.77
1.0-L.0	0.0 k	0.0 k	0.0 k	0.0 k	17.5 k	2.9 k	-2.5 k	20.4 k	20.38 k	1019	1.00	3 E.S.	3 E.S.	1330	0.77
0.5-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	5.5 k	1.0 k	-0.9 k	6.5 k	6.48 k	1037	1.00	3 E.S.	3 E.S.	1330	0.78
0.3-U.4	0.0 k	0.0 k	0.0 k	0.0 k	5.2 k	1.0 k	-0.9 k	6.3 k	6.27 k	1045	1.00	3 E.S.	3 E.S.	1330	0.79
0.1-U.3	0.0 k	0.0 k	0.0 k	0.0 k	3.9 k	0.8 k	-0.7 k	4.7 k	4.73 k	1052	0.97	3 E.S.	3 E.S.	1293	0.81
0.1-R.0	0.0 k	0.0 k	0.0 k	0.0 k	3.9 k	0.8 k	-0.7 k	4.7 k	4.73 k	1052	0.97	3 E.S.	3 E.S.	1293	0.81

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level**

0.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	0.7 k	-0.6 k	4.2 k	4.21 k	1054	1.00	3 E.S.	3 E.S.	1330	0.79
0.0-K.5	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	0.7 k	-0.6 k	4.2 k	4.21 k	1054	1.00	3 E.S.	3 E.S.	1330	0.79
0.0-P.7	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	0.7 k	-0.6 k	4.2 k	4.21 k	1054	1.00	3 E.S.	3 E.S.	1330	0.79
0.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	3.5 k	0.7 k	-0.6 k	4.2 k	4.21 k	1054	1.00	3 E.S.	3 E.S.	1330	0.79
4.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	1.5 k	-1.3 k	9.0 k	8.96 k	1054	1.00	3 E.S.	3 E.S.	1330	0.79
4.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	7.4 k	1.5 k	-1.3 k	9.0 k	8.96 k	1054	1.00	3 E.S.	3 E.S.	1330	0.79
U.4-29.0	5.7 k	-0.3 k	0.9 k	6.6 k	0.0 k	0.0 k	0.0 k	0.0 k	6.57 k	1094	1.00	3 E.S.	3 E.S.	1330	0.82
U.4-19.9	6.6 k	-0.4 k	1.1 k	7.7 k	0.0 k	0.0 k	0.0 k	0.0 k	7.66 k	1094	1.00	3 E.S.	3 E.S.	1330	0.82
U.4-17.4	5.7 k	-0.3 k	0.9 k	6.6 k	0.0 k	0.0 k	0.0 k	0.0 k	6.57 k	1094	1.00	3 E.S.	3 E.S.	1330	0.82
U.4-11.0	7.1 k	-0.4 k	1.1 k	8.2 k	0.0 k	0.0 k	0.0 k	0.0 k	8.21 k	1094	1.00	3 E.S.	3 E.S.	1330	0.82
U.4-4.0	5.2 k	-0.3 k	0.8 k	6.0 k	0.0 k	0.0 k	0.0 k	0.0 k	6.01 k	1093	1.00	3 E.S.	3 E.S.	1330	0.82
U.3-29.0	7.5 k	-0.4 k	1.1 k	8.7 k	0.0 k	0.0 k	0.0 k	0.0 k	8.66 k	1083	1.00	3 E.S.	3 E.S.	1330	0.81
U.0-4.0	17.0 k	-0.7 k	2.1 k	19.1 k	0.0 k	0.0 k	0.0 k	0.0 k	19.09 k	1061	1.00	3 E.S.	3 E.S.	1330	0.80
U.0-9.0	24.5 k	-1.0 k	3.1 k	27.6 k	0.0 k	0.0 k	0.0 k	0.0 k	27.58 k	1061	1.00	3 E.S.	3 E.S.	1330	0.80
U.0-12.0	24.5 k	-1.0 k	3.1 k	27.6 k	0.0 k	0.0 k	0.0 k	0.0 k	27.58 k	1061	1.00	3 E.S.	3 E.S.	1330	0.80
U.0-11.0	11.8 k	-0.5 k	1.5 k	13.3 k	0.0 k	0.0 k	0.0 k	0.0 k	13.26 k	1061	1.00	3 E.S.	3 E.S.	1330	0.80
U.0-20.1	17.0 k	-0.7 k	2.1 k	19.1 k	0.0 k	0.0 k	0.0 k	0.0 k	19.09 k	1061	1.00	3 E.S.	3 E.S.	1330	0.80
U.0-18.1	24.5 k	-1.0 k	3.1 k	27.6 k	0.0 k	0.0 k	0.0 k	0.0 k	27.58 k	1061	1.00	3 E.S.	3 E.S.	1330	0.80
U.0-17.2	23.1 k	-1.0 k	2.9 k	26.0 k	0.0 k	0.0 k	0.0 k	0.0 k	25.99 k	1061	1.00	3 E.S.	3 E.S.	1330	0.80
U.0-7.2	5.2 k	-0.2 k	0.6 k	5.8 k	0.0 k	0.0 k	0.0 k	0.0 k	5.83 k	1061	1.00	3 E.S.	3 E.S.	1330	0.80
T.0-29.5	27.8 k	-1.2 k	3.4 k	31.2 k	0.0 k	0.0 k	0.0 k	0.0 k	31.21 k	1058	1.00	3 E.S.	3 E.S.	1330	0.80
S.2-1.5	12.3 k	-0.5 k	1.5 k	13.8 k	0.0 k	0.0 k	0.0 k	0.0 k	13.75 k	1058	1.00	3 E.S.	3 E.S.	1330	0.80
S.2-25.2	12.3 k	-0.5 k	1.5 k	13.8 k	0.0 k	0.0 k	0.0 k	0.0 k	13.75 k	1058	1.00	3 E.S.	3 E.S.	1330	0.80
R.1-4.0	20.3 k	-0.8 k	2.4 k	22.7 k	0.0 k	0.0 k	0.0 k	0.0 k	22.66 k	1054	1.00	3 E.S.	3 E.S.	1330	0.79
Q.0-28.4	9.0 k	-0.4 k	1.0 k	10.0 k	0.0 k	0.0 k	0.0 k	0.0 k	10.00 k	1052	1.00	3 E.S.	3 E.S.	1330	0.79
Q.0-25.7	19.8 k	-0.8 k	2.3 k	22.1 k	0.0 k	0.0 k	0.0 k	0.0 k	22.09 k	1052	1.00	3 E.S.	3 E.S.	1330	0.79
P.8-29.0	11.3 k	-0.4 k	1.2 k	12.5 k	0.0 k	0.0 k	0.0 k	0.0 k	12.54 k	1045	1.00	3 E.S.	3 E.S.	1330	0.79
P.3-4.0	8.0 k	-0.3 k	0.7 k	8.7 k	0.0 k	0.0 k	0.0 k	0.0 k	8.75 k	1029	1.00	3 E.S.	3 E.S.	1330	0.77
P.0-4.0	27.8 k	-0.8 k	2.2 k	30.0 k	0.0 k	0.0 k	0.0 k	0.0 k	30.03 k	1018	1.00	3 E.S.	3 E.S.	1330	0.77
N.0-25.5	23.1 k	-0.6 k	1.6 k	24.7 k	0.0 k	0.0 k	0.0 k	0.0 k	24.73 k	1009	1.00	3 E.S.	3 E.S.	1330	0.76
M.0-4.0	31.6 k	-0.6 k	1.7 k	33.3 k	0.0 k	0.0 k	0.0 k	0.0 k	33.31 k	994	1.00	3 E.S.	3 E.S.	1330	0.75
L.1-25.5	22.6 k	-0.4 k	1.1 k	23.8 k	0.0 k	0.0 k	0.0 k	0.0 k	23.78 k	991	1.00	3 E.S.	3 E.S.	1330	0.74
K.0-25.5	23.1 k	-0.2 k	0.7 k	23.8 k	0.0 k	0.0 k	0.0 k	0.0 k	23.81 k	972	1.00	4 E.S.	3 E.S.	1330	0.73
J.8-4.0	8.0 k	-0.1 k	0.2 k	8.2 k	0.0 k	0.0 k	0.0 k	0.0 k	8.24 k	969	1.00	4 E.S.	3 E.S.	1330	0.73
H.6-25.7	23.6 k	0.0 k	0.1 k	23.6 k	0.0 k	0.0 k	0.0 k	0.0 k	23.64 k	946	1.00	4 E.S.	3 E.S.	1330	0.71
H.1-29.0	10.4 k	0.0 k	-0.1 k	10.4 k	0.0 k	0.0 k	0.0 k	0.0 k	10.41 k	946	1.00	4 E.S.	3 E.S.	1330	0.71
H.0-28.4	9.0 k	0.0 k	-0.1 k	9.0 k	0.0 k	0.0 k	0.0 k	0.0 k	9.00 k	948	1.00	4 E.S.	3 E.S.	1330	0.71
H.0-25.7	19.8 k	0.1 k	-0.3 k	19.9 k	0.0 k	0.0 k	0.0 k	0.0 k	19.90 k	948	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-8.0	24.5 k	0.2 k	-0.5 k	24.7 k	0.0 k	0.0 k	0.0 k	0.0 k	24.69 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-25.3	19.8 k	0.1 k	-0.4 k	19.9 k	0.0 k	0.0 k	0.0 k	0.0 k	19.94 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-22.1	15.1 k	0.1 k	-0.3 k	15.2 k	0.0 k	0.0 k	0.0 k	0.0 k	15.19 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-20.0	24.5 k	0.2 k	-0.5 k	24.7 k	0.0 k	0.0 k	0.0 k	0.0 k	24.69 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-18.0	15.1 k	0.1 k	-0.3 k	15.2 k	0.0 k	0.0 k	0.0 k	0.0 k	15.19 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-17.3	19.8 k	0.1 k	-0.4 k	19.9 k	0.0 k	0.0 k	0.0 k	0.0 k	19.94 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-11.9	26.9 k	0.2 k	-0.6 k	27.1 k	0.0 k	0.0 k	0.0 k	0.0 k	27.07 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-10.2	15.1 k	0.1 k	-0.3 k	15.2 k	0.0 k	0.0 k	0.0 k	0.0 k	15.19 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-5.9	15.1 k	0.1 k	-0.3 k	15.2 k	0.0 k	0.0 k	0.0 k	0.0 k	15.19 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.6-4.5	27.3 k	0.2 k	-0.6 k	27.5 k	0.0 k	0.0 k	0.0 k	0.0 k	27.54 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
F.5-4.0	31.1 k	0.2 k	-0.7 k	31.3 k	0.0 k	0.0 k	0.0 k	0.0 k	31.34 k	950	1.00	4 E.S.	3 E.S.	1330	0.71
E.9-29.0	23.1 k	0.2 k	-0.5 k	23.3 k	0.0 k	0.0 k	0.0 k	0.0 k	23.29 k	951	1.00	4 E.S.	3 E.S.	1330	0.71
E.7-4.1	6.6 k	0.1 k	-0.2 k	6.7 k	0.0 k	0.0 k	0.0 k	0.0 k	6.67 k	952	1.00	4 E.S.	3 E.S.	1330	0.72
E.4-29.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	3 E.S.	#DIV/0!	#DIV/0!	0.72
D.8-29.0	9.0 k	0.2 k	-0.4 k	9.1 k	0.0 k	0.0 k	0.0 k	0.0 k	9.11 k	959	1.00	4 E.S.	3 E.S.	1330	0.72
D.6-4.6	5.2 k	0.1 k	-0.3 k	5.3 k	0.0 k	0.0 k	0.0 k	0.0 k	5.28 k	960	1.00	4 E.S.	3 E.S.	1330	0.72
D.2-29.0	28.3 k	0.6 k	-1.7 k	28.9 k	0.0 k	0.0 k	0.0 k	0.0 k	28.88 k	963	1.00	4 E.S.	3 E.S.	1330	0.72
D.0-17.2	23.6 k	0.5 k	-1.6 k	24.1 k	0.0 k	0.0 k	0.0 k	0.0 k	24.11 k	964	1.00	4 E.S.	3 E.S.	1330	0.73
D.0-11.9	23.6 k	0.5 k	-1.6 k	24.1 k	0.0 k	0.0 k	0.0 k	0.0 k	24.11 k	964	1.00	4 E.S.	3 E.S.	1330	0.73
D.0-4.5	23.6 k	0.5 k	-1.6 k	24.1 k	0.0 k	0.0 k	0.0 k	0.0 k	24.11 k	964	1.00	4 E.S.	3 E.S.	1330	0.73
D.0-25.5	24.0 k	0.5 k	-1.6 k	24.6 k	0.0 k	0.0 k	0.0 k	0.0 k	24.59 k	964	1.00	4 E.S.	3 E.S.	1330	0.73
C.1-29.0	25.5 k	0.7 k	-2.1 k	26.2 k	0.0 k	0.0 k	0.0 k	0.0 k	26.18 k	970	1.00	4 E.S.	3 E.S.	1330	0.73
C.0-4.0	16.5 k	0.5 k	-1.4 k	17.0 k	0.0 k	0.0 k	0.0 k	0.0 k	16.98 k	970	1.00	4 E.S.	3 E.S.	1330	0.73
B.2-29.0	25.5 k	0.8 k	-2.4 k	26.3 k	0.0 k	0.0 k	0.0 k	0.0 k	26.27 k	973	1.00	4 E.S.	3 E.S.	1330	0.73

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore**

Katerra

Lateral Analysis - 3rd Floor Framing Level.

B.2-17.6	8.0 k	0.3 k	-0.7 k	8.3 k	0.0 k	0.0 k	0.0 k	0.0 k	8.27 k	973	1.00	4 E.S.	3 E.S.	1330	0.73
B.2-11.4	8.0 k	0.3 k	-0.7 k	8.3 k	0.0 k	0.0 k	0.0 k	0.0 k	8.27 k	973	1.00	4 E.S.	3 E.S.	1330	0.73
B.2-4.9	8.0 k	0.3 k	-0.7 k	8.3 k	0.0 k	0.0 k	0.0 k	0.0 k	8.27 k	973	1.00	4 E.S.	3 E.S.	1330	0.73
B.2-25.0	8.0 k	0.3 k	-0.7 k	8.3 k	0.0 k	0.0 k	0.0 k	0.0 k	8.27 k	973	1.00	4 E.S.	3 E.S.	1330	0.73
B.0-4.0	16.5 k	0.5 k	-1.6 k	17.0 k	0.0 k	0.0 k	0.0 k	0.0 k	17.04 k	973	1.00	4 E.S.	3 E.S.	1330	0.73
A.0-11.8	26.4 k	0.9 k	-2.8 k	27.3 k	0.0 k	0.0 k	0.0 k	0.0 k	27.35 k	977	1.00	4 E.S.	3 E.S.	1330	0.73
A.0-17.3	26.4 k	0.9 k	-2.8 k	27.3 k	0.0 k	0.0 k	0.0 k	0.0 k	27.35 k	977	1.00	4 E.S.	3 E.S.	1330	0.73
A.0-4.7	34.9 k	1.3 k	-3.7 k	36.1 k	0.0 k	0.0 k	0.0 k	0.0 k	36.14 k	977	1.00	4 E.S.	3 E.S.	1330	0.73
A.0-25.2	30.2 k	1.1 k	-3.2 k	31.3 k	0.0 k	0.0 k	0.0 k	0.0 k	31.26 k	977	1.00	4 E.S.	3 E.S.	1330	0.73
PL A.8-5.6	6.6 k	0.3 k	-0.8 k	6.9 k	0.0 k	0.0 k	0.0 k	0.0 k	6.86 k	980	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.7-29.0	8.5 k	0.3 k	-1.0 k	8.8 k	0.0 k	0.0 k	0.0 k	0.0 k	8.84 k	982	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.5-17.9	6.6 k	0.3 k	-0.8 k	6.9 k	0.0 k	0.0 k	0.0 k	0.0 k	6.88 k	983	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.5-10.5	6.6 k	0.3 k	-0.8 k	6.9 k	0.0 k	0.0 k	0.0 k	0.0 k	6.88 k	983	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.5-5.6	6.6 k	0.3 k	-0.8 k	6.9 k	0.0 k	0.0 k	0.0 k	0.0 k	6.88 k	983	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.5-22.5	6.6 k	0.3 k	-0.8 k	6.9 k	0.0 k	0.0 k	0.0 k	0.0 k	6.88 k	983	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.2-4.0	4.7 k	0.2 k	-0.7 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.94 k	988	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.2-5.0	4.7 k	0.2 k	-0.7 k	4.9 k	0.0 k	0.0 k	0.0 k	0.0 k	4.94 k	988	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.2-11.7	10.4 k	0.5 k	-1.5 k	10.9 k	0.0 k	0.0 k	0.0 k	0.0 k	10.87 k	988	1.00	3 E.S.	3 E.S.	1330	0.74
PL A.2-10.7	10.4 k	0.5 k	-1.5 k	10.9 k	0.0 k	0.0 k	0.0 k	0.0 k	10.87 k	988	1.00	3 E.S.	3 E.S.	1330	0.74
0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	3 E.S.	#DIV/0!	#DIV/0!
S	1211.6 k	0.3 k	-0.9 k	1273.9 k	1217.3 k	0.0 k	0.0 k	1332.4 k	2606.3 k						

Check for Torsional Irregularity

	Building	Max Defl.						
		Line	ΔX+	ΔX-	ΔY+	ΔY-	Ratio	
E/W	PL A.2-10.7		0.988	0.811			1.0	< 1.2 OK
	K.0-25.5		0.933	0.972			1.1	< 1.2 OK
N/S	29.0-H.5				0.703	1.019	1.1	< 1.2 OK
	10.0-E.5				0.924	0.830	1.1	< 1.2 OK
	Average		0.961	0.891	0.814	0.925		

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.****Tiedown Calculations - 3rd Floor Framing Level.**

Typ Flr Ht = 10.25'

Typ Plate Ht = 9.26'

Building Line	Element Length (ft)	Element Shear (kip)	Wall Thk (4x/6x)	Height (ft)	Moment (k-ft)	D. L. w (k/ft)	Uplift Above (kip)	Incr. Uplift (kip)	Total Uplift (kip)	Current TD Level	Tiedown Capacity		Demand to Capacity	TD End Post Area (sq.in)	TD Δ _a @ load in (LRFD)
											Incr. (kip)	Total (kip)			
29.0-H.5	4.00	4.077	6x	10.25	42	0.00	14.66	13.93	28.60	2	18.84	37.24	0.77	59.58	0.215
29.0-P.7	11.50	11.718	6x	10.25	120	0.00	12.04	11.44	23.48	2	14.46	37.24	0.79	59.58	0.177
29.0-U.3	8.00	8.136	6x	10.25	83	0.00	12.54	11.91	24.45	2	14.46	37.24	0.82	59.58	0.184
29.0-A.9	5.00	5.064	6x	10.25	52	0.00	13.66	12.98	26.64	2	14.46	37.24	0.90	59.58	0.200
29.0-PL A.7	5.50	5.571	6x	10.25	57	0.00	13.36	12.69	26.05	2	14.46	37.24	0.88	59.58	0.196
29.0-P.1	6.50	6.554	6x	10.25	67	0.00	12.86	12.21	25.08	2	14.46	37.24	0.84	59.58	0.189
29.0-J.0	6.50	6.554	6x	10.25	67	0.00	12.86	12.21	25.08	2	14.46	37.24	0.84	59.58	0.189
29.0-H.4	18.00	8.930	6x	10.25	92	0.00	11.35	5.38	16.73	2	14.46	37.24	0.45	59.58	0.126
29.0-H.4	18.00	8.930	6x	10.25	92	0.00	0.00	5.38	5.38	2	10.51	10.51	0.51	16.82	0.143
29.0-P.6	18.50	9.178	6x	10.25	94	0.00	11.33	5.38	16.71	2	14.46	37.24	0.45	59.58	0.126
29.0-P.6	18.50	9.178	6x	10.25	94	0.00	0.00	5.38	5.38	2	10.51	10.51	0.51	16.82	0.143
27.9-U.2	19.00	9.358	6x	10.25	96	0.00	11.24	5.33	16.57	2	14.46	37.24	0.44	59.58	0.125
27.9-U.2	19.00	9.358	6x	10.25	96	0.00	0.00	5.33	5.33	2	0.00	0.00	N/A	16.82	#DIV/0!
27.1-E.0	37.00	36.387	6x	10.25	373	0.00	10.92	10.36	21.28	2	14.46	37.24	0.72	59.58	0.160
27.1-H.5	5.50	5.409	6x	10.25	55	0.00	12.99	12.32	25.31	2	14.46	37.24	0.85	59.58	0.190
27.1-P.5	5.50	5.409	6x	10.25	55	0.00	12.99	12.32	25.31	2	14.46	37.24	0.85	59.58	0.190
27.1-C.4	8.00	7.867	6x	10.25	81	0.00	12.15	11.52	23.67	2	14.46	37.24	0.80	59.58	0.178
27.1-A.8	8.50	8.359	6x	10.25	86	0.00	12.05	11.42	23.47	2	14.46	37.24	0.79	59.58	0.176
27.1-PL A.7	18.00	17.702	6x	10.25	181	0.00	11.25	10.67	21.93	2	14.46	37.24	0.74	59.58	0.165
26.0-E.2	21.00	20.548	6x	10.25	211	0.00	11.11	10.53	21.64	2	14.46	37.24	0.73	59.58	0.163
26.0-C.9	23.50	22.994	6x	10.25	236	0.00	11.05	10.47	21.52	2	14.46	37.24	0.72	59.58	0.162
26.0-B.5	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	2	14.46	37.24	#DIV/0!	59.58	#DIV/0!
26.0-PL A.6	21.00	10.274	6x	10.25	105	0.00	11.11	5.27	16.37	2	14.46	37.24	0.44	59.58	0.123
26.0-PL A.6	21.00	10.274	6x	10.25	105	0.00	0.00	5.27	5.27	2	10.51	10.51	0.50	16.82	0.140
25.6-P.5	25.00	24.276	6x	10.25	249	0.00	10.94	10.37	21.31	2	14.46	37.24	0.72	59.58	0.160
25.4-U.3	8.50	8.205	6x	10.25	84	0.00	11.83	11.21	23.05	2	14.46	37.24	0.78	59.58	0.173
25.3-E.3	25.00	24.117	6x	10.25	247	0.00	10.87	10.30	21.17	2	14.46	37.24	0.71	59.58	0.159
25.0-H.5	28.50	27.288	6x	10.25	280	0.00	10.74	10.17	20.91	2	14.46	37.24	0.70	59.58	0.157
25.0-L.0	10.50	10.053	6x	10.25	103	0.00	11.45	10.85	22.30	2	14.46	37.24	0.75	59.58	0.168
25.0-K.0	18.50	17.713	6x	10.25	182	0.00	10.95	10.37	21.33	2	14.46	37.24	0.72	59.58	0.160
25.0-P.5	22.00	21.064	6x	10.25	216	0.00	10.86	10.28	21.14	2	14.46	37.24	0.71	59.58	0.159
25.0-N.1	18.50	17.713	6x	10.25	182	0.00	10.95	10.37	21.33	2	14.46	37.24	0.72	59.58	0.160
24.2-U.2	29.50	14.108	6x	10.25	145	0.00	10.71	5.07	15.79	2	14.46	37.24	0.42	59.58	0.119
24.2-U.2	29.50	14.108	6x	10.25	145	0.00	0.00	5.07	5.07	2	10.51	10.51	0.48	16.82	0.135
22.6-B.2	4.00	3.796	6x	10.25	39	0.00	13.70	12.97	26.67	2	18.84	37.24	0.72	59.58	0.200
22.1-E.4	24.50	11.566	6x	10.25	119	0.00	10.66	5.04	15.70	2	14.46	37.24	0.42	59.58	0.118
22.1-E.4	24.50	11.566	6x	10.25	119	0.00	0.00	5.04	5.04	2	10.51	10.51	0.48	16.82	0.134
21.0-E.4	8.50	7.942	7x	10.25	81	0.00	11.47	10.85	22.33	2	18.84	37.24	0.60	59.58	0.168
21.0-U.2	32.50	30.320	8x	10.25	311	0.00	10.43	9.87	20.30	2	12.27	31.25	0.80	50.00	0.182
20.0-E.4	24.50	11.322	9x	10.25	116	0.00	10.45	4.94	15.38	2	12.27	31.25	0.49	50.00	0.138
20.0-E.4	24.50	11.322	6x	10.25	116	0.00	0.00	4.94	4.94	2	0.00	0.00	N/A	16.82	#DIV/0!
19.5-E.5	8.50	7.776	10x	10.25	80	0.00	11.25	10.63	21.87	2	12.27	31.25	0.87	50.00	0.196
18.8-E.5	25.00	11.313	11x	10.25	116	0.00	10.23	4.83	15.06	2	12.27	31.25	0.48	50.00	0.135
18.8-E.5	25.00	11.313	6x	10.25	116	0.00	0.00	4.83	4.83	2	10.51	10.51	0.46	16.82	0.129
18.2-U.2	24.50	22.157	6x	10.25	227	0.00	10.23	9.66	19.90	2	14.46	37.24	0.67	59.58	0.150
17.2-PL A.7	7.00	6.167	6x	10.25	63	0.00	11.17	10.53	21.71	2	14.46	37.24	0.73	59.58	0.163
17.3-E.3	25.00	22.104	6x	10.25	227	0.00	10.01	9.44	19.45	2	14.46	37.24	0.65	59.58	0.146
17.0-U.2	32.50	14.226	6x	10.25	146	0.00	9.85	4.63	14.48	2	14.46	37.24	0.39	59.58	0.109
17.0-U.2	32.50	14.226	6x	10.25	146	0.00	0.00	4.63	4.63	2	10.51	10.51	0.44	16.82	0.123
15.8-PL A.6	23.00	20.159	6x	10.25	207	0.00	10.04	9.39	19.44	2	14.46	37.24	0.65	59.58	0.146
15.2-E.2	21.00	18.430	6x	10.25	189	0.00	10.10	9.45	19.55	2	14.46	37.24	0.65	59.58	0.147
15.2-C.7	29.50	25.889	6x	10.25	265	0.00	9.96	9.31	19.27	2	14.46	37.24	0.64	59.58	0.145
15.2-A.6	11.50	10.092	6x	10.25	103	0.00	10.54	9.85	20.39	2	14.46	37.24	0.68	59.58	0.153
13.8-C.7	29.50	26.068	6x	10.25	267	0.00	10.03	9.38	19.41	2	14.46	37.24	0.65	59.58	0.146

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.**

13.8-A.6	11.50	10.162	6x	10.25	104	0.00	10.62	9.92	20.54	2	14.46	37.24	0.69	59.58	0.154
13.8-E.2	22.00	19.441	6x	10.25	199	0.00	10.15	9.49	19.64	2	14.46	37.24	0.66	59.58	0.148
13.2-PL A.6	23.50	20.795	6x	10.25	213	0.00	10.14	9.47	19.61	2	14.46	37.24	0.66	59.58	0.147
12.0-U.2	24.50	10.952	6x	10.25	112	0.00	10.23	4.78	15.01	2	14.46	37.24	0.40	59.58	0.113
12.0-U.2	24.50	10.952	6x	10.25	112	0.00	0.00	4.78	4.78	2	10.51	10.51	0.45	16.82	0.127
11.8-E.3	25.00	11.248	6x	10.25	115	0.00	10.30	4.80	15.10	2	14.46	37.24	0.41	59.58	0.114
11.8-E.3	25.00	11.248	6x	10.25	115	0.00	0.00	4.80	4.80	2	10.51	10.51	0.46	16.82	0.128
11.0-U.2	32.50	14.892	6x	10.25	153	0.00	10.40	4.85	15.24	2	14.46	37.24	0.41	59.58	0.115
11.0-U.2	32.50	14.892	6x	10.25	153	0.00	0.00	4.85	4.85	2	10.51	10.51	0.46	16.82	0.129
10.0-E.5	25.00	11.553	6x	10.25	118	0.00	10.59	4.93	15.53	2	14.46	37.24	0.42	59.58	0.117
10.0-E.5	25.00	11.553	6x	10.25	118	0.00	0.00	4.93	4.93	2	10.51	10.51	0.47	16.82	0.131
9.5-S.5	8.50	7.889	6x	10.25	81	0.00	11.58	10.78	22.36	2	14.46	37.24	0.75	59.58	0.168
9.2-E.5	8.50	7.957	6x	10.25	82	0.00	11.69	10.88	22.56	2	14.46	37.24	0.75	59.58	0.170
9.0-U.2	24.50	11.501	6x	10.25	118	0.00	10.78	5.02	15.80	2	14.46	37.24	0.42	59.58	0.119
9.0-U.2	24.50	11.501	6x	10.25	118	0.00	0.00	5.02	5.02	2	10.51	10.51	0.48	16.82	0.134
7.9-E.4	24.50	11.595	6x	10.25	119	0.00	10.88	5.06	15.94	2	14.46	37.24	0.43	59.58	0.120
7.9-E.4	24.50	11.595	6x	10.25	119	0.00	0.00	5.06	5.06	2	10.51	10.51	0.48	16.82	0.135
7.3-E.0	8.50	8.070	6x	10.25	83	0.00	11.86	11.03	22.89	2	14.46	37.24	0.76	59.58	0.172
8.0-E.4	8.50	8.139	6x	10.25	83	0.00	11.97	11.12	23.10	2	14.46	37.24	0.77	59.58	0.174
7.0-U.2	32.50	15.620	6x	10.25	160	0.00	10.94	5.08	16.03	2	14.46	37.24	0.43	59.58	0.120
7.0-U.2	32.50	15.620	6x	10.25	160	0.00	0.00	5.08	5.08	2	10.51	10.51	0.48	16.82	0.135
6.0-E.5	25.00	12.118	6x	10.25	124	0.00	11.15	5.18	16.33	2	14.46	37.24	0.44	59.58	0.123
6.0-E.5	25.00	12.118	6x	10.25	124	0.00	0.00	5.18	5.18	2	10.51	10.51	0.49	16.82	0.138
5.6-B.5	4.50	4.389	6x	10.25	45	0.00	13.85	12.85	26.71	2	18.84	37.24	0.72	59.58	0.201
5.0-E.5	5.50	5.391	6x	10.25	55	0.00	13.24	12.28	25.52	2	14.46	37.24	0.85	59.58	0.192
4.9-D.9	8.00	7.883	6x	10.25	81	0.00	12.45	11.54	23.99	2	14.46	37.24	0.80	59.58	0.180
4.8-B.5	6.50	6.522	6x	10.25	67	0.00	13.12	12.15	25.28	2	14.46	37.24	0.84	59.58	0.190
4.6-E.3	25.00	24.855	6x	10.25	255	0.00	11.45	10.62	22.07	2	14.46	37.24	0.73	59.58	0.166
4.0-PL A.6	20.50	20.706	6x	10.25	212	0.00	8.18	10.88	19.07	2	14.46	26.73	0.75	42.77	0.200
4.0-K.5	34.50	34.846	6x	10.25	357	0.00	11.52	10.66	22.18	2	14.46	37.24	0.74	59.58	0.167
4.0-E.2	21.50	21.717	6x	10.25	223	0.00	11.73	10.86	22.59	2	14.46	37.24	0.75	59.58	0.170
4.0-C.9	23.50	23.737	6x	10.25	243	0.00	11.68	10.81	22.49	2	14.46	37.24	0.75	59.58	0.169
1.7-U.2	31.00	15.780	6x	10.25	162	0.00	11.65	5.39	17.04	2	14.46	37.24	0.46	59.58	0.128
1.7-U.2	31.00	15.780	6x	10.25	162	0.00	0.00	5.39	5.39	2	10.51	10.51	0.51	16.82	0.144
1.0-C.3	9.00	9.170	6x	10.25	94	0.00	12.70	11.75	24.45	2	14.46	37.24	0.81	59.58	0.184
1.0-E.9	6.50	6.623	6x	10.25	68	0.00	13.34	12.34	25.68	2	14.46	37.24	0.85	59.58	0.193
1.0-N.9	25.00	25.477	6x	10.25	261	0.00	11.76	10.88	22.64	2	14.46	37.24	0.75	59.58	0.170
1.0-P.8	19.00	19.362	6x	10.25	198	0.00	11.91	11.03	22.94	2	14.46	37.24	0.76	59.58	0.172
1.0-K.0	7.00	7.134	6x	10.25	73	0.00	13.17	12.19	25.36	2	14.46	37.24	0.84	59.58	0.191
1.0-L.0	20.00	20.381	6x	10.25	209	0.00	11.88	11.00	22.88	2	14.46	37.24	0.76	59.58	0.172
0.5-PL A.6	6.25	6.482	6x	10.25	66	0.00	0.00	12.65	12.65	1	14.46	14.46	0.88	23.14	0.245
0.3-U.4	6.00	6.268	6x	10.25	64	0.00	13.91	12.85	26.76	2	14.46	37.24	0.89	59.58	0.201
0.1-U.3	4.50	4.733	6x	10.25	49	0.00	15.01	13.86	28.87	2	18.84	37.24	0.78	59.58	0.217
0.1-R.0	4.50	4.733	6x	10.25	49	0.00	15.01	13.86	28.87	2	18.84	37.24	0.78	59.58	0.217
0.0-K.0	4.00	4.215	6x	10.25	43	0.00	15.59	14.40	29.99	2	18.84	37.24	0.81	59.58	0.226
0.0-K.5	4.00	4.215	6x	10.25	43	0.00	15.59	14.40	29.99	2	18.84	37.24	0.81	59.58	0.226
0.0-P.7	4.00	4.215	6x	10.25	43	0.00	15.59	14.40	29.99	2	18.84	37.24	0.81	59.58	0.226
0.0-P.4	4.00	4.215	6x	10.25	43	0.00	15.59	14.40	29.99	2	18.84	37.24	0.81	59.58	0.226
4.0-P.4	8.50	8.956	6x	10.25	92	0.00	#DIV/0!	12.24	#DIV/0!	2	14.46	37.24	#DIV/0!	59.58	#DIV/0!
4.0-P.4	8.50	8.956	6x	10.25	92	0.00	#DIV/0!	12.24	#DIV/0!	2	14.46	37.24	#DIV/0!	59.58	#DIV/0!
U.4-29.0	6.00	6.566	6x	10.25	67	0.00	14.28	13.46	27.74	2	18.84	37.24	0.74	59.58	0.209
U.4-19.9	7.00	7.660	6x	10.25	79	0.00	13.88	13.09	26.96	2	14.46	37.24	0.90	59.58	0.203
U.4-17.4	6.00	6.566	6x	10.25	67	0.00	14.28	13.46	27.74	2	18.84	37.24	0.74	59.58	0.209
U.4-11.0	7.50	8.207	6x	10.25	84	0.00	13.73	12.94	26.67	2	14.46	37.24	0.89	59.58	0.201
U.4-4.0	5.50	6.010	6x	10.25	62	0.00	14.52	13.69	28.21	2	18.84	37.24	0.76	59.58	0.212
U.3-29.0	8.00	8.665	6x	10.25	89	0.00	13.44	12.69	26.13	2	14.46	37.24	0.88	59.58	0.196
U.0-4.0	18.00	19.094	6x	10.25	196	0.00	12.17	11.51	23.68	2	14.46	37.24	0.80	59.58	0.178
U.0-9.0	26.00	27.577	6x	10.25	283	0.00	11.95	11.31	23.26	2	14.46	37.24	0.78	59.58	0.175
U.0-12.0	26.00	27.577	6x	10.25	283	0.00	11.95	11.31	23.26	2	14.46	37.24	0.78	59.58	0.175
U.0-11.0	12.50	13.258	6x	10.25	136	0.00	12.49	11.82	24.31	2	14.46	37.24	0.82	59.58	0.183
U.0-20.1	18.00	19.092	6x	10.25	196	0.00	12.17	11.51	23.68	2	14.46	37.24	0.80	59.58	0.178
U.0-18.1	26.00	27.577	6x	10.25	283	0.00	11.95	11.31	23.26	2	14.46	37.24	0.78	59.58	0.175

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.**

U.0-17.2	24.50	25.986	6x	10.25	266	0.00	11.98	11.33	23.31	2	14.46	37.24	0.78	59.58	0.175
U.0-7.2	5.50	5.834	6x	10.25	60	0.00	14.04	13.29	27.33	2	18.84	37.24	0.73	59.58	0.206
T.0-29.5	29.50	31.207	6x	10.25	320	0.00	11.86	11.22	23.08	2	14.46	37.24	0.78	59.58	0.174
S.2-1.5	13.00	13.750	6x	10.25	141	0.00	12.41	11.75	24.16	2	14.46	37.24	0.81	59.58	0.182
S.2-25.2	13.00	13.750	6x	10.25	141	0.00	12.41	11.75	24.16	2	14.46	37.24	0.81	59.58	0.182
R.1-4.0	21.50	22.655	6x	10.25	232	0.00	11.96	11.33	23.29	2	14.46	37.24	0.78	59.58	0.175
Q.0-28.4	9.50	9.995	6x	10.25	102	0.00	12.73	12.05	24.78	2	14.46	37.24	0.83	59.58	0.186
Q.0-25.7	21.00	22.095	6x	10.25	226	0.00	11.96	11.32	23.28	2	14.46	37.24	0.78	59.58	0.175
P.8-29.0	12.00	12.544	6x	10.25	129	0.00	12.33	11.69	24.02	2	14.46	37.24	0.81	59.58	0.181
P.3-4.0	8.50	8.745	6x	10.25	90	0.00	12.59	11.95	24.54	2	14.46	37.24	0.83	59.58	0.185
P.0-4.0	29.50	15.015	6x	10.25	154	0.00	11.36	5.40	16.76	2	14.46	37.24	0.45	59.58	0.126
P.0-4.0	29.50	15.015	6x	10.25	154	0.00	0.00	5.40	5.40	2	10.51	10.51	0.51	16.82	0.144
N.0-25.5	24.50	12.363	6x	10.25	127	0.00	11.34	5.39	16.73	2	14.46	37.24	0.45	59.58	0.126
N.0-25.5	24.50	12.363	6x	10.25	127	0.00	0.00	5.39	5.39	2	10.51	10.51	0.51	16.82	0.144
M.0-4.0	33.50	16.655	6x	10.25	171	0.00	11.02	5.25	16.27	2	14.46	37.24	0.44	59.58	0.122
M.0-4.0	33.50	16.655	6x	10.25	171	0.00	0.00	5.25	5.25	2	10.51	10.51	0.50	16.82	0.140
L.1-25.5	24.00	11.890	6x	10.25	122	0.00	11.11	5.30	16.41	2	14.46	37.24	0.44	59.58	0.123
L.1-25.5	24.00	11.890	6x	10.25	122	0.00	0.00	5.30	5.30	2	10.51	10.51	0.50	16.82	0.141
K.0-25.5	24.50	11.903	6x	10.25	122	0.00	10.86	5.19	16.06	2	14.46	37.24	0.43	59.58	0.121
K.0-25.5	24.50	11.903	6x	10.25	122	0.00	0.00	5.19	5.19	2	10.51	10.51	0.49	16.82	0.138
J.8-4.0	8.50	8.240	6x	10.25	84	0.00	11.78	11.26	23.04	2	14.46	37.24	0.78	59.58	0.173
H.6-25.7	25.00	23.639	6x	10.25	242	0.00	10.53	10.10	20.62	2	14.46	37.24	0.70	59.58	0.155
H.1-29.0	11.00	10.411	6x	10.25	107	0.00	11.11	10.67	21.79	2	14.46	37.24	0.74	59.58	0.164
H.0-28.4	9.50	9.003	6x	10.25	92	0.00	11.30	10.86	22.16	2	14.46	37.24	0.75	59.58	0.167
H.0-25.7	21.00	19.902	6x	10.25	204	0.00	10.62	10.20	20.82	2	14.46	37.24	0.71	59.58	0.157
F.6-8.0	26.00	24.691	6x	10.25	253	0.00	10.54	10.12	20.66	2	14.46	37.24	0.70	59.58	0.155
F.6-25.3	21.00	19.943	6x	10.25	204	0.00	10.64	10.22	20.86	2	14.46	37.24	0.71	59.58	0.157
F.6-22.1	16.00	15.195	6x	10.25	156	0.00	10.81	10.38	21.19	2	14.46	37.24	0.72	59.58	0.159
F.6-20.0	26.00	24.691	6x	10.25	253	0.00	10.54	10.12	20.66	2	14.46	37.24	0.70	59.58	0.155
F.6-18.0	16.00	15.195	6x	10.25	156	0.00	10.81	10.38	21.19	2	14.46	37.24	0.72	59.58	0.159
F.6-17.3	21.00	19.943	6x	10.25	204	0.00	10.64	10.22	20.86	2	14.46	37.24	0.71	59.58	0.157
F.6-11.9	28.50	27.066	6x	10.25	277	0.00	10.50	10.09	20.59	2	14.46	37.24	0.70	59.58	0.155
F.6-10.2	16.00	15.195	6x	10.25	156	0.00	10.81	10.38	21.19	2	14.46	37.24	0.72	59.58	0.159
F.6-5.9	16.00	15.195	6x	10.25	156	0.00	10.81	10.38	21.19	2	14.46	37.24	0.72	59.58	0.159
F.6-4.5	29.00	27.541	6x	10.25	282	0.00	10.49	10.08	20.57	2	14.46	37.24	0.70	59.58	0.155
F.5-4.0	33.00	31.340	6x	10.25	321	0.00	10.45	10.04	20.49	2	14.46	37.24	0.69	59.58	0.154
E.9-29.0	24.50	11.644	6x	10.25	119	0.00	10.57	5.08	15.65	2	14.46	37.24	0.42	59.58	0.118
E.9-29.0	24.50	11.644	6x	10.25	119	0.00	0.00	5.08	5.08	2	10.51	10.51	0.48	16.82	0.135
E.7-4.1	7.00	6.667	6x	10.25	68	0.00	11.85	11.39	23.23	2	14.46	37.24	0.79	59.58	0.175
E.4-29.0	0.00	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	2	14.46	37.24	#DIV/0!	59.58	#DIV/0!
D.8-29.0	9.50	9.111	6x	10.25	93	0.00	11.41	10.99	22.40	2	14.46	37.24	0.76	59.58	0.168
D.6-4.6	5.50	5.281	6x	10.25	54	0.00	12.49	12.03	24.52	2	14.46	37.24	0.83	59.58	0.184
D.2-29.0	30.00	14.441	6x	10.25	148	0.00	10.59	5.10	15.70	2	14.46	37.24	0.42	59.58	0.118
D.2-29.0	30.00	14.441	6x	10.25	148	0.00	0.00	5.10	5.10	2	10.51	10.51	0.49	16.82	0.136
D.0-17.2	25.00	12.055	6x	10.25	124	0.00	10.68	5.15	15.83	2	14.46	37.24	0.43	59.58	0.119
D.0-17.2	25.00	12.055	6x	10.25	124	0.00	0.00	5.15	5.15	2	10.51	10.51	0.49	16.82	0.137
D.0-11.9	25.00	12.055	6x	10.25	124	0.00	10.68	5.15	15.83	2	14.46	37.24	0.43	59.58	0.119
D.0-11.9	25.00	12.055	6x	10.25	124	0.00	0.00	5.15	5.15	2	10.51	10.51	0.49	16.82	0.137
D.0-4.5	25.00	12.055	6x	10.25	124	0.00	10.68	5.15	15.83	2	14.46	37.24	0.43	59.58	0.119
D.0-4.5	25.00	12.055	6x	10.25	124	0.00	0.00	5.15	5.15	2	10.51	10.51	0.49	16.82	0.137
D.0-25.5	25.50	12.296	6x	10.25	126	0.00	10.67	5.14	15.82	2	14.46	37.24	0.42	59.58	0.119
D.0-25.5	25.50	12.296	6x	10.25	126	0.00	0.00	5.14	5.14	2	0.00	0.00	N/A	#N/A	#N/A
C.1-29.0	27.00	26.177	6x	10.25	268	0.00	10.69	10.32	21.01	2	14.46	37.24	0.71	59.58	0.158
C.0-4.0	17.50	16.983	6x	10.25	174	0.00	10.93	10.55	21.48	2	14.46	37.24	0.73	59.58	0.161
B.2-29.0	27.00	26.267	6x	10.25	269	0.00	10.72	10.36	21.08	2	14.46	37.24	0.72	59.58	0.158
B.2-17.6	8.50	8.270	6x	10.25	85	0.00	11.70	11.30	23.00	2	14.46	37.24	0.78	59.58	0.173
B.2-11.4	8.50	8.270	6x	10.25	85	0.00	11.70	11.30	23.00	2	14.46	37.24	0.78	59.58	0.173
B.2-4.9	8.50	8.270	6x	10.25	85	0.00	11.70	11.30	23.00	2	14.46	37.24	0.78	59.58	0.173
B.2-25.0	8.50	8.270	6x	10.25	85	0.00	11.70	11.30	23.00	2	14.46	37.24	0.78	59.58	0.173
B.0-4.0	17.50	17.035	6x	10.25	175	0.00	10.95	10.58	21.54	2	14.46	37.24	0.73	59.58	0.162
A.0-11.8	28.00	13.673	6x	10.25	140	0.00	10.74	5.19	15.93	2	14.46	37.24	0.43	59.58	0.120
A.0-11.8	28.00	13.673	6x	10.25	140	0.00	0.00	5.19	5.19	2	10.51	10.51	0.49	16.82	0.138

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.**

A.0-17.3	28.00	13.673	6x	10.25	140	0.00	10.74	5.19	15.93	2	14.46	37.24	0.43	59.58	0.120
A.0-17.3	28.00	13.673	6x	10.25	140	0.00	0.00	5.19	5.19	2	10.51	10.51	0.49	16.82	0.138
A.0-4.7	37.00	36.140	6x	10.25	370	0.00	10.64	10.29	20.93	2	14.46	37.24	0.71	59.58	0.157
A.0-25.2	32.00	31.257	6x	10.25	320	0.00	10.69	10.33	21.02	2	14.46	37.24	0.71	59.58	0.158
PL A.8-5.6	7.00	6.863	6x	10.25	70	0.00	8.37	11.72	20.10	2	14.46	26.73	0.81	42.77	0.211
PL A.7-29.0	9.00	8.835	6x	10.25	91	0.00	11.70	11.32	23.02	2	14.46	37.24	0.78	59.58	0.173
PL A.5-17.9	7.00	6.884	6x	10.25	71	0.00	12.15	11.76	23.91	2	14.46	37.24	0.81	59.58	0.180
PL A.5-10.5	7.00	6.884	6x	10.25	71	0.00	12.15	11.76	23.91	2	14.46	37.24	0.81	59.58	0.180
PL A.5-5.6	7.00	6.884	6x	10.25	71	0.00	8.39	11.76	20.15	2	14.46	26.73	0.81	42.77	0.211
PL A.5-22.5	7.00	6.884	6x	10.25	71	0.00	12.15	11.76	23.91	2	14.46	37.24	0.81	59.58	0.180
PL A.2-4.0	5.00	4.941	6x	10.25	51	0.00	8.02	12.66	20.68	1	14.46	26.73	0.88	42.77	0.217
PL A.2-5.0	5.00	4.941	6x	10.25	51	0.00	8.02	12.66	20.68	1	14.46	26.73	0.88	42.77	0.217
PL A.2-11.7	11.00	10.870	6x	10.25	111	0.00	11.50	11.14	22.64	2	14.46	37.24	0.77	59.58	0.170
PL A.2-10.7	11.00	10.870	6x	10.25	111	0.00	11.50	11.14	22.64	2	14.46	37.24	0.77	59.58	0.170

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234Legacy LivermoreKaterraLateral Analysis - 2nd Floor Framing Level.Area at base = 55653 ft²

Story Shear	Center of Mass	Diaphragm Dimensions	Accidental Eccentricity (5%)
Vx = 1374 k	Xm = -136.3'	X = 368.3'	x-dir. Eac. = 18.4' <— E/W
Vy = 1374 k	Ym = 185.1'	Y = 281.5'	y-dir. Eac. = 14.1' <— N/S

Building Line	Location X	Location Y	Angle (degrees)	Length (ft)	Kx	Ky	Kx * Y	Ky * X	X Bar	Y Bar	Kx*y^2	Ky*x^2	h/w ratio
29.0-H.5	-313.4'	193.1'	360.00	4.0'	0.00	4.00	0	-1254	-178.0'	1.0'	0.0E+00	1.3E+05	2.32
29.0-P.7	-312.9'	94.1'	360.00	11.5'	0.00	11.50	0	-3598	-177.5'	-98.0'	0.0E+00	3.6E+05	0.81
29.0-U.3	-310.5'	54.6'	180.00	8.0'	0.00	8.00	0	-2484	-175.0'	-137.5'	0.0E+00	2.5E+05	1.16
29.0-A.9	-305.5'	282.8'	360.00	5.0'	0.00	5.00	0	-1527	-170.0'	90.7'	0.0E+00	1.4E+05	1.85
29.0-PL A.7	-305.5'	303.1'	180.00	5.5'	0.00	5.50	0	-1680	-170.0'	111.0'	0.0E+00	1.6E+05	1.68
29.0-P.1	-299.9'	114.8'	360.00	6.5'	0.00	6.50	0	-1949	-164.4'	-77.3'	0.0E+00	1.8E+05	1.42
29.0-J.0	-299.9'	178.4'	360.00	6.5'	0.00	6.50	0	-1949	-164.4'	-13.7'	0.0E+00	1.8E+05	1.42
29.0-H.4	-280.1'	194.1'	360.00	18.0'	0.00	18.00	0	-5041	-144.6'	2.0'	0.0E+00	3.8E+05	0.51
29.0-P.6	-280.0'	97.8'	360.00	18.5'	0.00	18.50	0	-5181	-144.6'	-94.3'	0.0E+00	3.9E+05	0.50
27.9-U.2	-271.3'	61.8'	360.00	19.0'	0.00	19.00	0	-5155	-135.9'	-130.3'	0.0E+00	3.5E+05	0.49
27.1-E.0	-269.3'	236.2'	180.00	37.0'	0.00	37.00	0	-9965	-133.9'	44.1'	0.0E+00	6.6E+05	0.25
27.1-H.5	-269.3'	236.2'	180.00	5.5'	0.00	5.50	0	-1481	-133.9'	44.1'	0.0E+00	9.9E+04	1.68
27.1-P.5	-269.3'	236.2'	180.00	5.5'	0.00	5.50	0	-1481	-133.9'	44.1'	0.0E+00	9.9E+04	1.68
27.1-C.4	-269.3'	265.8'	180.00	8.0'	0.00	8.00	0	-2155	-133.9'	73.7'	0.0E+00	1.4E+05	1.16
27.1-A.8	-269.3'	284.2'	180.00	8.5'	0.00	8.50	0	-2289	-133.9'	92.1'	0.0E+00	1.5E+05	1.09
27.1-PL A.7	-269.3'	305.4'	180.00	18.0'	0.00	18.00	0	-4848	-133.9'	113.3'	0.0E+00	3.2E+05	0.51
26.0-E.2	-263.2'	231.0'	360.00	21.0'	0.00	21.00	0	-5528	-127.8'	38.9'	0.0E+00	3.4E+05	0.44
26.0-C.9	-263.2'	257.4'	360.00	23.5'	0.00	23.50	0	-6186	-127.8'	65.3'	0.0E+00	3.8E+05	0.39
26.0-B.5	-263.2'	277.0'	180.00	0.0'	0.00	0.00	0	0	-127.8'	84.9'	0.0E+00	0.0E+00	#DIV/0!
26.0-PL A.6	-263.2'	309.2'	360.00	21.0'	0.00	21.00	0	-5528	-127.8'	117.1'	0.0E+00	3.4E+05	0.44
25.6-P.5	-254.1'	101.6'	225.00	25.0'	0.00	25.00	0	-6352	-118.7'	-90.5'	0.0E+00	3.5E+05	0.37
25.4-U.3	-247.1'	53.5'	360.00	8.5'	0.00	8.50	0	-2100	-111.6'	-138.6'	0.0E+00	1.1E+05	1.09
25.3-E.3	-246.3'	229.5'	315.00	25.0'	0.00	25.00	0	-6158	-110.9'	37.4'	0.0E+00	3.1E+05	0.37
25.0-H.5	-237.5'	192.5'	180.00	28.5'	0.00	28.50	0	-6768	-102.0'	0.4'	0.0E+00	3.0E+05	0.32
25.0-L.0	-237.4'	145.8'	360.00	10.5'	0.00	10.50	0	-2493	-102.0'	-46.3'	0.0E+00	1.1E+05	0.88
25.0-K.0	-237.4'	164.8'	360.00	18.5'	0.00	18.50	0	-4393	-102.0'	-27.4'	0.0E+00	1.9E+05	0.50
25.0-P.5	-237.4'	102.4'	180.00	22.0'	0.00	22.00	0	-5224	-102.0'	-89.7'	0.0E+00	2.3E+05	0.42
25.0-N.1	-237.4'	127.0'	180.00	18.5'	0.00	18.50	0	-4393	-102.0'	-65.1'	0.0E+00	1.9E+05	0.50
24.2-U.2	-236.2'	63.8'	180.00	29.5'	0.00	29.50	0	-6968	-100.8'	-128.3'	0.0E+00	3.0E+05	0.31
22.6-B.2	-226.9'	280.3'	180.00	4.0'	0.00	4.00	0	-908	-91.5'	88.2'	0.0E+00	3.3E+04	2.32
22.1-E.4	-221.1'	226.1'	180.00	24.5'	0.00	24.50	0	-5417	-85.7'	34.0'	0.0E+00	1.8E+05	0.38
21.0-E.4	-209.1'	226.1'	180.00	8.5'	0.00	8.50	0	-1777	-73.7'	34.0'	0.0E+00	4.6E+04	1.09
21.0-U.2	-207.4'	59.4'	180.00	32.5'	0.00	32.50	0	-6739	-71.9'	-132.7'	0.0E+00	1.7E+05	0.28
20.0-E.4	-196.7'	227.6'	360.00	24.5'	0.00	24.50	0	-4818	-61.2'	35.5'	0.0E+00	9.2E+04	0.38
19.5-E.5	-185.2'	225.8'	360.00	8.5'	0.00	8.50	0	-1574	-49.7'	33.7'	0.0E+00	2.1E+04	1.09
18.8-E.5	-173.2'	225.8'	360.00	25.0'	0.00	25.00	0	-4329	-37.7'	33.7'	0.0E+00	3.6E+04	0.37
18.2-U.2	-172.3'	61.4'	360.00	24.5'	0.00	24.50	0	-4222	-36.9'	-130.7'	0.0E+00	3.3E+04	0.38
17.2-PL A.7	-143.6'	302.9'	360.00	7.0'	0.00	7.00	0	-1005	-8.2'	110.8'	0.0E+00	4.7E+02	1.32
17.3-E.3	-147.5'	229.5'	225.00	25.0'	0.00	25.00	0	-3688	-12.1'	37.3'	0.0E+00	3.7E+03	0.37
17.0-U.2	-136.8'	59.4'	180.00	32.5'	0.00	32.50	0	-4446	-1.4'	-132.7'	0.0E+00	6.2E+01	0.28
15.8-PL A.6	-131.8'	308.0'	180.00	23.0'	0.00	23.00	0	-3030	3.7'	115.9'	0.0E+00	3.1E+02	0.40
15.2-E.2	-130.6'	231.0'	360.00	21.0'	0.00	21.00	0	-2742	4.9'	38.9'	0.0E+00	5.0E+02	0.44
15.2-C.7	-130.6'	259.8'	360.00	29.5'	0.00	29.50	0	-3851	4.9'	67.7'	0.0E+00	7.0E+02	0.31
15.2-A.6	-130.6'	285.3'	180.00	11.5'	0.00	11.50	0	-1501	4.9'	93.2'	0.0E+00	2.7E+02	0.81
13.8-C.7	-124.2'	259.8'	360.00	29.5'	0.00	29.50	0	-3664	11.2'	67.7'	0.0E+00	3.7E+03	0.31
13.8-A.6	-124.2'	285.3'	180.00	11.5'	0.00	11.50	0	-1428	11.2'	93.2'	0.0E+00	1.5E+03	0.81
13.8-E.2	-124.2'	230.6'	360.00	22.0'	0.00	22.00	0	-2732	11.2'	38.5'	0.0E+00	2.8E+03	0.42
13.2-PL A.6	-122.9'	309.2'	180.00	23.5'	0.00	23.50	0	-2889	12.5'	117.1'	0.0E+00	3.7E+03	0.39
12.0-U.2	-113.3'	61.4'	360.00	24.5'	0.00	24.50	0	-2776	22.1'	-130.7'	0.0E+00	1.2E+04	0.38
11.8-E.3	-107.2'	229.5'	135.00	25.0'	0.00	25.00	0	-2680	28.2'	37.4'	0.0E+00	2.0E+04	0.37
11.0-U.2	-89.8'	59.4'	180.00	32.5'	0.00	32.50	0	-2919	45.6'	-132.7'	0.0E+00	6.8E+04	0.28
10.0-E.5	-81.6'	225.8'	360.00	25.0'	0.00	25.00	0	-2040	53.8'	33.7'	0.0E+00	7.2E+04	0.37
9.5-S.5	-77.6'	225.8'	360.00	8.5'	0.00	8.50	0	-660	57.8'	33.7'	0.0E+00	2.8E+04	1.09

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore**

Katerra

Lateral Analysis - 2nd Floor Framing Level.

9.2-E.5	-69.1'	225.8'	360.00	8.5'	0.00	8.50	0	-587	66.3'	33.7'	0.0E+00	3.7E+04	1.09
9.0-U.2	-66.3'	61.4'	180.00	24.5'	0.00	24.50	0	-1624	69.1'	-130.7'	0.0E+00	1.2E+05	0.38
7.9-E.4	-58.2'	227.6'	180.00	24.5'	0.00	24.50	0	-1426	77.2'	35.4'	0.0E+00	1.5E+05	0.38
7.3-E.0	-55.1'	227.6'	180.00	8.5'	0.00	8.50	0	-469	80.3'	35.4'	0.0E+00	5.5E+04	1.09
8.0-E.4	-46.6'	227.6'	180.00	8.5'	0.00	8.50	0	-396	88.8'	35.4'	0.0E+00	6.7E+04	1.09
7.0-U.2	-42.8'	59.5'	180.00	32.5'	0.00	32.50	0	-1390	92.7'	-132.7'	0.0E+00	2.8E+05	0.28
6.0-E.5	-34.1'	225.8'	180.00	25.0'	0.00	25.00	0	-853	101.3'	33.7'	0.0E+00	2.6E+05	0.37
5.6-B.5	-27.9'	277.5'	180.00	4.5'	0.00	4.50	0	-126	107.5'	85.4'	0.0E+00	5.2E+04	2.06
5.0-E.5	-22.9'	277.5'	180.00	5.5'	0.00	5.50	0	-126	112.5'	85.4'	0.0E+00	7.0E+04	1.68
4.9-D.9	-17.4'	238.7'	180.00	8.0'	0.00	8.00	0	-139	118.0'	46.6'	0.0E+00	1.1E+05	1.16
4.8-B.5	1.4'	277.5'	180.00	6.5'	0.00	6.50	0	9	136.9'	85.4'	0.0E+00	1.2E+05	1.42
4.6-E.3	-8.2'	229.8'	180.00	25.0'	0.00	25.00	0	-205	127.2'	37.7'	0.0E+00	4.0E+05	0.37
4.0-PL A.6	8.4'	308.8'	180.00	20.5'	0.00	20.50	0	173	143.9'	116.7'	0.0E+00	4.2E+05	0.45
4.0-K.5	8.4'	308.8'	180.00	34.5'	0.00	34.50	0	291	143.9'	116.7'	0.0E+00	7.1E+05	0.27
4.0-E.2	8.5'	232.7'	180.00	21.5'	0.00	21.50	0	182	143.9'	40.6'	0.0E+00	4.5E+05	0.43
4.0-C.9	8.5'	257.6'	180.00	23.5'	0.00	23.50	0	199	143.9'	65.5'	0.0E+00	4.9E+05	0.39
1.7-U.2	16.9'	62.5'	360.00	31.0'	0.00	31.00	0	523	152.3'	-129.6'	0.0E+00	7.2E+05	0.30
1.0-C.3	17.7'	268.2'	180.00	9.0'	0.00	9.00	0	159	153.2'	76.1'	0.0E+00	2.1E+05	1.03
1.0-E.9	17.8'	215.4'	180.00	6.5'	0.00	6.50	0	116	153.2'	23.3'	0.0E+00	1.5E+05	1.42
1.0-N.9	17.9'	119.3'	180.00	25.0'	0.00	25.00	0	448	153.3'	-72.8'	0.0E+00	5.9E+05	0.37
1.0-P.8	17.9'	92.8'	180.00	19.0'	0.00	19.00	0	340	153.3'	-99.3'	0.0E+00	4.5E+05	0.49
1.0-K.0	17.9'	163.6'	360.00	7.0'	0.00	7.00	0	125	153.3'	-28.5'	0.0E+00	1.6E+05	1.32
1.0-L.0	17.9'	145.9'	360.00	20.0'	0.00	20.00	0	358	153.3'	-46.2'	0.0E+00	4.7E+05	0.46
0.5-PL A.6	36.8'	308.4'	180.00	0.0'	0.00	0.00	0	0	172.2'	116.3'	0.0E+00	0.0E+00	#DIV/0!
0.3-U.4	44.8'	49.5'	180.00	6.0'	0.00	6.00	0	269	180.3'	-142.6'	0.0E+00	1.9E+05	1.54
0.1-U.3	52.3'	56.2'	180.00	4.5'	0.00	4.50	0	235	187.8'	-135.9'	0.0E+00	1.6E+05	2.06
0.1-R.0	52.3'	83.1'	180.00	4.5'	0.00	4.50	0	235	187.8'	-109.0'	0.0E+00	1.6E+05	2.06
0.0-K.0	54.2'	164.9'	180.00	4.0'	0.00	4.00	0	217	189.6'	-27.2'	0.0E+00	1.4E+05	1.03
0.0-K.5	54.2'	155.3'	180.00	4.0'	0.00	4.00	0	217	189.6'	-36.8'	0.0E+00	1.4E+05	1.03
0.0-P.7	54.2'	96.2'	180.00	4.0'	0.00	4.00	0	217	189.7'	-95.9'	0.0E+00	1.4E+05	1.03
0.0-P.4	54.2'	105.8'	180.00	4.0'	0.00	4.00	0	217	189.7'	-86.3'	0.0E+00	1.4E+05	1.03
4.0-P.4	54.2'	105.8'	180.00	8.5'	0.00	8.50	0	461	189.7'	-86.3'	0.0E+00	3.1E+05	1.09
4.0-P.4	54.2'	105.8'	180.00	8.5'	0.00	8.50	0	461	189.7'	-86.3'	0.0E+00	3.1E+05	1.09

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

U.4-29.0	-287.6'	42.7'	270.00	6.0'	6.00	0.00	256	0	-152.2'	-149.4'	1.3E+05	0.0E+00	1.54
U.4-19.9	-195.1'	42.7'	270.00	7.0'	7.00	0.00	299	0	-59.7'	-149.4'	1.6E+05	0.0E+00	1.32
U.4-17.4	-149.1'	42.7'	450.00	6.0'	6.00	0.00	256	0	-13.6'	-149.4'	1.3E+05	0.0E+00	1.54
U.4-11.0	-89.3'	42.8'	90.00	7.5'	7.50	0.00	321	0	46.2'	-149.3'	1.7E+05	0.0E+00	1.23
U.4-4.0	32.4'	44.3'	450.00	5.5'	5.50	0.00	244	0	167.9'	-147.8'	1.2E+05	0.0E+00	1.68
U.5-4.0	32.4'	47.3'	450.00	6.0'	6.00	0.00	284	0	167.9'	-144.8'	1.3E+05	0.0E+00	1.54
U.3-29.0	-296.1'	53.8'	270.00	8.0'	8.00	0.00	431	0	-160.7'	-138.3'	1.5E+05	0.0E+00	1.16
U.0-4.0	10.0'	76.0'	270.00	18.0'	18.00	0.00	1368	0	145.5'	-116.1'	2.4E+05	0.0E+00	0.51
U.0-9.0	-66.1'	76.1'	270.00	26.0'	26.00	0.00	1979	0	69.4'	-116.0'	3.5E+05	0.0E+00	0.36
U.0-12.0	-113.1'	76.1'	270.00	26.0'	26.00	0.00	1979	0	22.4'	-116.0'	3.5E+05	0.0E+00	0.36
U.0-11.0	-89.6'	76.1'	270.00	12.5'	12.50	0.00	952	0	45.8'	-116.0'	1.7E+05	0.0E+00	0.74
U.0-20.1	-198.4'	76.1'	270.00	18.0'	18.00	0.00	1370	0	-63.0'	-116.0'	2.4E+05	0.0E+00	0.51
U.0-18.1	-172.1'	76.1'	270.00	26.0'	26.00	0.00	1979	0	-36.6'	-116.0'	3.5E+05	0.0E+00	0.36
U.0-17.2	-142.6'	76.1'	270.00	24.5'	24.50	0.00	1865	0	-7.2'	-116.0'	3.3E+05	0.0E+00	0.38
U.0-7.2	-46.0'	76.1'	270.00	5.5'	5.50	0.00	419	0	89.4'	-116.0'	7.4E+04	0.0E+00	1.68
T.0-29.5	-296.7'	78.9'	90.00	29.5'	29.50	0.00	2328	0	-161.2'	-113.2'	3.8E+05	0.0E+00	0.31
S.2-1.5	-262.5'	79.0'	90.00	13.0'	13.00	0.00	1027	0	-127.0'	-113.1'	1.7E+05	0.0E+00	0.71
S.2-25.2	-242.6'	79.0'	90.00	13.0'	13.00	0.00	1027	0	-107.1'	-113.1'	1.7E+05	0.0E+00	0.71
R.1-4.0	41.2'	83.0'	270.00	21.5'	21.50	0.00	1785	0	176.7'	-109.1'	2.6E+05	0.0E+00	0.43
Q.0-28.4	-275.4'	84.6'	90.00	9.5'	9.50	0.00	804	0	-140.0'	-107.5'	1.1E+05	0.0E+00	0.97
Q.0-25.7	-255.7'	84.6'	90.00	21.0'	21.00	0.00	1776	0	-120.2'	-107.5'	2.4E+05	0.0E+00	0.44
P.8-29.0	-306.5'	91.4'	90.00	12.0'	12.00	0.00	1096	0	-171.1'	-100.7'	1.2E+05	0.0E+00	0.77
P.3-4.0	43.5'	107.7'	270.00	8.5'	8.50	0.00	916	0	178.9'	-84.4'	6.1E+04	0.0E+00	1.09
P.0-4.0	33.1'	118.5'	450.00	29.5'	29.50	0.00	3496	0	168.5'	-73.6'	1.6E+05	0.0E+00	0.31
N.0-25.5	-250.7'	127.2'	450.00	24.5'	24.50	0.00	3117	0	-115.3'	-64.9'	1.0E+05	0.0E+00	0.38
M.0-4.0	35.2'	142.0'	450.00	33.5'	33.50	0.00	4757	0	170.7'	-50.1'	8.4E+04	0.0E+00	0.28
L.1-25.5	-250.3'	145.5'	450.00	24.0'	24.00	0.00	3493	0	-114.8'	-46.6'	5.2E+04	0.0E+00	0.39
K.0-25.5	-250.7'	164.5'	450.00	24.5'	24.50	0.00	4030	0	-115.3'	-27.6'	1.9E+04	0.0E+00	0.38
J.8-4.0	36.1'	166.8'	270.00	8.5'	8.50	0.00	1418	0	171.5'	-25.3'	5.5E+03	0.0E+00	1.09
H.6-25.7	-254.4'	190.5'	315.00	25.0'	25.00	0.00	4762	0	-119.0'	-1.6'	6.8E+01	0.0E+00	0.37
H.1-29.0	-304.5'	203.5'	450.00	11.0'	11.00	0.00	2239	0	-169.1'	11.4'	1.4E+03	0.0E+00	0.84
H.0-28.4	-275.4'	207.1'	450.00	9.5'	9.50	0.00	1967	0	-140.0'	15.0'	2.1E+03	0.0E+00	0.97
H.0-25.7	-255.7'	207.1'	90.00	21.0'	21.00	0.00	4349	0	-120.2'	15.0'	4.7E+03	0.0E+00	0.44
F.6-8.0	-57.9'	212.8'	270.00	26.0'	26.00	0.00	5533	0	77.6'	20.7'	1.1E+04	0.0E+00	0.36
F.6-25.3	-245.0'	212.8'	270.00	21.0'	21.00	0.00	4469	0	-109.5'	20.7'	9.0E+03	0.0E+00	0.44
F.6-22.1	-222.0'	212.8'	450.00	16.0'	16.00	0.00	3405	0	-86.6'	20.7'	6.9E+03	0.0E+00	0.58
F.6-20.0	-196.9'	212.8'	270.00	26.0'	26.00	0.00	5533	0	-61.5'	20.7'	1.1E+04	0.0E+00	0.36
F.6-18.0	-171.7'	212.8'	270.00	16.0'	16.00	0.00	3405	0	-36.2'	20.7'	6.9E+03	0.0E+00	0.58
F.6-17.3	-148.8'	212.8'	270.00	21.0'	21.00	0.00	4469	0	-13.4'	20.7'	9.0E+03	0.0E+00	0.44
F.6-11.9	-109.6'	212.8'	270.00	28.5'	28.50	0.00	6065	0	25.8'	20.7'	1.2E+04	0.0E+00	0.32
F.6-10.2	-83.1'	212.8'	270.00	16.0'	16.00	0.00	3405	0	52.3'	20.7'	6.9E+03	0.0E+00	0.58
F.6-5.9	-32.7'	212.8'	90.00	16.0'	16.00	0.00	3405	0	102.8'	20.7'	6.9E+03	0.0E+00	0.58
F.6-4.5	-5.9'	212.8'	90.00	29.0'	29.00	0.00	6172	0	129.5'	20.7'	1.2E+04	0.0E+00	0.32
F.5-4.0	35.3'	212.9'	90.00	33.0'	33.00	0.00	7026	0	170.7'	20.8'	1.4E+04	0.0E+00	0.28
E.9-29.0	-295.2'	215.3'	270.00	24.5'	24.50	0.00	5274	0	-159.8'	23.2'	1.3E+04	0.0E+00	0.38
E.7-4.1	4.6'	220.6'	90.00	7.0'	7.00	0.00	1545	0	140.1'	28.5'	5.7E+03	0.0E+00	1.32
E.4-29.0	-308.6'	226.8'	270.00	0.0'	0.00	0.00	0	0	-173.2'	34.7'	0.0E+00	0.0E+00	#DIV/0!
D.8-29.0	-295.2'	240.0'	270.00	9.5'	9.50	0.00	2280	0	-159.8'	47.9'	2.2E+04	0.0E+00	0.97
D.6-4.6	-9.1'	243.4'	90.00	5.5'	5.50	0.00	1339	0	126.3'	51.3'	1.4E+04	0.0E+00	1.68
D.2-29.0	-284.9'	250.8'	270.00	30.0'	30.00	0.00	7523	0	-149.4'	58.6'	1.0E+05	0.0E+00	0.31
D.0-17.2	-143.5'	255.4'	90.00	25.0'	25.00	0.00	6385	0	-8.1'	63.3'	1.0E+05	0.0E+00	0.37
D.0-11.9	-111.1'	255.4'	450.00	25.0'	25.00	0.00	6385	0	24.3'	63.3'	1.0E+05	0.0E+00	0.37
D.0-4.5	-4.6'	255.4'	90.00	25.0'	25.00	0.00	6386	0	130.9'	63.3'	1.0E+05	0.0E+00	0.37
D.0-25.5	-249.9'	255.4'	450.00	25.5'	25.50	0.00	6513	0	-114.5'	63.3'	1.0E+05	0.0E+00	0.36
C.1-29.0	-283.3'	270.3'	90.00	27.0'	27.00	0.00	7298	0	-147.8'	78.2'	1.7E+05	0.0E+00	0.34
C.0-4.0	23.5'	273.1'	90.00	17.5'	17.50	0.00	4779	0	158.9'	81.0'	1.1E+05	0.0E+00	0.53
B.2-29.0	-283.2'	280.0'	90.00	27.0'	27.00	0.00	7560	0	-147.8'	87.9'	2.1E+05	0.0E+00	0.34
B.2-17.6	-157.3'	280.1'	90.00	8.5'	8.50	0.00	2381	0	-21.9'	88.0'	6.6E+04	0.0E+00	1.09
B.2-11.4	-98.6'	280.1'	450.00	8.5'	8.50	0.00	2381	0	36.8'	88.0'	6.6E+04	0.0E+00	1.09
B.2-4.9	-17.1'	280.2'	90.00	8.5'	8.50	0.00	2381	0	118.3'	88.1'	6.6E+04	0.0E+00	1.09
B.2-25.0	-237.6'	280.2'	270.00	8.5'	8.50	0.00	2382	0	-102.2'	88.1'	6.6E+04	0.0E+00	1.09
B.0-4.0	23.5'	281.7'	90.00	17.5'	17.50	0.00	4930	0	158.9'	89.6'	1.4E+05	0.0E+00	0.53

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

A.0-11.8	-108.1'	290.9'	450.00	28.0'	28.00	0.00	8145	0	27.3'	98.8'	2.7E+05	0.0E+00	0.33
A.0-17.3	-146.6'	290.9'	90.00	28.0'	28.00	0.00	8145	0	-11.2'	98.8'	2.7E+05	0.0E+00	0.33
A.0-4.7	-11.7'	291.4'	90.00	37.0'	37.00	0.00	10780	0	123.7'	99.3'	3.6E+05	0.0E+00	0.25
A.0-25.2	-243.4'	291.4'	270.00	32.0'	32.00	0.00	9324	0	-107.9'	99.3'	3.2E+05	0.0E+00	0.29
PL A.8-5.6	-28.5'	301.9'	90.00	7.0'	7.00	0.00	2113	0	107.0'	109.7'	8.4E+04	0.0E+00	1.32
PL A.7-29.0	-299.2'	305.7'	270.00	9.0'	9.00	0.00	2751	0	-163.8'	113.6'	1.2E+05	0.0E+00	1.03
PL A.5-17.9	-169.4'	310.7'	450.00	7.0'	7.00	0.00	2175	0	-34.0'	118.6'	9.8E+04	0.0E+00	1.32
PL A.5-10.5	-85.5'	310.7'	270.00	7.0'	7.00	0.00	2175	0	49.9'	118.6'	9.8E+04	0.0E+00	1.32
PL A.5-5.6	-28.5'	310.7'	90.00	7.0'	7.00	0.00	2175	0	107.0'	118.6'	9.8E+04	0.0E+00	1.32
PL A.5-22.5	-226.3'	310.7'	450.00	7.0'	7.00	0.00	2175	0	-90.8'	118.6'	9.9E+04	0.0E+00	1.32
PL A.2-4.0	21.7'	324.3'	90.00	0.0'	0.00	0.00	0	0	157.2'	132.2'	0.0E+00	0.0E+00	#DIV/0!
PL A.2-5.0	44.4'	324.3'	90.00	0.0'	0.00	0.00	0	0	179.8'	132.2'	0.0E+00	0.0E+00	#DIV/0!
PL A.2-11.7	-105.4'	324.3'	270.00	11.0'	11.00	0.00	3568	0	30.0'	132.2'	1.9E+05	0.0E+00	0.84
PL A.2-10.7	-87.2'	324.3'	270.00	11.0'	11.00	0.00	3568	0	48.2'	132.2'	1.9E+05	0.0E+00	0.84
0	0.0'	0.0'	0.00	0.0'	0.00	0.00	0	0	135.4'	-192.1'	0.0E+00	0.0E+00	#DIV/0!
S							1281	1387	246092	-187851	8.8E+06	1.6E+07	

Center of Rigidity

Xr = -135.4'

Yr = 192.1'

Eccentricity + Eac.

Ex = 17.58'

Ey = 7.03'

Eccentricity - Eac.

Ex = -19.24'

Ey = -21.12'

Rotational Stiffness

Jr = 2.50E+07

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Katterra

Lateral Analysis - 2nd Floor Framing Level.**Lateral Design: Rigid Diaphragm -2nd Floor Framing Level.**

Building Line	X - Direction				Y - Direction				2:1/3.5:1						
	Direct Shear	+Eac. Torsional Shear	-Eac. Torsional Shear	Total Shear X-Dir.	Direct Shear	+Eac. Torsional Shear	-Eac. Torsional Shear	Total Shear Y-Dir.	Maximum Shear	Shear (lb/ft)	Capacity Reduction	SW Type Min Req.	SW Type Used	Capacity (plf)	D/C
29.0-H.5	0.0 k	0.0 k	0.0 k	0.0 k	4.0 k	-0.7 k	0.8 k	4.7 k	4.71 k	1179	0.86	2 E.S.	2 E.S.	1503	0.78
29.0-P.7	0.0 k	0.0 k	0.0 k	0.0 k	11.4 k	-2.0 k	2.2 k	13.5 k	13.55 k	1178	1.00	3 E.S.	2 E.S.	1740	0.68
29.0-U.3	0.0 k	0.0 k	0.0 k	0.0 k	7.9 k	-1.4 k	1.5 k	9.4 k	9.40 k	1175	1.00	3 E.S.	2 E.S.	1740	0.68
29.0-A.9	0.0 k	0.0 k	0.0 k	0.0 k	5.0 k	-0.8 k	0.9 k	5.9 k	5.85 k	1170	1.00	3 E.S.	2 E.S.	1740	0.67
29.0-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	5.4 k	-0.9 k	1.0 k	6.4 k	6.44 k	1170	1.00	3 E.S.	2 E.S.	1740	0.67
29.0-P.1	0.0 k	0.0 k	0.0 k	0.0 k	6.4 k	-1.0 k	1.1 k	7.6 k	7.57 k	1164	1.00	3 E.S.	2 E.S.	1740	0.67
29.0-J.0	0.0 k	0.0 k	0.0 k	0.0 k	6.4 k	-1.0 k	1.1 k	7.6 k	7.57 k	1164	1.00	3 E.S.	2 E.S.	1740	0.67
29.0-H.4	0.0 k	0.0 k	0.0 k	0.0 k	17.8 k	-2.5 k	2.8 k	20.6 k	20.58 k	1143	1.00	3 E.S.	2 E.S.	1740	0.66
29.0-P.6	0.0 k	0.0 k	0.0 k	0.0 k	18.3 k	-2.6 k	2.8 k	21.2 k	21.15 k	1143	1.00	3 E.S.	2 E.S.	1740	0.66
27.9-U.2	0.0 k	0.0 k	0.0 k	0.0 k	18.8 k	-2.5 k	2.7 k	21.5 k	21.55 k	1134	1.00	3 E.S.	2 E.S.	1740	0.65
27.1-E.0	0.0 k	0.0 k	0.0 k	0.0 k	36.6 k	-4.8 k	5.2 k	41.9 k	41.88 k	1132	1.00	3 E.S.	2 E.S.	1740	0.65
27.1-H.5	0.0 k	0.0 k	0.0 k	0.0 k	5.4 k	-0.7 k	0.8 k	6.2 k	6.23 k	1132	1.00	3 E.S.	2 E.S.	1740	0.65
27.1-P.5	0.0 k	0.0 k	0.0 k	0.0 k	5.4 k	-0.7 k	0.8 k	6.2 k	6.23 k	1132	1.00	3 E.S.	2 E.S.	1740	0.65
27.1-C.4	0.0 k	0.0 k	0.0 k	0.0 k	7.9 k	-1.0 k	1.1 k	9.1 k	9.06 k	1132	1.00	3 E.S.	2 E.S.	1740	0.65
27.1-A.8	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	-1.1 k	1.2 k	9.6 k	9.62 k	1132	1.00	3 E.S.	2 E.S.	1740	0.65
27.1-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	17.8 k	-2.3 k	2.5 k	20.4 k	20.38 k	1132	1.00	3 E.S.	2 E.S.	1740	0.65
26.0-E.2	0.0 k	0.0 k	0.0 k	0.0 k	20.8 k	-2.6 k	2.8 k	23.6 k	23.64 k	1126	1.00	3 E.S.	2 E.S.	1740	0.65
26.0-C.9	0.0 k	0.0 k	0.0 k	0.0 k	23.3 k	-2.9 k	3.2 k	26.4 k	26.45 k	1126	1.00	3 E.S.	2 E.S.	1740	0.65
26.0-B.5	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2 E.S.	#DIV/0!	#DIV/0!
26.0-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	20.8 k	-2.6 k	2.8 k	23.6 k	23.64 k	1126	1.00	3 E.S.	2 E.S.	1740	0.65
25.6-P.5	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	-2.9 k	3.1 k	27.9 k	27.90 k	1116	1.00	3 E.S.	2 E.S.	1740	0.64
25.4-U.3	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	-0.9 k	1.0 k	9.4 k	9.42 k	1108	1.00	3 E.S.	2 E.S.	1740	0.64
25.3-E.3	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	-2.7 k	2.9 k	27.7 k	27.69 k	1108	1.00	3 E.S.	2 E.S.	1740	0.64
25.0-H.5	0.0 k	0.0 k	0.0 k	0.0 k	28.2 k	-2.8 k	3.1 k	31.3 k	31.30 k	1098	1.00	3 E.S.	2 E.S.	1740	0.63
25.0-L.0	0.0 k	0.0 k	0.0 k	0.0 k	10.4 k	-1.0 k	1.1 k	11.5 k	11.53 k	1098	1.00	3 E.S.	2 E.S.	1740	0.63
25.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	18.3 k	-1.8 k	2.0 k	20.3 k	20.32 k	1098	1.00	3 E.S.	2 E.S.	1740	0.63
25.0-P.5	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	-2.2 k	2.4 k	24.2 k	24.16 k	1098	1.00	3 E.S.	2 E.S.	1740	0.63
25.0-N.1	0.0 k	0.0 k	0.0 k	0.0 k	18.3 k	-1.8 k	2.0 k	20.3 k	20.32 k	1098	1.00	3 E.S.	2 E.S.	1740	0.63
24.2-U.2	0.0 k	0.0 k	0.0 k	0.0 k	29.2 k	-2.9 k	3.1 k	32.4 k	32.36 k	1097	1.00	3 E.S.	2 E.S.	1740	0.63
22.6-B.2	0.0 k	0.0 k	0.0 k	0.0 k	4.0 k	-0.4 k	0.4 k	4.3 k	4.35 k	1087	0.86	3 E.S.	2 E.S.	1503	0.72
22.1-E.4	0.0 k	0.0 k	0.0 k	0.0 k	24.3 k	-2.0 k	2.2 k	26.5 k	26.48 k	1081	1.00	3 E.S.	2 E.S.	1740	0.62
21.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	-0.6 k	0.7 k	9.1 k	9.08 k	1068	1.00	3 E.S.	2 E.S.	1740	0.61
21.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	32.2 k	-2.3 k	2.5 k	34.7 k	34.66 k	1066	1.00	3 E.S.	2 E.S.	1740	0.61
20.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	24.3 k	-1.4 k	1.6 k	25.9 k	25.85 k	1055	1.00	3 E.S.	2 E.S.	1740	0.61
19.5-E.5	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	-0.4 k	0.4 k	8.9 k	8.87 k	1043	1.00	3 E.S.	2 E.S.	1740	0.60
18.8-E.5	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	-0.9 k	1.0 k	25.8 k	25.76 k	1030	1.00	3 E.S.	2 E.S.	1740	0.59
18.2-U.2	0.0 k	0.0 k	0.0 k	0.0 k	24.3 k	-0.9 k	1.0 k	25.2 k	25.22 k	1029	1.00	3 E.S.	2 E.S.	1740	0.59
17.2-PL A.7	0.0 k	0.0 k	0.0 k	0.0 k	6.9 k	-0.1 k	0.1 k	7.0 k	6.99 k	999	1.00	3 E.S.	2 E.S.	1740	0.57
17.3-E.3	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	-0.3 k	0.3 k	25.1 k	25.08 k	1003	1.00	3 E.S.	2 E.S.	1740	0.58
17.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	32.2 k	0.0 k	0.0 k	32.2 k	32.24 k	992	1.00	3 E.S.	2 E.S.	1740	0.57
15.8-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	22.8 k	0.1 k	-0.1 k	22.9 k	22.86 k	994	1.00	3 E.S.	2 E.S.	1740	0.57
15.2-E.2	0.0 k	0.0 k	0.0 k	0.0 k	20.8 k	0.1 k	-0.1 k	20.9 k	20.90 k	995	1.00	3 E.S.	2 E.S.	1740	0.57
15.2-C.7	0.0 k	0.0 k	0.0 k	0.0 k	29.2 k	0.1 k	-0.2 k	29.4 k	29.36 k	995	1.00	3 E.S.	2 E.S.	1740	0.57
15.2-A.6	0.0 k	0.0 k	0.0 k	0.0 k	11.4 k	0.1 k	-0.1 k	11.4 k	11.44 k	995	1.00	3 E.S.	2 E.S.	1740	0.57
13.8-C.7	0.0 k	0.0 k	0.0 k	0.0 k	29.2 k	0.3 k	-0.4 k	29.5 k	29.54 k	1001	1.00	3 E.S.	2 E.S.	1740	0.58
13.8-A.6	0.0 k	0.0 k	0.0 k	0.0 k	11.4 k	0.1 k	-0.1 k	11.5 k	11.51 k	1001	1.00	3 E.S.	2 E.S.	1740	0.58
13.8-E.2	0.0 k	0.0 k	0.0 k	0.0 k	21.8 k	0.2 k	-0.3 k	22.0 k	22.03 k	1001	1.00	3 E.S.	2 E.S.	1740	0.58
13.2-PL A.6	0.0 k	0.0 k	0.0 k	0.0 k	23.3 k	0.3 k	-0.3 k	23.6 k	23.56 k	1002	1.00	3 E.S.	2 E.S.	1740	0.58
12.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	24.3 k	0.5 k	-0.6 k	24.8 k	24.79 k	1012	1.00	3 E.S.	2 E.S.	1740	0.58
11.8-E.3	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	0.7 k	-0.7 k	25.4 k	25.44 k	1018	1.00	3 E.S.	2 E.S.	1740	0.58
11.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	32.2 k	1.4 k	-1.6 k	33.6 k	33.62 k	1034	1.00	3 E.S.	2 E.S.	1740	0.59
10.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	1.3 k	-1.4 k	26.1 k	26.06 k	1042	1.00	3 E.S.	2 E.S.	1740	0.60
9.5-S.5	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	0.5 k	-0.5 k	8.9 k	8.89 k	1046	1.00	3 E.S.	2 E.S.	1740	0.60
9.2-E.5	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	0.5 k	-0.6 k	9.0 k	8.96 k	1055	1.00	3 E.S.	2 E.S.	1740	0.61
9.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	24.3 k	1.6 k	-1.8 k	25.9 k	25.90 k	1057	1.00	3 E.S.	2 E.S.	1740	0.61
7.9-E.4	0.0 k	0.0 k	0.0 k	0.0 k	24.3 k	1.8 k	-2.0 k	26.1 k	26.09 k	1065	1.00	3 E.S.	2 E.S.	1740	0.61
7.3-E.0	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	0.7 k	-0.7 k	9.1 k	9.08 k	1068	1.00	3 E.S.	2 E.S.	1740	0.61

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STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

8.0-E.4	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	0.7 k	-0.8 k	9.1 k	9.15 k	1076	1.00	3 E.S.	2 E.S.	1740	0.62
7.0-U.2	0.0 k	0.0 k	0.0 k	0.0 k	32.2 k	2.9 k	-3.2 k	35.1 k	35.10 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
6.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	2.4 k	-2.7 k	27.2 k	27.21 k	1088	1.00	3 E.S.	2 E.S.	1740	0.63
5.6-B.5	0.0 k	0.0 k	0.0 k	0.0 k	4.5 k	0.5 k	-0.5 k	4.9 k	4.92 k	1094	0.97	3 E.S.	2 E.S.	1691	0.65
5.0-E.5	0.0 k	0.0 k	0.0 k	0.0 k	5.4 k	0.6 k	-0.7 k	6.0 k	6.05 k	1099	1.00	3 E.S.	2 E.S.	1740	0.63
4.9-D.9	0.0 k	0.0 k	0.0 k	0.0 k	7.9 k	0.9 k	-1.0 k	8.8 k	8.84 k	1104	1.00	3 E.S.	2 E.S.	1740	0.63
4.8-B.5	0.0 k	0.0 k	0.0 k	0.0 k	6.4 k	0.9 k	-0.9 k	7.3 k	7.30 k	1123	1.00	3 E.S.	2 E.S.	1740	0.65
4.6-E.3	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	3.1 k	-3.4 k	27.8 k	27.83 k	1113	1.00	3 E.S.	2 E.S.	1740	0.64
4.0-PLA.6	0.0 k	0.0 k	0.0 k	0.0 k	20.3 k	2.8 k	-3.1 k	23.2 k	23.15 k	1129	1.00	3 E.S.	2 E.S.	1740	0.65
4.0-K.5	0.0 k	0.0 k	0.0 k	0.0 k	34.2 k	4.8 k	-5.2 k	39.0 k	38.96 k	1129	1.00	3 E.S.	2 E.S.	1740	0.65
4.0-E.2	0.0 k	0.0 k	0.0 k	0.0 k	21.3 k	3.0 k	-3.3 k	24.3 k	24.28 k	1129	1.00	3 E.S.	2 E.S.	1740	0.65
4.0-C.9	0.0 k	0.0 k	0.0 k	0.0 k	23.3 k	3.3 k	-3.6 k	26.5 k	26.54 k	1129	1.00	3 E.S.	2 E.S.	1740	0.65
1.7-U.2	0.0 k	0.0 k	0.0 k	0.0 k	30.7 k	4.6 k	-5.0 k	35.3 k	35.26 k	1138	1.00	3 E.S.	2 E.S.	1740	0.65
1.0-C.3	0.0 k	0.0 k	0.0 k	0.0 k	8.9 k	1.3 k	-1.5 k	10.2 k	10.25 k	1138	1.00	3 E.S.	2 E.S.	1740	0.65
1.0-E.9	0.0 k	0.0 k	0.0 k	0.0 k	6.4 k	1.0 k	-1.1 k	7.4 k	7.40 k	1138	1.00	3 E.S.	2 E.S.	1740	0.65
1.0-N.9	0.0 k	0.0 k	0.0 k	0.0 k	24.8 k	3.7 k	-4.1 k	28.5 k	28.46 k	1139	1.00	3 E.S.	2 E.S.	1740	0.65
1.0-P.8	0.0 k	0.0 k	0.0 k	0.0 k	18.8 k	2.8 k	-3.1 k	21.6 k	21.63 k	1139	1.00	3 E.S.	2 E.S.	1740	0.65
1.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	6.9 k	1.0 k	-1.1 k	8.0 k	7.97 k	1139	1.00	3 E.S.	2 E.S.	1740	0.65
1.0-L.0	0.0 k	0.0 k	0.0 k	0.0 k	19.8 k	3.0 k	-3.2 k	22.8 k	22.77 k	1139	1.00	3 E.S.	2 E.S.	1740	0.65
0.5-PLA.6	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2 E.S.	#DIV/0!	#DIV/0!
0.3-U.4	0.0 k	0.0 k	0.0 k	0.0 k	5.9 k	1.0 k	-1.1 k	7.0 k	6.99 k	1165	1.00	3 E.S.	2 E.S.	1740	0.67
0.1-U.3	0.0 k	0.0 k	0.0 k	0.0 k	4.5 k	0.8 k	-0.9 k	5.3 k	5.27 k	1172	0.97	3 E.S.	2 E.S.	1691	0.69
0.1-R.0	0.0 k	0.0 k	0.0 k	0.0 k	4.5 k	0.8 k	-0.9 k	5.3 k	5.27 k	1172	0.97	3 E.S.	2 E.S.	1691	0.69

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STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Kattera****Lateral Analysis - 2nd Floor Framing Level.**

0.0-K.0	0.0 k	0.0 k	0.0 k	0.0 k	4.0 k	0.7 k	-0.8 k	4.7 k	4.69 k	1174	1.00	3 E.S.	2 E.S.	1740	0.67
0.0-K.5	0.0 k	0.0 k	0.0 k	0.0 k	4.0 k	0.7 k	-0.8 k	4.7 k	4.69 k	1174	1.00	3 E.S.	2 E.S.	1740	0.67
0.0-P.7	0.0 k	0.0 k	0.0 k	0.0 k	4.0 k	0.7 k	-0.8 k	4.7 k	4.69 k	1174	1.00	3 E.S.	2 E.S.	1740	0.67
0.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	4.0 k	0.7 k	-0.8 k	4.7 k	4.69 k	1174	1.00	3 E.S.	2 E.S.	1740	0.67
4.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	1.6 k	-1.7 k	10.0 k	9.98 k	1174	1.00	3 E.S.	2 E.S.	1740	0.67
4.0-P.4	0.0 k	0.0 k	0.0 k	0.0 k	8.4 k	1.6 k	-1.7 k	10.0 k	9.98 k	1174	1.00	3 E.S.	2 E.S.	1740	0.67
U.4-29.0	6.4 k	-0.3 k	1.0 k	7.5 k	0.0 k	0.0 k	0.0 k	0.0 k	7.47 k	1246	1.00	3 E.S.	2 E.S.	1740	0.72
U.4-19.9	7.5 k	-0.4 k	1.2 k	8.7 k	0.0 k	0.0 k	0.0 k	0.0 k	8.72 k	1246	1.00	3 E.S.	2 E.S.	1740	0.72
U.4-17.4	6.4 k	-0.3 k	1.0 k	7.5 k	0.0 k	0.0 k	0.0 k	0.0 k	7.47 k	1246	1.00	3 E.S.	2 E.S.	1740	0.72
U.4-11.0	8.0 k	-0.4 k	1.3 k	9.3 k	0.0 k	0.0 k	0.0 k	0.0 k	9.34 k	1246	1.00	3 E.S.	2 E.S.	1740	0.72
U.4-4.0	5.9 k	-0.3 k	0.9 k	6.8 k	0.0 k	0.0 k	0.0 k	0.0 k	6.84 k	1244	1.00	3 E.S.	2 E.S.	1740	0.71
U.3-29.0	8.6 k	-0.4 k	1.3 k	9.9 k	0.0 k	0.0 k	0.0 k	0.0 k	9.86 k	1233	1.00	3 E.S.	2 E.S.	1740	0.71
U.0-4.0	19.3 k	-0.8 k	2.4 k	21.7 k	0.0 k	0.0 k	0.0 k	0.0 k	21.73 k	1207	1.00	3 E.S.	2 E.S.	1740	0.69
U.0-9.0	27.9 k	-1.2 k	3.5 k	31.4 k	0.0 k	0.0 k	0.0 k	0.0 k	31.38 k	1207	1.00	3 E.S.	2 E.S.	1740	0.69
U.0-12.0	27.9 k	-1.2 k	3.5 k	31.4 k	0.0 k	0.0 k	0.0 k	0.0 k	31.38 k	1207	1.00	3 E.S.	2 E.S.	1740	0.69
U.0-11.0	13.4 k	-0.6 k	1.7 k	15.1 k	0.0 k	0.0 k	0.0 k	0.0 k	15.09 k	1207	1.00	3 E.S.	2 E.S.	1740	0.69
U.0-20.1	19.3 k	-0.8 k	2.4 k	21.7 k	0.0 k	0.0 k	0.0 k	0.0 k	21.73 k	1207	1.00	3 E.S.	2 E.S.	1740	0.69
U.0-18.1	27.9 k	-1.2 k	3.5 k	31.4 k	0.0 k	0.0 k	0.0 k	0.0 k	31.38 k	1207	1.00	3 E.S.	2 E.S.	1740	0.69
U.0-17.2	26.3 k	-1.1 k	3.3 k	29.6 k	0.0 k	0.0 k	0.0 k	0.0 k	29.57 k	1207	1.00	3 E.S.	2 E.S.	1740	0.69
U.0-7.2	5.9 k	-0.2 k	0.7 k	6.6 k	0.0 k	0.0 k	0.0 k	0.0 k	6.64 k	1207	1.00	3 E.S.	2 E.S.	1740	0.69
T.0-29.5	31.6 k	-1.3 k	3.9 k	35.5 k	0.0 k	0.0 k	0.0 k	0.0 k	35.51 k	1204	1.00	3 E.S.	2 E.S.	1740	0.69
S.2-1.5	13.9 k	-0.6 k	1.7 k	15.6 k	0.0 k	0.0 k	0.0 k	0.0 k	15.65 k	1204	1.00	3 E.S.	2 E.S.	1740	0.69
S.2-25.2	13.9 k	-0.6 k	1.7 k	15.6 k	0.0 k	0.0 k	0.0 k	0.0 k	15.65 k	1204	1.00	3 E.S.	2 E.S.	1740	0.69
R.1-4.0	23.1 k	-0.9 k	2.7 k	25.8 k	0.0 k	0.0 k	0.0 k	0.0 k	25.78 k	1199	1.00	3 E.S.	2 E.S.	1740	0.69
Q.0-28.4	10.2 k	-0.4 k	1.2 k	11.4 k	0.0 k	0.0 k	0.0 k	0.0 k	11.37 k	1197	1.00	3 E.S.	2 E.S.	1740	0.69
Q.0-25.7	22.5 k	-0.9 k	2.6 k	25.1 k	0.0 k	0.0 k	0.0 k	0.0 k	25.14 k	1197	1.00	3 E.S.	2 E.S.	1740	0.69
P.8-29.0	12.9 k	-0.5 k	1.4 k	14.3 k	0.0 k	0.0 k	0.0 k	0.0 k	14.27 k	1189	1.00	3 E.S.	2 E.S.	1740	0.68
P.3-4.0	9.1 k	-0.3 k	0.8 k	9.9 k	0.0 k	0.0 k	0.0 k	0.0 k	9.95 k	1170	1.00	3 E.S.	2 E.S.	1740	0.67
P.0-4.0	31.6 k	-0.8 k	2.5 k	34.2 k	0.0 k	0.0 k	0.0 k	0.0 k	34.15 k	1158	1.00	3 E.S.	2 E.S.	1740	0.67
N.0-25.5	26.3 k	-0.6 k	1.8 k	28.1 k	0.0 k	0.0 k	0.0 k	0.0 k	28.12 k	1148	1.00	3 E.S.	2 E.S.	1740	0.66
M.0-4.0	35.9 k	-0.6 k	1.9 k	37.9 k	0.0 k	0.0 k	0.0 k	0.0 k	37.87 k	1130	1.00	3 E.S.	2 E.S.	1740	0.65
L.1-25.5	25.7 k	-0.4 k	1.3 k	27.0 k	0.0 k	0.0 k	0.0 k	0.0 k	27.03 k	1126	1.00	3 E.S.	2 E.S.	1740	0.65
K.0-25.5	26.3 k	-0.3 k	0.8 k	27.1 k	0.0 k	0.0 k	0.0 k	0.0 k	27.06 k	1104	1.00	3 E.S.	2 E.S.	1740	0.63
J.8-4.0	9.1 k	-0.1 k	0.2 k	9.4 k	0.0 k	0.0 k	0.0 k	0.0 k	9.36 k	1102	1.00	3 E.S.	2 E.S.	1740	0.63
H.6-25.7	26.8 k	0.0 k	0.0 k	26.9 k	0.0 k	0.0 k	0.0 k	0.0 k	26.86 k	1074	1.00	3 E.S.	2 E.S.	1740	0.62
H.1-29.0	11.8 k	0.0 k	-0.1 k	11.8 k	0.0 k	0.0 k	0.0 k	0.0 k	11.84 k	1077	1.00	3 E.S.	2 E.S.	1740	0.62
H.0-28.4	10.2 k	0.1 k	-0.2 k	10.2 k	0.0 k	0.0 k	0.0 k	0.0 k	10.24 k	1078	1.00	3 E.S.	2 E.S.	1740	0.62
H.0-25.7	22.5 k	0.1 k	-0.4 k	22.6 k	0.0 k	0.0 k	0.0 k	0.0 k	22.64 k	1078	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-8.0	27.9 k	0.2 k	-0.6 k	28.1 k	0.0 k	0.0 k	0.0 k	0.0 k	28.09 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-25.3	22.5 k	0.2 k	-0.5 k	22.7 k	0.0 k	0.0 k	0.0 k	0.0 k	22.69 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-22.1	17.2 k	0.1 k	-0.4 k	17.3 k	0.0 k	0.0 k	0.0 k	0.0 k	17.29 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-20.0	27.9 k	0.2 k	-0.6 k	28.1 k	0.0 k	0.0 k	0.0 k	0.0 k	28.09 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-18.0	17.2 k	0.1 k	-0.4 k	17.3 k	0.0 k	0.0 k	0.0 k	0.0 k	17.29 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-17.3	22.5 k	0.2 k	-0.5 k	22.7 k	0.0 k	0.0 k	0.0 k	0.0 k	22.69 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-11.9	30.6 k	0.2 k	-0.7 k	30.8 k	0.0 k	0.0 k	0.0 k	0.0 k	30.79 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-10.2	17.2 k	0.1 k	-0.4 k	17.3 k	0.0 k	0.0 k	0.0 k	0.0 k	17.29 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-5.9	17.2 k	0.1 k	-0.4 k	17.3 k	0.0 k	0.0 k	0.0 k	0.0 k	17.29 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.6-4.5	31.1 k	0.2 k	-0.7 k	31.3 k	0.0 k	0.0 k	0.0 k	0.0 k	31.33 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
F.5-4.0	35.4 k	0.3 k	-0.8 k	35.7 k	0.0 k	0.0 k	0.0 k	0.0 k	35.65 k	1080	1.00	3 E.S.	2 E.S.	1740	0.62
E.9-29.0	26.3 k	0.2 k	-0.7 k	26.5 k	0.0 k	0.0 k	0.0 k	0.0 k	26.49 k	1081	1.00	3 E.S.	2 E.S.	1740	0.62
E.7-4.1	7.5 k	0.1 k	-0.2 k	7.6 k	0.0 k	0.0 k	0.0 k	0.0 k	7.58 k	1083	1.00	3 E.S.	2 E.S.	1740	0.62
E.4-29.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2 E.S.	#DIV/0!	#DIV/0!
D.8-29.0	10.2 k	0.2 k	-0.5 k	10.4 k	0.0 k	0.0 k	0.0 k	0.0 k	10.36 k	1091	1.00	3 E.S.	2 E.S.	1740	0.63
D.6-4.6	5.9 k	0.1 k	-0.3 k	6.0 k	0.0 k	0.0 k	0.0 k	0.0 k	6.01 k	1092	1.00	3 E.S.	2 E.S.	1740	0.63
D.2-29.0	32.2 k	0.7 k	-2.0 k	32.9 k	0.0 k	0.0 k	0.0 k	0.0 k	32.85 k	1095	1.00	3 E.S.	2 E.S.	1740	0.63
D.0-17.2	26.8 k	0.6 k	-1.8 k	27.4 k	0.0 k	0.0 k	0.0 k	0.0 k	27.42 k	1097	1.00	3 E.S.	2 E.S.	1740	0.63
D.0-11.9	26.8 k	0.6 k	-1.8 k	27.4 k	0.0 k	0.0 k	0.0 k	0.0 k	27.42 k	1097	1.00	3 E.S.	2 E.S.	1740	0.63
D.0-4.5	26.8 k	0.6 k	-1.8 k	27.4 k	0.0 k	0.0 k	0.0 k	0.0 k	27.42 k	1097	1.00	3 E.S.	2 E.S.	1740	0.63
D.0-25.5	27.3 k	0.6 k	-1.9 k	28.0 k	0.0 k	0.0 k	0.0 k	0.0 k	27.97 k	1097	1.00	3 E.S.	2 E.S.	1740	0.63
C.1-29.0	29.0 k	0.8 k	-2.5 k	29.8 k	0.0 k	0.0 k	0.0 k	0.0 k	29.77 k	1103	1.00	3 E.S.	2 E.S.	1740	0.63
C.0-4.0	18.8 k	0.5 k	-1.6 k	19.3 k	0.0 k	0.0 k	0.0 k	0.0 k	19.31 k	1104	1.00	3 E.S.	2 E.S.	1740	0.63
B.2-29.0	29.0 k	0.9 k	-2.8 k	29.9 k	0.0 k	0.0 k	0.0 k	0.0 k	29.87 k	1106	1.00	3 E.S.	2 E.S.	1740	0.64

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

B.2-17.6	9.1 k	0.3 k	-0.9 k	9.4 k	0.0 k	0.0 k	0.0 k	0.0 k	9.40 k	1106	1.00	3 E.S.	2 E.S.	1740	0.64
B.2-11.4	9.1 k	0.3 k	-0.9 k	9.4 k	0.0 k	0.0 k	0.0 k	0.0 k	9.40 k	1106	1.00	3 E.S.	2 E.S.	1740	0.64
B.2-4.9	9.1 k	0.3 k	-0.9 k	9.4 k	0.0 k	0.0 k	0.0 k	0.0 k	9.40 k	1106	1.00	3 E.S.	2 E.S.	1740	0.64
B.2-25.0	9.1 k	0.3 k	-0.9 k	9.4 k	0.0 k	0.0 k	0.0 k	0.0 k	9.40 k	1106	1.00	3 E.S.	2 E.S.	1740	0.64
B.0-4.0	18.8 k	0.6 k	-1.8 k	19.4 k	0.0 k	0.0 k	0.0 k	0.0 k	19.37 k	1107	1.00	3 E.S.	2 E.S.	1740	0.64
A.0-11.8	30.0 k	1.1 k	-3.2 k	31.1 k	0.0 k	0.0 k	0.0 k	0.0 k	31.09 k	1111	1.00	3 E.S.	2 E.S.	1740	0.64
A.0-17.3	30.0 k	1.1 k	-3.2 k	31.1 k	0.0 k	0.0 k	0.0 k	0.0 k	31.09 k	1111	1.00	3 E.S.	2 E.S.	1740	0.64
A.0-4.7	39.7 k	1.4 k	-4.3 k	41.1 k	0.0 k	0.0 k	0.0 k	0.0 k	41.10 k	1111	1.00	3 E.S.	2 E.S.	1740	0.64
A.0-25.2	34.3 k	1.2 k	-3.7 k	35.5 k	0.0 k	0.0 k	0.0 k	0.0 k	35.54 k	1111	1.00	3 E.S.	2 E.S.	1740	0.64
PL A.8-5.6	7.5 k	0.3 k	-0.9 k	7.8 k	0.0 k	0.0 k	0.0 k	0.0 k	7.80 k	1115	1.00	3 E.S.	2 E.S.	1740	0.64
PL A.7-29.0	9.7 k	0.4 k	-1.2 k	10.0 k	0.0 k	0.0 k	0.0 k	0.0 k	10.05 k	1116	1.00	3 E.S.	2 E.S.	1740	0.64
PL A.5-17.9	7.5 k	0.3 k	-1.0 k	7.8 k	0.0 k	0.0 k	0.0 k	0.0 k	7.83 k	1118	1.00	3 E.S.	2 E.S.	1740	0.64
PL A.5-10.5	7.5 k	0.3 k	-1.0 k	7.8 k	0.0 k	0.0 k	0.0 k	0.0 k	7.83 k	1118	1.00	3 E.S.	2 E.S.	1740	0.64
PL A.5-5.6	7.5 k	0.3 k	-1.0 k	7.8 k	0.0 k	0.0 k	0.0 k	0.0 k	7.83 k	1118	1.00	3 E.S.	2 E.S.	1740	0.64
PL A.5-22.5	7.5 k	0.3 k	-1.0 k	7.8 k	0.0 k	0.0 k	0.0 k	0.0 k	7.83 k	1118	1.00	3 E.S.	2 E.S.	1740	0.64
PL A.2-4.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2 E.S.	#DIV/0!	#DIV/0!
PL A.2-5.0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2 E.S.	#DIV/0!	#DIV/0!
PL A.2-11.7	11.8 k	0.6 k	-1.7 k	12.4 k	0.0 k	0.0 k	0.0 k	0.0 k	12.36 k	1123	1.00	3 E.S.	2 E.S.	1740	0.65
PL A.2-10.7	11.8 k	0.6 k	-1.7 k	12.4 k	0.0 k	0.0 k	0.0 k	0.0 k	12.36 k	1123	1.00	3 E.S.	2 E.S.	1740	0.65
0	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.0 k	0.00 k	#DIV/0!	#DIV/0!	#DIV/0!	2 E.S.	#DIV/0!	#DIV/0!
S	1367.3 k	0.3 k	-1.0 k	1437.7 k	1373.7 k	0.0 k	0.0 k	1504.4 k	2942.2 k						

Check for Torsional Irregularity

	Building Line	Max Defl.					
		$\Delta X+$	$\Delta X-$	$\Delta Y+$	$\Delta Y-$	Ratio	
E/W	PL A.2-10.7	1.123	0.919			1.0	< 1.2 OK
	K.0-25.5	1.062	1.104			1.1	< 1.2 OK
N/S	29.0-H.5			0.818	1.179	1.1	< 1.2 OK
	10.0-E.5			1.042	0.933	1.1	< 1.2 OK
	Average	1.093	1.012	0.930	1.056		

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.****Tiedown Calculations - 2nd Floor Framing Level.**

Typ Fir Ht = 10.25'

Typ Plate Ht = 9.26'

Building Line	Element Length (ft)	Element Shear (kip)	Wall Thk (4x/6x)	Height (ft)	Moment (k-ft)	D. L. w (k/ft)	Uplift Above (kip)	Incr. Uplift (kip)	Total Uplift (kip)	Current TD Level	Tiedown Capacity		Demand to Capacity	TD End Post Area (sq.in)	TD Δ_b @ load in (LRFD)
											Incr.	Total			
29.0-H.5	4.0	4.714	6x	10.25	48	0.00	28.60	16.11	44.70	1	21.02	53.89	0.83	86.22	0.232
29.0-P.7	11.5	13.548	6x	10.25	139	0.00	23.48	13.23	36.71	1	16.65	53.89	0.79	86.22	0.191
29.0-U.3	8.0	9.404	6x	10.25	96	0.00	24.45	13.77	38.22	1	16.65	53.89	0.83	86.22	0.199
29.0-A.9	5.0	5.851	6x	10.25	60	0.00	26.64	14.99	41.64	1	16.65	53.89	0.90	86.22	0.216
29.0-PL A.7	5.5	6.436	6x	10.25	66	0.00	26.05	14.66	40.71	1	16.65	53.89	0.88	86.22	0.212
29.0-P.1	6.5	7.568	6x	10.25	78	0.00	25.08	14.10	39.18	1	16.65	53.89	0.85	86.22	0.204
29.0-J.0	6.5	7.568	6x	10.25	78	0.00	25.08	14.10	39.18	1	16.65	53.89	0.85	86.22	0.204
29.0-H.4	18.0	10.290	6x	10.25	105	0.00	16.73	6.20	22.94	1	16.65	53.89	0.43	86.22	0.119
29.0-H.4	18.0	10.290	6x	10.25	105	0.00	5.38	6.20	11.59	1	12.27	22.78	0.51	36.45	0.142
29.0-P.6	18.5	10.576	6x	10.25	108	0.00	16.71	6.19	22.90	1	16.65	53.89	0.42	86.22	0.119
29.0-P.6	18.5	10.576	6x	10.25	108	0.00	5.38	6.19	11.57	1	12.27	22.78	0.51	36.45	0.142
27.9-U.2	19.0	10.774	6x	10.25	110	0.00	16.57	6.13	22.70	1	16.65	53.89	0.42	86.22	0.118
27.9-U.2	19.0	10.774	6x	10.25	110	0.00	5.33	6.13	11.46	1	0.00	0.00	N/A	36.45	#DIV/0!
27.1-E.0	37.0	41.883	6x	10.25	429	0.00	21.28	11.92	33.21	1	16.65	53.89	0.72	86.22	0.173
27.1-H.5	5.5	6.226	6x	10.25	64	0.00	25.31	14.18	39.49	1	16.65	53.89	0.85	86.22	0.205
27.1-P.5	5.5	6.226	6x	10.25	64	0.00	25.31	14.18	39.49	1	16.65	53.89	0.85	86.22	0.205
27.1-C.4	8.0	9.056	6x	10.25	93	0.00	23.67	13.26	36.93	1	16.65	53.89	0.80	86.22	0.192
27.1-A.8	8.5	9.622	6x	10.25	99	0.00	23.47	13.15	36.62	1	16.65	53.89	0.79	86.22	0.190
27.1-PL A.7	18.0	20.375	6x	10.25	209	0.00	21.93	12.29	34.21	1	16.65	53.89	0.74	86.22	0.178
26.0-E.2	21.0	23.636	6x	10.25	242	0.00	21.64	12.11	33.75	1	16.65	53.89	0.73	86.22	0.175
26.0-C.9	23.5	26.450	6x	10.25	271	0.00	21.52	12.05	33.57	1	16.65	53.89	0.72	86.22	0.174
26.0-B.5	0.0	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	16.65	53.89	#DIV/0!	86.22	#DIV/0!
26.0-PL A.6	21.0	11.818	6x	10.25	121	0.00	16.37	6.06	22.43	1	16.65	53.89	0.42	86.22	0.117
26.0-PL A.6	21.0	11.818	6x	10.25	121	0.00	5.27	6.06	11.32	1	12.27	22.78	0.50	36.45	0.139
25.6-P.5	25.0	27.897	6x	10.25	286	0.00	21.31	11.91	33.22	1	16.65	53.89	0.72	86.22	0.173
25.4-U.3	8.5	9.422	6x	10.25	97	0.00	23.05	12.88	35.92	1	16.65	53.89	0.77	86.22	0.187
25.3-E.3	25.0	27.691	6x	10.25	284	0.00	21.17	11.83	33.00	1	16.65	53.89	0.71	86.22	0.171
25.0-H.5	28.5	31.301	6x	10.25	321	0.00	20.91	11.67	32.58	1	16.65	53.89	0.70	86.22	0.169
25.0-L.0	10.5	11.532	6x	10.25	118	0.00	22.30	12.44	34.74	1	16.65	53.89	0.75	86.22	0.181
25.0-K.0	18.5	20.318	6x	10.25	208	0.00	21.33	11.90	33.23	1	16.65	53.89	0.71	86.22	0.173
25.0-P.5	22.0	24.162	6x	10.25	248	0.00	21.14	11.79	32.93	1	16.65	53.89	0.71	86.22	0.171
25.0-N.1	18.5	20.318	6x	10.25	208	0.00	21.33	11.90	33.23	1	16.65	53.89	0.71	86.22	0.173
24.2-U.2	29.5	16.180	6x	10.25	166	0.00	15.79	5.82	21.61	1	16.65	53.89	0.40	86.22	0.112
24.2-U.2	29.5	16.180	6x	10.25	166	0.00	5.07	5.82	10.89	1	12.27	22.78	0.48	36.45	0.134
22.6-B.2	4.0	4.349	6x	10.25	45	0.00	26.67	14.86	41.52	1	21.02	53.89	0.77	86.22	0.216
22.1-E.4	24.5	13.242	6x	10.25	136	0.00	15.70	5.78	21.48	1	16.65	53.89	0.40	86.22	0.112
22.1-E.4	24.5	13.242	6x	10.25	136	0.00	5.04	5.78	10.82	1	12.27	22.78	0.47	36.45	0.133
21.0-E.4	8.5	9.081	7x	10.25	93	0.00	22.33	12.41	34.74	1	21.02	53.89	0.64	86.22	0.180
21.0-U.2	32.5	34.660	8x	10.25	355	0.00	20.30	11.28	31.57	1	14.46	45.71	0.78	73.14	0.193
20.0-E.4	24.5	12.925	9x	10.25	132	0.00	15.38	5.64	21.02	1	14.46	45.71	0.46	73.14	0.129
20.0-E.4	24.5	12.925	6x	10.25	132	0.00	4.94	5.64	10.58	1	0.00	0.00	N/A	36.45	#DIV/0!
19.5-E.5	8.5	8.865	10x	10.25	91	0.00	21.87	12.12	33.99	1	14.46	45.71	0.84	73.14	0.208
18.8-E.5	25.0	12.879	11x	10.25	132	0.00	15.06	5.50	20.56	1	14.46	45.71	0.45	73.14	0.126
18.8-E.5	25.0	12.879	6x	10.25	132	0.00	4.83	5.50	10.33	1	12.27	22.78	0.45	36.45	0.127
18.2-U.2	24.5	25.220	6x	10.25	259	0.00	19.90	11.00	30.90	1	16.65	53.89	0.66	86.22	0.161
17.2-PL A.7	7.0	6.993	6x	10.25	72	0.00	21.71	11.95	33.65	1	16.65	53.89	0.72	86.22	0.175
17.3-E.3	25.0	25.080	6x	10.25	257	0.00	19.45	10.71	30.16	1	16.65	53.89	0.64	86.22	0.157
17.0-U.2	32.5	16.118	6x	10.25	165	0.00	14.48	5.24	19.73	1	16.65	53.89	0.37	86.22	0.103
17.0-U.2	32.5	16.118	6x	10.25	165	0.00	4.63	5.24	9.87	1	12.27	22.78	0.43	36.45	0.121
15.8-PL A.6	23.0	22.861	6x	10.25	234	0.00	19.44	10.65	30.09	1	16.65	53.89	0.64	86.22	0.156
15.2-E.2	21.0	20.898	6x	10.25	214	0.00	19.55	10.71	30.26	1	16.65	53.89	0.64	86.22	0.157
15.2-C.7	29.5	29.356	6x	10.25	301	0.00	19.27	10.56	29.83	1	16.65	53.89	0.63	86.22	0.155
15.2-A.6	11.5	11.444	6x	10.25	117	0.00	20.39	11.17	31.56	1	16.65	53.89	0.67	86.22	0.164
13.8-C.7	29.5	29.537	6x	10.25	303	0.00	19.41	10.62	30.03	1	16.65	53.89	0.64	86.22	0.156

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

13.8-A.6	11.5	11.514	6x	10.25	118	0.00	20.54	11.24	31.78	1	16.65	53.89	0.68	86.22	0.165
13.8-E.2	22.0	22.028	6x	10.25	226	0.00	19.64	10.75	30.39	1	16.65	53.89	0.65	86.22	0.158
13.2-PL A.6	23.5	23.559	6x	10.25	241	0.00	19.61	10.73	30.34	1	16.65	53.89	0.64	86.22	0.158
12.0-U.2	24.5	12.394	6x	10.25	127	0.00	15.01	5.41	20.42	1	16.65	53.89	0.38	86.22	0.106
12.0-U.2	24.5	12.394	6x	10.25	127	0.00	4.78	5.41	10.18	1	12.27	22.78	0.45	36.45	0.125
11.8-E.3	25.0	12.721	6x	10.25	130	0.00	15.10	5.43	20.53	1	16.65	53.89	0.38	86.22	0.107
11.8-E.3	25.0	12.721	6x	10.25	130	0.00	4.80	5.43	10.24	1	12.27	22.78	0.45	36.45	0.126
11.0-U.2	32.5	16.811	6x	10.25	172	0.00	15.24	5.47	20.71	1	16.65	53.89	0.38	86.22	0.108
11.0-U.2	32.5	16.811	6x	10.25	172	0.00	4.85	5.47	10.32	1	12.27	22.78	0.45	36.45	0.127
10.0-E.5	25.0	13.030	6x	10.25	134	0.00	15.53	5.57	21.09	1	16.65	53.89	0.39	86.22	0.110
10.0-E.5	25.0	13.030	6x	10.25	134	0.00	4.93	5.57	10.50	1	12.27	22.78	0.46	36.45	0.129
9.5-S.5	8.5	8.893	6x	10.25	91	0.00	22.36	12.15	34.51	1	16.65	53.89	0.73	86.22	0.179
9.2-E.5	8.5	8.963	6x	10.25	92	0.00	22.56	12.25	34.81	1	16.65	53.89	0.74	86.22	0.181
9.0-U.2	24.5	12.951	6x	10.25	133	0.00	15.80	5.65	21.45	1	16.65	53.89	0.40	86.22	0.111
9.0-U.2	24.5	12.951	6x	10.25	133	0.00	5.02	5.65	10.66	1	12.27	22.78	0.47	36.45	0.131
7.9-E.4	24.5	13.047	6x	10.25	134	0.00	15.94	5.69	21.63	1	16.65	53.89	0.40	86.22	0.112
7.9-E.4	24.5	13.047	6x	10.25	134	0.00	5.06	5.69	10.75	1	12.27	22.78	0.47	36.45	0.132
7.3-E.0	8.5	9.078	6x	10.25	93	0.00	22.89	12.41	35.30	1	16.65	53.89	0.75	86.22	0.183
8.0-E.4	8.5	9.148	6x	10.25	94	0.00	23.10	12.50	35.60	1	16.65	53.89	0.75	86.22	0.185
7.0-U.2	32.5	17.549	6x	10.25	180	0.00	16.03	5.71	21.74	1	16.65	53.89	0.40	86.22	0.113
7.0-U.2	32.5	17.549	6x	10.25	180	0.00	5.08	5.71	10.79	1	12.27	22.78	0.47	36.45	0.133
6.0-E.5	25.0	13.603	6x	10.25	139	0.00	16.33	5.81	22.13	1	16.65	53.89	0.41	86.22	0.115
6.0-E.5	25.0	13.603	6x	10.25	139	0.00	5.18	5.81	10.99	1	12.27	22.78	0.48	36.45	0.135
5.6-B.5	4.5	4.924	6x	10.25	50	0.00	26.71	14.42	41.13	1	21.02	53.89	0.76	86.22	0.214
5.0-E.5	5.5	6.045	6x	10.25	62	0.00	25.52	13.77	39.29	1	16.65	53.89	0.83	86.22	0.204
4.9-D.9	8.0	8.835	6x	10.25	91	0.00	23.99	12.94	36.93	1	16.65	53.89	0.78	86.22	0.192
4.8-B.5	6.5	7.297	6x	10.25	75	0.00	25.28	13.60	38.88	1	16.65	53.89	0.82	86.22	0.202
4.6-E.3	25.0	27.834	6x	10.25	285	0.00	22.07	11.89	33.96	1	16.65	53.89	0.71	86.22	0.176
4.0-PL A.6	20.5	23.153	6x	10.25	237	0.00	19.07	12.17	31.24	1	16.65	43.38	0.73	69.41	0.202
4.0-K.5	34.5	38.965	6x	10.25	399	0.00	22.18	11.92	34.10	1	16.65	53.89	0.72	86.22	0.177
4.0-E.2	21.5	24.283	6x	10.25	249	0.00	22.59	12.14	34.73	1	16.65	53.89	0.73	86.22	0.180
4.0-C.9	23.5	26.542	6x	10.25	272	0.00	22.49	12.09	34.58	1	16.65	53.89	0.73	86.22	0.180
1.7-U.2	31.0	17.632	6x	10.25	181	0.00	17.04	6.02	23.07	1	16.65	53.89	0.43	86.22	0.120
1.7-U.2	31.0	17.632	6x	10.25	181	0.00	5.39	6.02	11.42	1	12.27	22.78	0.50	36.45	0.140
1.0-C.3	9.0	10.245	6x	10.25	105	0.00	24.45	13.13	37.57	1	16.65	53.89	0.79	86.22	0.195
1.0-E.9	6.5	7.400	6x	10.25	76	0.00	25.68	13.79	39.47	1	16.65	53.89	0.83	86.22	0.205
1.0-N.9	25.0	28.464	6x	10.25	292	0.00	22.64	12.16	34.80	1	16.65	53.89	0.73	86.22	0.181
1.0-P.8	19.0	21.633	6x	10.25	222	0.00	22.94	12.32	35.26	1	16.65	53.89	0.74	86.22	0.183
1.0-K.0	7.0	7.970	6x	10.25	82	0.00	25.36	13.62	38.97	1	16.65	53.89	0.82	86.22	0.202
1.0-L.0	20.0	22.771	6x	10.25	233	0.00	22.88	12.28	35.16	1	16.65	53.89	0.74	86.22	0.183
0.5-PL A.6															
0.3-U.4	6.0	6.987	6x	10.25	72	0.00	26.76	14.32	41.08	1	16.65	53.89	0.86	86.22	0.213
0.1-U.3	4.5	5.273	6x	10.25	54	0.00	28.87	15.44	44.31	1	21.02	53.89	0.82	86.22	0.230
0.1-R.0	4.5	5.273	6x	10.25	54	0.00	28.87	15.44	44.31	1	21.02	53.89	0.82	86.22	0.230
0.0-K.0	4.0	4.694	6x	10.25	48	0.00	29.99	16.04	46.03	1	21.02	53.89	0.85	86.22	0.239
0.0-K.5	4.0	4.695	6x	10.25	48	0.00	29.99	16.04	46.03	1	21.02	53.89	0.85	86.22	0.239
0.0-P.7	4.0	4.695	6x	10.25	48	0.00	29.99	16.04	46.03	1	21.02	53.89	0.85	86.22	0.239
0.0-P.4	4.0	4.695	6x	10.25	48	0.00	29.99	16.04	46.03	1	21.02	53.89	0.85	86.22	0.239
4.0-P.4	8.5	9.976	6x	10.25	102	0.00	#DIV/0!	13.63	#DIV/0!	1	16.65	53.89	#DIV/0!	86.22	#DIV/0!
4.0-P.4	8.5	9.976	6x	10.25	102	0.00	#DIV/0!	13.63	#DIV/0!	1	16.65	53.89	#DIV/0!	86.22	#DIV/0!
U.4-29.0	6.0	7.475	6x	10.25	77	0.00	27.74	15.32	43.06	1	21.02	53.89	0.80	86.22	0.224
U.4-19.9	7.0	8.720	6x	10.25	89	0.00	26.96	14.90	41.86	1	16.65	53.89	0.89	86.22	0.218
U.4-17.4	6.0	7.474	6x	10.25	77	0.00	27.74	15.32	43.06	1	21.02	53.89	0.80	86.22	0.224
U.4-11.0	7.5	9.343	6x	10.25	96	0.00	26.67	14.73	41.40	1	16.65	53.89	0.88	86.22	0.215
U.4-4.0	5.5	6.842	6x	10.25	70	0.00	28.21	15.58	43.79	1	21.02	53.89	0.81	86.22	0.228
U.3-29.0	8.0	9.863	6x	10.25	101	0.00	26.13	14.44	40.57	1	16.65	53.89	0.87	86.22	0.211
U.0-4.0	18.0	21.728	6x	10.25	223	0.00	23.68	13.10	36.78	1	16.65	53.89	0.79	86.22	0.191
U.0-9.0	26.0	31.381	6x	10.25	322	0.00	23.26	12.87	36.12	1	16.65	53.89	0.77	86.22	0.188
U.0-12.0	26.0	31.381	6x	10.25	322	0.00	23.26	12.87	36.12	1	16.65	53.89	0.77	86.22	0.188
U.0-11.0	12.5	15.087	6x	10.25	155	0.00	24.31	13.45	37.75	1	16.65	53.89	0.81	86.22	0.196
U.0-20.1	18.0	21.725	6x	10.25	223	0.00	23.68	13.10	36.78	1	16.65	53.89	0.79	86.22	0.191
U.0-18.1	26.0	31.381	6x	10.25	322	0.00	23.26	12.87	36.12	1	16.65	53.89	0.77	86.22	0.188

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

U.0-17.2	24.5	29.570	6x	10.25	303	0.00	23.31	12.90	36.21	1	16.65	53.89	0.77	86.22	0.188
U.0-7.2	5.5	6.638	6x	10.25	68	0.00	27.33	15.12	42.45	1	21.02	53.89	0.79	86.22	0.221
T.0-29.5	29.5	35.510	6x	10.25	364	0.00	23.08	12.77	35.85	1	16.65	53.89	0.77	86.22	0.186
S.2-1.5	13.0	15.647	6x	10.25	160	0.00	24.16	13.36	37.52	1	16.65	53.89	0.80	86.22	0.195
S.2-25.2	13.0	15.647	6x	10.25	160	0.00	24.16	13.36	37.52	1	16.65	53.89	0.80	86.22	0.195
R.1-4.0	21.5	25.778	6x	10.25	264	0.00	23.29	12.89	36.18	1	16.65	53.89	0.77	86.22	0.188
Q.0-28.4	9.5	11.373	6x	10.25	117	0.00	24.78	13.71	38.50	1	16.65	53.89	0.82	86.22	0.200
Q.0-25.7	21.0	25.140	6x	10.25	258	0.00	23.28	12.88	36.17	1	16.65	53.89	0.77	86.22	0.188
P.8-29.0	12.0	14.271	6x	10.25	146	0.00	24.02	13.30	37.32	1	16.65	53.89	0.80	86.22	0.194
P.3-4.0	8.5	9.948	6x	10.25	102	0.00	24.54	13.59	38.14	1	16.65	53.89	0.82	86.22	0.198
P.0-4.0	29.5	17.077	6x	10.25	175	0.00	16.76	6.14	22.90	1	16.65	53.89	0.43	86.22	0.119
P.0-4.0	29.5	17.077	6x	10.25	175	0.00	5.40	6.14	11.54	1	12.27	22.78	0.51	36.45	0.142
N.0-25.5	24.5	14.059	6x	10.25	144	0.00	16.73	6.13	22.86	1	16.65	53.89	0.42	86.22	0.119
N.0-25.5	24.5	14.059	6x	10.25	144	0.00	5.39	6.13	11.52	1	12.27	22.78	0.51	36.45	0.142
M.0-4.0	33.5	18.936	6x	10.25	194	0.00	16.27	5.97	22.25	1	16.65	53.89	0.41	86.22	0.116
M.0-4.0	33.5	18.936	6x	10.25	194	0.00	5.25	5.97	11.22	1	12.27	22.78	0.49	36.45	0.138
L.1-25.5	24.0	13.517	6x	10.25	139	0.00	16.41	6.02	22.44	1	16.65	53.89	0.42	86.22	0.117
L.1-25.5	24.0	13.517	6x	10.25	139	0.00	5.30	6.02	11.32	1	12.27	22.78	0.50	36.45	0.139
K.0-25.5	24.5	13.529	6x	10.25	139	0.00	16.06	5.90	21.96	1	16.65	53.89	0.41	86.22	0.114
K.0-25.5	24.5	13.529	6x	10.25	139	0.00	5.19	5.90	11.09	1	12.27	22.78	0.49	36.45	0.136
J.8-4.0	8.5	9.365	6x	10.25	96	0.00	23.04	12.80	35.84	1	16.65	53.89	0.77	86.22	0.186
H.6-25.7	25.0	26.857	6x	10.25	275	0.00	20.62	11.47	32.09	1	16.65	53.89	0.69	86.22	0.167
H.1-29.0	11.0	11.844	6x	10.25	121	0.00	21.79	12.14	33.93	1	16.65	53.89	0.73	86.22	0.176
H.0-28.4	9.5	10.242	6x	10.25	105	0.00	22.16	12.35	34.51	1	16.65	53.89	0.74	86.22	0.179
H.0-25.7	21.0	22.641	6x	10.25	232	0.00	20.82	11.60	32.42	1	16.65	53.89	0.70	86.22	0.168
F.6-8.0	26.0	28.089	6x	10.25	288	0.00	20.66	11.52	32.18	1	16.65	53.89	0.69	86.22	0.167
F.6-25.3	21.0	22.687	6x	10.25	233	0.00	20.86	11.63	32.48	1	16.65	53.89	0.70	86.22	0.169
F.6-22.1	16.0	17.286	6x	10.25	177	0.00	21.19	11.81	33.00	1	16.65	53.89	0.71	86.22	0.171
F.6-20.0	26.0	28.089	6x	10.25	288	0.00	20.66	11.52	32.18	1	16.65	53.89	0.69	86.22	0.167
F.6-18.0	16.0	17.286	6x	10.25	177	0.00	21.19	11.81	33.00	1	16.65	53.89	0.71	86.22	0.171
F.6-17.3	21.0	22.687	6x	10.25	233	0.00	20.86	11.63	32.48	1	16.65	53.89	0.70	86.22	0.169
F.6-11.9	28.5	30.790	6x	10.25	316	0.00	20.59	11.48	32.06	1	16.65	53.89	0.69	86.22	0.167
F.6-10.2	16.0	17.286	6x	10.25	177	0.00	21.19	11.81	33.00	1	16.65	53.89	0.71	86.22	0.171
F.6-5.9	16.0	17.286	6x	10.25	177	0.00	21.19	11.81	33.00	1	16.65	53.89	0.71	86.22	0.171
F.6-4.5	29.0	31.330	6x	10.25	321	0.00	20.57	11.47	32.04	1	16.65	53.89	0.69	86.22	0.166
F.5-4.0	33.0	35.653	6x	10.25	365	0.00	20.49	11.42	31.91	1	16.65	53.89	0.69	86.22	0.166
E.9-29.0	24.5	13.246	6x	10.25	136	0.00	15.65	5.78	21.42	1	16.65	53.89	0.40	86.22	0.111
E.9-29.0	24.5	13.246	6x	10.25	136	0.00	5.08	5.78	10.86	1	12.27	22.78	0.48	36.45	0.133
E.7-4.1	7.0	7.584	6x	10.25	78	0.00	23.23	12.96	36.19	1	16.65	53.89	0.78	86.22	0.188
E.4-29.0	0.0	#DIV/0!	6x	10.25	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	1	16.65	53.89	#DIV/0!	86.22	#DIV/0!
D.8-29.0	9.5	10.363	6x	10.25	106	0.00	22.40	12.50	34.89	1	16.65	53.89	0.75	86.22	0.181
D.6-4.6	5.5	6.007	6x	10.25	62	0.00	24.52	13.68	38.20	1	16.65	53.89	0.82	86.22	0.198
D.2-29.0	30.0	16.425	6x	10.25	168	0.00	15.70	5.81	21.50	1	16.65	53.89	0.40	86.22	0.112
D.2-29.0	30.0	16.425	6x	10.25	168	0.00	5.10	5.81	10.91	1	12.27	22.78	0.48	36.45	0.134
D.0-17.2	25.0	13.710	6x	10.25	141	0.00	15.83	5.86	21.68	1	16.65	53.89	0.40	86.22	0.113
D.0-17.2	25.0	13.710	6x	10.25	141	0.00	5.15	5.86	11.00	1	12.27	22.78	0.48	36.45	0.135
D.0-11.9	25.0	13.710	6x	10.25	141	0.00	15.83	5.86	21.68	1	16.65	53.89	0.40	86.22	0.113
D.0-11.9	25.0	13.710	6x	10.25	141	0.00	5.15	5.86	11.00	1	12.27	22.78	0.48	36.45	0.135
D.0-4.5	25.0	13.710	6x	10.25	141	0.00	15.83	5.86	21.68	1	16.65	53.89	0.40	86.22	0.113
D.0-4.5	25.0	13.710	6x	10.25	141	0.00	5.15	5.86	11.00	1	12.27	22.78	0.48	36.45	0.135
D.0-25.5	25.5	13.984	6x	10.25	143	0.00	15.82	5.85	21.67	1	16.65	53.89	0.40	86.22	0.113
D.0-25.5	25.5	13.984	6x	10.25	143	0.00	5.14	5.85	10.99	1	0.00	0.00	N/A	#N/A	#N/A
C.1-29.0	27.0	29.769	6x	10.25	305	0.00	21.01	11.74	32.75	1	16.65	53.89	0.70	86.22	0.170
C.0-4.0	17.5	19.314	6x	10.25	198	0.00	21.48	12.00	33.48	1	16.65	53.89	0.72	86.22	0.174
B.2-29.0	27.0	29.870	6x	10.25	306	0.00	21.08	11.78	32.85	1	16.65	53.89	0.71	86.22	0.171
B.2-17.6	8.5	9.404	6x	10.25	96	0.00	23.00	12.85	35.85	1	16.65	53.89	0.77	86.22	0.186
B.2-11.4	8.5	9.404	6x	10.25	96	0.00	23.00	12.85	35.85	1	16.65	53.89	0.77	86.22	0.186
B.2-4.9	8.5	9.404	6x	10.25	96	0.00	23.00	12.85	35.85	1	16.65	53.89	0.77	86.22	0.186
B.2-25.0	8.5	9.404	6x	10.25	96	0.00	23.00	12.85	35.85	1	16.65	53.89	0.77	86.22	0.186
B.0-4.0	17.5	19.372	6x	10.25	199	0.00	21.54	12.03	33.57	1	16.65	53.89	0.72	86.22	0.174
A.0-11.8	28.0	15.547	6x	10.25	159	0.00	15.93	5.90	21.83	1	16.65	53.89	0.41	86.22	0.113
A.0-11.8	28.0	15.547	6x	10.25	159	0.00	5.19	5.90	11.09	1	12.27	22.78	0.49	36.45	0.136

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

A.0-17.3	28.0	15.547	6x	10.25	159	0.00	15.93	5.90	21.83	1	16.65	53.89	0.41	86.22	0.113
A.0-17.3	28.0	15.547	6x	10.25	159	0.00	5.19	5.90	11.09	1	12.27	22.78	0.49	36.45	0.136
A.0-4.7	37.0	41.096	6x	10.25	421	0.00	20.93	11.70	32.63	1	16.65	53.89	0.70	86.22	0.170
A.0-25.2	32.0	35.543	6x	10.25	364	0.00	21.02	11.75	32.78	1	16.65	53.89	0.71	86.22	0.170
PL A.8-5.6	7.0	7.803	6x	10.25	80	0.00	20.10	13.33	33.43	1	16.65	43.38	0.80	69.41	0.216
PL A.7-29.0	9.0	10.046	6x	10.25	103	0.00	23.02	12.87	35.89	1	16.65	53.89	0.77	86.22	0.186
PL A.5-17.9	7.0	7.827	6x	10.25	80	0.00	23.91	13.37	37.28	1	16.65	53.89	0.80	86.22	0.194
PL A.5-10.5	7.0	7.827	6x	10.25	80	0.00	23.91	13.37	37.28	1	16.65	53.89	0.80	86.22	0.194
PL A.5-5.6	7.0	7.827	6x	10.25	80	0.00	20.15	13.37	33.52	1	16.65	43.38	0.80	69.41	0.216
PL A.5-22.5	7.0	7.827	6x	10.25	80	0.00	23.91	13.37	37.28	1	16.65	53.89	0.80	86.22	0.194
PL A.2-4.0															
PL A.2-5.0															
PL A.2-11.7	11.0	12.358	6x	10.25	127	0.00	22.64	12.67	35.30	1	16.65	53.89	0.76	86.22	0.183
PL A.2-10.7	11.0	12.358	6x	10.25	127	0.00	22.64	12.67	35.30	1	16.65	53.89	0.76	86.22	0.183

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Katterra

Tiedown Summary

Element									Demand
Building	Length		Level 5	Level 4	Level 3	Level 2	Override	CTDS	to
Line	(ft)	Type	Run	Run	Run	Run	Run	Run	Capacity
29.0-H.5	4.00	4	41	42	43	43	44	44	0.83
29.0-P.7	11.50	4	41	41	42	42	43	43	0.79
29.0-U.3	8.00	4	41	42	42	42	43	43	0.82
29.0-A.9	5.00	4	41	42	43	43	43	43	0.90
29.0-PL A.	5.50	4	41	42	43	43	43	43	0.88
29.0-P.1	6.50	4	41	42	42	42	43	43	0.84
29.0-J.0	6.50	4	41	42	42	42	43	43	0.84
29.0-H.4	18.00	4	41	41	41	41	43	43	0.64
29.0-H.4	18.00	2	-	-	21	21	21	21	0.51
29.0-P.6	18.50	4	41	41	41	41	43	43	0.64
29.0-P.6	18.50	2	-	-	21	21	21	21	0.51
27.9-U.2	19.00	4	41	41	41	41	43	43	0.63
27.9-U.2	19.00	3	-	-	31	31	21	21	0.00
27.1-E.0	37.00	4	41	41	41	41	43	43	0.72
27.1-H.5	5.50	4	41	42	43	42	43	43	0.85
27.1-P.5	5.50	4	41	42	43	42	43	43	0.85
27.1-C.4	8.00	4	41	41	42	42	43	43	0.80
27.1-A.8	8.50	4	41	41	42	42	43	43	0.79
27.1-PL A.	18.00	4	41	41	42	42	43	43	0.74
26.0-E.2	21.00	4	41	41	42	41	43	43	0.73
26.0-C.9	23.50	4	41	41	41	41	43	43	0.72
26.0-B.5	0.00	4	#VALUE!	#VALUE!	#VALUE!	#VALUE!	43	43	#DIV/0!
26.0-PL A.1	21.00	4	41	41	41	41	43	43	0.62
26.0-PL A.1	21.00	2	-	-	21	21	21	21	0.50
25.6-P.5	25.00	4	41	41	41	41	43	43	0.72
25.4-U.3	8.50	4	41	41	42	42	43	43	0.78
25.3-E.3	25.00	4	41	41	41	41	43	43	0.71
25.0-H.5	28.50	4	41	41	41	41	43	43	0.70
25.0-L.0	10.50	4	41	41	42	42	43	43	0.75
25.0-K.0	18.50	4	41	41	41	41	43	43	0.72
25.0-P.5	22.00	4	41	41	41	41	43	43	0.71
25.0-N.1	18.50	4	41	41	41	41	43	43	0.72
24.2-U.2	29.50	4	41	41	41	41	43	43	0.60
24.2-U.2	29.50	2	-	-	21	21	21	21	0.48
22.6-B.2	4.00	4	41	42	43	43	44	44	0.72
22.1-E.4	24.50	4	41	41	41	41	43	43	0.60
22.1-E.4	24.50	2	-	-	21	21	21	21	0.48
21.0-E.4	8.50	4	41	41	42	42	44	44	0.60
21.0-U.2	32.50	4	41	41	41	41	42	42	0.80
20.0-E.4	24.50	4	41	41	41	41	42	42	0.69
20.0-E.4	24.50	3	-	-	31	31	21	21	0.00
19.5-E.5	8.50	4	41	41	42	41	42	42	0.87
18.8-E.5	25.00	4	41	41	41	41	42	42	0.67
18.8-E.5	25.00	2	-	-	21	21	21	21	0.46
18.2-U.2	24.50	4	41	41	41	41	43	43	0.67
17.2-PL A.	7.00	4	41	41	42	41	43	43	0.73
17.3-E.3	25.00	4	41	41	41	41	43	43	0.65
17.0-U.2	32.50	4	41	41	41	41	43	43	0.56
17.0-U.2	32.50	2	-	-	21	21	21	21	0.44
15.8-PL A.1	23.00	4	41	41	41	41	43	43	0.65
15.2-E.2	21.00	4	41	41	41	41	43	43	0.65
15.2-C.7	29.50	4	41	41	41	41	43	43	0.64
15.2-A.6	11.50	4	41	41	41	41	43	43	0.68
13.8-C.7	29.50	4	41	41	41	41	43	43	0.65

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13.8-A.6	11.50	4	41	41	41	41	43	43	0.69
13.8-E.2	22.00	4	41	41	41	41	43	43	0.66
13.2-PL A.1	23.50	4	41	41	41	41	43	43	0.66
12.0-U.2	24.50	4	41	41	41	41	43	43	0.58
12.0-U.2	24.50	2	-	-	21	21	21	21	0.45
11.8-E.3	25.00	4	41	41	41	41	43	43	0.58
11.8-E.3	25.00	2	-	-	21	21	21	21	0.46
11.0-U.2	32.50	4	41	41	41	41	43	43	0.59
11.0-U.2	32.50	2	-	-	21	21	21	21	0.46
10.0-E.5	25.00	4	41	41	41	41	43	43	0.60
10.0-E.5	25.00	2	-	-	21	21	21	21	0.47
9.5-S.5	8.50	4	41	41	42	41	43	43	0.75
9.2-E.5	8.50	4	41	41	42	41	43	43	0.75
9.0-U.2	24.50	4	41	41	41	41	43	43	0.61
9.0-U.2	24.50	2	-	-	21	21	21	21	0.48
7.9-E.4	24.50	4	41	41	41	41	43	43	0.62
7.9-E.4	24.50	2	-	-	21	21	21	21	0.48
7.3-E.0	8.50	4	41	41	42	42	43	43	0.76
8.0-E.4	8.50	4	41	41	42	42	43	43	0.77
7.0-U.2	32.50	4	41	41	41	41	43	43	0.62
7.0-U.2	32.50	2	-	-	21	21	21	21	0.48
6.0-E.5	25.00	4	41	41	41	41	43	43	0.63
6.0-E.5	25.00	2	-	-	21	21	21	21	0.49
5.6-B.5	4.50	4	41	42	43	42	44	44	0.72
5.0-E.5	5.50	4	41	42	43	42	43	43	0.85
4.9-D.9	8.00	4	41	42	42	42	43	43	0.80
4.8-B.5	6.50	4	41	42	42	42	43	43	0.84
4.6-E.3	25.00	4	41	41	42	41	43	43	0.73
4.0-PL A.6	20.50	3	-	31	32	31	33	33	0.75
4.0-K.5	34.50	4	41	41	42	41	43	43	0.74
4.0-E.2	21.50	4	41	41	42	41	43	43	0.75
4.0-C.9	23.50	4	41	41	42	41	43	43	0.75
1.7-U.2	31.00	4	41	41	41	41	43	43	0.66
1.7-U.2	31.00	2	-	-	21	21	21	21	0.51
1.0-C.3	9.00	4	41	42	42	42	43	43	0.81
1.0-E.9	6.50	4	41	42	43	42	43	43	0.85
1.0-N.9	25.00	4	41	41	42	41	43	43	0.75
1.0-P.8	19.00	4	41	41	42	42	43	43	0.76
1.0-K.0	7.00	4	41	42	42	42	43	43	0.84
1.0-L.0	20.00	4	41	41	42	42	43	43	0.76
0.5-PL A.6	0.00	1	-	-	13	-	13	13	0.88
0.3-U.4	6.00	4	41	42	43	42	43	43	0.89
0.1-U.3	4.50	4	41	42	43	43	44	44	0.78
0.1-R.0	4.50	4	41	42	43	43	44	44	0.78
0.0-K.0	4.00	4	41	43	43	43	44	44	0.81
0.0-K.5	4.00	4	41	43	43	43	44	44	0.81
0.0-P.7	4.00	4	41	43	43	43	44	44	0.81
0.0-P.4	4.00	4	41	43	43	43	44	44	0.81
4.0-P.4	8.50	4	#VALUE!	#VALUE!	#VALUE!	#VALUE!	43	43	#DIV/0!
4.0-P.4	8.50	4	#VALUE!	#VALUE!	#VALUE!	#VALUE!	43	43	#DIV/0!
U.4-29.0	6.00	4	41	42	43	43	44	44	0.74
U.4-19.9	7.00	4	41	42	43	43	43	43	0.90
U.4-17.4	6.00	4	41	42	43	43	44	44	0.74
U.4-11.0	7.50	4	41	42	43	43	43	43	0.89
U.4-4.0	5.50	4	41	42	43	43	44	44	0.76
U.3-29.0	8.00	4	41	42	43	42	43	43	0.88
U.0-4.0	18.00	4	41	41	42	42	43	43	0.80
U.0-9.0	26.00	4	41	41	42	42	43	43	0.78
U.0-12.0	26.00	4	41	41	42	42	43	43	0.78
U.0-11.0	12.50	4	41	42	42	42	43	43	0.82
U.0-20.1	18.00	4	41	41	42	42	43	43	0.80
U.0-18.1	26.00	4	41	41	42	42	43	43	0.78

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U.0-17.2	24.50	4	41	41	42	42	43	43	0.78
U.0-7.2	5.50	4	41	42	43	43	44	44	0.73
T.0-29.5	29.50	4	41	41	42	42	43	43	0.78
S.2-1.5	13.00	4	41	42	42	42	43	43	0.81
S.2-25.2	13.00	4	41	42	42	42	43	43	0.81
R.1-4.0	21.50	4	41	41	42	42	43	43	0.78
Q.0-28.4	9.50	4	41	42	42	42	43	43	0.83
Q.0-25.7	21.00	4	41	41	42	42	43	43	0.78
P.8-29.0	12.00	4	41	42	42	42	43	43	0.81
P.3-4.0	8.50	4	41	42	42	42	43	43	0.83
P.0-4.0	29.50	4	41	41	41	41	43	43	0.64
P.0-4.0	29.50	2	-	-	21	21	21	21	0.51
N.0-25.5	24.50	4	41	41	41	41	43	43	0.64
N.0-25.5	24.50	2	-	-	21	21	21	21	0.51
M.0-4.0	33.50	4	41	41	41	41	43	43	0.62
M.0-4.0	33.50	2	-	-	21	21	21	21	0.50
L.1-25.5	24.00	4	41	41	41	41	43	43	0.63
L.1-25.5	24.00	2	-	-	21	21	21	21	0.50
K.0-25.5	24.50	4	41	41	41	41	43	43	0.61
K.0-25.5	24.50	2	-	-	21	21	21	21	0.49
J.8-4.0	8.50	4	41	41	42	42	43	43	0.78
H.6-25.7	25.00	4	41	41	41	41	43	43	0.70
H.1-29.0	11.00	4	41	41	42	41	43	43	0.74
H.0-28.4	9.50	4	41	41	42	42	43	43	0.75
H.0-25.7	21.00	4	41	41	41	41	43	43	0.71
F.6-8.0	26.00	4	41	41	41	41	43	43	0.70
F.6-25.3	21.00	4	41	41	41	41	43	43	0.71
F.6-22.1	16.00	4	41	41	41	41	43	43	0.72
F.6-20.0	26.00	4	41	41	41	41	43	43	0.70
F.6-18.0	16.00	4	41	41	41	41	43	43	0.72
F.6-17.3	21.00	4	41	41	41	41	43	43	0.71
F.6-11.9	28.50	4	41	41	41	41	43	43	0.70
F.6-10.2	16.00	4	41	41	41	41	43	43	0.72
F.6-5.9	16.00	4	41	41	41	41	43	43	0.72
F.6-4.5	29.00	4	41	41	41	41	43	43	0.70
F.5-4.0	33.00	4	41	41	41	41	43	43	0.69
E.9-29.0	24.50	4	41	41	41	41	43	43	0.60
E.9-29.0	24.50	2	-	-	21	21	21	21	0.48
E.7-4.1	7.00	4	41	41	42	42	43	43	0.79
E.4-29.0	0.00	4	#VALUE!	#VALUE!	#VALUE!	#VALUE!	43	43	#DIV/0!
D.8-29.0	9.50	4	41	41	42	42	43	43	0.76
D.6-4.6	5.50	4	41	42	42	42	43	43	0.83
D.2-29.0	30.00	4	41	41	41	41	43	43	0.60
D.2-29.0	30.00	2	-	-	21	21	21	21	0.49
D.0-17.2	25.00	4	41	41	41	41	43	43	0.60
D.0-17.2	25.00	2	-	-	21	21	21	21	0.49
D.0-11.9	25.00	4	41	41	41	41	43	43	0.60
D.0-11.9	25.00	2	-	-	21	21	21	21	0.49
D.0-4.5	25.00	4	41	41	41	41	43	43	0.60
D.0-4.5	25.00	2	-	-	21	21	21	21	0.49
D.0-25.5	25.50	4	41	41	41	41	43	43	0.60
D.0-25.5	25.50	2	-	-	21	21	1	1	0.00
C.1-29.0	27.00	4	41	41	41	41	43	43	0.71
C.0-4.0	17.50	4	41	41	42	41	43	43	0.73
B.2-29.0	27.00	4	41	41	41	41	43	43	0.72
B.2-17.6	8.50	4	41	41	42	42	43	43	0.78
B.2-11.4	8.50	4	41	41	42	42	43	43	0.78
B.2-4.9	8.50	4	41	41	42	42	43	43	0.78
B.2-25.0	8.50	4	41	41	42	42	43	43	0.78
B.0-4.0	17.50	4	41	41	42	41	43	43	0.73
A.0-11.8	28.00	4	41	41	41	41	43	43	0.60
A.0-11.8	28.00	2	-	-	21	21	21	21	0.49

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A.0-17.3	28.00	4	41	41	41	41	43	43	✓ 0.60
A.0-17.3	28.00	2	-	-	21	21	21	21	✓ 0.49
A.0-4.7	37.00	4	41	41	41	41	43	43	✓ 0.71
A.0-25.2	32.00	4	41	41	41	41	43	43	✓ 0.71
PL A.8-5.6	7.00	3	-	31	32	32	33	33	✓ 0.81
PL A.7-29.1	9.00	4	41	41	42	42	43	43	✓ 0.78
PL A.5-17.1	7.00	4	41	41	42	42	43	43	✓ 0.81
PL A.5-10.1	7.00	4	41	41	42	42	43	43	✓ 0.81
PL A.5-5.6	7.00	3	-	31	32	32	33	33	✓ 0.81
PL A.5-22.1	7.00	4	41	41	42	42	43	43	✓ 0.81
PL A.2-4.0	0.00	2	-	21	22	-	22	22	✓ 0.88
PL A.2-5.0	0.00	2	-	21	22	-	22	22	✓ 0.88
PL A.2-11.1	11.00	4	41	41	42	42	43	43	✓ 0.77
PL A.2-10.1	11.00	4	41	41	42	42	43	43	✓ 0.77

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Legacy Livermore

Katerra

Lateral Analysis - Roof Framing Level.**Shearwall Drift Calculations - Roof Framing Level.**

$$\delta_{sw} = \frac{8vh^3}{Eab} + \frac{yh}{G_t I_t} + 0.75he_n + \frac{h}{b} \Delta_n \quad (C4.3.2-1)$$

$$C_d = 4$$

$$I = 1.0$$

$$E = 1600000 \text{ psi (DF\#2)}$$

Lumber Type = Dry

Allowable Story Drift = 2.46 in

Sheath Type	Gvtv
OSB	83500
Ply	35000
Ply S1	45500

Building	SW Length	Plate Height, h	LRFD Shear	Nail Spac.	e _n	Sheath Type	Double Shear?	Wall anch.				Total Defl	Amplified	d/c
								bending	shear	nail slip	slip			
Line	(ft)	(ft)	(plf)	in	in			8vh ³ /EAb	vh/G _t I _t	0.75he _n	h ² Δ _n /b	in	in	
N/S 29.0-H.5	4.00'	9.26'	468	4	0.0084	Ply S1	No	0.0276	0.0952	0.0447	0.2815	0.4489	1.7958	
29.0-P.7	11.50'	9.26'	467	4	0.0064	Ply S1	No	0.0096	0.0951	0.0446	0.0804	0.2297	0.9189	
29.0-U.3	8.00'	9.26'	466	4	0.0064	Ply S1	No	0.0138	0.0949	0.0443	0.1203	0.2733	1.0934	
29.0-A.9	5.00'	9.26'	464	4	0.0063	Ply S1	No	0.0219	0.0945	0.0437	0.2097	0.3699	1.4794	
29.0-PL A.7	5.50'	9.26'	464	4	0.0063	Ply S1	No	0.0199	0.0945	0.0437	0.1864	0.3446	1.3783	
29.0-P.1	6.50'	9.26'	462	4	0.0062	Ply S1	No	0.0168	0.0941	0.0430	0.1518	0.3057	1.2227	
29.0-J.0	6.50'	9.26'	462	4	0.0062	Ply S1	No	0.0168	0.0941	0.0430	0.1518	0.3057	1.2227	
29.0-H.4	18.00'	9.26'	454	4	0.0059	Ply S1	No	0.0060	0.0925	0.0407	0.0483	0.1874	0.7495	
29.0-P.6	18.50'	9.26'	454	4	0.0059	Ply S1	No	0.0058	0.0925	0.0407	0.0469	0.1858	0.7433	
27.9-U.2	19.00'	9.26'	451	4	0.0057	Ply S1	No	0.0056	0.0918	0.0397	0.0452	0.1823	0.7291	
27.1-E.0	37.00'	9.26'	450	4	0.0057	Ply S1	No	0.0029	0.0916	0.0394	0.0226	0.1565	0.6260	
27.1-H.5	5.50'	9.26'	450	4	0.0057	Ply S1	No	0.0193	0.0916	0.0394	0.1807	0.3310	1.3241	
27.1-P.5	5.50'	9.26'	450	4	0.0057	Ply S1	No	0.0193	0.0916	0.0394	0.1807	0.3310	1.3241	
27.1-C.4	8.00'	9.26'	450	4	0.0057	Ply S1	No	0.0133	0.0916	0.0394	0.1161	0.2605	1.0419	
27.1-A.8	8.50'	9.26'	450	4	0.0057	Ply S1	No	0.0125	0.0916	0.0394	0.1084	0.2519	1.0078	
27.1-PL A.7	18.00'	9.26'	450	4	0.0057	Ply S1	No	0.0059	0.0916	0.0394	0.0478	0.1848	0.7391	
26.0-E.2	21.00'	9.26'	448	4	0.0056	Ply S1	No	0.0050	0.0911	0.0387	0.0404	0.1753	0.7013	
26.0-C.9	23.50'	9.26'	448	4	0.0056	Ply S1	No	0.0045	0.0911	0.0387	0.0359	0.1703	0.6812	
26.0-PL A.6	21.00'	9.26'	448	4	0.0056	Ply S1	No	0.0050	0.0911	0.0387	0.0404	0.1753	0.7013	
25.6-P.5	25.00'	9.26'	444	4	0.0054	Ply S1	No	0.0042	0.0904	0.0377	0.0334	0.1657	0.6629	
25.4-U.3	8.50'	9.26'	441	4	0.0053	Ply S1	No	0.0123	0.0898	0.0370	0.1063	0.2453	0.9812	
25.3-E.3	25.00'	9.26'	441	4	0.0053	Ply S1	No	0.0042	0.0898	0.0369	0.0332	0.1640	0.6559	
25.0-H.5	28.50'	9.26'	438	4	0.0052	Ply S1	No	0.0036	0.0890	0.0359	0.0287	0.1573	0.6293	
25.0-L.0	10.50'	9.26'	438	4	0.0052	Ply S1	No	0.0098	0.0890	0.0359	0.0832	0.2180	0.8719	
25.0-K.0	18.50'	9.26'	438	4	0.0052	Ply S1	No	0.0056	0.0890	0.0359	0.0452	0.1757	0.7028	
25.0-P.5	22.00'	9.26'	438	4	0.0052	Ply S1	No	0.0047	0.0890	0.0359	0.0376	0.1673	0.6692	
25.0-N.1	18.50'	9.26'	438	4	0.0052	Ply S1	No	0.0056	0.0890	0.0359	0.0452	0.1757	0.7028	
24.2-U.2	29.50'	9.26'	437	4	0.0052	Ply S1	No	0.0035	0.0889	0.0358	0.0277	0.1559	0.6237	
22.6-B.2	4.00'	9.26'	433	4	0.0050	Ply S1	No	0.0256	0.0882	0.0348	0.2609	0.4095	1.6380	
22.1-E.4	24.50'	9.26'	431	4	0.0049	Ply S1	No	0.0042	0.0877	0.0342	0.0331	0.1592	0.6369	
21.0-E.4	8.50'	9.26'	426	4	0.0048	Ply S1	No	0.0118	0.0868	0.0330	0.1027	0.2343	0.9370	
21.0-U.2	32.50'	9.26'	426	4	0.0047	Ply S1	No	0.0032	0.0866	0.0328	0.0303	0.1529	0.6115	
20.0-E.4	24.50'	9.26'	421	4	0.0046	Ply S1	No	0.0041	0.0858	0.0318	0.0402	0.1618	0.6474	
19.5-E.5	8.50'	9.26'	417	4	0.0044	Ply S1	No	0.0118	0.0848	0.0307	0.1246	0.2518	1.0073	
18.8-E.5	25.00'	9.26'	412	4	0.0043	Ply S1	No	0.0040	0.0839	0.0295	0.0385	0.1558	0.6233	
18.2-U.2	24.50'	9.26'	412	4	0.0042	Ply S1	No	0.0040	0.0838	0.0294	0.0316	0.1488	0.5954	
17.2-PL A.7	7.00'	9.26'	400	4	0.0039	Ply S1	No	0.0135	0.0815	0.0269	0.1205	0.2424	0.9694	
17.3-E.3	25.00'	9.26'	402	4	0.0039	Ply S1	No	0.0038	0.0818	0.0272	0.0302	0.1430	0.5722	
17.0-U.2	32.50'	9.26'	400	4	0.0039	Ply S1	No	0.0029	0.0815	0.0269	0.0230	0.1342	0.5368	
15.8-PL A.6	23.00'	9.26'	403	4	0.0039	Ply S1	No	0.0041	0.0819	0.0273	0.0330	0.1465	0.5858	
15.2-E.2	21.00'	9.26'	403	4	0.0040	Ply S1	No	0.0045	0.0820	0.0275	0.0364	0.1504	0.6017	

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STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - Roof Framing Level.**

15.2-C.7	29.50'	9.26'	403	4	0.0040	Ply S1	No	0.0032	0.0820	0.0275	0.0255	0.1383	0.5531
15.2-A.6	11.50'	9.26'	403	4	0.0040	Ply S1	No	0.0083	0.0820	0.0275	0.0693	0.1871	0.7484
13.8-C.7	29.50'	9.26'	406	4	0.0040	Ply S1	No	0.0032	0.0826	0.0281	0.0257	0.1397	0.5587
13.8-A.6	11.50'	9.26'	406	4	0.0040	Ply S1	No	0.0083	0.0826	0.0281	0.0698	0.1888	0.7554
13.8-E.2	22.00'	9.26'	406	4	0.0040	Ply S1	No	0.0044	0.0826	0.0281	0.0349	0.1500	0.5998
13.2-PL A.6	23.50'	9.26'	406	4	0.0041	Ply S1	No	0.0041	0.0827	0.0282	0.0326	0.1476	0.5906
12.0-U.2													
12.0-U.2	24.50'	9.26'	411	4	0.0042	Ply S1	No	0.0040	0.0836	0.0292	0.0316	0.1483	0.5931
11.8-E.3													
11.8-E.3	25.00'	9.26'	413	4	0.0043	Ply S1	No	0.0039	0.0841	0.0298	0.0311	0.1489	0.5958
11.0-U.2													
11.0-U.2	32.50'	9.26'	421	4	0.0046	Ply S1	No	0.0031	0.0857	0.0317	0.0241	0.1445	0.5781
10.0-E.5													
10.0-E.5	25.00'	9.26'	425	4	0.0047	Ply S1	No	0.0040	0.0864	0.0326	0.0320	0.1549	0.6197
9.5-S.5	8.50'	9.26'	426	4	0.0048	Ply S1	No	0.0118	0.0868	0.0330	0.1027	0.2343	0.9371
9.2-E.5	8.50'	9.26'	430	4	0.0049	Ply S1	No	0.0119	0.0875	0.0340	0.1036	0.2370	0.9480
9.0-U.2													
9.0-U.2	24.50'	9.26'	431	4	0.0049	Ply S1	No	0.0042	0.0878	0.0343	0.0331	0.1594	0.6374
7.9-E.4													
7.9-E.4	24.50'	9.26'	435	4	0.0051	Ply S1	No	0.0042	0.0885	0.0352	0.0334	0.1613	0.6453
7.3-E.0	8.50'	9.26'	436	4	0.0051	Ply S1	No	0.0121	0.0888	0.0356	0.1050	0.2415	0.9660
8.0-E.4	8.50'	9.26'	440	4	0.0053	Ply S1	No	0.0122	0.0895	0.0366	0.1059	0.2443	0.9770
7.0-U.2													
7.0-U.2	32.50'	9.26'	442	4	0.0053	Ply S1	No	0.0032	0.0899	0.0370	0.0253	0.1554	0.6218
6.0-E.5													
6.0-E.5	25.00'	9.26'	445	4	0.0055	Ply S1	No	0.0042	0.0906	0.0381	0.0335	0.1665	0.6658
5.6-B.5	4.50'	9.26'	448	4	0.0056	Ply S1	No	0.0235	0.0912	0.0389	0.2313	0.3848	1.5394
5.0-E.5	5.50'	9.26'	450	4	0.0057	Ply S1	No	0.0193	0.0916	0.0395	0.1808	0.3312	1.3249
4.9-D.9	8.00'	9.26'	453	4	0.0058	Ply S1	No	0.0134	0.0921	0.0402	0.1168	0.2625	1.0500
4.8-B.5	6.50'	9.26'	461	4	0.0061	Ply S1	No	0.0167	0.0938	0.0426	0.1514	0.3046	1.2184
4.6-E.3	25.00'	9.26'	457	4	0.0060	Ply S1	No	0.0043	0.0930	0.0414	0.0344	0.1730	0.6921
4.0-PL A.6													
4.0-K.5	34.50'	9.26'	464	4	0.0063	Ply S1	No	0.0032	0.0944	0.0436	0.0250	0.1662	0.6649
4.0-E.2	21.50'	9.26'	464	4	0.0063	Ply S1	No	0.0051	0.0945	0.0436	0.0409	0.1840	0.7361
4.0-C.9	23.50'	9.26'	464	4	0.0063	Ply S1	No	0.0047	0.0945	0.0436	0.0373	0.1800	0.7198
1.7-U.2													
1.7-U.2	31.00'	9.26'	468	4	0.0064	Ply S1	No	0.0036	0.0952	0.0447	0.0282	0.1717	0.6866
1.0-C.3	9.00'	9.26'	468	4	0.0065	Ply S1	No	0.0123	0.0953	0.0448	0.1057	0.2581	1.0324
1.0-E.9	6.50'	9.26'	468	4	0.0065	Ply S1	No	0.0170	0.0953	0.0449	0.1537	0.3109	1.2435
1.0-N.9	25.00'	9.26'	468	4	0.0065	Ply S1	No	0.0044	0.0953	0.0449	0.0352	0.1798	0.7193
1.0-P.8	19.00'	9.26'	468	4	0.0065	Ply S1	No	0.0058	0.0953	0.0449	0.0470	0.1930	0.7719
1.0-K.0	7.00'	9.26'	468	4	0.0065	Ply S1	No	0.0158	0.0953	0.0449	0.1410	0.2969	1.1876
1.0-L.0	20.00'	9.26'	468	4	0.0065	Ply S1	No	0.0055	0.0953	0.0449	0.0445	0.1902	0.7608
0.5-PL A.6													
0.3-U.4	6.00'	9.26'	480	4	0.0070	Ply S1	No	0.0189	0.0977	0.0487	0.1734	0.3387	1.3547
0.1-U.3	4.50'	9.26'	483	4	0.0072	Ply S1	No	0.0254	0.0984	0.0498	0.2494	0.4229	1.6918
0.1-R.0	4.50'	9.26'	483	4	0.0072	Ply S1	No	0.0254	0.0984	0.0498	0.2494	0.4229	1.6918
0.0-K.0	4.00'	9.26'	484	4	0.0072	Ply S1	No	0.0286	0.0985	0.0501	0.2915	0.4687	1.8746
0.0-K.5	4.00'	9.26'	484	4	0.0072	Ply S1	No	0.0286	0.0985	0.0501	0.2915	0.4687	1.8747
0.0-P.7	4.00'	9.26'	484	4	0.0072	Ply S1	No	0.0286	0.0985	0.0501	0.2915	0.4687	1.8747
0.0-P.4	4.00'	9.26'	484	4	0.0072	Ply S1	No	0.0286	0.0985	0.0501	0.2915	0.4687	1.8747
4.0-P.4													
4.0-P.4													
U.4-29.0	6.00'	9.26'	501	4	0.0081	Ply S1	No	0.0197	0.1020	0.0561	0.1811	0.3590	1.4361
U.4-19.9	7.00'	9.26'	501	4	0.0081	Ply S1	No	0.0169	0.1020	0.0561	0.1509	0.3260	1.3041
U.4-17.4	6.00'	9.26'	501	4	0.0081	Ply S1	No	0.0197	0.1020	0.0561	0.1811	0.3590	1.4361
U.4-11.0	7.50'	9.26'	501	4	0.0081	Ply S1	No	0.0158	0.1020	0.0561	0.1393	0.3133	1.2530
U.4-4.0	5.50'	9.26'	501	4	0.0080	Ply S1	No	0.0215	0.1019	0.0558	0.2009	0.3801	1.5205
U.3-29.0	8.00'	9.26'	496	4	0.0078	Ply S1	No	0.0146	0.1009	0.0541	0.1279	0.2975	1.1898
U.0-4.0	18.00'	9.26'	484	4	0.0072	Ply S1	No	0.0064	0.0985	0.0501	0.0514	0.2064	0.8257
U.0-9.0	26.00'	9.26'	484	4	0.0072	Ply S1	No	0.0044	0.0985	0.0501	0.0350	0.1880	0.7519
U.0-12.0	26.00'	9.26'	484	4	0.0072	Ply S1	No	0.0044	0.0985	0.0501	0.0350	0.1880	0.7518

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

Katerra

Lateral Analysis - Roof Framing Level.

U.0-11.0	12.50'	9.26'	484	4	0.0072	Ply S1	No	0.0091	0.0985	0.0501	0.0760	0.2338	0.9351
U.0-20.1	18.00'	9.26'	484	4	0.0072	Ply S1	No	0.0084	0.0985	0.0501	0.0514	0.2064	0.8255
U.0-18.1	26.00'	9.26'	484	4	0.0072	Ply S1	No	0.0044	0.0985	0.0501	0.0350	0.1880	0.7518
U.0-17.2	24.50'	9.26'	484	4	0.0072	Ply S1	No	0.0047	0.0985	0.0501	0.0372	0.1905	0.7618
U.0-7.2	5.50'	9.26'	484	4	0.0072	Ply S1	No	0.0208	0.0985	0.0501	0.1943	0.3637	1.4547
T.0-29.5	29.50'	9.26'	483	4	0.0071	Ply S1	No	0.0039	0.0982	0.0496	0.0306	0.1823	0.7291
S.2-1.5	13.00'	9.26'	483	4	0.0071	Ply S1	No	0.0088	0.0982	0.0496	0.0726	0.2292	0.9167
S.2-25.2	13.00'	9.26'	483	4	0.0071	Ply S1	No	0.0088	0.0982	0.0496	0.0726	0.2292	0.9167
R.1-4.0	21.50'	9.26'	481	4	0.0070	Ply S1	No	0.0053	0.0978	0.0489	0.0423	0.1943	0.7772
Q.0-28.4	9.50'	9.26'	480	4	0.0070	Ply S1	No	0.0119	0.0976	0.0486	0.1019	0.2601	1.0404
Q.0-25.7	21.00'	9.26'	480	4	0.0070	Ply S1	No	0.0054	0.0976	0.0486	0.0433	0.1950	0.7798
P.8-29.0	12.00'	9.26'	476	4	0.0068	Ply S1	No	0.0094	0.0969	0.0474	0.0782	0.2319	0.9278
P.3-4.0	8.50'	9.26'	468	4	0.0064	Ply S1	No	0.0130	0.0952	0.0447	0.1127	0.2656	1.0624
P.0-4.0													
P.0-4.0	29.50'	9.26'	462	4	0.0062	Ply S1	No	0.0037	0.0941	0.0430	0.0293	0.1701	0.6804
N.0-25.5													
N.0-25.5	24.50'	9.26'	458	4	0.0060	Ply S1	No	0.0044	0.0932	0.0417	0.0352	0.1744	0.6977
M.0-4.0													
M.0-4.0	33.50'	9.26'	450	4	0.0057	Ply S1	No	0.0032	0.0916	0.0394	0.0250	0.1592	0.6369
L.1-25.5													
L.1-25.5	24.00'	9.26'	448	4	0.0056	Ply S1	No	0.0044	0.0912	0.0389	0.0352	0.1698	0.6791
K.0-25.5													
K.0-25.5	24.50'	9.26'	439	4	0.0052	Ply S1	No	0.0042	0.0892	0.0362	0.0337	0.1634	0.6535
J.8-4.0	8.50'	9.26'	437	4	0.0052	Ply S1	No	0.0121	0.0890	0.0359	0.1053	0.2424	0.9694
H.6-25.7	25.00'	9.26'	425	4	0.0047	Ply S1	No	0.0040	0.0865	0.0327	0.0320	0.1552	0.6209
H.1-29.0	11.00'	9.26'	426	4	0.0048	Ply S1	No	0.0092	0.0868	0.0330	0.0770	0.2060	0.8240
H.0-28.4	9.50'	9.26'	427	4	0.0048	Ply S1	No	0.0106	0.0869	0.0331	0.0907	0.2213	0.8854
H.0-25.7	21.00'	9.26'	427	4	0.0048	Ply S1	No	0.0048	0.0869	0.0331	0.0386	0.1634	0.6535
F.6-8.0	26.00'	9.26'	428	4	0.0048	Ply S1	No	0.0039	0.0870	0.0333	0.0309	0.1551	0.6205
F.6-25.3	21.00'	9.26'	428	4	0.0048	Ply S1	No	0.0048	0.0870	0.0333	0.0386	0.1638	0.6551
F.6-22.1	16.00'	9.26'	428	4	0.0048	Ply S1	No	0.0063	0.0870	0.0333	0.0515	0.1781	0.7126
F.6-20.0	26.00'	9.26'	428	4	0.0048	Ply S1	No	0.0039	0.0870	0.0333	0.0309	0.1551	0.6205
F.6-18.0	16.00'	9.26'	428	4	0.0048	Ply S1	No	0.0063	0.0870	0.0333	0.0515	0.1781	0.7126
F.6-17.3	21.00'	9.26'	428	4	0.0048	Ply S1	No	0.0048	0.0870	0.0333	0.0386	0.1638	0.6551
F.6-11.9	28.50'	9.26'	428	4	0.0048	Ply S1	No	0.0035	0.0870	0.0333	0.0281	0.1520	0.6079
F.6-10.2	16.00'	9.26'	428	4	0.0048	Ply S1	No	0.0063	0.0870	0.0333	0.0515	0.1781	0.7126
F.6-5.9	16.00'	9.26'	428	4	0.0048	Ply S1	No	0.0063	0.0870	0.0333	0.0515	0.1781	0.7126
F.6-4.5	29.00'	9.26'	428	4	0.0048	Ply S1	No	0.0035	0.0870	0.0333	0.0276	0.1514	0.6056
F.5-4.0	33.00'	9.26'	428	4	0.0048	Ply S1	No	0.0031	0.0870	0.0333	0.0241	0.1475	0.5902
E.9-29.0													
E.9-29.0	24.50'	9.26'	428	4	0.0048	Ply S1	No	0.0041	0.0871	0.0334	0.0329	0.1575	0.6300
E.7-4.1	7.00'	9.26'	429	4	0.0048	Ply S1	No	0.0145	0.0872	0.0336	0.1290	0.2642	1.0570
E.4-29.0													
D.8-29.0	9.50'	9.26'	431	4	0.0049	Ply S1	No	0.0107	0.0877	0.0342	0.0916	0.2241	0.8966
D.6-4.6	5.50'	9.26'	431	4	0.0049	Ply S1	No	0.0185	0.0878	0.0343	0.1731	0.3137	1.2548
D.2-29.0													
D.2-29.0	30.00'	9.26'	432	4	0.0050	Ply S1	No	0.0034	0.0880	0.0345	0.0269	0.1528	0.6112
D.0-17.2													
D.0-17.2	25.00'	9.26'	433	4	0.0050	Ply S1	No	0.0041	0.0881	0.0347	0.0326	0.1594	0.6376
D.0-11.9													
D.0-11.9	25.00'	9.26'	433	4	0.0050	Ply S1	No	0.0041	0.0881	0.0347	0.0326	0.1594	0.6376
D.0-4.5													
D.0-4.5	25.00'	9.26'	433	4	0.0050	Ply S1	No	0.0041	0.0881	0.0347	0.0326	0.1594	0.6376
D.0-25.5													
D.0-25.5	25.50'	9.26'	433	4	0.0050	Ply S1	No	0.0040	0.0881	0.0347	0.0319	0.1587	0.6346
C.1-29.0	27.00'	9.26'	435	4	0.0051	Ply S1	No	0.0038	0.0884	0.0351	0.0302	0.1576	0.6303
C.0-4.0	17.50'	9.26'	435	4	0.0051	Ply S1	No	0.0059	0.0885	0.0352	0.0476	0.1772	0.7089
B.2-29.0	27.00'	9.26'	436	4	0.0051	Ply S1	No	0.0038	0.0887	0.0355	0.0303	0.1582	0.6329
B.2-17.6	8.50'	9.26'	436	4	0.0051	Ply S1	No	0.0121	0.0887	0.0355	0.1049	0.2412	0.9648
B.2-11.4	8.50'	9.26'	436	4	0.0051	Ply S1	No	0.0121	0.0887	0.0355	0.1049	0.2412	0.9648
B.2-4.9	8.50'	9.26'	436	4	0.0051	Ply S1	No	0.0121	0.0887	0.0355	0.1049	0.2412	0.9648
B.2-25.0	8.50'	9.26'	436	4	0.0051	Ply S1	No	0.0121	0.0887	0.0355	0.1050	0.2412	0.9648

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - Roof Framing Level.**

B.0-4.0	17.50'	9.26'	436	4	0.0051	Ply S1	No	0.0059	0.0887	0.0355	0.0477	0.1779	0.7114
A.0-11.8													
A.0-11.8	28.00'	9.26'	437	4	0.0052	Ply S1	No	0.0037	0.0890	0.0358	0.0292	0.1577	0.6308
A.0-17.3													
A.0-17.3	28.00'	9.26'	437	4	0.0052	Ply S1	No	0.0037	0.0890	0.0358	0.0292	0.1577	0.6308
A.0-4.7	37.00'	9.26'	437	4	0.0052	Ply S1	No	0.0028	0.0890	0.0358	0.0219	0.1495	0.5981
A.0-25.2	32.00'	9.26'	437	4	0.0052	Ply S1	No	0.0032	0.0890	0.0358	0.0255	0.1535	0.6140
PL A.8-5.6													
PL A.7-29.0	9.00'	9.26'	439	4	0.0052	Ply S1	No	0.0115	0.0893	0.0363	0.0991	0.2362	0.9449
PL A.5-17.9	7.00'	9.26'	440	4	0.0053	Ply S1	No	0.0148	0.0894	0.0365	0.1323	0.2730	1.0922
PL A.5-10.5	7.00'	9.26'	440	4	0.0053	Ply S1	No	0.0148	0.0894	0.0365	0.1323	0.2730	1.0922
PL A.5-5.6													
PL A.5-22.5	7.00'	9.26'	440	4	0.0053	Ply S1	No	0.0148	0.0894	0.0365	0.1323	0.2730	1.0922
PL A.2-4.0													
PL A.2-5.0													
PL A.2-11.7	11.00'	9.26'	441	4	0.0053	Ply S1	No	0.0095	0.0898	0.0369	0.0797	0.2159	0.8634
PL A.2-10.7	11.00'	9.26'	441	4	0.0053	Ply S1	No	0.0095	0.0898	0.0369	0.0797	0.2159	0.8634

NS Average Drift: 0.9274 D/C= 0.38
EW Average Drift : 0.8402 D/C= 0.34
Allowable Drift : 2.46

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.****Shearwall Drift Calculations - 3rd Floor Framing Level.**

$$\delta_{sn} = \frac{8vh^3}{EAh} + \frac{vh}{G_r I_r} + 0.75he_n + \frac{h}{b} \Delta_u \quad (C4.3.2-1)$$

$$C_d = 4$$

$$I = 1.0$$

$$E = 1600000 \text{ psi (DF\#2)}$$

$$\text{Lumber Type} = \text{Dry}$$

$$\text{Allowable Story Drift} = 2.46 \text{ in}$$

Sheath Type	Gvtv
OSB	83500
Ply	35000
Ply S1	45500

Building Line	SW Length (ft)	Plate Height, h (ft)	LRFD Shear (plf)	Nail Spac. in	e _n in	Sheath Type	Double Shear?	Wall anch.				Total Defl in	Amplified defl, in	d/c
								bending 8vh ³ /EAb in	shear vh/G _r I _r in	nail slip 0.75he _n in	slip h*Δ _u /b in			
29.0-H.5	4.00'	9.26'	1427	3	0.0100	Ply S1	Yes	0.0238	0.2904	0.0695	0.4977	0.8815	3.5258	
29.0-P.7	11.50'	9.26'	1427	3	0.0100	Ply S1	Yes	0.0083	0.2903	0.0694	0.1422	0.5102	2.0407	
29.0-U.3	8.00'	9.26'	1424	3	0.0099	Ply S1	Yes	0.0119	0.2898	0.0690	0.2128	0.5834	2.3336	
29.0-A.9	5.00'	9.26'	1418	3	0.0098	Ply S1	Yes	0.0189	0.2886	0.0681	0.3710	0.7466	2.9862	
29.0-PL A.7	5.50'	9.26'	1418	3	0.0098	Ply S1	Yes	0.0172	0.2886	0.0681	0.3298	0.7036	2.8145	
29.0-P.1	6.50'	9.26'	1412	3	0.0097	Ply S1	Yes	0.0145	0.2873	0.0671	0.2686	0.6375	2.5499	
29.0-J.0	6.50'	9.26'	1412	3	0.0097	Ply S1	Yes	0.0145	0.2873	0.0671	0.2686	0.6375	2.5499	
29.0-H.4	18.00'	9.26'	1389	3	0.0092	Ply S1	Yes	0.0051	0.2827	0.0636	0.0647	0.4162	1.6647	
29.0-H.4	18.00'	9.26'	1389	3	0.0092	Ply S1	Yes	0.0051	0.2827	0.0636	0.0647	0.4162	1.6647	
29.0-P.6	18.50'	9.26'	1389	3	0.0092	Ply S1	Yes	0.0050	0.2827	0.0636	0.0629	0.4142	1.6567	
29.0-P.6	18.50'	9.26'	1389	3	0.0092	Ply S1	Yes	0.0050	0.2827	0.0636	0.0629	0.4142	1.6567	
27.9-U.2	19.00'	9.26'	1379	3	0.0089	Ply S1	Yes	0.0048	0.2807	0.0621	0.0607	0.4083	1.6333	
27.9-U.2	19.00'	9.26'	1379	3	0.0089	Ply S1	Yes	0.0048	0.2807	0.0621	0.0607	0.4083	1.6333	
27.1-E.0	37.00'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0025	0.2802	0.0618	0.0401	0.3845	1.5381	
27.1-H.5	5.50'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0167	0.2802	0.0618	0.3204	0.6791	2.7164	
27.1-P.5	5.50'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0167	0.2802	0.0618	0.3204	0.6791	2.7164	
27.1-C.4	8.00'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0115	0.2802	0.0618	0.2060	0.5594	2.2378	
27.1-A.8	8.50'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0108	0.2802	0.0618	0.1922	0.5450	2.1802	
27.1-PL A.7	18.00'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0051	0.2802	0.0618	0.0848	0.4319	1.7276	
26.0-E.2	21.00'	9.26'	1370	3	0.0088	Ply S1	Yes	0.0043	0.2788	0.0608	0.0717	0.4157	1.6626	
26.0-C.9	23.50'	9.26'	1370	3	0.0088	Ply S1	Yes	0.0039	0.2788	0.0608	0.0638	0.4072	1.6289	
26.0-B.5	0.00'	9.26'												
26.0-PL A.6	21.00'	9.26'	1370	3	0.0088	Ply S1	Yes	0.0043	0.2788	0.0608	0.0543	0.3982	1.5928	
26.0-PL A.6	21.00'	9.26'	1370	3	0.0088	Ply S1	Yes	0.0043	0.2788	0.0608	0.0543	0.3982	1.5928	
25.6-P.5	25.00'	9.26'	1359	3	0.0085	Ply S1	Yes	0.0036	0.2767	0.0593	0.0593	0.3989	1.5956	
25.4-U.3	8.50'	9.26'	1351	3	0.0084	Ply S1	Yes	0.0106	0.2750	0.0581	0.1888	0.5326	2.1302	
25.3-E.3	25.00'	9.26'	1351	3	0.0084	Ply S1	Yes	0.0036	0.2749	0.0580	0.0590	0.3954	1.5817	
25.0-H.5	28.50'	9.26'	1340	3	0.0082	Ply S1	Yes	0.0031	0.2728	0.0566	0.0511	0.3836	1.5345	
25.0-L.0	10.50'	9.26'	1340	3	0.0082	Ply S1	Yes	0.0085	0.2728	0.0566	0.1479	0.4858	1.9431	
25.0-K.0	18.50'	9.26'	1340	3	0.0082	Ply S1	Yes	0.0048	0.2728	0.0566	0.0803	0.4145	1.6580	
25.0-P.5	22.00'	9.26'	1340	3	0.0082	Ply S1	Yes	0.0041	0.2728	0.0566	0.0669	0.4004	1.6014	
25.0-N.1	18.50'	9.26'	1340	3	0.0082	Ply S1	Yes	0.0048	0.2728	0.0566	0.0803	0.4145	1.6580	
24.2-U.2	29.50'	9.26'	1339	3	0.0081	Ply S1	Yes	0.0030	0.2725	0.0564	0.0373	0.3692	1.4769	
24.2-U.2	29.50'	9.26'	1339	3	0.0081	Ply S1	Yes	0.0030	0.2725	0.0564	0.0373	0.3692	1.4769	
22.6-B.2	4.00'	9.26'	1328	3	0.0079	Ply S1	Yes	0.0221	0.2704	0.0550	0.4641	0.8116	3.2464	
22.1-E.4	24.50'	9.26'	1322	3	0.0078	Ply S1	Yes	0.0036	0.2690	0.0541	0.0446	0.3713	1.4852	
22.1-E.4	24.50'	9.26'	1322	3	0.0078	Ply S1	Yes	0.0036	0.2690	0.0541	0.0446	0.3713	1.4852	
21.0-E.4	8.50'	9.26'	1308	3	0.0075	Ply S1	Yes	0.0103	0.2662	0.0523	0.1829	0.5116	2.0465	
21.0-U.2	32.50'	9.26'	1306	3	0.0075	Ply S1	Yes	0.0032	0.2658	0.0520	0.0518	0.3728	1.4913	
20.0-E.4	24.50'	9.26'	1294	3	0.0073	Ply S1	Yes	0.0042	0.2633	0.0504	0.0521	0.3700	1.4802	
20.0-E.4	24.50'	9.26'	1294	3	0.0073	Ply S1	Yes	0.0042	0.2633	0.0504	0.0521	0.3700	1.4802	
19.5-E.5	8.50'	9.26'	1281	3	0.0070	Ply S1	Yes	0.0120	0.2607	0.0488	0.2135	0.5349	2.1396	
18.8-E.5	25.00'	9.26'	1267	3	0.0068	Ply S1	Yes	0.0040	0.2579	0.0471	0.0500	0.3590	1.4359	
18.8-E.5	25.00'	9.26'	1267	3	0.0068	Ply S1	Yes	0.0040	0.2579	0.0471	0.0500	0.3590	1.4359	
18.2-U.2	24.50'	9.26'	1266	3	0.0068	Ply S1	Yes	0.0034	0.2577	0.0470	0.0565	0.3646	1.4585	
17.2-PL A.7	7.00'	9.26'	1233	3	0.0062	Ply S1	Yes	0.0117	0.2510	0.0431	0.2159	0.5217	2.0869	
17.3-E.3	25.00'	9.26'	1238	3	0.0063	Ply S1	Yes	0.0033	0.2519	0.0436	0.0542	0.3530	1.4120	
17.0-U.2	32.50'	9.26'	1226	3	0.0061	Ply S1	Yes	0.0025	0.2494	0.0422	0.0310	0.3252	1.3008	
17.0-U.2	32.50'	9.26'	1226	3	0.0061	Ply S1	Yes	0.0025	0.2494	0.0422	0.0310	0.3252	1.3008	
15.8-PL A.6	23.00'	9.26'	1227	3	0.0061	Ply S1	Yes	0.0036	0.2497	0.0424	0.0588	0.3545	1.4180	
15.2-E.2	21.00'	9.26'	1229	3	0.0061	Ply S1	Yes	0.0039	0.2500	0.0426	0.0648	0.3613	1.4453	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.**

15.2-C.7	29.50'	9.26'	1229	3	0.0061	Ply S1	Yes	0.0028	0.2500	0.0426	0.0455	0.3409	1.3635
15.2-A.6	11.50'	9.26'	1229	3	0.0061	Ply S1	Yes	0.0071	0.2500	0.0426	0.1234	0.4232	1.6927
13.8-C.7	29.50'	9.26'	1237	3	0.0063	Ply S1	Yes	0.0028	0.2518	0.0435	0.0458	0.3439	1.3756
13.8-A.6	11.50'	9.26'	1237	3	0.0063	Ply S1	Yes	0.0072	0.2518	0.0435	0.1243	0.4268	1.7072
13.8-E.2	22.00'	9.26'	1237	3	0.0063	Ply S1	Yes	0.0037	0.2518	0.0435	0.0622	0.3612	1.4449
13.2-PL A.6	23.50'	9.26'	1239	3	0.0063	Ply S1	Yes	0.0035	0.2521	0.0437	0.0581	0.3575	1.4299
12.0-U.2	24.50'	9.26'	1252	3	0.0065	Ply S1	Yes	0.0034	0.2547	0.0452	0.0427	0.3460	1.3841
12.0-U.2	24.50'	9.26'	1252	3	0.0065	Ply S1	Yes	0.0034	0.2547	0.0452	0.0427	0.3460	1.3841
11.8-E.3	25.00'	9.26'	1260	3	0.0067	Ply S1	Yes	0.0034	0.2564	0.0462	0.0421	0.3480	1.3920
11.8-E.3	25.00'	9.26'	1260	3	0.0067	Ply S1	Yes	0.0034	0.2564	0.0462	0.0421	0.3480	1.3920
11.0-U.2	32.50'	9.26'	1283	3	0.0071	Ply S1	Yes	0.0026	0.2611	0.0490	0.0327	0.3454	1.3818
11.0-U.2	32.50'	9.26'	1283	3	0.0071	Ply S1	Yes	0.0026	0.2611	0.0490	0.0327	0.3454	1.3818
10.0-E.5	25.00'	9.26'	1294	3	0.0073	Ply S1	Yes	0.0034	0.2633	0.0504	0.0432	0.3605	1.4419
10.0-E.5	25.00'	9.26'	1294	3	0.0073	Ply S1	Yes	0.0034	0.2633	0.0504	0.0432	0.3605	1.4419
9.5-S.5	8.50'	9.26'	1299	3	0.0074	Ply S1	Yes	0.0102	0.2644	0.0511	0.1831	0.5089	2.0355
9.2-E.5	8.50'	9.26'	1311	3	0.0076	Ply S1	Yes	0.0103	0.2667	0.0526	0.1848	0.5144	2.0576
9.0-U.2	24.50'	9.26'	1314	3	0.0076	Ply S1	Yes	0.0036	0.2675	0.0531	0.0449	0.3690	1.4762
9.0-U.2	24.50'	9.26'	1314	3	0.0076	Ply S1	Yes	0.0036	0.2675	0.0531	0.0449	0.3690	1.4762
7.9-E.4	24.50'	9.26'	1325	3	0.0079	Ply S1	Yes	0.0036	0.2697	0.0545	0.0453	0.3731	1.4925
7.9-E.4	24.50'	9.26'	1325	3	0.0079	Ply S1	Yes	0.0036	0.2697	0.0545	0.0453	0.3731	1.4925
7.3-E.0	8.50'	9.26'	1329	3	0.0079	Ply S1	Yes	0.0104	0.2705	0.0551	0.1875	0.5235	2.0942
8.0-E.4	8.50'	9.26'	1341	3	0.0082	Ply S1	Yes	0.0105	0.2728	0.0566	0.1892	0.5292	2.1166
7.0-U.2	32.50'	9.26'	1346	3	0.0083	Ply S1	Yes	0.0028	0.2739	0.0573	0.0343	0.3683	1.4733
7.0-U.2	32.50'	9.26'	1346	3	0.0083	Ply S1	Yes	0.0028	0.2739	0.0573	0.0343	0.3683	1.4733
6.0-E.5	25.00'	9.26'	1357	3	0.0085	Ply S1	Yes	0.0036	0.2762	0.0590	0.0455	0.3843	1.5371
6.0-E.5	25.00'	9.26'	1357	3	0.0085	Ply S1	Yes	0.0036	0.2762	0.0590	0.0455	0.3843	1.5371
5.6-B.5	4.50'	9.26'	1366	3	0.0087	Ply S1	Yes	0.0202	0.2779	0.0602	0.4132	0.7715	3.0861
5.0-E.5	5.50'	9.26'	1372	3	0.0088	Ply S1	Yes	0.0166	0.2793	0.0611	0.3230	0.6800	2.7202
4.9-D.9	8.00'	9.26'	1380	3	0.0090	Ply S1	Yes	0.0115	0.2808	0.0622	0.2088	0.5632	2.2530
4.8-B.5	6.50'	9.26'	1405	3	0.0095	Ply S1	Yes	0.0144	0.2859	0.0660	0.2707	0.6370	2.5481
4.6-E.3	25.00'	9.26'	1392	3	0.0092	Ply S1	Yes	0.0037	0.2833	0.0640	0.0615	0.4125	1.6499
4.0-PL A.6	20.50'	9.26'	1414	3	0.0097	Ply S1	Yes	0.0064	0.2878	0.0674	0.0902	0.4519	1.8074
4.0-K.5	34.50'	9.26'	1414	3	0.0097	Ply S1	Yes	0.0027	0.2878	0.0674	0.0448	0.4027	1.6109
4.0-E.2	21.50'	9.26'	1414	3	0.0097	Ply S1	Yes	0.0044	0.2878	0.0675	0.0731	0.4328	1.7311
4.0-C.9	23.50'	9.26'	1414	3	0.0097	Ply S1	Yes	0.0040	0.2878	0.0675	0.0666	0.4259	1.7036
1.7-U.2	31.00'	9.26'	1425	3	0.0100	Ply S1	Yes	0.0031	0.2901	0.0692	0.0383	0.4006	1.6026
1.7-U.2	31.00'	9.26'	1425	3	0.0100	Ply S1	Yes	0.0031	0.2901	0.0692	0.0383	0.4006	1.6026
1.0-C.3	9.00'	9.26'	1426	3	0.0100	Ply S1	Yes	0.0106	0.2903	0.0694	0.1891	0.5594	2.2375
1.0-E.9	6.50'	9.26'	1427	3	0.0100	Ply S1	Yes	0.0146	0.2903	0.0694	0.2751	0.6494	2.5978
1.0-N.9	25.00'	9.26'	1427	3	0.0100	Ply S1	Yes	0.0038	0.2904	0.0694	0.0630	0.4266	1.7066
1.0-P.8	19.00'	9.26'	1427	3	0.0100	Ply S1	Yes	0.0050	0.2904	0.0694	0.0841	0.4489	1.7955
1.0-K.0	7.00'	9.26'	1427	3	0.0100	Ply S1	Yes	0.0136	0.2904	0.0694	0.2522	0.6256	2.5023
1.0-L.0	20.00'	9.26'	1427	3	0.0100	Ply S1	Yes	0.0048	0.2904	0.0694	0.0796	0.4442	1.7768
0.5-PL A.6	6.25'	9.26'	1452	3	0.0106	Ply S1	Yes	0.0399	0.2955	0.0735	0.3631	0.7719	3.0878
0.3-U.4	6.00'	9.26'	1463	3	0.0108	Ply S1	Yes	0.0162	0.2977	0.0753	0.3105	0.6997	2.7990
0.1-U.3	4.50'	9.26'	1473	3	0.0111	Ply S1	Yes	0.0218	0.2997	0.0770	0.4467	0.8452	3.3810
0.1-R.0	4.50'	9.26'	1473	3	0.0111	Ply S1	Yes	0.0218	0.2997	0.0770	0.4467	0.8452	3.3810
0.0-K.0	4.00'	9.26'	1475	3	0.0112	Ply S1	Yes	0.0246	0.3002	0.0775	0.5221	0.9243	3.6972
0.0-K.5	4.00'	9.26'	1475	3	0.0112	Ply S1	Yes	0.0246	0.3002	0.0775	0.5221	0.9243	3.6973
0.0-P.7	4.00'	9.26'	1475	3	0.0112	Ply S1	Yes	0.0246	0.3002	0.0775	0.5221	0.9243	3.6974
0.0-P.4	4.00'	9.26'	1475	3	0.0112	Ply S1	Yes	0.0246	0.3002	0.0775	0.5221	0.9243	3.6974
4.0-P.4	8.50'	9.26'											
4.0-P.4	8.50'	9.26'											
U.4-29.0	6.00'	9.26'	1532	3	0.0126	Ply S1	Yes	0.0170	0.3118	0.0877	0.3218	0.7383	2.9533
U.4-19.9	7.00'	9.26'	1532	3	0.0126	Ply S1	Yes	0.0146	0.3118	0.0877	0.2682	0.6823	2.7290
U.4-17.4	6.00'	9.26'	1532	3	0.0126	Ply S1	Yes	0.0170	0.3118	0.0877	0.3218	0.7383	2.9533
U.4-11.0	7.50'	9.26'	1532	3	0.0126	Ply S1	Yes	0.0136	0.3118	0.0877	0.2476	0.6606	2.6424
U.4-4.0	5.50'	9.26'	1530	3	0.0126	Ply S1	Yes	0.0185	0.3113	0.0873	0.3571	0.7742	3.0968
U.3-29.0	8.00'	9.26'	1516	3	0.0122	Ply S1	Yes	0.0126	0.3086	0.0848	0.2274	0.6334	2.5337
U.0-4.0	18.00'	9.26'	1485	3	0.0114	Ply S1	Yes	0.0055	0.3022	0.0792	0.0916	0.4785	1.9141
U.0-9.0	26.00'	9.26'	1485	3	0.0114	Ply S1	Yes	0.0038	0.3022	0.0792	0.0623	0.4475	1.7898
U.0-12.0	26.00'	9.26'	1485	3	0.0114	Ply S1	Yes	0.0038	0.3022	0.0792	0.0623	0.4475	1.7898

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level**

U.0-11.0	12.50'	9.26'	1485	3	0.0114	Ply S1	Yes	0.0079	0.3022	0.0792	0.1354	0.5247	2.0987
U.0-20.1	18.00'	9.26'	1485	3	0.0114	Ply S1	Yes	0.0055	0.3022	0.0792	0.0916	0.4784	1.9138
U.0-18.1	26.00'	9.26'	1485	3	0.0114	Ply S1	Yes	0.0038	0.3022	0.0792	0.0623	0.4475	1.7898
U.0-17.2	24.50'	9.26'	1485	3	0.0114	Ply S1	Yes	0.0040	0.3022	0.0792	0.0663	0.4517	1.8066
U.0-7.2	5.50'	9.26'	1485	3	0.0114	Ply S1	Yes	0.0180	0.3022	0.0792	0.3460	0.7453	2.9814
T.0-29.5	29.50'	9.26'	1481	3	0.0113	Ply S1	Yes	0.0033	0.3014	0.0785	0.0545	0.4377	1.7508
S.2-1.5	13.00'	9.26'	1481	3	0.0113	Ply S1	Yes	0.0076	0.3014	0.0785	0.1294	0.5168	2.0671
S.2-25.2	13.00'	9.26'	1481	3	0.0113	Ply S1	Yes	0.0076	0.3014	0.0785	0.1294	0.5168	2.0671
R.1-4.0	21.50'	9.26'	1475	3	0.0112	Ply S1	Yes	0.0046	0.3002	0.0775	0.0754	0.4577	1.8308
Q.0-28.4	9.50'	9.26'	1473	3	0.0111	Ply S1	Yes	0.0103	0.2998	0.0771	0.1816	0.5688	2.2753
Q.0-25.7	21.00'	9.26'	1473	3	0.0111	Ply S1	Yes	0.0047	0.2998	0.0771	0.0772	0.4587	1.8349
P.8-29.0	12.00'	9.26'	1463	3	0.0109	Ply S1	Yes	0.0081	0.2978	0.0755	0.1394	0.5208	2.0833
P.3-4.0	8.50'	9.26'	1440	3	0.0103	Ply S1	Yes	0.0113	0.2931	0.0717	0.2010	0.5771	2.3084
P.0-4.0	29.50'	9.26'	1425	3	0.0100	Ply S1	Yes	0.0032	0.2900	0.0692	0.0396	0.4020	1.6081
P.0-4.0	29.50'	9.26'	1425	3	0.0100	Ply S1	Yes	0.0032	0.2900	0.0692	0.0396	0.4020	1.6081
N.0-25.5	24.50'	9.26'	1413	3	0.0097	Ply S1	Yes	0.0038	0.2876	0.0673	0.0475	0.4062	1.6248
N.0-25.5	24.50'	9.26'	1413	3	0.0097	Ply S1	Yes	0.0038	0.2876	0.0673	0.0475	0.4062	1.6248
M.0-4.0	33.50'	9.26'	1392	3	0.0092	Ply S1	Yes	0.0028	0.2833	0.0641	0.0338	0.3840	1.5359
M.0-4.0	33.50'	9.26'	1392	3	0.0092	Ply S1	Yes	0.0028	0.2833	0.0641	0.0338	0.3840	1.5359
L.1-25.5	24.00'	9.26'	1387	3	0.0091	Ply S1	Yes	0.0039	0.2823	0.0633	0.0476	0.3971	1.5884
L.1-25.5	24.00'	9.26'	1387	3	0.0091	Ply S1	Yes	0.0039	0.2823	0.0633	0.0476	0.3971	1.5884
K.0-25.5	24.50'	9.26'	1360	3	0.0086	Ply S1	Yes	0.0037	0.2769	0.0594	0.0456	0.3856	1.5424
K.0-25.5	24.50'	9.26'	1360	3	0.0086	Ply S1	Yes	0.0037	0.2769	0.0594	0.0456	0.3856	1.5424
J.8-4.0	8.50'	9.26'	1357	3	0.0085	Ply S1	Yes	0.0106	0.2762	0.0590	0.1887	0.5345	2.1381
H.6-25.7	25.00'	9.26'	1324	3	0.0078	Ply S1	Yes	0.0035	0.2694	0.0543	0.0574	0.3847	1.5389
H.1-29.0	11.00'	9.26'	1325	3	0.0078	Ply S1	Yes	0.0080	0.2697	0.0545	0.1379	0.4701	1.8804
H.0-28.4	9.50'	9.26'	1327	3	0.0079	Ply S1	Yes	0.0093	0.2700	0.0547	0.1624	0.4965	1.9859
H.0-25.7	21.00'	9.26'	1327	3	0.0079	Ply S1	Yes	0.0042	0.2700	0.0547	0.0690	0.3980	1.5920
F.6-8.0	26.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0034	0.2706	0.0551	0.0553	0.3844	1.5377
F.6-25.3	21.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0042	0.2706	0.0551	0.0692	0.3991	1.5963
F.6-22.1	16.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0055	0.2706	0.0551	0.0922	0.4234	1.6938
F.6-20.0	26.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0034	0.2706	0.0551	0.0553	0.3844	1.5377
F.6-18.0	16.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0055	0.2706	0.0551	0.0922	0.4234	1.6938
F.6-17.3	21.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0042	0.2706	0.0551	0.0692	0.3991	1.5963
F.6-11.9	28.50'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0031	0.2706	0.0551	0.0503	0.3791	1.5164
F.6-10.2	16.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0055	0.2706	0.0551	0.0922	0.4234	1.6938
F.6-5.9	16.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0055	0.2706	0.0551	0.0922	0.4234	1.6938
F.6-4.5	29.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0031	0.2706	0.0551	0.0494	0.3782	1.5126
F.5-4.0	33.00'	9.26'	1330	3	0.0079	Ply S1	Yes	0.0027	0.2706	0.0551	0.0432	0.3716	1.4865
E.9-29.0	24.50'	9.26'	1331	3	0.0080	Ply S1	Yes	0.0036	0.2708	0.0553	0.0445	0.3742	1.4968
E.9-29.0	24.50'	9.26'	1331	3	0.0080	Ply S1	Yes	0.0036	0.2708	0.0553	0.0445	0.3742	1.4968
E.7-4.1	7.00'	9.26'	1333	3	0.0080	Ply S1	Yes	0.0127	0.2714	0.0556	0.2311	0.5708	2.2831
E.4-29.0	0.00'	9.26'											
D.8-29.0	9.50'	9.26'	1343	3	0.0082	Ply S1	Yes	0.0094	0.2733	0.0569	0.1641	0.5037	2.0149
D.6-4.6	5.50'	9.26'	1344	3	0.0082	Ply S1	Yes	0.0163	0.2736	0.0571	0.3104	0.6574	2.6296
D.2-29.0	30.00'	9.26'	1348	3	0.0083	Ply S1	Yes	0.0030	0.2743	0.0576	0.0364	0.3714	1.4855
D.2-29.0	30.00'	9.26'	1348	3	0.0083	Ply S1	Yes	0.0030	0.2743	0.0576	0.0364	0.3714	1.4855
D.0-17.2	25.00'	9.26'	1350	3	0.0083	Ply S1	Yes	0.0036	0.2748	0.0580	0.0441	0.3804	1.5216
D.0-17.2	25.00'	9.26'	1350	3	0.0083	Ply S1	Yes	0.0036	0.2748	0.0580	0.0441	0.3804	1.5216
D.0-11.9	25.00'	9.26'	1350	3	0.0083	Ply S1	Yes	0.0036	0.2748	0.0580	0.0441	0.3804	1.5216
D.0-11.9	25.00'	9.26'	1350	3	0.0083	Ply S1	Yes	0.0036	0.2748	0.0580	0.0441	0.3804	1.5216
D.0-4.5	25.00'	9.26'	1350	3	0.0083	Ply S1	Yes	0.0036	0.2748	0.0580	0.0441	0.3804	1.5217
D.0-4.5	25.00'	9.26'	1350	3	0.0083	Ply S1	Yes	0.0036	0.2748	0.0580	0.0441	0.3804	1.5217
D.0-25.5	25.50'	9.26'	1350	3	0.0083	Ply S1	Yes	0.0035	0.2748	0.0580	0.0432	0.3794	1.5178
D.0-25.5	25.50'	9.26'	1350	3	0.0083	Ply S1	Yes	0.0035	0.2748	0.0580	0.0432	0.3794	1.5178
C.1-29.0	27.00'	9.26'	1357	3	0.0085	Ply S1	Yes	0.0033	0.2762	0.0590	0.0542	0.3927	1.5710
C.0-4.0	17.50'	9.26'	1359	3	0.0085	Ply S1	Yes	0.0052	0.2765	0.0592	0.0855	0.4263	1.7052
B.2-29.0	27.00'	9.26'	1362	3	0.0086	Ply S1	Yes	0.0034	0.2772	0.0596	0.0543	0.3945	1.5782
B.2-17.6	8.50'	9.26'	1362	3	0.0086	Ply S1	Yes	0.0107	0.2772	0.0597	0.1884	0.5359	2.1438
B.2-11.4	8.50'	9.26'	1362	3	0.0086	Ply S1	Yes	0.0107	0.2772	0.0597	0.1884	0.5359	2.1438
B.2-4.9	8.50'	9.26'	1362	3	0.0086	Ply S1	Yes	0.0107	0.2772	0.0597	0.1884	0.5360	2.1438
B.2-25.0	8.50'	9.26'	1362	3	0.0086	Ply S1	Yes	0.0107	0.2772	0.0597	0.1884	0.5360	2.1438

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 3rd Floor Framing Level.**

B.0-4.0	17.50'	9.26'	1363	3	0.0086	Ply S1	Yes	0.0052	0.2774	0.0598	0.0857	0.4280	1.7120
A.0-11.8	28.00'	9.26'	1367	3	0.0087	Ply S1	Yes	0.0033	0.2783	0.0604	0.0396	0.3815	1.5261
A.0-11.8	28.00'	9.26'	1367	3	0.0087	Ply S1	Yes	0.0033	0.2783	0.0604	0.0396	0.3815	1.5261
A.0-17.3	28.00'	9.26'	1367	3	0.0087	Ply S1	Yes	0.0033	0.2783	0.0604	0.0396	0.3815	1.5261
A.0-17.3	28.00'	9.26'	1367	3	0.0087	Ply S1	Yes	0.0033	0.2783	0.0604	0.0396	0.3815	1.5261
A.0-4.7	37.00'	9.26'	1367	3	0.0087	Ply S1	Yes	0.0025	0.2783	0.0604	0.0394	0.3806	1.5224
A.0-25.2	32.00'	9.26'	1367	3	0.0087	Ply S1	Yes	0.0028	0.2783	0.0604	0.0457	0.3873	1.5493
PL A.8-5.6	7.00'	9.26'	1373	3	0.0088	Ply S1	Yes	0.0182	0.2793	0.0612	0.2785	0.6372	2.5487
PL A.7-29.0	9.00'	9.26'	1374	3	0.0088	Ply S1	Yes	0.0102	0.2797	0.0614	0.1781	0.5294	2.1176
PL A.5-17.9	7.00'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0131	0.2802	0.0618	0.2378	0.5929	2.3716
PL A.5-10.5	7.00'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0131	0.2802	0.0618	0.2378	0.5929	2.3716
PL A.5-5.6	7.00'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0183	0.2802	0.0618	0.2793	0.6395	2.5581
PL A.5-22.5	7.00'	9.26'	1377	3	0.0089	Ply S1	Yes	0.0131	0.2802	0.0618	0.2378	0.5929	2.3716
PL A.2-4.0	5.00'	9.26'	1383	3	0.0090	Ply S1	Yes	0.0257	0.2815	0.0628	0.4012	0.7712	3.0850
PL A.2-5.0	5.00'	9.26'	1383	3	0.0090	Ply S1	Yes	0.0257	0.2815	0.0628	0.4012	0.7712	3.0850
PL A.2-11.7	11.00'	9.26'	1383	3	0.0090	Ply S1	Yes	0.0084	0.2815	0.0628	0.1433	0.4960	1.9839
PL A.2-10.7	11.00'	9.26'	1383	3	0.0090	Ply S1	Yes	0.0084	0.2815	0.0628	0.1433	0.4960	1.9839

NS Average Drift: 1.9401 D/C= 0.79
EW Average Drift: 1.9029 D/C= 0.77
Allowable Drift: 2.46

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore**

Kattera

Lateral Analysis -4th Floor Framing Level.**Shearwall Drift Calculations - 4th Floor Framing Level.**

$$\delta_{sl} = \frac{8vh^3}{EA b} + \frac{vh}{G_v I_v} + 0.75he_n + \frac{h}{b}\Delta_u \quad (C4.3.2-1)$$

$$C_d = 4$$

$$I = 1.0$$

$$E = 1600000 \text{ psi (DF\#2)}$$

Lumber Type = Dry

Allowable Story Drift = 2.46 in

Sheath Type	Gvtv
OSB	83500
Ply	35000
Ply S1	45500

Building Line	SW Length (ft)	Plate Height, h (ft)	LRFD Shear (plf)	Nail Spac. in	e_n in	Sheath Type	Double Shear?	Wall anch.				Total Defl in	Amplified defl, in	d/c
								bending $8vh^3/EA b$	shear $vh/G_v I_v$	nail slip $0.75he_n$	slip $h^2\Delta_u/b$			
29.0-H.5	4.00'	9.26'	739	2	0.0030	Ply S1	No	0.0201	0.1504	0.0207	0.4173	0.6084	2.4338	
29.0-P.7	11.50'	9.26'	739	2	0.0030	Ply S1	No	0.0070	0.1503	0.0206	0.1192	0.2971	1.1886	
29.0-U.3	8.00'	9.26'	737	2	0.0030	Ply S1	No	0.0100	0.1501	0.0205	0.1784	0.3591	1.4362	
29.0-A.9	5.00'	9.26'	735	2	0.0029	Ply S1	No	0.0160	0.1495	0.0203	0.3111	0.4969	1.9875	
29.0-PL A.7	5.50'	9.26'	735	2	0.0029	Ply S1	No	0.0146	0.1495	0.0203	0.2765	0.4609	1.8434	
29.0-P.1	6.50'	9.26'	732	2	0.0029	Ply S1	No	0.0123	0.1489	0.0200	0.2253	0.4064	1.6258	
29.0-J.0	6.50'	9.26'	732	2	0.0029	Ply S1	No	0.0123	0.1489	0.0200	0.2253	0.4064	1.6258	
29.0-H.4	18.00'	9.26'	721	2	0.0027	Ply S1	No	0.0044	0.1468	0.0191	0.0718	0.2420	0.9679	
29.0-H.4	18.00'	9.26'	721	2	0.0027	Ply S1	No	0.0044	0.1468	0.0191	0.0718	0.2420	0.9679	
29.0-P.6	18.50'	9.26'	721	2	0.0027	Ply S1	No	0.0042	0.1468	0.0191	0.0697	0.2398	0.9592	
29.0-P.6	18.50'	9.26'	721	2	0.0027	Ply S1	No	0.0042	0.1468	0.0191	0.0697	0.2398	0.9592	
27.9-U.2	19.00'	9.26'	716	2	0.0027	Ply S1	No	0.0041	0.1458	0.0187	0.0673	0.2359	0.9436	
27.9-U.2	19.00'	9.26'	716	2	0.0027	Ply S1	No	0.0041	0.1458	0.0187	0.0673	0.2359	0.9436	
27.1-E.0	37.00'	9.26'	715	2	0.0027	Ply S1	No	0.0021	0.1456	0.0186	0.0336	0.1999	0.7995	
27.1-H.5	5.50'	9.26'	715	2	0.0027	Ply S1	No	0.0142	0.1456	0.0186	0.2688	0.4472	1.7887	
27.1-P.5	5.50'	9.26'	715	2	0.0027	Ply S1	No	0.0142	0.1456	0.0186	0.2688	0.4472	1.7887	
27.1-C.4	8.00'	9.26'	715	2	0.0027	Ply S1	No	0.0097	0.1456	0.0186	0.1728	0.3467	1.3870	
27.1-A.8	8.50'	9.26'	715	2	0.0027	Ply S1	No	0.0092	0.1456	0.0186	0.1613	0.3346	1.3386	
27.1-PL A.7	18.00'	9.26'	715	2	0.0027	Ply S1	No	0.0043	0.1456	0.0186	0.0712	0.2397	0.9587	
26.0-E.2	21.00'	9.26'	712	2	0.0026	Ply S1	No	0.0037	0.1449	0.0183	0.0602	0.2271	0.9085	
26.0-C.9	23.50'	9.26'	712	2	0.0026	Ply S1	No	0.0033	0.1449	0.0183	0.0535	0.2200	0.8802	
26.0-B.5														
26.0-PL A.6	21.00'	9.26'	712	2	0.0026	Ply S1	No	0.0037	0.1449	0.0183	0.0602	0.2271	0.9085	
26.0-PL A.6	21.00'	9.26'	712	2	0.0026	Ply S1	No	0.0037	0.1449	0.0183	0.0602	0.2271	0.9085	
25.6-P.5	25.00'	9.26'	707	2	0.0026	Ply S1	No	0.0031	0.1439	0.0179	0.0498	0.2147	0.8589	
25.4-U.3	8.50'	9.26'	704	2	0.0025	Ply S1	No	0.0090	0.1432	0.0176	0.1585	0.3282	1.3130	
25.3-E.3	25.00'	9.26'	703	2	0.0025	Ply S1	No	0.0031	0.1431	0.0175	0.0495	0.2132	0.8528	
25.0-H.5	28.50'	9.26'	698	2	0.0025	Ply S1	No	0.0027	0.1421	0.0172	0.0429	0.2049	0.8194	
25.0-L.0	10.50'	9.26'	698	2	0.0025	Ply S1	No	0.0072	0.1421	0.0172	0.1241	0.2907	1.1627	
25.0-K.0	18.50'	9.26'	698	2	0.0025	Ply S1	No	0.0041	0.1421	0.0172	0.0674	0.2308	0.9232	
25.0-P.5	22.00'	9.26'	698	2	0.0025	Ply S1	No	0.0035	0.1421	0.0172	0.0562	0.2189	0.8756	
25.0-N.1	18.50'	9.26'	698	2	0.0025	Ply S1	No	0.0041	0.1421	0.0172	0.0674	0.2308	0.9232	
24.2-U.2	29.50'	9.26'	698	2	0.0025	Ply S1	No	0.0026	0.1420	0.0171	0.0413	0.2030	0.8121	
24.2-U.2	29.50'	9.26'	698	2	0.0025	Ply S1	No	0.0026	0.1420	0.0171	0.0413	0.2030	0.8121	
22.6-B.2	4.00'	9.26'	693	2	0.0024	Ply S1	No	0.0189	0.1410	0.0167	0.3898	0.5663	2.2654	
22.1-E.4	24.50'	9.26'	690	2	0.0024	Ply S1	No	0.0031	0.1404	0.0165	0.0495	0.2094	0.8376	
22.1-E.4	24.50'	9.26'	690	2	0.0024	Ply S1	No	0.0031	0.1404	0.0165	0.0495	0.2094	0.8376	
21.0-E.4	8.50'	9.26'	683	2	0.0023	Ply S1	No	0.0088	0.1390	0.0160	0.1536	0.3174	1.2697	
21.0-U.2	32.50'	9.26'	682	2	0.0023	Ply S1	No	0.0027	0.1389	0.0159	0.0438	0.2013	0.8054	
20.0-E.4	24.50'	9.26'	677	2	0.0022	Ply S1	No	0.0036	0.1377	0.0155	0.0582	0.2150	0.8601	
20.0-E.4	24.50'	9.26'	677	2	0.0022	Ply S1	No	0.0036	0.1377	0.0155	0.0582	0.2150	0.8601	
19.5-E.5	8.50'	9.26'	670	2	0.0022	Ply S1	No	0.0103	0.1364	0.0150	0.1808	0.3425	1.3701	
18.8-E.5	25.00'	9.26'	664	2	0.0021	Ply S1	No	0.0035	0.1351	0.0145	0.0559	0.2091	0.8363	
18.8-E.5	25.00'	9.26'	664	2	0.0021	Ply S1	No	0.0035	0.1351	0.0145	0.0559	0.2091	0.8363	
18.2-U.2	24.50'	9.26'	664	2	0.0021	Ply S1	No	0.0030	0.1350	0.0145	0.0475	0.2001	0.8002	
17.2-PL A.7	7.00'	9.26'	648	2	0.0019	Ply S1	No	0.0101	0.1319	0.0134	0.1816	0.3371	1.3484	
17.3-E.3	25.00'	9.26'	650	2	0.0020	Ply S1	No	0.0028	0.1323	0.0136	0.0456	0.1943	0.7773	
17.0-U.2	32.50'	9.26'	646	2	0.0019	Ply S1	No	0.0022	0.1314	0.0133	0.0345	0.1814	0.7256	
17.0-U.2	32.50'	9.26'	646	2	0.0019	Ply S1	No	0.0022	0.1314	0.0133	0.0345	0.1814	0.7256	
15.8-PL A.6	23.00'	9.26'	650	2	0.0020	Ply S1	No	0.0031	0.1322	0.0136	0.0497	0.1986	0.7943	
15.2-E.2	21.00'	9.26'	651	2	0.0020	Ply S1	No	0.0034	0.1324	0.0136	0.0548	0.2042	0.8167	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

15.2-C.7	29.50'	9.26'	651	2	0.0020	Ply S1	No	0.0024	0.1324	0.0136	0.0384	0.1869	0.7475
15.2-A.6	11.50'	9.26'	651	2	0.0020	Ply S1	No	0.0062	0.1324	0.0136	0.1043	0.2565	1.0261
13.8-C.7	29.50'	9.26'	656	2	0.0020	Ply S1	No	0.0024	0.1334	0.0140	0.0387	0.1885	0.7542
13.8-A.6	11.50'	9.26'	656	2	0.0020	Ply S1	No	0.0062	0.1334	0.0140	0.1051	0.2587	1.0348
13.8-E.2	22.00'	9.26'	656	2	0.0020	Ply S1	No	0.0032	0.1334	0.0140	0.0525	0.2032	0.8128
13.2-PL A.6	23.50'	9.26'	657	2	0.0020	Ply S1	No	0.0030	0.1337	0.0140	0.0491	0.1998	0.7993
12.0-U.2	24.50'	9.26'	664	2	0.0021	Ply S1	No	0.0030	0.1352	0.0146	0.0475	0.2002	0.8009
12.0-U.2	24.50'	9.26'	664	2	0.0021	Ply S1	No	0.0030	0.1352	0.0146	0.0475	0.2002	0.8009
11.8-E.3	25.00'	9.26'	669	2	0.0021	Ply S1	No	0.0029	0.1362	0.0149	0.0469	0.2008	0.8034
11.8-E.3	25.00'	9.26'	669	2	0.0021	Ply S1	No	0.0029	0.1362	0.0149	0.0469	0.2008	0.8034
11.0-U.2	32.50'	9.26'	683	2	0.0023	Ply S1	No	0.0023	0.1389	0.0159	0.0364	0.1936	0.7742
11.0-U.2	32.50'	9.26'	683	2	0.0023	Ply S1	No	0.0023	0.1389	0.0159	0.0364	0.1936	0.7742
10.0-E.5	25.00'	9.26'	689	2	0.0024	Ply S1	No	0.0030	0.1402	0.0164	0.0482	0.2079	0.8315
10.0-E.5	25.00'	9.26'	689	2	0.0024	Ply S1	No	0.0030	0.1402	0.0164	0.0482	0.2079	0.8315
9.5-S.5	8.50'	9.26'	692	2	0.0024	Ply S1	No	0.0089	0.1409	0.0167	0.1550	0.3214	1.2857
9.2-E.5	8.50'	9.26'	699	2	0.0025	Ply S1	No	0.0090	0.1422	0.0172	0.1565	0.3248	1.2994
9.0-U.2	24.50'	9.26'	701	2	0.0025	Ply S1	No	0.0031	0.1427	0.0174	0.0501	0.2132	0.8530
9.0-U.2	24.50'	9.26'	701	2	0.0025	Ply S1	No	0.0031	0.1427	0.0174	0.0501	0.2132	0.8530
7.9-E.4	24.50'	9.26'	707	2	0.0026	Ply S1	No	0.0031	0.1440	0.0179	0.0505	0.2155	0.8621
7.9-E.4	24.50'	9.26'	707	2	0.0026	Ply S1	No	0.0031	0.1440	0.0179	0.0505	0.2155	0.8621
7.3-E.0	8.50'	9.26'	710	2	0.0026	Ply S1	No	0.0091	0.1444	0.0181	0.1589	0.3305	1.3219
8.0-E.4	8.50'	9.26'	716	2	0.0027	Ply S1	No	0.0092	0.1458	0.0187	0.1603	0.3339	1.3357
7.0-U.2	32.50'	9.26'	719	2	0.0027	Ply S1	No	0.0024	0.1464	0.0189	0.0383	0.2060	0.8242
7.0-U.2	32.50'	9.26'	719	2	0.0027	Ply S1	No	0.0024	0.1464	0.0189	0.0383	0.2060	0.8242
6.0-E.5	25.00'	9.26'	726	2	0.0028	Ply S1	No	0.0032	0.1478	0.0195	0.0508	0.2212	0.8848
6.0-E.5	25.00'	9.26'	726	2	0.0028	Ply S1	No	0.0032	0.1478	0.0195	0.0508	0.2212	0.8848
5.6-B.5	4.50'	9.26'	731	2	0.0029	Ply S1	No	0.0177	0.1488	0.0199	0.3504	0.5368	2.1470
5.0-E.5	5.50'	9.26'	735	2	0.0029	Ply S1	No	0.0146	0.1496	0.0203	0.2739	0.4583	1.8333
4.9-D.9	8.00'	9.26'	739	2	0.0030	Ply S1	No	0.0101	0.1504	0.0207	0.1771	0.3583	1.4330
4.8-B.5	6.50'	9.26'	754	2	0.0032	Ply S1	No	0.0126	0.1534	0.0221	0.2298	0.4179	1.6715
4.6-E.3	25.00'	9.26'	746	2	0.0031	Ply S1	No	0.0033	0.1519	0.0213	0.0521	0.2286	0.9145
4.0-PL A.6	20.50'	9.26'	759	2	0.0033	Ply S1	No	0.0075	0.1545	0.0226	0.0843	0.2690	1.0759
4.0-K.5	34.50'	9.26'	759	2	0.0033	Ply S1	No	0.0024	0.1545	0.0226	0.0380	0.2175	0.8701
4.0-E.2	21.50'	9.26'	759	2	0.0033	Ply S1	No	0.0038	0.1546	0.0226	0.0621	0.2431	0.9723
4.0-C.9	23.50'	9.26'	759	2	0.0033	Ply S1	No	0.0035	0.1546	0.0226	0.0566	0.2372	0.9489
1.7-U.2	31.00'	9.26'	766	2	0.0033	Ply S1	No	0.0027	0.1559	0.0232	0.0428	0.2246	0.8984
1.7-U.2	31.00'	9.26'	766	2	0.0033	Ply S1	No	0.0027	0.1559	0.0232	0.0428	0.2246	0.8984
1.0-C.3	9.00'	9.26'	767	2	0.0034	Ply S1	No	0.0093	0.1560	0.0233	0.1606	0.3492	1.3967
1.0-E.9	6.50'	9.26'	767	2	0.0034	Ply S1	No	0.0128	0.1560	0.0233	0.2336	0.4257	1.7030
1.0-N.9	25.00'	9.26'	767	2	0.0034	Ply S1	No	0.0033	0.1561	0.0233	0.0535	0.2362	0.9449
1.0-P.8	19.00'	9.26'	767	2	0.0034	Ply S1	No	0.0044	0.1561	0.0233	0.0714	0.2551	1.0205
1.0-K.0	7.00'	9.26'	767	2	0.0034	Ply S1	No	0.0119	0.1561	0.0233	0.2141	0.4054	1.6217
1.0-L.0	20.00'	9.26'	767	2	0.0034	Ply S1	No	0.0042	0.1561	0.0233	0.0676	0.2512	1.0046
0.5-PL A.6													
0.3-U.4	6.00'	9.26'	788	4	0.0037	Ply S1	Yes	0.0143	0.1603	0.0255	0.2638	0.4639	1.8558
0.1-U.3	4.50'	9.26'	794	4	0.0038	Ply S1	Yes	0.0192	0.1615	0.0261	0.3796	0.5865	2.3459
0.1-R.0	4.50'	9.26'	794	4	0.0038	Ply S1	Yes	0.0192	0.1615	0.0261	0.3796	0.5865	2.3459
0.0-K.0	4.00'	9.26'	795	4	0.0038	Ply S1	Yes	0.0217	0.1618	0.0263	0.4437	0.6534	2.6137
0.0-K.5	4.00'	9.26'	795	4	0.0038	Ply S1	Yes	0.0217	0.1618	0.0263	0.4437	0.6535	2.6138
0.0-P.7	4.00'	9.26'	795	4	0.0038	Ply S1	Yes	0.0217	0.1618	0.0263	0.4437	0.6535	2.6139
0.0-P.4	4.00'	9.26'	795	4	0.0038	Ply S1	Yes	0.0217	0.1618	0.0263	0.4437	0.6535	2.6139
4.0-P.4													
4.0-P.4													
U.4-29.0	6.00'	9.26'	802	4	0.0039	Ply S1	Yes	0.0146	0.1633	0.0271	0.2708	0.4757	1.9030
U.4-19.9	7.00'	9.26'	802	4	0.0039	Ply S1	Yes	0.0125	0.1633	0.0271	0.2257	0.4285	1.7141
U.4-17.4	6.00'	9.26'	802	4	0.0039	Ply S1	Yes	0.0146	0.1633	0.0271	0.2708	0.4757	1.9030
U.4-11.0	7.50'	9.26'	802	4	0.0039	Ply S1	Yes	0.0117	0.1633	0.0270	0.2083	0.4103	1.6412
U.4-4.0	5.50'	9.26'	801	4	0.0039	Ply S1	Yes	0.0159	0.1631	0.0269	0.3004	0.5063	2.0250
U.3-29.0	8.00'	9.26'	793	4	0.0038	Ply S1	Yes	0.0108	0.1615	0.0261	0.1912	0.3896	1.5583
U.0-4.0	18.00'	9.26'	775	4	0.0035	Ply S1	Yes	0.0047	0.1578	0.0242	0.0769	0.2636	1.0545
U.0-9.0	26.00'	9.26'	775	4	0.0035	Ply S1	Yes	0.0032	0.1578	0.0242	0.0523	0.2375	0.9501
U.0-12.0	26.00'	9.26'	775	4	0.0035	Ply S1	Yes	0.0032	0.1578	0.0242	0.0523	0.2375	0.9501

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OFCHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

U.0-11.0	12.50'	9.26'	775	4	0.0035	Ply S1	Yes	0.0068	0.1578	0.0242	0.1137	0.3024	1.2097
U.0-20.1	18.00'	9.26'	775	4	0.0035	Ply S1	Yes	0.0047	0.1578	0.0242	0.0769	0.2636	1.0543
U.0-18.1	26.00'	9.26'	775	4	0.0035	Ply S1	Yes	0.0032	0.1578	0.0242	0.0523	0.2375	0.9501
U.0-17.2	24.50'	9.26'	775	4	0.0035	Ply S1	Yes	0.0034	0.1578	0.0242	0.0557	0.2411	0.9642
U.0-7.2	5.50'	9.26'	775	4	0.0035	Ply S1	Yes	0.0154	0.1578	0.0242	0.2906	0.4879	1.9518
T.0-29.5	29.50'	9.26'	773	4	0.0034	Ply S1	Yes	0.0029	0.1573	0.0239	0.0458	0.2299	0.9195
S.2-1.5	13.00'	9.26'	773	4	0.0034	Ply S1	Yes	0.0065	0.1573	0.0239	0.1087	0.2964	1.1855
S.2-25.2	13.00'	9.26'	773	4	0.0034	Ply S1	Yes	0.0065	0.1573	0.0239	0.1087	0.2964	1.1855
R.1-4.0	21.50'	9.26'	770	4	0.0034	Ply S1	Yes	0.0039	0.1566	0.0236	0.0633	0.2475	0.9899
Q.0-28.4	9.50'	9.26'	768	2	0.0034	Ply S1	No	0.0088	0.1564	0.0235	0.1525	0.3412	1.3647
Q.0-25.7	21.00'	9.26'	768	2	0.0034	Ply S1	No	0.0040	0.1564	0.0235	0.0648	0.2487	0.9946
P.8-29.0	12.00'	9.26'	763	2	0.0033	Ply S1	No	0.0069	0.1553	0.0229	0.1170	0.3021	1.2084
P.3-4.0	8.50'	9.26'	750	2	0.0031	Ply S1	No	0.0096	0.1526	0.0216	0.1686	0.3524	1.4095
P.0-4.0	29.50'	9.26'	741	2	0.0030	Ply S1	No	0.0027	0.1508	0.0208	0.0438	0.2182	0.8727
P.0-4.0	29.50'	9.26'	741	2	0.0030	Ply S1	No	0.0027	0.1508	0.0208	0.0438	0.2182	0.8727
N.0-25.5	24.50'	9.26'	734	2	0.0029	Ply S1	No	0.0033	0.1493	0.0202	0.0527	0.2254	0.9017
N.0-25.5	24.50'	9.26'	734	2	0.0029	Ply S1	No	0.0033	0.1493	0.0202	0.0527	0.2254	0.9017
M.0-4.0	33.50'	9.26'	722	2	0.0028	Ply S1	No	0.0023	0.1469	0.0191	0.0374	0.2058	0.8231
M.0-4.0	33.50'	9.26'	722	2	0.0028	Ply S1	No	0.0023	0.1469	0.0191	0.0374	0.2058	0.8231
L.1-25.5	24.00'	9.26'	719	2	0.0027	Ply S1	No	0.0033	0.1463	0.0189	0.0527	0.2211	0.8845
L.1-25.5	24.00'	9.26'	719	2	0.0027	Ply S1	No	0.0033	0.1463	0.0189	0.0527	0.2211	0.8845
K.0-25.5	24.50'	9.26'	703	2	0.0025	Ply S1	No	0.0031	0.1432	0.0176	0.0505	0.2143	0.8573
K.0-25.5	24.50'	9.26'	703	2	0.0025	Ply S1	No	0.0031	0.1432	0.0176	0.0505	0.2143	0.8573
J.8-4.0	8.50'	9.26'	702	2	0.0025	Ply S1	No	0.0090	0.1428	0.0174	0.1577	0.3269	1.3077
H.6-25.7	25.00'	9.26'	682	2	0.0023	Ply S1	No	0.0030	0.1389	0.0159	0.0479	0.2057	0.8226
H.1-29.0	11.00'	9.26'	681	2	0.0023	Ply S1	No	0.0067	0.1386	0.0158	0.1150	0.2762	1.1047
H.0-28.4	9.50'	9.26'	682	2	0.0023	Ply S1	No	0.0078	0.1388	0.0159	0.1354	0.2979	1.1915
H.0-25.7	21.00'	9.26'	682	2	0.0023	Ply S1	No	0.0035	0.1388	0.0159	0.0576	0.2157	0.8629
F.6-8.0	26.00'	9.26'	683	2	0.0023	Ply S1	No	0.0029	0.1390	0.0159	0.0461	0.2039	0.8157
F.6-25.3	21.00'	9.26'	683	2	0.0023	Ply S1	No	0.0035	0.1390	0.0159	0.0577	0.2161	0.8645
F.6-22.1	16.00'	9.26'	683	2	0.0023	Ply S1	No	0.0046	0.1390	0.0159	0.0769	0.2364	0.9458
F.6-20.0	26.00'	9.26'	683	2	0.0023	Ply S1	No	0.0029	0.1390	0.0159	0.0461	0.2039	0.8157
F.6-18.0	16.00'	9.26'	683	2	0.0023	Ply S1	No	0.0046	0.1390	0.0159	0.0769	0.2364	0.9458
F.6-17.3	21.00'	9.26'	683	2	0.0023	Ply S1	No	0.0035	0.1390	0.0159	0.0577	0.2161	0.8645
F.6-11.9	28.50'	9.26'	683	2	0.0023	Ply S1	No	0.0026	0.1390	0.0159	0.0419	0.1995	0.7979
F.6-10.2	16.00'	9.26'	683	2	0.0023	Ply S1	No	0.0046	0.1390	0.0159	0.0769	0.2364	0.9458
F.6-5.9	16.00'	9.26'	683	2	0.0023	Ply S1	No	0.0046	0.1390	0.0159	0.0769	0.2365	0.9458
F.6-4.5	29.00'	9.26'	683	2	0.0023	Ply S1	No	0.0026	0.1390	0.0159	0.0412	0.1987	0.7947
F.5-4.0	33.00'	9.26'	683	2	0.0023	Ply S1	No	0.0023	0.1390	0.0159	0.0360	0.1932	0.7729
E.9-29.0	24.50'	9.26'	683	2	0.0023	Ply S1	No	0.0030	0.1391	0.0160	0.0491	0.2072	0.8288
E.9-29.0	24.50'	9.26'	683	2	0.0023	Ply S1	No	0.0030	0.1391	0.0160	0.0491	0.2072	0.8288
E.7-4.1	7.00'	9.26'	684	2	0.0023	Ply S1	No	0.0107	0.1393	0.0161	0.1926	0.3586	1.4344
E.4-29.0													
D.8-29.0	9.50'	9.26'	688	2	0.0024	Ply S1	No	0.0079	0.1400	0.0164	0.1367	0.3010	1.2039
D.6-4.6	5.50'	9.26'	689	2	0.0024	Ply S1	No	0.0136	0.1402	0.0164	0.2585	0.4287	1.7147
D.2-29.0	30.00'	9.26'	690	2	0.0024	Ply S1	No	0.0025	0.1405	0.0165	0.0402	0.1997	0.7987
D.2-29.0	30.00'	9.26'	690	2	0.0024	Ply S1	No	0.0025	0.1405	0.0165	0.0402	0.1997	0.7987
D.0-17.2	25.00'	9.26'	691	2	0.0024	Ply S1	No	0.0030	0.1407	0.0166	0.0486	0.2089	0.8355
D.0-17.2	25.00'	9.26'	691	2	0.0024	Ply S1	No	0.0030	0.1407	0.0166	0.0486	0.2089	0.8355
D.0-11.9	25.00'	9.26'	691	2	0.0024	Ply S1	No	0.0030	0.1407	0.0166	0.0486	0.2089	0.8355
D.0-11.9	25.00'	9.26'	691	2	0.0024	Ply S1	No	0.0030	0.1407	0.0166	0.0486	0.2089	0.8355
D.0-4.5	25.00'	9.26'	691	2	0.0024	Ply S1	No	0.0030	0.1407	0.0166	0.0486	0.2089	0.8355
D.0-4.5	25.00'	9.26'	691	2	0.0024	Ply S1	No	0.0030	0.1407	0.0166	0.0486	0.2089	0.8355
D.0-25.5	25.50'	9.26'	691	2	0.0024	Ply S1	No	0.0030	0.1407	0.0166	0.0476	0.2078	0.8313
D.0-25.5	25.50'	9.26'	691	2	0.0024	Ply S1	No	0.0030	0.1407	0.0166	0.0476	0.2078	0.8313
C.1-29.0	27.00'	9.26'	694	2	0.0024	Ply S1	No	0.0028	0.1412	0.0168	0.0451	0.2059	0.8237
C.0-4.0	17.50'	9.26'	695	2	0.0024	Ply S1	No	0.0043	0.1414	0.0169	0.0711	0.2336	0.9344
B.2-29.0	27.00'	9.26'	696	2	0.0024	Ply S1	No	0.0028	0.1416	0.0170	0.0452	0.2066	0.8263
B.2-17.6	8.50'	9.26'	696	2	0.0024	Ply S1	No	0.0089	0.1416	0.0170	0.1567	0.3242	1.2967
B.2-11.4	8.50'	9.26'	696	2	0.0024	Ply S1	No	0.0089	0.1416	0.0170	0.1567	0.3242	1.2967
B.2-4.9	8.50'	9.26'	696	2	0.0024	Ply S1	No	0.0089	0.1416	0.0170	0.1567	0.3242	1.2967
B.2-25.0	8.50'	9.26'	696	2	0.0024	Ply S1	No	0.0089	0.1416	0.0170	0.1567	0.3242	1.2967

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234 18-234**Legacy Livermore****Katerra****Lateral Analysis -4th Floor Framing Level.**

B.0-4.0	17.50'	9.26'	696	2	0.0024	Ply S1	No	0.0043	0.1417	0.0170	0.0712	0.2343	0.9370
A.0-11.8	28.00'	9.26'	698	2	0.0025	Ply S1	No	0.0027	0.1421	0.0171	0.0436	0.2055	0.8222
A.0-11.8	28.00'	9.26'	698	2	0.0025	Ply S1	No	0.0027	0.1421	0.0171	0.0436	0.2055	0.8222
A.0-17.3	28.00'	9.26'	698	2	0.0025	Ply S1	No	0.0027	0.1421	0.0171	0.0436	0.2055	0.8222
A.0-17.3	28.00'	9.26'	698	2	0.0025	Ply S1	No	0.0027	0.1421	0.0171	0.0436	0.2055	0.8222
A.0-4.7	37.00'	9.26'	698	2	0.0025	Ply S1	No	0.0021	0.1421	0.0171	0.0327	0.1940	0.7760
A.0-25.2	32.00'	9.26'	698	2	0.0025	Ply S1	No	0.0024	0.1421	0.0171	0.0380	0.1996	0.7984
PL A.8-5.6	7.00'	9.26'	700	2	0.0025	Ply S1	No	0.0202	0.1425	0.0173	0.2527	0.4327	1.7309
PL A.7-29.0	9.00'	9.26'	701	2	0.0025	Ply S1	No	0.0085	0.1426	0.0174	0.1479	0.3164	1.2656
PL A.5-17.9	7.00'	9.26'	702	2	0.0025	Ply S1	No	0.0109	0.1428	0.0174	0.1975	0.3687	1.4748
PL A.5-10.5	7.00'	9.26'	702	2	0.0025	Ply S1	No	0.0109	0.1428	0.0174	0.1975	0.3687	1.4748
PL A.5-5.6	7.00'	9.26'	702	2	0.0025	Ply S1	No	0.0203	0.1428	0.0174	0.2533	0.4339	1.7356
PL A.5-22.5	7.00'	9.26'	702	2	0.0025	Ply S1	No	0.0109	0.1428	0.0174	0.1975	0.3687	1.4748
PL A.2-4.0	10.00'	9.26'	704	2	0.0025	Ply S1	No	0.0142	0.1434	0.0177	0.1695	0.3448	1.3791
PL A.2-5.0	10.00'	9.26'	704	2	0.0025	Ply S1	No	0.0142	0.1434	0.0177	0.1695	0.3448	1.3791
PL A.2-11.7	11.00'	9.26'	704	2	0.0025	Ply S1	No	0.0070	0.1434	0.0177	0.1189	0.2869	1.1478
PL A.2-10.7	11.00'	9.26'	704	2	0.0025	Ply S1	No	0.0070	0.1434	0.0177	0.1189	0.2869	1.1478

NS Average Drift: 1.1771 D/C= 0.48
EW Average Drift : 1.0877 D/C= 0.44
Allowable Drift : 2.46

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OFCHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.****Shearwall Drift - 2nd Floor Framing Level.**

$$\delta_{SH} = \frac{8vh^3}{EAb} + \frac{vh}{G_t I_t} + 0.75he_n + \frac{h}{b} \Delta_a \quad (C4.3.2-1)$$

$$C_d = 4$$

$$I = 1.0$$

$$E = 1600000 \text{ psi (DF\#2)}$$

$$\text{Lumber Type} = \text{Dry}$$

$$\text{Allowable Story Drift} = 2.46 \text{ in}$$

Sheath Type	Gvtv
OSB	83500
Ply	35000
Ply S1	45500

Building Line	SW Length (ft)	Plate Height, h (ft)	LRFD Shear (plf)	Nail Spac. in	e _n in	Sheath Type	Double Shear?	bending 8vh ³ /EAb	shear vh/G _t I _t	nail slip 0.75he _n	Wall anch. slip h*Δ _a /b	Total Defl in	Amplified defl, in	d/c
								in	in	in	in			
29.0-H.5	4.00'	9.26'	1650	2	0.0043	Ply S1	Yes	0.0190	0.3358	0.0296	0.5377	0.9221	3.6885	
29.0-P.7	11.50'	9.26'	1649	2	0.0043	Ply S1	Yes	0.0066	0.3357	0.0296	0.1536	0.5254	2.1016	
29.0-U.3	8.00'	9.26'	1646	2	0.0042	Ply S1	Yes	0.0095	0.3349	0.0294	0.2299	0.8036	2.4146	
29.0-A.9	5.00'	9.26'	1638	2	0.0042	Ply S1	Yes	0.0151	0.3334	0.0289	0.4006	0.7781	3.1123	
29.0-PL A.7	5.50'	9.26'	1638	2	0.0042	Ply S1	Yes	0.0137	0.3334	0.0289	0.3561	0.7322	2.9288	
29.0-P.1	6.50'	9.26'	1630	2	0.0041	Ply S1	Yes	0.0115	0.3317	0.0285	0.2900	0.6618	2.6471	
29.0-J.0	6.50'	9.26'	1630	2	0.0041	Ply S1	Yes	0.0115	0.3317	0.0285	0.2900	0.6618	2.6471	
29.0-H.4	18.00'	9.26'	1601	2	0.0039	Ply S1	Yes	0.0041	0.3258	0.0268	0.0613	0.4180	1.6720	
29.0-H.4	18.00'	9.26'	1601	2	0.0039	Ply S1	Yes	0.0041	0.3258	0.0268	0.0613	0.4180	1.6720	
29.0-P.6	18.50'	9.26'	1601	2	0.0039	Ply S1	Yes	0.0040	0.3258	0.0268	0.0596	0.4161	1.6645	
29.0-P.6	18.50'	9.26'	1601	2	0.0039	Ply S1	Yes	0.0040	0.3258	0.0268	0.0596	0.4161	1.6645	
27.9-U.2	19.00'	9.26'	1588	2	0.0038	Ply S1	Yes	0.0038	0.3231	0.0261	0.0575	0.4106	1.6423	
27.9-U.2	19.00'	9.26'	1588	2	0.0038	Ply S1	Yes	0.0038	0.3231	0.0261	0.0575	0.4106	1.6423	
27.1-E.0	37.00'	9.26'	1585	2	0.0037	Ply S1	Yes	0.0020	0.3225	0.0260	0.0432	0.3936	1.5745	
27.1-H.5	5.50'	9.26'	1585	2	0.0037	Ply S1	Yes	0.0133	0.3225	0.0260	0.3455	0.7072	2.8289	
27.1-P.5	5.50'	9.26'	1585	2	0.0037	Ply S1	Yes	0.0133	0.3225	0.0260	0.3455	0.7072	2.8289	
27.1-C.4	8.00'	9.26'	1585	2	0.0037	Ply S1	Yes	0.0091	0.3225	0.0260	0.2221	0.5797	2.3187	
27.1-A.8	8.50'	9.26'	1585	2	0.0037	Ply S1	Yes	0.0086	0.3225	0.0260	0.2073	0.5643	2.2574	
27.1-PL A.7	18.00'	9.26'	1585	2	0.0037	Ply S1	Yes	0.0041	0.3225	0.0260	0.0914	0.4440	1.7759	
26.0-E.2	21.00'	9.26'	1576	2	0.0037	Ply S1	Yes	0.0035	0.3207	0.0255	0.0773	0.4269	1.7078	
26.0-C.9	23.50'	9.26'	1576	2	0.0037	Ply S1	Yes	0.0031	0.3207	0.0255	0.0687	0.4180	1.6719	
26.0-B.5														
26.0-PL A.6	21.00'	9.26'	1576	2	0.0037	Ply S1	Yes	0.0035	0.3207	0.0255	0.0514	0.4010	1.6040	
26.0-PL A.6	21.00'	9.26'	1576	2	0.0037	Ply S1	Yes	0.0035	0.3207	0.0255	0.0514	0.4010	1.6040	
25.6-P.5	25.00'	9.26'	1562	2	0.0036	Ply S1	Yes	0.0029	0.3179	0.0248	0.0639	0.4095	1.6381	
25.4-U.3	8.50'	9.26'	1552	2	0.0035	Ply S1	Yes	0.0084	0.3158	0.0242	0.2033	0.5518	2.2072	
25.3-E.3	25.00'	9.26'	1551	2	0.0035	Ply S1	Yes	0.0029	0.3156	0.0242	0.0635	0.4061	1.6245	
25.0-H.5	28.50'	9.26'	1538	2	0.0034	Ply S1	Yes	0.0025	0.3129	0.0235	0.0550	0.3939	1.5757	
25.0-L.0	10.50'	9.26'	1538	2	0.0034	Ply S1	Yes	0.0067	0.3129	0.0235	0.1592	0.5024	2.0094	
25.0-K.0	18.50'	9.26'	1538	2	0.0034	Ply S1	Yes	0.0038	0.3129	0.0235	0.0864	0.4267	1.7067	
25.0-P.5	22.00'	9.26'	1538	2	0.0034	Ply S1	Yes	0.0032	0.3129	0.0235	0.0720	0.4117	1.6466	
25.0-N.1	18.50'	9.26'	1538	2	0.0034	Ply S1	Yes	0.0038	0.3129	0.0235	0.0864	0.4267	1.7067	
24.2-U.2	29.50'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0024	0.3126	0.0234	0.0352	0.3736	1.4944	
24.2-U.2	29.50'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0024	0.3126	0.0234	0.0352	0.3736	1.4944	
22.6-B.2	4.00'	9.26'	1522	2	0.0033	Ply S1	Yes	0.0175	0.3098	0.0227	0.4995	0.8495	3.3979	
22.1-E.4	24.50'	9.26'	1513	2	0.0032	Ply S1	Yes	0.0028	0.3080	0.0223	0.0422	0.3753	1.5014	
22.1-E.4	24.50'	9.26'	1513	2	0.0032	Ply S1	Yes	0.0028	0.3080	0.0223	0.0422	0.3753	1.5014	
21.0-E.4	8.50'	9.26'	1496	2	0.0031	Ply S1	Yes	0.0081	0.3044	0.0215	0.1966	0.5306	2.1224	
21.0-U.2	32.50'	9.26'	1493	2	0.0031	Ply S1	Yes	0.0025	0.3039	0.0214	0.0551	0.3828	1.5312	
20.0-E.4	24.50'	9.26'	1477	2	0.0030	Ply S1	Yes	0.0033	0.3006	0.0206	0.0487	0.3732	1.4928	
20.0-E.4	24.50'	9.26'	1477	2	0.0030	Ply S1	Yes	0.0033	0.3006	0.0206	0.0487	0.3732	1.4928	
19.5-E.5	8.50'	9.26'	1460	2	0.0029	Ply S1	Yes	0.0093	0.2972	0.0199	0.2268	0.5532	2.2127	
18.8-E.5	25.00'	9.26'	1442	2	0.0027	Ply S1	Yes	0.0031	0.2936	0.0191	0.0467	0.3624	1.4497	
18.8-E.5	25.00'	9.26'	1442	2	0.0027	Ply S1	Yes	0.0031	0.2936	0.0191	0.0467	0.3624	1.4497	
18.2-U.2	24.50'	9.26'	1441	2	0.0027	Ply S1	Yes	0.0027	0.2933	0.0190	0.0607	0.3757	1.5028	
17.2-PL A.7	7.00'	9.26'	1399	2	0.0025	Ply S1	Yes	0.0092	0.2846	0.0172	0.2313	0.5424	2.1696	
17.3-E.3	25.00'	9.26'	1404	2	0.0025	Ply S1	Yes	0.0026	0.2858	0.0175	0.0580	0.3639	1.4557	
17.0-U.2	32.50'	9.26'	1389	2	0.0024	Ply S1	Yes	0.0020	0.2826	0.0168	0.0292	0.3306	1.3224	
17.0-U.2	32.50'	9.26'	1389	2	0.0024	Ply S1	Yes	0.0020	0.2826	0.0168	0.0292	0.3306	1.3224	
15.8-PL A.6	23.00'	9.26'	1392	2	0.0024	Ply S1	Yes	0.0028	0.2832	0.0170	0.0629	0.3659	1.4635	
15.2-E.2	21.00'	9.26'	1393	2	0.0025	Ply S1	Yes	0.0031	0.2835	0.0170	0.0693	0.3729	1.4917	

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**SHEET NO. OF CHKD. BY DATE

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

15.2-C.7	29.50'	9.26'	1393	2	0.0025	Ply S1	Yes	0.0022	0.2835	0.0170	0.0486	0.3514	1.4055
15.2-A.6	11.50'	9.26'	1393	2	0.0025	Ply S1	Yes	0.0056	0.2835	0.0170	0.1320	0.4382	1.7527
13.8-C.7	29.50'	9.26'	1402	2	0.0025	Ply S1	Yes	0.0022	0.2853	0.0174	0.0490	0.3538	1.4153
13.8-A.6	11.50'	9.26'	1402	2	0.0025	Ply S1	Yes	0.0056	0.2853	0.0174	0.1329	0.4412	1.7648
13.8-E.2	22.00'	9.26'	1402	2	0.0025	Ply S1	Yes	0.0029	0.2853	0.0174	0.0665	0.3721	1.4882
13.2-PL A.6	23.50'	9.26'	1403	2	0.0025	Ply S1	Yes	0.0027	0.2856	0.0174	0.0621	0.3679	1.4718
12.0-U.2	24.50'	9.26'	1416	2	0.0026	Ply S1	Yes	0.0027	0.2883	0.0180	0.0401	0.3490	1.3960
12.0-U.2	24.50'	9.26'	1416	2	0.0026	Ply S1	Yes	0.0027	0.2883	0.0180	0.0401	0.3490	1.3960
11.8-E.3	25.00'	9.26'	1425	2	0.0026	Ply S1	Yes	0.0026	0.2900	0.0183	0.0395	0.3504	1.4017
11.8-E.3	25.00'	9.26'	1425	2	0.0026	Ply S1	Yes	0.0026	0.2900	0.0183	0.0395	0.3504	1.4017
11.0-U.2	32.50'	9.26'	1448	2	0.0028	Ply S1	Yes	0.0021	0.2948	0.0193	0.0307	0.3468	1.3872
11.0-U.2	32.50'	9.26'	1448	2	0.0028	Ply S1	Yes	0.0021	0.2948	0.0193	0.0307	0.3468	1.3872
10.0-E.5	25.00'	9.26'	1459	2	0.0029	Ply S1	Yes	0.0027	0.2970	0.0198	0.0406	0.3601	1.4404
10.0-E.5	25.00'	9.26'	1459	2	0.0029	Ply S1	Yes	0.0027	0.2970	0.0198	0.0406	0.3601	1.4404
9.5-S.5	8.50'	9.26'	1465	2	0.0029	Ply S1	Yes	0.0079	0.2981	0.0201	0.1954	0.5215	2.0858
9.2-E.5	8.50'	9.26'	1476	2	0.0030	Ply S1	Yes	0.0080	0.3005	0.0206	0.1970	0.5261	2.1043
9.0-U.2	24.50'	9.26'	1480	2	0.0030	Ply S1	Yes	0.0028	0.3012	0.0207	0.0421	0.3669	1.4675
9.0-U.2	24.50'	9.26'	1480	2	0.0030	Ply S1	Yes	0.0028	0.3012	0.0207	0.0421	0.3669	1.4675
7.9-E.4	24.50'	9.26'	1491	2	0.0031	Ply S1	Yes	0.0028	0.3035	0.0213	0.0425	0.3700	1.4799
7.9-E.4	24.50'	9.26'	1491	2	0.0031	Ply S1	Yes	0.0028	0.3035	0.0213	0.0425	0.3700	1.4799
7.3-E.0	8.50'	9.26'	1495	2	0.0031	Ply S1	Yes	0.0081	0.3043	0.0215	0.1998	0.5337	2.1346
8.0-E.4	8.50'	9.26'	1507	2	0.0032	Ply S1	Yes	0.0082	0.3066	0.0220	0.2015	0.5383	2.1531
7.0-U.2	32.50'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0021	0.3077	0.0222	0.0322	0.3643	1.4571
7.0-U.2	32.50'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0021	0.3077	0.0222	0.0322	0.3643	1.4571
6.0-E.5	25.00'	9.26'	1524	2	0.0033	Ply S1	Yes	0.0028	0.3101	0.0228	0.0426	0.3783	1.5132
6.0-E.5	25.00'	9.26'	1524	2	0.0033	Ply S1	Yes	0.0028	0.3101	0.0228	0.0426	0.3783	1.5132
5.6-B.5	4.50'	9.26'	1532	2	0.0033	Ply S1	Yes	0.0157	0.3118	0.0232	0.4397	0.7904	3.1617
5.0-E.5	5.50'	9.26'	1539	2	0.0034	Ply S1	Yes	0.0129	0.3132	0.0236	0.3437	0.6933	2.7732
4.9-D.9	8.00'	9.26'	1546	2	0.0034	Ply S1	Yes	0.0089	0.3147	0.0239	0.2221	0.5696	2.2784
4.8-B.5	6.50'	9.26'	1572	2	0.0036	Ply S1	Yes	0.0111	0.3199	0.0253	0.2878	0.6440	2.5761
4.6-E.3	25.00'	9.26'	1559	2	0.0035	Ply S1	Yes	0.0029	0.3172	0.0246	0.0653	0.4100	1.6401
4.0-PL A.6	20.50'	9.26'	1581	2	0.0037	Ply S1	Yes	0.0044	0.3218	0.0258	0.0911	0.4430	1.7722
4.0-K.5	34.50'	9.26'	1581	2	0.0037	Ply S1	Yes	0.0021	0.3218	0.0258	0.0476	0.3972	1.5889
4.0-E.2	21.50'	9.26'	1581	2	0.0037	Ply S1	Yes	0.0034	0.3218	0.0258	0.0777	0.4287	1.7147
4.0-C.9	23.50'	9.26'	1581	2	0.0037	Ply S1	Yes	0.0031	0.3218	0.0258	0.0708	0.4215	1.6859
1.7-U.2	31.00'	9.26'	1593	2	0.0038	Ply S1	Yes	0.0024	0.3241	0.0264	0.0358	0.3887	1.5546
1.7-U.2	31.00'	9.26'	1593	2	0.0038	Ply S1	Yes	0.0024	0.3241	0.0264	0.0358	0.3887	1.5546
1.0-C.3	9.00'	9.26'	1594	2	0.0038	Ply S1	Yes	0.0082	0.3244	0.0264	0.2009	0.5598	2.2392
1.0-E.9	6.50'	9.26'	1594	2	0.0038	Ply S1	Yes	0.0113	0.3244	0.0264	0.2922	0.6543	2.6171
1.0-N.9	25.00'	9.26'	1594	2	0.0038	Ply S1	Yes	0.0029	0.3244	0.0265	0.0670	0.4208	1.6830
1.0-P.8	19.00'	9.26'	1594	2	0.0038	Ply S1	Yes	0.0039	0.3244	0.0265	0.0893	0.4440	1.7760
1.0-K.0	7.00'	9.26'	1594	2	0.0038	Ply S1	Yes	0.0105	0.3244	0.0265	0.2679	0.6292	2.5168
1.0-L.0	20.00'	9.26'	1594	2	0.0038	Ply S1	Yes	0.0037	0.3244	0.0265	0.0846	0.4391	1.7565
0.5-PL A.6													
0.3-U.4	6.00'	9.26'	1630	2	0.0041	Ply S1	Yes	0.0125	0.3318	0.0285	0.3294	0.7022	2.8090
0.1-U.3	4.50'	9.26'	1641	2	0.0042	Ply S1	Yes	0.0168	0.3339	0.0291	0.4738	0.8535	3.4141
0.1-R.0	4.50'	9.26'	1641	2	0.0042	Ply S1	Yes	0.0168	0.3339	0.0291	0.4738	0.8535	3.4141
0.0-K.0	4.00'	9.26'	1643	2	0.0042	Ply S1	Yes	0.0189	0.3344	0.0292	0.5537	0.9362	3.7448
0.0-K.5	4.00'	9.26'	1643	2	0.0042	Ply S1	Yes	0.0189	0.3344	0.0292	0.5537	0.9362	3.7449
0.0-P.7	4.00'	9.26'	1643	2	0.0042	Ply S1	Yes	0.0189	0.3344	0.0292	0.5537	0.9362	3.7450
0.0-P.4	4.00'	9.26'	1643	2	0.0042	Ply S1	Yes	0.0189	0.3344	0.0292	0.5537	0.9362	3.7450
4.0-P.4													
4.0-P.4													
U.4-29.0	6.00'	9.26'	1744	2	0.0051	Ply S1	Yes	0.0134	0.3549	0.0355	0.3453	0.7491	2.9965
U.4-19.9	7.00'	9.26'	1744	2	0.0051	Ply S1	Yes	0.0115	0.3549	0.0355	0.2877	0.6897	2.7587
U.4-17.4	6.00'	9.26'	1744	2	0.0051	Ply S1	Yes	0.0134	0.3549	0.0355	0.3453	0.7491	2.9965
U.4-11.0	7.50'	9.26'	1744	2	0.0051	Ply S1	Yes	0.0107	0.3549	0.0355	0.2656	0.6667	2.6669
U.4-4.0	5.50'	9.26'	1742	2	0.0051	Ply S1	Yes	0.0146	0.3544	0.0354	0.3831	0.7874	3.1497
U.3-29.0	8.00'	9.26'	1726	2	0.0049	Ply S1	Yes	0.0099	0.3513	0.0343	0.2440	0.6395	2.5581
U.0-4.0	18.00'	9.26'	1690	2	0.0046	Ply S1	Yes	0.0043	0.3439	0.0320	0.0983	0.4786	1.9145
U.0-9.0	26.00'	9.26'	1690	2	0.0046	Ply S1	Yes	0.0030	0.3439	0.0320	0.0668	0.4458	1.7830
U.0-12.0	26.00'	9.26'	1690	2	0.0046	Ply S1	Yes	0.0030	0.3439	0.0320	0.0668	0.4458	1.7830

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234**Legacy Livermore****Katerra****Lateral Analysis - 2nd Floor Framing Level.**

U.0-11.0	12.50'	9.26'	1690	2	0.0046	Ply S1	Yes	0.0062	0.3439	0.0320	0.1453	0.5275	2.1098
U.0-20.1	18.00'	9.26'	1690	2	0.0046	Ply S1	Yes	0.0043	0.3439	0.0320	0.0983	0.4785	1.9142
U.0-18.1	26.00'	9.26'	1690	2	0.0046	Ply S1	Yes	0.0030	0.3439	0.0320	0.0668	0.4458	1.7830
U.0-17.2	24.50'	9.26'	1690	2	0.0046	Ply S1	Yes	0.0032	0.3439	0.0320	0.0711	0.4502	1.8008
U.0-7.2	5.50'	9.26'	1690	2	0.0046	Ply S1	Yes	0.0141	0.3439	0.0320	0.3714	0.7614	3.0457
T.0-29.5	29.50'	9.26'	1685	2	0.0046	Ply S1	Yes	0.0026	0.3430	0.0317	0.0585	0.4358	1.7433
S.2-1.5	13.00'	9.26'	1685	2	0.0046	Ply S1	Yes	0.0060	0.3429	0.0317	0.1389	0.5195	2.0780
S.2-25.2	13.00'	9.26'	1685	2	0.0046	Ply S1	Yes	0.0060	0.3429	0.0317	0.1389	0.5195	2.0780
R.1-4.0	21.50'	9.26'	1679	2	0.0045	Ply S1	Yes	0.0036	0.3416	0.0313	0.0810	0.4575	1.8301
Q.0-28.4	9.50'	9.26'	1676	2	0.0045	Ply S1	Yes	0.0081	0.3411	0.0312	0.1950	0.5754	2.3014
Q.0-25.7	21.00'	9.26'	1676	2	0.0045	Ply S1	Yes	0.0037	0.3411	0.0312	0.0829	0.4588	1.8352
P.8-29.0	12.00'	9.26'	1665	2	0.0044	Ply S1	Yes	0.0064	0.3389	0.0305	0.1496	0.5254	2.1016
P.3-4.0	8.50'	9.26'	1638	2	0.0042	Ply S1	Yes	0.0089	0.3334	0.0289	0.2159	0.5871	2.3485
P.0-4.0	29.50'	9.26'	1621	2	0.0040	Ply S1	Yes	0.0025	0.3299	0.0279	0.0374	0.3977	1.5908
P.0-4.0	29.50'	9.26'	1621	2	0.0040	Ply S1	Yes	0.0025	0.3299	0.0279	0.0374	0.3977	1.5908
N.0-25.5	24.50'	9.26'	1607	2	0.0039	Ply S1	Yes	0.0030	0.3270	0.0272	0.0449	0.4021	1.6083
N.0-25.5	24.50'	9.26'	1607	2	0.0039	Ply S1	Yes	0.0030	0.3270	0.0272	0.0449	0.4021	1.6083
M.0-4.0	33.50'	9.26'	1583	2	0.0037	Ply S1	Yes	0.0022	0.3221	0.0258	0.0320	0.3821	1.5283
M.0-4.0	33.50'	9.26'	1583	2	0.0037	Ply S1	Yes	0.0022	0.3221	0.0258	0.0320	0.3821	1.5283
L.1-25.5	24.00'	9.26'	1577	2	0.0037	Ply S1	Yes	0.0030	0.3209	0.0255	0.0450	0.3945	1.5779
L.1-25.5	24.00'	9.26'	1577	2	0.0037	Ply S1	Yes	0.0030	0.3209	0.0255	0.0450	0.3945	1.5779
K.0-25.5	24.50'	9.26'	1546	2	0.0034	Ply S1	Yes	0.0029	0.3147	0.0239	0.0431	0.3846	1.5386
K.0-25.5	24.50'	9.26'	1546	2	0.0034	Ply S1	Yes	0.0029	0.3147	0.0239	0.0431	0.3846	1.5386
J.8-4.0	8.50'	9.26'	1542	2	0.0034	Ply S1	Yes	0.0084	0.3139	0.0238	0.2029	0.5489	2.1956
H.6-25.7	25.00'	9.26'	1504	2	0.0031	Ply S1	Yes	0.0028	0.3061	0.0219	0.0618	0.3925	1.5699
H.1-29.0	11.00'	9.26'	1507	2	0.0032	Ply S1	Yes	0.0063	0.3068	0.0220	0.1484	0.4835	1.9341
H.0-28.4	9.50'	9.26'	1509	2	0.0032	Ply S1	Yes	0.0073	0.3072	0.0221	0.1748	0.5114	2.0457
H.0-25.7	21.00'	9.26'	1509	2	0.0032	Ply S1	Yes	0.0033	0.3072	0.0221	0.0743	0.4069	1.6276
F.6-8.0	26.00'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0027	0.3078	0.0223	0.0595	0.3923	1.5692
F.6-25.3	21.00'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0033	0.3078	0.0223	0.0744	0.4078	1.6313
F.6-22.1	16.00'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0044	0.3078	0.0223	0.0992	0.4337	1.7347
F.6-20.0	26.00'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0027	0.3078	0.0223	0.0595	0.3923	1.5692
F.6-18.0	16.00'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0044	0.3078	0.0223	0.0992	0.4337	1.7347
F.6-17.3	21.00'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0033	0.3078	0.0223	0.0744	0.4078	1.6313
F.6-11.9	28.50'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0024	0.3078	0.0223	0.0541	0.3867	1.5467
F.6-10.2	16.00'	9.26'	1512	2	0.0032	Ply S1	Yes	0.0044	0.3078	0.0223	0.0992	0.4337	1.7347
F.6-5.9	16.00'	9.26'	1513	2	0.0032	Ply S1	Yes	0.0044	0.3078	0.0223	0.0992	0.4337	1.7347
F.6-4.5	29.00'	9.26'	1513	2	0.0032	Ply S1	Yes	0.0024	0.3078	0.0223	0.0532	0.3857	1.5426
F.5-4.0	33.00'	9.26'	1513	2	0.0032	Ply S1	Yes	0.0021	0.3078	0.0223	0.0465	0.3787	1.5149
E.9-29.0	24.50'	9.26'	1514	2	0.0032	Ply S1	Yes	0.0028	0.3081	0.0223	0.0421	0.3753	1.5014
E.9-29.0	24.50'	9.26'	1514	2	0.0032	Ply S1	Yes	0.0028	0.3081	0.0223	0.0421	0.3753	1.5014
E.7-4.1	7.00'	9.26'	1517	2	0.0032	Ply S1	Yes	0.0100	0.3087	0.0225	0.2487	0.5899	2.3595
E.4-29.0													
D.8-29.0	9.50'	9.26'	1527	2	0.0033	Ply S1	Yes	0.0074	0.3108	0.0230	0.1767	0.5179	2.0717
D.6-4.6	5.50'	9.26'	1529	2	0.0033	Ply S1	Yes	0.0128	0.3112	0.0231	0.3342	0.6812	2.7250
D.2-29.0	30.00'	9.26'	1533	2	0.0034	Ply S1	Yes	0.0024	0.3120	0.0233	0.0345	0.3721	1.4884
D.2-29.0	30.00'	9.26'	1533	2	0.0034	Ply S1	Yes	0.0024	0.3120	0.0233	0.0345	0.3721	1.4884
D.0-17.2	25.00'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0028	0.3125	0.0234	0.0417	0.3805	1.5219
D.0-17.2	25.00'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0028	0.3125	0.0234	0.0417	0.3805	1.5219
D.0-11.9	25.00'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0028	0.3125	0.0234	0.0417	0.3805	1.5219
D.0-11.9	25.00'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0028	0.3125	0.0234	0.0417	0.3805	1.5219
D.0-4.5	25.00'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0028	0.3125	0.0234	0.0417	0.3805	1.5219
D.0-4.5	25.00'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0028	0.3125	0.0234	0.0417	0.3805	1.5219
D.0-25.5	25.50'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0028	0.3125	0.0234	0.0409	0.3796	1.5183
D.0-25.5	25.50'	9.26'	1536	2	0.0034	Ply S1	Yes	0.0028	0.3125	0.0234	0.0409	0.3796	1.5183
C.1-29.0	27.00'	9.26'	1544	2	0.0034	Ply S1	Yes	0.0026	0.3141	0.0238	0.0584	0.3989	1.5958
C.0-4.0	17.50'	9.26'	1545	2	0.0034	Ply S1	Yes	0.0041	0.3145	0.0239	0.0920	0.4344	1.7378
B.2-29.0	27.00'	9.26'	1549	2	0.0035	Ply S1	Yes	0.0026	0.3152	0.0241	0.0585	0.4005	1.6019
B.2-17.6	8.50'	9.26'	1549	2	0.0035	Ply S1	Yes	0.0084	0.3152	0.0241	0.2029	0.5506	2.2026
B.2-11.4	8.50'	9.26'	1549	2	0.0035	Ply S1	Yes	0.0084	0.3152	0.0241	0.2029	0.5506	2.2026
B.2-4.9	8.50'	9.26'	1549	2	0.0035	Ply S1	Yes	0.0084	0.3152	0.0241	0.2029	0.5507	2.2026
B.2-25.0	8.50'	9.26'	1549	2	0.0035	Ply S1	Yes	0.0084	0.3152	0.0241	0.2030	0.5507	2.2026

BY ACM DATE 02/06/19**PEOPLES ASSOCIATES**

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

STRUCTURAL ENGINEERS

JOB NO. 18-234Legacy LivermoreKaterraLateral Analysis - 2nd Floor Framing Level.

B.0-4.0	17.50'	9.26'	1550	2	0.0035	Ply S1	Yes	0.0041	0.3154	0.0241	0.0923	0.4359	1.7436
A.0-11.8	28.00'	9.26'	1555	2	0.0035	Ply S1	Yes	0.0026	0.3164	0.0244	0.0375	0.3809	1.5234
A.0-11.8	28.00'	9.26'	1555	2	0.0035	Ply S1	Yes	0.0026	0.3164	0.0244	0.0375	0.3809	1.5234
A.0-17.3	28.00'	9.26'	1555	2	0.0035	Ply S1	Yes	0.0026	0.3164	0.0244	0.0375	0.3809	1.5235
A.0-17.3	28.00'	9.26'	1555	2	0.0035	Ply S1	Yes	0.0026	0.3164	0.0244	0.0375	0.3809	1.5235
A.0-4.7	37.00'	9.26'	1555	2	0.0035	Ply S1	Yes	0.0019	0.3165	0.0244	0.0424	0.3852	1.5409
A.0-25.2	32.00'	9.26'	1555	2	0.0035	Ply S1	Yes	0.0022	0.3165	0.0244	0.0493	0.3924	1.5695
PL A.8-5.6	7.00'	9.26'	1561	2	0.0036	Ply S1	Yes	0.0128	0.3176	0.0247	0.2854	0.6405	2.5619
PL A.7-29.0	9.00'	9.26'	1563	2	0.0036	Ply S1	Yes	0.0080	0.3180	0.0248	0.1919	0.5427	2.1708
PL A.5-17.9	7.00'	9.26'	1565	2	0.0036	Ply S1	Yes	0.0103	0.3186	0.0249	0.2562	0.6100	2.4402
PL A.5-10.5	7.00'	9.26'	1565	2	0.0036	Ply S1	Yes	0.0103	0.3186	0.0249	0.2562	0.6100	2.4402
PL A.5-5.6	7.00'	9.26'	1565	2	0.0036	Ply S1	Yes	0.0128	0.3186	0.0249	0.2862	0.6426	2.5703
PL A.5-22.5	7.00'	9.26'	1565	2	0.0036	Ply S1	Yes	0.0103	0.3186	0.0249	0.2562	0.6101	2.4402
PL A.2-4.0													
PL A.2-5.0													
PL A.2-11.7	11.00'	9.26'	1573	2	0.0036	Ply S1	Yes	0.0066	0.3201	0.0253	0.1544	0.5064	2.0256
PL A.2-10.7	11.00'	9.26'	1573	2	0.0036	Ply S1	Yes	0.0066	0.3201	0.0253	0.1544	0.5064	2.0256

NS Average Drift: 1.9602 D/C= 0.80
EW Average Drift: 1.8971 D/C= 0.77
Allowable Drift: 2.46

BY ACM

DATE 02/05/19

SHEET

OF

CHKD BY

DATE

PEOPLES ASSOCIATES
STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

TIEDOWN CONCRETE ANCHORAGE

PER ACI 318-11

D.3.3.4.4

$$a) \phi N_{SA} = \phi A_{se,N} f_{uta} \quad (D.5.1)$$

$$A_{se} = 0.763 \text{ SQ. IN. (FROM AISC TABLE 7-18)}$$

$$f_{uta} = 120 \text{ ksi (PER Simpson)}$$

$$\phi N_{SA} = 0.75 (0.763) (120 \text{ ksi}) = 68.67 \text{ KIP}$$

b) NO CONC. BREAKOUT

-SEE ANCHORAGE REINF. CALC. (NEXT PAGE)

c) PULLOUT (D.5.3)

$$0.75 \phi N_{PN} = 0.75 \phi \psi_{cp} N_p$$

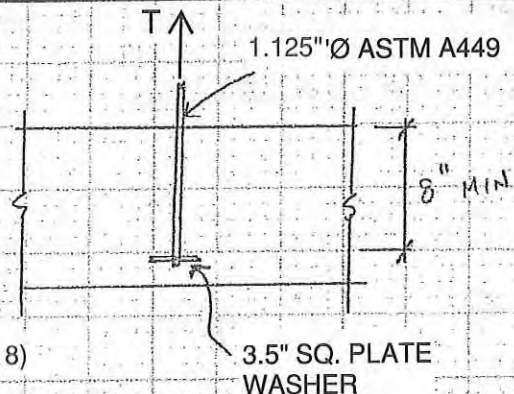
$$\psi_{cp} = 1.0 \text{ (CRACKED)}$$

$$N_p = 8 A_{brg} f'_c$$

$$A_{brg} = (3.5)^2 - \pi (1.56/2)^2 = 10.33 \text{ in}^2$$

$$0.75 \phi N_{PN} = 0.75 (0.7) (8) (10.33) (4000) = 173.5 \text{ K}$$

$$68.67 \text{ KIP} (1.2) = 82.40 \text{ K} < 173.5 \text{ K}$$

 $\therefore$ STEEL GOVERNS. OK

BY ACM

DATE 02/05/19

SHEET

OF

CHKD BY

DATE

PEOPLES ASSOCIATES

STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

TIEDOWN ANCHORAGE REINFORCEMENT→ INTERIOR CONDITION

$$T = 82.40 \text{ KIP} \\ (\text{LRFD})$$

$$\phi V_c = 2 \phi d b_o \sqrt{f'_c}$$

$$\phi = 0.75$$

$$d = 12" - 3" - \frac{3/8}{2} = 8.812"$$

$$f'_c = 4000 \text{ psi}$$

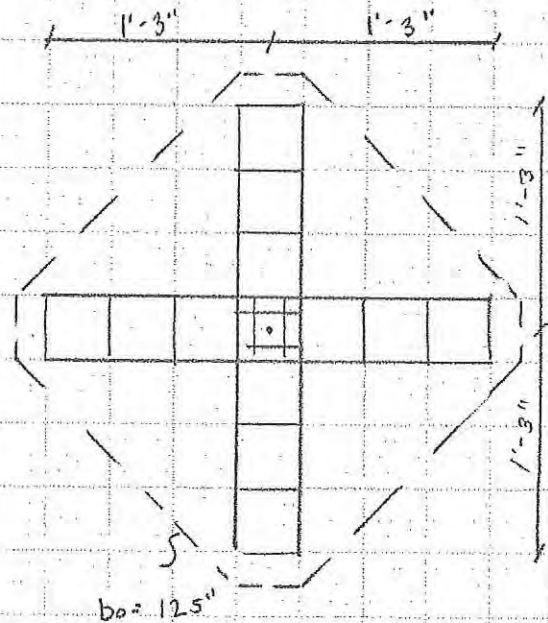
$$86.8 \text{ K} = 2(0.75)(8.812) b_o \sqrt{4000}$$

$$b_o, \text{ req'd} = 98.57"$$

$$b_o, \text{ provided} = 125"$$

USE STIRRUP ASSEMBLY AS SHOWN

$$d/c = 0.79$$



BY ACM

DATE 02/05/19

SHEET

OF

CHKD BY

DATE

PEOPLES ASSOCIATES
STRUCTURAL ENGINEERS

JOB NO. 18-234

Legacy Livermore

TIEDOWN CONCRETE ANCHORAGE (SLAB-ON-GRADE)

⇒ EDGE CONDITION

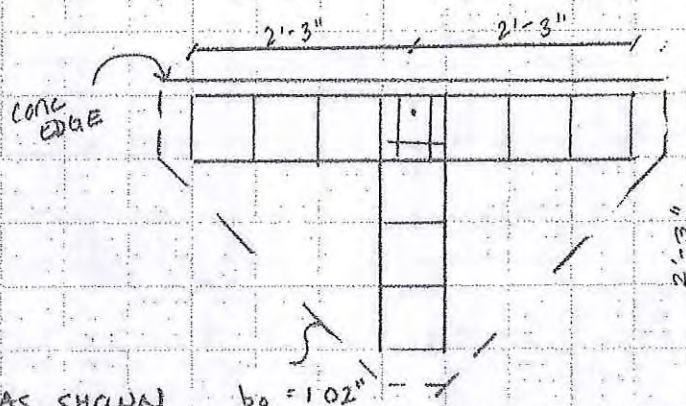
$$T = 82.40 \text{ KIP}$$

$$b_o, \text{REQ'D} = 98.57''$$

$$b_o, \text{PROVIDED} = 102''$$

∴ USE STIRRUP ASSEMBLY AS SHOWN

$$d/c = 0.97$$



⇒ CORNER CONDITION

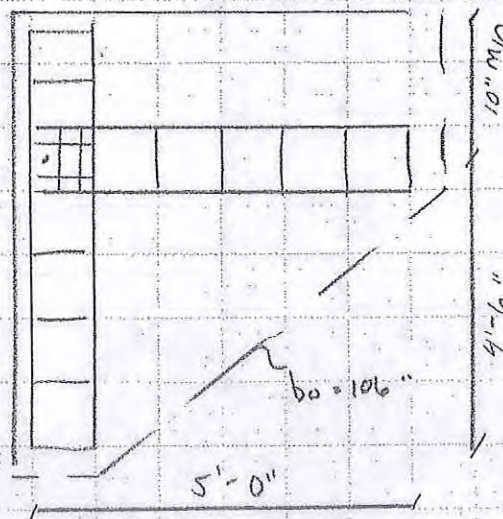
$$T = 82.40 \text{ KIP}$$

$$b_o, \text{REQ'D} = 98.57''$$

$$b_o, \text{PROVIDED} = 106''$$

∴ USE STIRRUP ASSEMBLY AS SHOWN

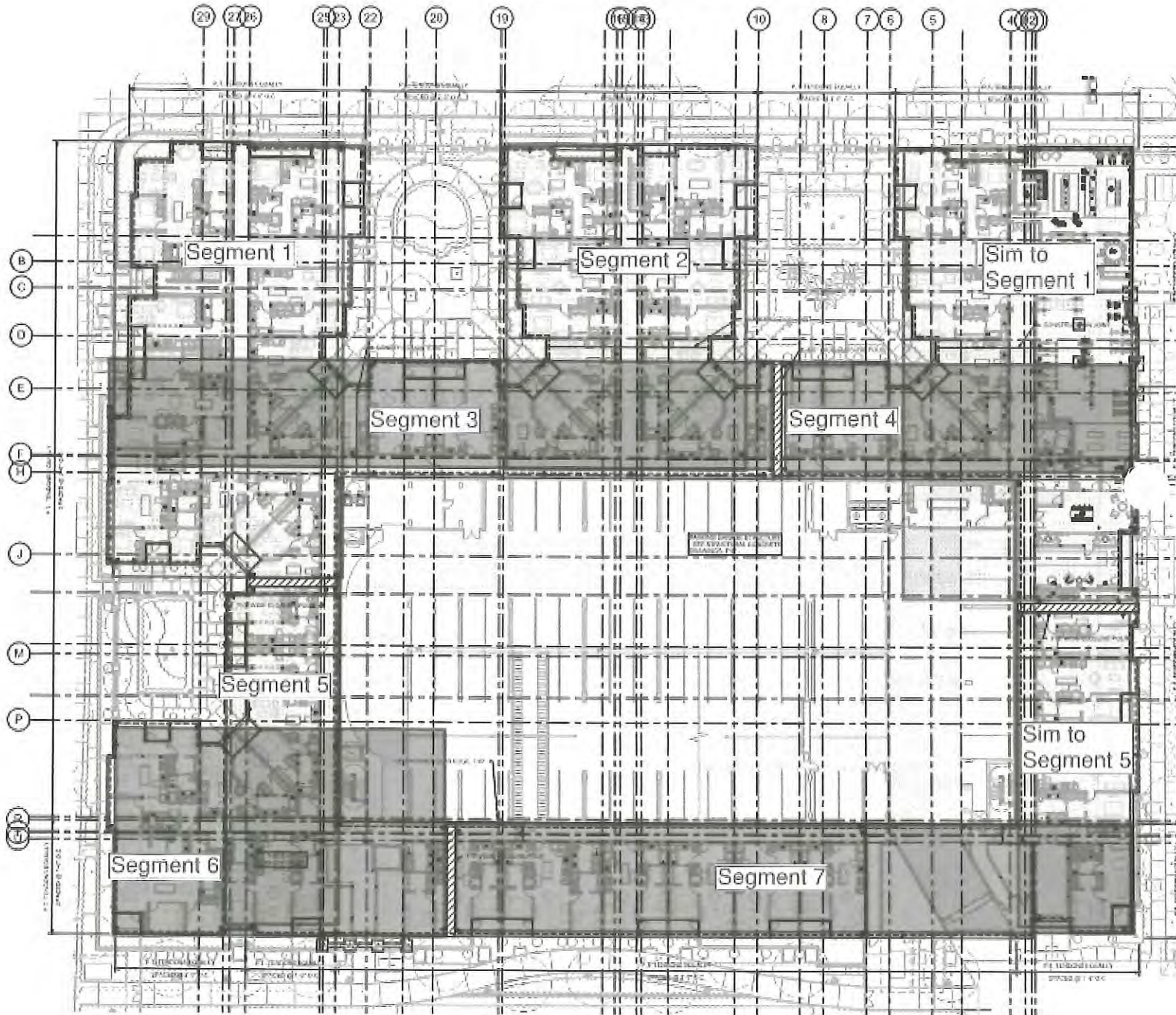
$$d/c = 0.93$$



PEOPLES ASSOCIATES

STRUCTURAL ENGINEERS

PT SOG SEGMENT KEY PLAN



BY EJK DATE 12/11/18
CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
JOB NO. 18-234

LEGACY & LIVERMORE

P.T. SOG ANALYSIS

A) PARALLEL $\Rightarrow$
TO EXT WALL

$$\begin{aligned} \text{DL} &= (32 \text{ psf}) \left(\frac{36}{2} \right) + (30 \text{ psf}) (1') (3 \text{ FLS}) + (19 \text{ psf}) (16') (4) = 1436 \text{ psf} \\ \text{LL} &= (20 \text{ psf}) \left(\frac{36}{2} \right) + (40 \text{ psf}) (1') (3 \text{ FLS}) = 480 \text{ psf} \end{aligned}$$

- ROOF - - FLR - - WALL -

B) PERP TO $\Rightarrow$
EXT WALL

$$\begin{aligned} \text{DL} &= (32 \text{ psf}) \left(\frac{11}{2} \right) + (30 \text{ psf}) \left(\frac{11}{2} \right) (3 \text{ FLS}) + (19 \text{ psf}) (16') (4) = 1420 \text{ psf} \\ \text{LL} &= (20 \text{ psf}) \left(\frac{11}{2} \right) + (40 \text{ psf}) \left(\frac{11}{2} \right) (3 \text{ FLS}) = 770 \text{ psf} \end{aligned}$$

- ROOF - - FLR - - WALL -

C) INT WALL $\Rightarrow$

$$\begin{aligned} \text{DL} &= (32 \text{ psf}) \left(\frac{27}{2} \right) + (30 \text{ psf}) \left(\frac{27}{2} \right) (3 \text{ FLS}) + (16 \text{ psf}) (9') (4) = 1220 \text{ psf} \\ \text{LL} &= (20 \text{ psf}) \left(\frac{27}{2} \right) + (30 \text{ psf}) \left(\frac{27}{2} \right) (3 \text{ FLS}) = 1470 \text{ psf} \end{aligned}$$

- ROOF - - FLR - - WALL -

PSF LOADS $\Rightarrow$

PER PTI

DEFAULT LOADS

$$\begin{aligned} w_{DL} &= 65 \text{ psf} \quad (4" \text{ THICK SLAB} + 15 \text{ psf}) \\ w_{LL} &= 40 \text{ psf} \end{aligned}$$

$$12" \text{ SLAB} \Rightarrow w_p = (150 \text{ pcf}) \left(\frac{12" - 4"}{12} \right) = 100 \text{ psf}$$

- SEE FOLLOWING SHEETS FOR ANALYSIS

USE 12" THICK PT SLAB

W/ P.T. TENDONS @ 2'-0" O.C. (TRANS)

9 P.T. TENDONS @ 1'-6" O.C. (LONG)

BY DEK DATE _____
CHKD. BY _____ DATE _____

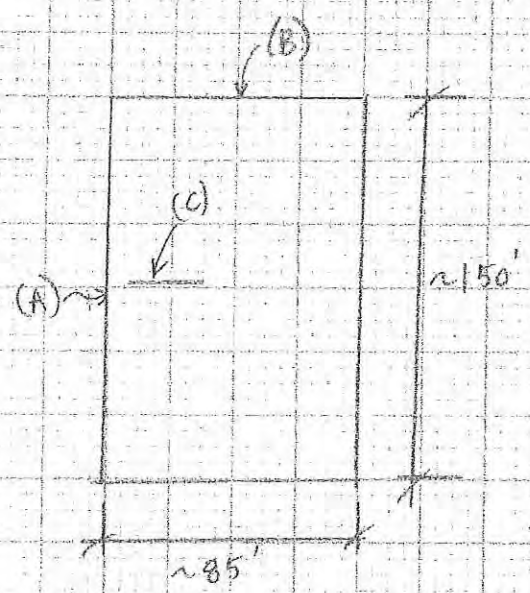
PEOPLES ASSOCIATES
STRUCTURAL ENGINEERS

SHEET NO. _____ OF _____
JOB NO. _____

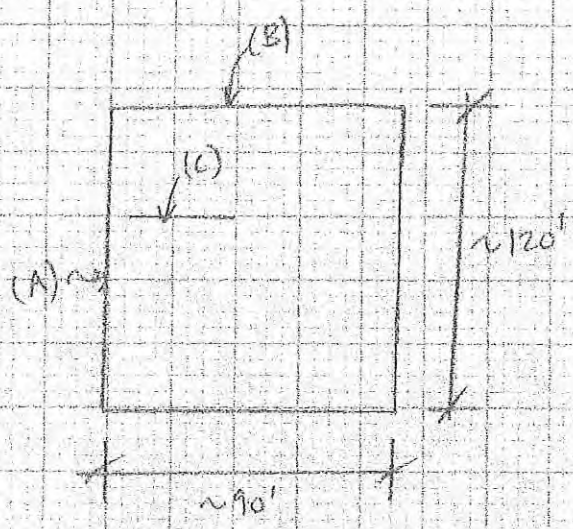
LEGACY @ LIVERMORE

PT SOG ANALYSIS

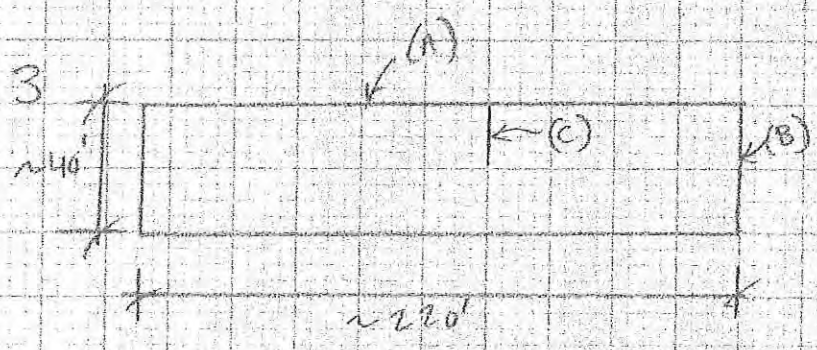
SEGMENT 1



SEGMENT 2



SEGMENT 3



BY DEK DATE _____
 CHKD. BY _____ DATE _____

PEOPLES ASSOCIATES
 STRUCTURAL ENGINEERS

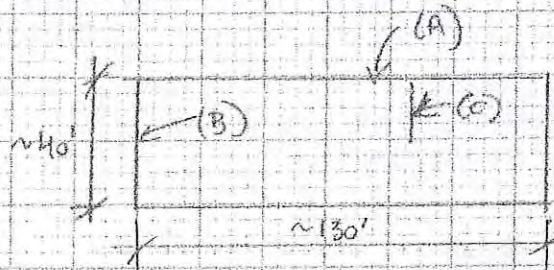
SHEET NO. _____ OF _____

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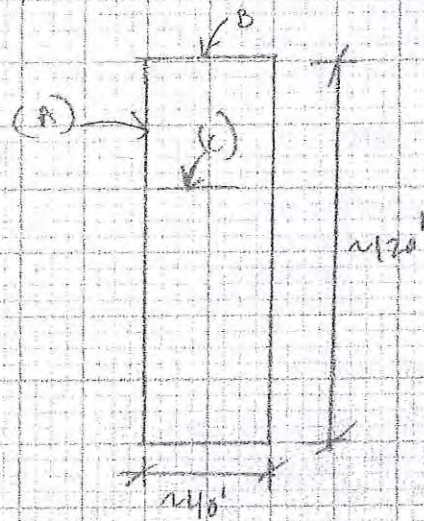
LEGACY @ LIVERMORE

PT SOG ANALYSIS

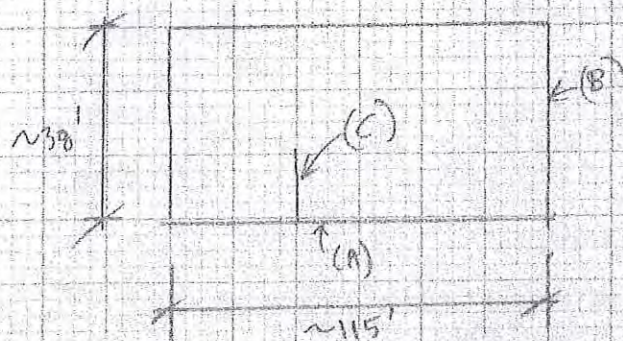
SEGMENT 4



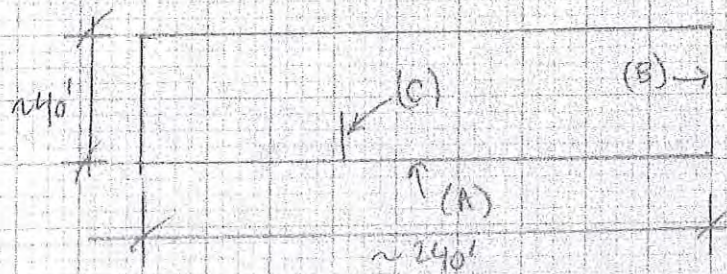
SEGMENT 5



SEGMENT 6



SEGMENT 7



PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 1
 Project Engineer : DEK

Project Number : 18-234
 Project Date : February 6, 2019
 Report Date : Jan. 31, 2019
 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 85.00 FT x 150.00 FT x 7.50 Inches

Material Properties

Concrete Strength, f'_c :	4,000 PSI
Tendon Strength, F_{pu} :	270 KSI
Tendon Diameter :	1 / 2 Inch

Material Quantities

Concrete Volume :	424.8 Cubic Yards
Prestressing Tendon :	11,191 Linear Feet
Number of End Anchorages :	196

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	5	10
Depth of Beams :	14.5 Inches	14.5 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	2	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.07 Feet O.C.
Number of Slab Tendons :		31
Slab Tendon Spacing :		2.70 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	20	20
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	2	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.00 Feet O.C.
Number of Slab Tendons :		22
Slab Tendon Spacing :		6.95 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

PTISlab 3.5

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RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Section 6.2.4 of PTI DC10.5-12 Standard states:

Applied soil bearing pressure shall be evaluated using generally accepted techniques and shall not exceed allowable as specified by the Licensed Design Professional with geotechnical experience.

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	22	31
Number of Beam Tendons	35	10
Spacing of Slab Tendons (Feet)	6.95	2.70
Center of Gravity of Concrete (from top of slab) (Inch)	5.53	4.92
Center of Gravity of Tendons (from top of slab) (Inch)	6.82	4.85
Eccentricity of Prestressing (Inch)	-1.29	0.07
Minimum Effective Prestress Force (K)	893.8	467.9
Beta Distance Effective Prestress Force (K)	1,345.1	1,013.6
Minimum Effective Prestress (PSI)	50	51
Beta Distance Effective Prestress (PSI)	76	111

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 6.49 FT-K/FT
Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 6.18 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.206	-0.176	Actual Stress	0.559	0.671

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	263,159	106,675
Required Moment of Inertia (Inch ⁴)	197,706	85,137
Required Moment of Inertia controlled by	6*Beta	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction. 1.95 K/FT
Maximum Shear, Long Direction 1.07 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	167	174
Actual Shear Stress (PSI)	35	30

PTISlab 3.5

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	541.6	699.6
0.5 Moment (FT-K)	487.0	262.8

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	3.92 FT-K/FT
Maximum Moment, Long Direction	3.64 FT-K/FT

Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)		
	Short Direction	Long Direction	Short Direction	Long Direction	
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.115	-0.229	Actual Stress	0.188	0.285

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	263,159	106,675
Required Moment of Inertia (Inch ⁴)	238,429	100,127
Required Moment of Inertia controlled by	6*Beta	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.27	K/FT
Maximum Shear, Long Direction	2.33	K/FT
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	167	174
Actual Shear Stress (PSI)	41	65

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	673.5	182.2
0.5 Moment (FT-K)	293.7	154.6

PTISlab 3.5

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	17,700	9,120
Moment of Inertia (Inch ⁴) :	263,159	106,675
Section Modulus, Top (Inch ³) :	47,591	21,688
Section Modulus, Bottom (Inch ³) :	27,788	11,133
Center of Gravity of Concrete - from top (Inch) :	5.53	4.92
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.82	4.85
Eccentricity of Prestress (Inch) :	-1.29	0.07
Beta Distance (Feet) :	11.75	9.37
Jacking Force :	33.05 KIPS	

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UNIFORM THICKNESS FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 85.00 FT x 150.00 FT x 12.00 Inches
Uniform Thickness Slab : 12.00 (12.06) Inches
(rounded to the nearest 0.25 inch)

Material Properties

Concrete Strength, f'_c : 4,000 PSI
Tendon Strength, F_{pu} : 270 KSI
Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 472.2 Cubic Yards
Prestressing Tendon : 13,516.0 Linear Feet
Number of End Anchorages : 236

In the LONG direction ...

Number of Slab Tendons : 50
Slab Tendon Spacing : 1.69 Feet O.C.
Slab Tendon Centroid : 6.00 Inches from top of slab

In the SHORT direction ...

Number of Slab Tendons : 68
Slab Tendon Spacing : 2.21 Feet O.C.
Slab Tendon Centroid : 6.00 Inches from top of slab

Selected Variables

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	21,600	12,240
Moment of Inertia (Inch ⁴) :	259,200	146,880
Section Modulus, Top and Bottom (Inch ³) :	43,200	24,480
Beta Distance (Feet) :	11.70	10.15

Jacking Force : 33.05 KIPS

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Project Title : Legacy at Livermore PT Slab Segment 1
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

RIBBED FOUNDATION COMPLIANCE :

RIBBED FOUNDATION IN COMPLIANCE.

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 1
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS

Uniform Thickness Slab
(rounded to nearest 0.25 inch)

12.00 (12.06) Inches

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Tendons	68	50
Spacing of Tendons (FT)	2.21	1.69
Center of Gravity of Concrete (from top of slab) (Inch)	6.00	6.00
Center of Gravity of Tendons (from top of slab) (Inch)	6.00	6.00
Eccentricity of Prestressing (Inch)	0.00	0.00
Minimum Effective Prestress Force (K)	1,117.0	637.8
Beta Distance Effective Prestress Force (K)	1,619.4	1,237.3
Minimum Effective Prestress (PSI)	52	52
Beta Distance Effective Prestress (PSI)	75	101

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.49 FT-K/FT
Maximum Moment, Long Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.18 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.196	-0.157	Actual Stress	0.346	0.359

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	259,200	146,880
Required Moment of Inertia (Inch ⁴)	196,958	92,224
Required Moment of Inertia controlled by	6*Beta	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction 1.95 K/FT
Maximum Shear, Long Direction 1.07 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	167	172
Actual Shear Stress (PSI)	14	7

Registered To : Peoples Associates Structural Engineers, Inc

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	882.8	644.3
0.5 Moment (FT-K)	487.0	262.8

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	3.92 FT-K/FT
Maximum Moment, Long Direction	3.64 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short	Long		Short	Long
	Direction	Direction		Direction	Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.088	-0.050	Actual Stress	0.238	0.253

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

Based on a Stiffness Coefficient of 720	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	259,200	146,880
Required Moment of Inertia (Inch ⁴)	237,528	108,462
Required Moment of Inertia controlled by	6*Beta	6*Beta

Shear Stress Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.27	K/FT
Maximum Shear, Long Direction	2.33	K/FT
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	167	172
Actual Shear Stress (PSI)	16	16

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	882.8	644.3
0.5 Moment (FT-K)	293.7	154.6

PTISlab 3.5

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Project Title : Legacy at Livermore PT Slab Segment 1
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Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA

Material Properties

Material Label :	Slab
Concrete Strength, f'_c :	4,000.0 PSI
Concrete Creep Modulus, E_c :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Label :	Rectangle				
Rectangle Geometry :	85.00 FT x 150.00 FT x 7.50 Inches				
	<table border="0"> <tr> <td><u>Short Direction</u></td> <td><u>Long Direction</u></td> </tr> <tr> <td>50.00 PSI</td> <td>50.00 PSI</td> </tr> </table>	<u>Short Direction</u>	<u>Long Direction</u>	50.00 PSI	50.00 PSI
<u>Short Direction</u>	<u>Long Direction</u>				
50.00 PSI	50.00 PSI				
Minimum Permissible Prestress :					

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	20	20	5	10	
Depth :	15.0	15.0	14.5	14.5	Inches
Width :	14.0	14.0	14.0	14.0	Inches
Tendons :	2	0	2	0	
Cover :	6.00	6.00	6.00	6.00	Inches

Average beam spacing used in analysis

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Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA - Continued

Soil Properties

Soil Label :	Soil	
Allowable Bearing Pressure :	1,000.0 PSF	
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	5.10 Feet
Differential Soil Movement, y_m :	0.470 Inches	1.100 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	100.00 PSF
Total Perimeter Load :	2,190.00 PLF
Smallest Load Intensity :	1,910.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

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Geotechnical Report : GEOCON Consultants

PTI EXCEPTION SUMMARY

The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.

NO PTI EXCEPTIONS EXIST

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LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	3,720.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	32 PCI
Slab Thickness (Ribbed Slab) :	7.50 Inch
Slab Thickness (Uniform Thickness Foundation) :	12.00 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment (7.50 Inch Thick Slab) :	3.93 Ft-K/Ft
Applied Moment (Uniform Thickness Foundation) :	8.38 Ft-K/Ft

Bending Stresses (KSI)

	Tension in Extreme Fiber	Compression in Extreme Fiber
Allowable Stress :	-0.379	1.800
Applied Stress (7.50 Inch Thick Slab) :	-0.368	0.470
Applied Stress (Uniform Thickness Foundation) :	-0.297	0.401
Prestress at Line Load (7.50 In. Thick Slab) :		51.3 PSI
Prestress at Line Load (Uniform Thickness Foundation) :		52.1 PSI

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 2
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 90.00 FT x 120.00 FT x 7.50 Inches

Material Properties

Concrete Strength, f'_c :	4,000 PSI
Tendon Strength, F_{pu} :	270 KSI
Tendon Diameter :	1 / 2 Inch

Material Quantities

Concrete Volume :	354.1 Cubic Yards
Prestressing Tendon :	8,868 Linear Feet
Number of End Anchorages :	168

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	5	10
Depth of Beams :	14.5 Inches	14.5 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	2	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.43 Feet O.C.
Number of Slab Tendons :		28
Slab Tendon Spacing :		3.19 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	20	10
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	1	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.00 Feet O.C.
Number of Slab Tendons :		26
Slab Tendon Spacing :		4.64 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

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RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Section 6.2.4 of PTI DC10.5-12 Standard states:

Applied soil bearing pressure shall be evaluated using generally accepted techniques and shall not exceed qallow as specified by the Licensed Design Professional with geotechnical experience.

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	26	28
Number of Beam Tendons	20	10
Spacing of Slab Tendons (Feet)	4.64	3.19
Center of Gravity of Concrete (from top of slab) (Inch)	5.44	4.86
Center of Gravity of Tendons (from top of slab) (Inch)	5.92	4.93
Eccentricity of Prestressing (Inch)	-0.48	-0.07
Minimum Effective Prestress Force (K)	704.7	491.8
Beta Distance Effective Prestress Force (K)	1,097.5	929.9
Minimum Effective Prestress (PSI)	51	51
Beta Distance Effective Prestress (PSI)	79	97

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2)

6.59 FT-K/FT

Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2)

6.28 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.190	-0.207	Actual Stress	0.551	0.700

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	202,568	109,370
Required Moment of Inertia (Inch ⁴)	150,326	92,042
Required Moment of Inertia controlled by	6*Beta	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction.

1.97 K/FT

Maximum Shear, Long Direction

1.10 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	168	171
Actual Shear Stress (PSI)	38	32

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	634.9	635.3
0.5 Moment (FT-K)	395.3	282.4

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	3.94 FT-K/FT
Maximum Moment, Long Direction	3.66 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.164	-0.246	Actual Stress	0.217	0.27

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	202,568	109,370
Required Moment of Inertia (Inch ⁴)	179,949	107,447
Required Moment of Inertia controlled by	6*Beta	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.28 K/FT	
Maximum Shear, Long Direction	2.29 K/FT	
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	168	171
Actual Shear Stress (PSI)	43	68

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	385.8	182.2
0.5 Moment (FT-K)	236.6	164.8

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 2
 Project Engineer : DEK

Project Number : 18-234
 Project Date : February 6, 2019
 Report Date : Jan. 31, 2019
 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	13,950	9,570
Moment of Inertia (Inch ⁴) :	202,568	109,370
Section Modulus, Top (Inch ³) :	37,213	22,487
Section Modulus, Bottom (Inch ³) :	21,197	11,350
Center of Gravity of Concrete - from top (Inch) :	5.44	4.86
Center of Gravity of Prestressing Tendons - from top (Inch) :	5.92	4.93
Eccentricity of Prestress (Inch) :	-0.48	-0.07
Beta Distance (Feet) :	11.00	9.43
Jacking Force :	33.05 KIPS	

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 90.00 FT x 120.00 FT x 12.00 Inches
 Uniform Thickness Slab : 12.00 (11.91) Inches
 (rounded to the nearest 0.25 inch)

Material Properties

Concrete Strength, f'_c : 4,000 PSI
 Tendon Strength, F_{pu} : 270 KSI
 Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 400.0 Cubic Yards
 Prestressing Tendon : 10,916.0 Linear Feet
 Number of End Anchorages : 206

In the LONG direction ...

Number of Slab Tendons : 48
 Slab Tendon Spacing : 1.87 Feet O.C.
 Slab Tendon Centroid : 6.00 Inches from top of slab

In the SHORT direction ...

Number of Slab Tendons : 55
 Slab Tendon Spacing : 2.19 Feet O.C.
 Slab Tendon Centroid : 6.00 Inches from top of slab

Selected Variables

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	17,280	12,960
Moment of Inertia (Inch ⁴) :	207,360	155,520
Section Modulus, Top and Bottom (Inch ³) :	34,560	25,920
Beta Distance (Feet) :	11.07	10.30
Jacking Force :	33.05 KIPS	

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

RIBBED FOUNDATION COMPLIANCE :

RIBBED FOUNDATION IN COMPLIANCE.

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Serial Number : 100-350-144

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS

Uniform Thickness Slab **12.00 (11.91) Inches**
 (rounded to nearest 0.25 inch)

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Tendons	55	48
Spacing of Tendons (FT)	2.19	1.87
Center of Gravity of Concrete (from top of slab) (Inch)	6.00	6.00
Center of Gravity of Tendons (from top of slab) (Inch)	6.00	6.00
Eccentricity of Prestressing (Inch)	0.00	0.00
Minimum Effective Prestress Force (K)	877.0	690.6
Beta Distance Effective Prestress Force (K)	1,319.8	1,177.1
Minimum Effective Prestress (PSI)	51	53
Beta Distance Effective Prestress (PSI)	76	91

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.59 FT-K/FT
 Maximum Moment, Long Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.28 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.198	-0.171	Actual Stress	0.351	0.352

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	207,360	155,520
Required Moment of Inertia (Inch ⁴)	151,207	100,510
Required Moment of Inertia controlled by	6*Beta	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction 1.97 K/FT
 Maximum Shear, Long Direction 1.10 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	167	170
Actual Shear Stress (PSI)	14	8

PTISlab 3.5

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	713.9	620.4
0.5 Moment (FT-K)	395.3	282.4

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	3.94 FT-K/FT
Maximum Moment, Long Direction	3.66 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.088	-0.062	Actual Stress	0.241	0.243

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	207,360	155,520
Required Moment of Inertia (Inch ⁴)	181,004	117,332
Required Moment of Inertia controlled by	6*Beta	6*Beta

Shear Stress Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.28	K/FT
Maximum Shear, Long Direction	2.29	K/FT
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	167	170
Actual Shear Stress (PSI)	16	16

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	713.9	620.4
0.5 Moment (FT-K)	236.6	164.8

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Geostructural Tool Kit, Inc.

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SUMMARY OF INPUT DATA

Material Properties

Material Label :	Slab
Concrete Strength, f'_c :	4,000.0 PSI
Concrete Creep Modulus, E_c :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
 Tendon Strength, F_{pu} :	 270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Label :	Rectangle	
Rectangle Geometry :	90.00 FT x 120.00 FT x 7.50 Inches	
	<u>Short Direction</u>	<u>Long Direction</u>
Minimum Permissible Prestress :	50.00 PSI	50.00 PSI

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	20	10	5	10	
Depth :	15.0	15.0	14.5	14.5	Inches
Width :	14.0	14.0	14.0	14.0	Inches
Tendons :	1	0	2	0	
Cover :	6.00	6.00	6.00	6.00	Inches

Average beam spacing used in analysis

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Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA - Continued

Soil Properties

Soil Label :	Soil	
Allowable Bearing Pressure :	1,000.0 PSF	
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	5.10 Feet
Differential Soil Movement, y_m :	0.470 Inches	1.100 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	100.00 PSF
Total Perimeter Load :	2,190.00 PLF
Smallest Load Intensity :	1,910.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

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Geotechnical Report : GEOCON Consultants

Project Number : 18-234
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PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

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Geostructural Tool Kit, Inc.

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Geotechnical Report : GEOCON Consultants

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	3,720.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	32 PCI
Slab Thickness (Ribbed Slab) :	7.50 Inch
Slab Thickness (Uniform Thickness Foundation) :	12.00 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment (7.50 Inch Thick Slab) :	3.93 Ft-K/Ft
Applied Moment (Uniform Thickness Foundation) :	8.38 Ft-K/Ft

Bending Stresses (KSI)

	Tension in Extreme Fiber	Compression in Extreme Fiber
Allowable Stress :	-0.379	1.800
Applied Stress (7.50 Inch Thick Slab) :	-0.367	0.470
Applied Stress (Uniform Thickness Foundation) :	-0.296	0.402
Prestress at Line Load (7.50 In. Thick Slab) :		51.4 PSI
Prestress at Line Load (Uniform Thickness Foundation) :		53.3 PSI

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

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Geostructural Tool Kit, Inc.

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Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 3
 Project Engineer : DEK

Project Number : 18-234
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 Report Date : Jan. 31, 2019
 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 40.00 FT x 220.00 FT x 7.50 Inches

Material Properties

Concrete Strength, f'_c :	4,000 PSI
Tendon Strength, F_{pu} :	270 KSI
Tendon Diameter :	1 / 2 Inch

Material Quantities

Concrete Volume :	284.4 Cubic Yards
Prestressing Tendon :	8,112 Linear Feet
Number of End Anchorages :	172

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	8	0
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	1	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.00 Feet O.C.
Number of Slab Tendons :		17
Slab Tendon Spacing :		2.25 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	20	20
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	2	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.00 Feet O.C.
Number of Slab Tendons :		31
Slab Tendon Spacing :		7.20 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

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RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Section 6.2.4 of PTI DC10.5-12 Standard states:

Applied soil bearing pressure shall be evaluated using generally accepted techniques and shall not exceed qallow as specified by the Licensed Design Professional with geotechnical experience.

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	31	17
Number of Beam Tendons	30	8
Spacing of Slab Tendons (Feet)	7.20	2.25
Center of Gravity of Concrete (from top of slab) (Inch)	5.06	5.17
Center of Gravity of Tendons (from top of slab) (Inch)	6.21	5.35
Eccentricity of Prestressing (Inch)	-1.15	-0.18
Minimum Effective Prestress Force (K)	1,206.5	248.1
Beta Distance Effective Prestress Force (K)	1,369.0	634.9
Minimum Effective Prestress (PSI)	50	56
Beta Distance Effective Prestress (PSI)	57	143

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 6.66 FT-K/FT
Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 6.34 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.258	-0.133	Actual Stress	0.676	0.668

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	307,406	59,123
Required Moment of Inertia (Inch ⁴)	168,688	35,433
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction. 1.69 K/FT
Maximum Shear, Long Direction 1.12 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	180
Actual Shear Stress (PSI)	44	27

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RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	758.8	401.9
0.5 Moment (FT-K)	732.2	126.8

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.01 FT-K/FT
Maximum Moment, Long Direction	3.72 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.234	-0.135	Actual Stress	0.205	0.289

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	307,406	59,123
Required Moment of Inertia (Inch ⁴)	203,045	41,592
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.15 K/FT	
Maximum Shear, Long Direction	2.43 K/FT	
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	180
Actual Shear Stress (PSI)	56	58

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	579.4	154.1
0.5 Moment (FT-K)	440.6	74.4

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	24,000	4,440
Moment of Inertia (Inch ⁴) :	307,406	59,123
Section Modulus, Top (Inch ³) :	60,722	11,438
Section Modulus, Bottom (Inch ³) :	30,934	6,014
Center of Gravity of Concrete - from top (Inch) :	5.06	5.17
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.21	5.35
Eccentricity of Prestress (Inch) :	-1.15	-0.18
Beta Distance (Feet) :	12.21	8.09
Jacking Force :	33.05 KIPS	

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Project Number : 18-234
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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 40.00 FT x 220.00 FT x 11.50 Inches
Uniform Thickness Slab : 11.50 (11.39) Inches
(rounded to the nearest 0.25 inch)

Material Properties

Concrete Strength, f'_c : 4,000 PSI
Tendon Strength, F_{pu} : 270 KSI
Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 312.3 Cubic Yards
Prestressing Tendon : 9,588.0 Linear Feet
Number of End Anchorages : 208

In the LONG direction ...

Number of Slab Tendons : 29
Slab Tendon Spacing : 1.36 Feet O.C.
Slab Tendon Centroid : 5.75 Inches from top of slab

In the SHORT direction ...

Number of Slab Tendons : 75
Slab Tendon Spacing : 2.95 Feet O.C.
Slab Tendon Centroid : 5.75 Inches from top of slab

Selected Variables

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	30,360	5,520
Moment of Inertia (Inch ⁴) :	334,593	60,835
Section Modulus, Top and Bottom (Inch ³) :	58,190	10,580
Beta Distance (Feet) :	12.47	8.14
Jacking Force :	33.05 KIPS	

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

RIBBED FOUNDATION COMPLIANCE :

RIBBED FOUNDATION IN COMPLIANCE.

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS

Uniform Thickness Slab
(rounded to nearest 0.25 inch)

11.50 (11.39) Inches

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Tendons	75	29
Spacing of Tendons (FT)	2.95	1.36
Center of Gravity of Concrete (from top of slab) (Inch)	5.75	5.75
Center of Gravity of Tendons (from top of slab) (Inch)	5.75	5.75
Eccentricity of Prestressing (Inch)	0.00	0.00
Minimum Effective Prestress Force (K)	1,538.1	313.5
Beta Distance Effective Prestress Force (K)	1,710.7	738.1
Minimum Effective Prestress (PSI)	51	57
Beta Distance Effective Prestress (PSI)	56	134

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.66 FT-K/FT
Maximum Moment, Long Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.34 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.246	-0.154	Actual Stress	0.358	0.421

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	334,593	60,835
Required Moment of Inertia (Inch ⁴)	168,688	35,686
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction 1.69 K/FT
Maximum Shear, Long Direction 1.12 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	179
Actual Shear Stress (PSI)	12	8

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 3
 Project Engineer : DEK

Project Number : 18-234
 Project Date : February 6, 2019
 Report Date : Jan. 31, 2019
 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	938.2	354.7
0.5 Moment (FT-K)	732.2	126.8

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.01 FT-K/FT
Maximum Moment, Long Direction	3.72 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.125	-0.035	Actual Stress	0.238	0.303

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	334,593	60,835
Required Moment of Inertia (Inch ⁴)	203,045	41,889
Required Moment of Inertia controlled by	Width	6*Beta

Shear Stress Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.15 K/FT	
Maximum Shear, Long Direction	2.43 K/FT	
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	179
Actual Shear Stress (PSI)	16	18

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	938.2	354.7
0.5 Moment (FT-K)	440.6	74.4

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 3
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
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Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA

Material Properties

Material Label :	Slab
Concrete Strength, f'_c :	4,000.0 PSI
Concrete Creep Modulus, E_c :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Label :	Rectangle				
Rectangle Geometry :	40.00 FT x 220.00 FT x 7.50 Inches				
	<table> <thead> <tr> <th>Short Direction</th> <th>Long Direction</th> </tr> </thead> <tbody> <tr> <td>Minimum Permissible Prestress :</td> <td>50.00 PSI 50.00 PSI</td> </tr> </tbody> </table>	Short Direction	Long Direction	Minimum Permissible Prestress :	50.00 PSI 50.00 PSI
Short Direction	Long Direction				
Minimum Permissible Prestress :	50.00 PSI 50.00 PSI				

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	20	20	8	0	
Depth :	15.0	15.0	15.0	15.0	Inches
Width :	14.0	14.0	14.0	14.0	Inches
Tendons :	2	0	1	0	
Cover :	6.00	6.00	6.00	6.00	Inches

Average beam spacing used in analysis

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Geostructural Tool Kit, Inc.

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Project Title : Legacy at Livermore PT Slab Segment 3
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 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA - Continued

Soil Properties

Soil Label :	Soil	
Allowable Bearing Pressure :	1,000.0 PSF	
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	5.10 Feet
Differential Soil Movement, y_m :	0.470 Inches	1.100 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	100.00 PSF
Total Perimeter Load :	2,190.00 PLF
Smallest Load Intensity :	1,910.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

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Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 3
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
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Geotechnical Report : GEOCON Consultants

PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

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Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 3
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	3,720.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	32 PCI
Slab Thickness (Ribbed Slab) :	7.50 Inch
Slab Thickness (Uniform Thickness Foundation) :	11.50 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment (7.50 Inch Thick Slab) :	3.93 Ft-K/Ft
Applied Moment (Uniform Thickness Foundation) :	8.12 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.379	1.800
Applied Stress (7.50 Inch Thick Slab) :	-0.363	0.475
Applied Stress (Uniform Thickness Foundation) :	-0.311	0.425

Prestress at Line Load (7.50 In. Thick Slab) :	55.9 PSI
Prestress at Line Load (Uniform Thickness Foundation) :	56.8 PSI

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Serial Number : 100-350-144

Registered To : Peoples Associates Structural Engineers, Inc

Project Title : Legacy at Livermore PT Slab Segment 4
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 40.00 FT x 130.00 FT x 7.50 Inches

Material Properties

Concrete Strength, f'_c : 4,000 PSI
Tendon Strength, F_{pu} : 270 KSI
Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 170.8 Cubic Yards
Prestressing Tendon : 4,020 Linear Feet
Number of End Anchorages : 110

In the LONG direction ...

Type I Beam

Type II Beam

Quantity of Beams :	10	0
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	1	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.00 Feet O.C.
Number of Slab Tendons :		9
Slab Tendon Spacing :		4.50 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

In the SHORT direction ...

Type I Beam

Type II Beam

Quantity of Beams :	10	10
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	2	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.84 Feet O.C.
Number of Slab Tendons :		19
Slab Tendon Spacing :		7.20 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

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Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 4
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 4
Project Engineer : DEK

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Section 6.2.4 of PTI DC10.5-12 Standard states:

Applied soil bearing pressure shall be evaluated using generally accepted techniques and shall not exceed qallow as specified by the Licensed Design Professional with geotechnical experience.

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	19	9
Number of Beam Tendons	18	10
Spacing of Slab Tendons (Feet)	7.20	4.50
Center of Gravity of Concrete (from top of slab) (Inch)	4.89	5.44
Center of Gravity of Tendons (from top of slab) (Inch)	6.18	6.38
Eccentricity of Prestressing (Inch)	-1.29	-0.94
Minimum Effective Prestress Force (K)	707.7	255.1
Beta Distance Effective Prestress Force (K)	827.4	473.6
Minimum Effective Prestress (PSI)	51	55
Beta Distance Effective Prestress (PSI)	60	102

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2)

6.61 FT-K/FT

Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2)

6.30 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.278	-0.178	Actual Stress	0.758	0.592

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	164,837	67,523
Required Moment of Inertia (Inch ⁴)	99,000	36,379
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction.

1.79 K/FT

Maximum Shear, Long Direction

1.07 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	164	172
Actual Shear Stress (PSI)	56	20

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Geostructural Tool Kit, Inc.

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	451.1	219.6
0.5 Moment (FT-K)	429.7	125.9

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction					4.02 FT-K/FT
Maximum Moment, Long Direction					3.73 FT-K/FT
	Tension in Bottom Fiber (KSI)		Compression in Top Fiber (KSI)		
	Short	Long		Short	Long
	Direction	Direction		Direction	Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.259	-0.089	Actual Stress	0.214	0.21

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	164,837	67,523
Required Moment of Inertia (Inch ⁴)	120,392	43,143
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction		2.15 K/FT
Maximum Shear, Long Direction		2.34 K/FT
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	164	172
Actual Shear Stress (PSI)	67	45

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	338.0	192.3
0.5 Moment (FT-K)	261.3	74.7

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 4
 Project Engineer : DEK

Project Number : 18-234
 Project Date : February 6, 2019
 Report Date : Jan. 31, 2019
 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	13,800	4,650
Moment of Inertia (Inch ⁴) :	164,837	67,523
Section Modulus, Top (Inch ³) :	33,700	12,404
Section Modulus, Bottom (Inch ³) :	16,306	7,066
Center of Gravity of Concrete - from top (Inch) :	4.89	5.44
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.18	6.38
Eccentricity of Prestress (Inch) :	-1.29	-0.94
Beta Distance (Feet) :	10.45	8.36
Jacking Force :	33.05 KIPS	

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Geostructural Tool Kit, Inc.

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Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 4
 Project Engineer : DEK

Project Number : 18-234
 Project Date : February 6, 2019
 Report Date : Jan. 31, 2019
 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 40.00 FT x 130.00 FT x 12.00 Inches
 Uniform Thickness Slab : 12.00 (11.91) Inches
 (rounded to the nearest 0.25 inch)

Material Properties

Concrete Strength, f'_c : 4,000 PSI
 Tendon Strength, F_{pu} : 270 KSI
 Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 192.6 Cubic Yards
 Prestressing Tendon : 5,010.0 Linear Feet
 Number of End Anchorages : 140

In the LONG direction ...

Number of Slab Tendons : 23
 Slab Tendon Spacing : 1.73 Feet O.C.
 Slab Tendon Centroid : 6.00 Inches from top of slab

In the SHORT direction ...

Number of Slab Tendons : 47
 Slab Tendon Spacing : 2.78 Feet O.C.
 Slab Tendon Centroid : 6.00 Inches from top of slab

Selected Variables

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	18,720	5,760
Moment of Inertia (Inch ⁴) :	224,640	69,120
Section Modulus, Top and Bottom (Inch ³) :	37,440	11,520
Beta Distance (Feet) :	11.29	8.41
Jacking Force :	33.05 KIPS	

PTISlab 3.5

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Project Title : Legacy at Livermore PT Slab Segment 4
Project Engineer : DEK

Project Number : 18-234
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Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

RIBBED FOUNDATION COMPLIANCE :

RIBBED FOUNDATION IN COMPLIANCE.

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 4
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Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS

Uniform Thickness Slab **12.00 (11.91) Inches**
(rounded to nearest 0.25 inch)

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Tendons	47	23
Spacing of Tendons (FT)	2.78	1.73
Center of Gravity of Concrete (from top of slab) (Inch)	6.00	6.00
Center of Gravity of Tendons (from top of slab) (Inch)	6.00	6.00
Eccentricity of Prestressing (Inch)	0.00	0.00
Minimum Effective Prestress Force (K)	968.5	329.6
Beta Distance Effective Prestress Force (K)	1,091.6	575.7
Minimum Effective Prestress (PSI)	52	57
Beta Distance Effective Prestress (PSI)	58	100

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.61 FT-K/FT
Maximum Moment, Long Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.30 FT-K/FT

	Tension in Top Fiber (KSI)		Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	1.800	1.800
Actual Stress	-0.217	-0.162	0.334	0.362

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	224,640	69,120
Required Moment of Inertia (Inch ⁴)	99,000	36,593
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction	1.79 K/FT	
Maximum Shear, Long Direction	1.07 K/FT	
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	172
Actual Shear Stress (PSI)	12	7

PTISlab 3.5

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	613.3	296.6
0.5 Moment (FT-K)	429.7	125.9

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.02 FT-K/FT
Maximum Moment, Long Direction	3.73 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.109	-0.056	Actual Stress	0.226	0.256

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	224,640	69,120
Required Moment of Inertia (Inch ⁴)	120,392	43,396
Required Moment of Inertia controlled by	Width	6*Beta

Shear Stress Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.15	K/FT
Maximum Shear, Long Direction	2.34	K/FT
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	172
Actual Shear Stress (PSI)	15	16

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	613.3	296.6
0.5 Moment (FT-K)	261.3	74.7

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 4
 Project Engineer : DEK

Project Number : 18-234
 Project Date : February 6, 2019
 Report Date : Jan. 31, 2019
 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA

Material Properties

Material Label :	Slab
Concrete Strength, f'_c :	4,000.0 PSI
Concrete Creep Modulus, E_c :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
 Tendon Strength, F_{pu} :	 270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Label :	Rectangle	
Rectangle Geometry :	40.00 FT x 130.00 FT x 7.50 Inches	
	<u>Short Direction</u>	<u>Long Direction</u>
Minimum Permissible Prestress :	50.00 PSI	50.00 PSI

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	10	10	10	0	
Depth :	15.0	15.0	15.0	15.0	Inches
Width :	14.0	14.0	14.0	14.0	Inches
Tendons :	2	0	1	0	
Cover :	6.00	6.00	6.00	6.00	Inches

Average beam spacing used in analysis

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 4
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA - Continued

Soil Properties

Soil Label :	Soil	
Allowable Bearing Pressure :	1,000.0 PSF	
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	5.10 Feet
Differential Soil Movement, y_m :	0.470 Inches	1.100 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	100.00 PSF
Total Perimeter Load :	2,190.00 PLF
Smallest Load Intensity :	1,910.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

NO PTI EXCEPTIONS EXIST

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 4
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	3,720.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	32 PCI
Slab Thickness (Ribbed Slab) :	7.50 Inch
Slab Thickness (Uniform Thickness Foundation) :	12.00 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment (7.50 Inch Thick Slab) :	3.93 Ft-K/Ft
Applied Moment (Uniform Thickness Foundation) :	8.38 Ft-K/Ft

Bending Stresses (KSI)

	Tension in Extreme Fiber	Compression in Extreme Fiber
Allowable Stress :	-0.379	1.800
Applied Stress (7.50 Inch Thick Slab) :	-0.364	0.474
Applied Stress (Uniform Thickness Foundation) :	-0.292	0.406
Prestress at Line Load (7.50 In. Thick Slab) :		54.9 PSI
Prestress at Line Load (Uniform Thickness Foundation) :		57.2 PSI

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 5
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 40.00 FT x 120.00 FT x 7.50 Inches

Material Properties

Concrete Strength, f'_c : 4,000 PSI
Tendon Strength, F_{pu} : 270 KSI
Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 158.8 Cubic Yards
Prestressing Tendon : 3,582 Linear Feet
Number of End Anchorages : 102

In the LONG direction ...

Type I Beam

Type II Beam

Quantity of Beams :	10	0
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	1	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.00 Feet O.C.
Number of Slab Tendons :		8
Slab Tendon Spacing :		5.14 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

In the SHORT direction ...

Type I Beam

Type II Beam

Quantity of Beams :	10	10
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	2	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.32 Feet O.C.
Number of Slab Tendons :		18
Slab Tendon Spacing :		6.82 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 5
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Section 6.2.4 of PTI DC10.5-12 Standard states:

Applied soil bearing pressure shall be evaluated using generally accepted techniques and shall not exceed allowable as specified by the Licensed Design Professional with geotechnical experience.

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	18	8
Number of Beam Tendons	15	10
Spacing of Slab Tendons (Feet)	6.82	5.14
Center of Gravity of Concrete (from top of slab) (Inch)	4.97	5.44
Center of Gravity of Tendons (from top of slab) (Inch)	6.02	6.53
Eccentricity of Prestressing (Inch)	-1.05	-1.08
Minimum Effective Prestress Force (K)	645.4	246.0
Beta Distance Effective Prestress Force (K)	757.7	446.7
Minimum Effective Prestress (PSI)	50	53
Beta Distance Effective Prestress (PSI)	59	96

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2)

6.60 FT-K/FT

Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2)

6.29 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.263	-0.186	Actual Stress	0.707	0.592

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	159,364	67,523
Required Moment of Inertia (Inch ⁴)	91,289	36,342
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction.

1.73 K/FT

Maximum Shear, Long Direction

1.06 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	164	171
Actual Shear Stress (PSI)	49	20

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	439.2	195.7
0.5 Moment (FT-K)	396.2	125.8

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.02 FT-K/FT
Maximum Moment, Long Direction	3.74 FT-K/FT

Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)		
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.256	-0.089	Actual Stress	0.215	0.202

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	159,364	67,523
Required Moment of Inertia (Inch ⁴)	111,189	43,166
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.15	K/FT
Maximum Shear, Long Direction	2.33	K/FT
	Short	Long
	Direction	Direction
Allowable Shear Stress (PSI)	164	171
Actual Shear Stress (PSI)	61	44

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	289.8	192.3
0.5 Moment (FT-K)	241.3	74.7

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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	12,900	4,650
Moment of Inertia (Inch ⁴) :	159,364	67,523
Section Modulus, Top (Inch ³) :	32,059	12,404
Section Modulus, Bottom (Inch ³) :	15,890	7,066
Center of Gravity of Concrete - from top (Inch) :	4.97	5.44
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.02	6.53
Eccentricity of Prestress (Inch) :	-1.05	-1.08
Beta Distance (Feet) :	10.36	8.36
Jacking Force :	33.05 KIPS	

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 40.00 FT x 120.00 FT x 12.00 Inches
Uniform Thickness Slab : 12.00 (11.91) Inches
(rounded to the nearest 0.25 inch)

Material Properties

Concrete Strength, f'_c : 4,000 PSI
Tendon Strength, F_{pu} : 270 KSI
Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 177.8 Cubic Yards
Prestressing Tendon : 4,490.0 Linear Feet
Number of End Anchorages : 130

In the LONG direction ...

Number of Slab Tendons : 22
Slab Tendon Spacing : 1.81 Feet O.C.
Slab Tendon Centroid : 6.00 Inches from top of slab

In the SHORT direction ...

Number of Slab Tendons : 43
Slab Tendon Spacing : 2.81 Feet O.C.
Slab Tendon Centroid : 6.00 Inches from top of slab

Selected Variables

	Short Direction	Long Direction
Cross Sectional Area (Inch^2) :	17,280	5,760
Moment of Inertia (Inch^4) :	207,360	69,120
Section Modulus, Top and Bottom (Inch^3) :	34,560	11,520
Beta Distance (Feet) :	11.07	8.41
Jacking Force :	33.05 KIPS	

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

RIBBED FOUNDATION COMPLIANCE :

RIBBED FOUNDATION IN COMPLIANCE.

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

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UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS

Uniform Thickness Slab

(rounded to nearest 0.25 inch)

12.00 (11.91) Inches

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Tendons	43	22
Spacing of Tendons (FT)	2.81	1.81
Center of Gravity of Concrete (from top of slab) (Inch)	6.00	6.00
Center of Gravity of Tendons (from top of slab) (Inch)	6.00	6.00
Eccentricity of Prestressing (Inch)	0.00	0.00
Minimum Effective Prestress Force (K)	883.7	324.7
Beta Distance Effective Prestress Force (K)	1,000.3	549.1
Minimum Effective Prestress (PSI)	51	56
Beta Distance Effective Prestress (PSI)	58	95

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.60 FT-K/FT
Maximum Moment, Long Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.29 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.217	-0.167	Actual Stress	0.333	0.357

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	207,360	69,120
Required Moment of Inertia (Inch ⁴)	91,289	36,555
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction 1.73 K/FT
Maximum Shear, Long Direction 1.06 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	171
Actual Shear Stress (PSI)	12	7

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	561.2	284.1
0.5 Moment (FT-K)	396.2	125.8

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.02 FT-K/FT
Maximum Moment, Long Direction	3.74 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.110	-0.060	Actual Stress	0.225	0.251

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	207,360	69,120
Required Moment of Inertia (Inch ⁴)	111,189	43,419
Required Moment of Inertia controlled by	Width	6*Beta

Shear Stress Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.15	K/FT
Maximum Shear, Long Direction	2.33	K/FT
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	171
Actual Shear Stress (PSI)	15	16

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	561.2	284.1
0.5 Moment (FT-K)	241.3	74.7

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SUMMARY OF INPUT DATA

Material Properties

Material Label :	Slab
Concrete Strength, f'_c :	4,000.0 PSI
Concrete Creep Modulus, E_c :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Label :	Rectangle				
Rectangle Geometry :	40.00 FT x 120.00 FT x 7.50 Inches				
Minimum Permissible Prestress :	<table> <thead> <tr> <th>Short Direction</th> <th>Long Direction</th> </tr> </thead> <tbody> <tr> <td>50.00 PSI</td> <td>50.00 PSI</td> </tr> </tbody> </table>	Short Direction	Long Direction	50.00 PSI	50.00 PSI
Short Direction	Long Direction				
50.00 PSI	50.00 PSI				

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	10	10	10	0	
Depth :	15.0	15.0	15.0	15.0	Inches
Width :	14.0	14.0	14.0	14.0	Inches
Tendons :	2	0	1	0	
Cover :	6.00	6.00	6.00	6.00	Inches

Average beam spacing used in analysis

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Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA - Continued

Soil Properties

Soil Label :		Soil
Allowable Bearing Pressure :		1,000.0 PSF
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	5.10 Feet
Differential Soil Movement, y_m :	0.470 Inches	1.100 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	100.00 PSF
Total Perimeter Load :	2,190.00 PLF
Smallest Load Intensity :	1,910.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
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Subgrade Friction Coefficient :	0.75
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PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

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LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	3,720.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	32 PCI
Slab Thickness (Ribbed Slab) :	7.50 Inch
Slab Thickness (Uniform Thickness Foundation) :	12.00 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment (7.50 Inch Thick Slab) :	3.93 Ft-K/Ft
Applied Moment (Uniform Thickness Foundation) :	8.38 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.379	1.800
Applied Stress (7.50 Inch Thick Slab) :	-0.366	0.472
Applied Stress (Uniform Thickness Foundation) :	-0.293	0.406
Prestress at Line Load (7.50 In. Thick Slab) :		52.9 PSI
Prestress at Line Load (Uniform Thickness Foundation) :		56.4 PSI

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

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Serial Number : 100-350-144

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Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 38.00 FT x 115.00 FT x 7.50 Inches

Material Properties

Concrete Strength, f'_c :	4,000 PSI
Tendon Strength, F_{pu} :	270 KSI
Tendon Diameter :	1 / 2 Inch

Material Quantities

Concrete Volume :	146.4 Cubic Yards
Prestressing Tendon :	3,269 Linear Feet
Number of End Anchorages :	98

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	10	0
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	1	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.00 Feet O.C.
Number of Slab Tendons :		7
Slab Tendon Spacing :		5.67 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	10	10
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	2	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		6.05 Feet O.C.
Number of Slab Tendons :		17
Slab Tendon Spacing :		6.94 Feet O.C.
Slab Tendon Centroid :		3.75 Inches from top of slab

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RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

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RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Section 6.2.4 of PTI DC10.5-12 Standard states:

Applied soil bearing pressure shall be evaluated using generally accepted techniques and shall not exceed qallow as specified by the Licensed Design Professional with geotechnical experience.

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	17	7
Number of Beam Tendons	15	10
Spacing of Slab Tendons (Feet)	6.94	5.67
Center of Gravity of Concrete (from top of slab) (Inch)	5.02	5.51
Center of Gravity of Tendons (from top of slab) (Inch)	6.09	6.69
Eccentricity of Prestressing (Inch)	-1.08	-1.18
Minimum Effective Prestress Force (K)	636.9	237.6
Beta Distance Effective Prestress Force (K)	735.2	421.5
Minimum Effective Prestress (PSI)	51	53
Beta Distance Effective Prestress (PSI)	59	94

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 6.60 FT-K/FT
Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 6.29 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.258	-0.186	Actual Stress	0.691	0.577

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	156,560	66,142
Required Moment of Inertia (Inch ⁴)	83,065	34,328
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction.
Maximum Shear, Long Direction

1.68 K/FT
1.05 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	164	171
Actual Shear Stress (PSI)	46	19

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RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	415.3	171.7
0.5 Moment (FT-K)	379.5	119.4

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.02 FT-K/FT
Maximum Moment, Long Direction	3.74 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.244	-0.079	Actual Stress	0.211	0.195

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	156,560	66,142
Required Moment of Inertia (Inch ⁴)	101,256	40,807
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.15 K/FT	
Maximum Shear, Long Direction	2.32 K/FT	
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	164	171
Actual Shear Stress (PSI)	59	42

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	289.8	192.2
0.5 Moment (FT-K)	231.3	71.0

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Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 6
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	12,450	4,470
Moment of Inertia (Inch ⁴) :	156,560	66,142
Section Modulus, Top (Inch ³) :	31,218	12,000
Section Modulus, Bottom (Inch ³) :	15,680	6,971
Center of Gravity of Concrete - from top (Inch) :	5.02	5.51
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.09	6.69
Eccentricity of Prestress (Inch) :	-1.08	-1.18
Beta Distance (Feet) :	10.32	8.32
Jacking Force :	33.05 KIPS	

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UNIFORM THICKNESS FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 38.00 FT x 115.00 FT x 12.00 Inches
 Uniform Thickness Slab : 12.00 (12.03) Inches
 (rounded to the nearest 0.25 inch)

Material Properties

Concrete Strength, f'_c : 4,000 PSI
 Tendon Strength, F_{pu} : 270 KSI
 Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 161.9 Cubic Yards
 Prestressing Tendon : 3,980.0 Linear Feet
 Number of End Anchorages : 122

In the LONG direction ...

Number of Slab Tendons : 20
 Slab Tendon Spacing : 1.89 Feet O.C.
 Slab Tendon Centroid : 6.00 Inches from top of slab

In the SHORT direction ...

Number of Slab Tendons : 41
 Slab Tendon Spacing : 2.83 Feet O.C.
 Slab Tendon Centroid : 6.00 Inches from top of slab

Selected Variables

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	16,560	5,472
Moment of Inertia (Inch ⁴) :	198,720	65,664
Section Modulus, Top and Bottom (Inch ³) :	33,120	10,944
Beta Distance (Feet) :	10.95	8.30
Jacking Force :	33.05 KIPS	

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UNIFORM THICKNESS FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

RIBBED FOUNDATION COMPLIANCE :

RIBBED FOUNDATION IN COMPLIANCE.

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

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UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS

Uniform Thickness Slab
(rounded to nearest 0.25 inch)

12.00 (12.03) Inches

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Tendons	41	20
Spacing of Tendons (FT)	2.83	1.89
Center of Gravity of Concrete (from top of slab) (Inch)	6.00	6.00
Center of Gravity of Tendons (from top of slab) (Inch)	6.00	6.00
Eccentricity of Prestressing (Inch)	0.00	0.00
Minimum Effective Prestress Force (K)	853.9	294.8
Beta Distance Effective Prestress Force (K)	954.6	498.1
Minimum Effective Prestress (PSI)	52	54
Beta Distance Effective Prestress (PSI)	58	91

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.60 FT-K/FT
Maximum Moment, Long Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.29 FT-K/FT

	Tension in Top Fiber (KSI)		Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	1.800	1.800
Actual Stress	-0.217	-0.171	0.333	0.353

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	198,720	65,664
Required Moment of Inertia (Inch ⁴)	83,065	34,266
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction	1.68 K/FT
Maximum Shear, Long Direction	1.05 K/FT
	Short DirectionLong Direction
Allowable Shear Stress (PSI)	163170
Actual Shear Stress (PSI)	127

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UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	535.2	258.6
0.5 Moment (FT-K)	379.5	119.4

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.02 FT-K/FT
Maximum Moment, Long Direction	3.74 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.110	-0.065	Actual Stress	0.225	0.247

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	198,720	65,664
Required Moment of Inertia (Inch ⁴)	101,256	40,734
Required Moment of Inertia controlled by	Width	6*Beta

Shear Stress Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.15 K/FT	
Maximum Shear, Long Direction	2.32 K/FT	
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	170
Actual Shear Stress (PSI)	15	16

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	535.2	258.6
0.5 Moment (FT-K)	231.3	71.0

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SUMMARY OF INPUT DATA

Material Properties

Material Label :	Slab
Concrete Strength, f'_c :	4,000.0 PSI
Concrete Creep Modulus, E_c :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Label :	Rectangle				
Rectangle Geometry :	38.00 FT x 115.00 FT x 7.50 Inches				
Minimum Permissible Prestress :	<table> <thead> <tr> <th>Short Direction</th> <th>Long Direction</th> </tr> </thead> <tbody> <tr> <td>50.00 PSI</td> <td>50.00 PSI</td> </tr> </tbody> </table>	Short Direction	Long Direction	50.00 PSI	50.00 PSI
Short Direction	Long Direction				
50.00 PSI	50.00 PSI				

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	10	10	10	0	
Depth :	15.0	15.0	15.0	15.0	Inches
Width :	14.0	14.0	14.0	14.0	Inches
Tendons :	2	0	1	0	
Cover :	6.00	6.00	6.00	6.00	Inches

Average beam spacing used in analysis

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SUMMARY OF INPUT DATA - Continued

Soil Properties

Soil Label :	Soil	
Allowable Bearing Pressure :	1,000.0 PSF	
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	5.10 Feet
Differential Soil Movement, y_m :	0.470 Inches	1.100 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	100.00 PSF
Total Perimeter Load :	2,190.00 PLF
Smallest Load Intensity :	1,910.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

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PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

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LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	3,720.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_S :	32 PCI
Slab Thickness (Ribbed Slab) :	7.50 Inch
Slab Thickness (Uniform Thickness Foundation) :	12.00 Inch
Concrete Creep Modulus, E_C :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment (7.50 Inch Thick Slab) :	3.93 Ft-K/Ft
Applied Moment (Uniform Thickness Foundation) :	8.38 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.379	1.800
Applied Stress (7.50 Inch Thick Slab) :	-0.366	0.472
Applied Stress (Uniform Thickness Foundation) :	-0.295	0.403
Prestress at Line Load (7.50 In. Thick Slab) :		53.2 PSI
Prestress at Line Load (Uniform Thickness Foundation) :		53.9 PSI

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

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Geostructural Tool Kit, Inc.

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Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 7
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Geotechnical Report : GEOCON Consultants

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 40.00 FT x 240.00 FT x 7.75 Inches

Material Properties

Concrete Strength, f'_c : 4,000 PSI
Tendon Strength, F_{pu} : 270 KSI
Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 298.4 Cubic Yards
Prestressing Tendon : 8,780 Linear Feet
Number of End Anchorages : 180

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	5	2
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	6.25 Inches	6.25 Inches
Beam Spacing :		6.67 Feet O.C.
Number of Slab Tendons :		18
Slab Tendon Spacing :		2.12 Feet O.C.
Slab Tendon Centroid :		3.88 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	20	10
Depth of Beams :	15.0 Inches	15.0 Inches
Width of Beams :	14.0 Inches	14.0 Inches
Tendons per Beam :	2	0
Beam Tendon Centroid :	6.25 Inches	0.00 Inches
Beam Spacing :		8.28 Feet O.C.
Number of Slab Tendons :		35
Slab Tendon Spacing :		6.94 Feet O.C.
Slab Tendon Centroid :		3.88 Inches from top of slab

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RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

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RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Section 6.2.4 of PTI DC10.5-12 Standard states:

Applied soil bearing pressure shall be evaluated using generally accepted techniques and shall not exceed qallow as specified by the Licensed Design Professional with geotechnical experience.

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	35	18
Number of Beam Tendons	30	7
Spacing of Slab Tendons (Feet)	6.94	2.12
Center of Gravity of Concrete (from top of slab) (Inch)	4.78	5.08
Center of Gravity of Tendons (from top of slab) (Inch)	6.13	5.24
Eccentricity of Prestressing (Inch)	-1.35	-0.16
Minimum Effective Prestress Force (K)	1,292.3	227.4
Beta Distance Effective Prestress Force (K)	1,470.1	636.5
Minimum Effective Prestress (PSI)	51	51
Beta Distance Effective Prestress (PSI)	58	144

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 6.88 FT-K/FT
Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 6.55 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.320	-0.155	Actual Stress	0.866	0.727

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	275,773	55,288
Required Moment of Inertia (Inch ⁴)	190,268	36,026
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction. 1.95 K/FT
Maximum Shear, Long Direction 1.21 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	181
Actual Shear Stress (PSI)	74	33

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RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	838.5	415.5
0.5 Moment (FT-K)	825.8	131.1

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.05 FT-K/FT
Maximum Moment, Long Direction	3.76 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.301	-0.161	Actual Stress	0.225	0.30

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	275,773	55,288
Required Moment of Inertia (Inch ⁴)	223,723	41,310
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.14 K/FT	
Maximum Shear, Long Direction	2.44 K/FT	
	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	181
Actual Shear Stress (PSI)	82	66

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	579.6	135.0
0.5 Moment (FT-K)	485.5	75.2

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RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	25,365	4,431
Moment of Inertia (Inch ⁴) :	275,773	55,288
Section Modulus, Top (Inch ³) :	57,749	10,888
Section Modulus, Bottom (Inch ³) :	26,971	5,572
Center of Gravity of Concrete - from top (Inch) :	4.78	5.08
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.13	5.24
Eccentricity of Prestress (Inch) :	-1.35	-0.16
Beta Distance (Feet) :	11.88	7.95
Jacking Force :	33.05 KIPS	

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 40.00 FT x 240.00 FT x 11.25 Inches
Uniform Thickness Slab : 11.25 (11.14) Inches
(rounded to the nearest 0.25 inch)

Material Properties

Concrete Strength, f'_c : 4,000 PSI
Tendon Strength, F_{pu} : 270 KSI
Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 333.3 Cubic Yards
Prestressing Tendon : 10,420.0 Linear Feet
Number of End Anchorages : 220

In the LONG direction ...

Number of Slab Tendons : 29
Slab Tendon Spacing : 1.36 Feet O.C.
Slab Tendon Centroid : 5.63 Inches from top of slab

In the SHORT direction ...

Number of Slab Tendons : 81
Slab Tendon Spacing : 2.98 Feet O.C.
Slab Tendon Centroid : 5.63 Inches from top of slab

Selected Variables

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	32,400	5,400
Moment of Inertia (Inch ⁴) :	341,719	56,953
Section Modulus, Top and Bottom (Inch ³) :	60,750	10,125
Beta Distance (Feet) :	12.54	8.01

Jacking Force : 33.05 KIPS

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UNIFORM THICKNESS FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

RIBBED FOUNDATION COMPLIANCE :

RIBBED FOUNDATION IN COMPLIANCE.

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

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UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS

Uniform Thickness Slab

(rounded to nearest 0.25 inch)

11.25 (11.14) Inches

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Tendons	81	29
Spacing of Tendons (FT)	2.98	1.36
Center of Gravity of Concrete (from top of slab) (Inch)	5.63	5.63
Center of Gravity of Tendons (from top of slab) (Inch)	5.63	5.63
Eccentricity of Prestressing (Inch)	0.00	0.00
Minimum Effective Prestress Force (K)	1,667.0	282.7
Beta Distance Effective Prestress Force (K)	1,849.6	739.4
Minimum Effective Prestress (PSI)	51	52
Beta Distance Effective Prestress (PSI)	57	137

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.88 FT-K/FT
Maximum Moment, Long Dir. (calculated with $E_m=5.0$ per PTI 4.3.2) 6.55 FT-K/FT

	Tension in Top Fiber (KSI)			Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.269	-0.174	Actual Stress	0.383	0.448

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	341,719	56,953
Required Moment of Inertia (Inch ⁴)	190,268	36,294
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction 1.95 K/FT
Maximum Shear, Long Direction 1.21 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	163	179
Actual Shear Stress (PSI)	14	9

PTISlab 3.5

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Geotechnical Report : GEOCON Consultants

UNIFORM THICKNESS FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	991.0	346.7
0.5 Moment (FT-K)	825.8	131.1

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.05 FT-K/FT
Maximum Moment, Long Direction	3.76 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.379	-0.379	Allowable Stress	1.800	1.800
Actual Stress	-0.135	-0.041	Actual Stress	0.249	0.315

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	341,719	56,953
Required Moment of Inertia (Inch ⁴)	223,723	41,617
Required Moment of Inertia controlled by	Width	6*Beta

Shear Stress Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.14	K/FT
Maximum Shear, Long Direction	2.44	K/FT
	Short	Long
	Direction	Direction
Allowable Shear Stress (PSI)	163	179
Actual Shear Stress (PSI)	16	18

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	991.0	346.7
0.5 Moment (FT-K)	485.5	75.2

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 7
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA

Material Properties

Material Label :	Slab
Concrete Strength, f'_c :	4,000.0 PSI
Concrete Creep Modulus, E_c :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Label :	Rectangle				
Rectangle Geometry :	40.00 FT x 240.00 FT x 7.75 Inches				
	<table> <thead> <tr> <th>Short Direction</th> <th>Long Direction</th> </tr> </thead> <tbody> <tr> <td>50.00 PSI</td> <td>50.00 PSI</td> </tr> </tbody> </table>	Short Direction	Long Direction	50.00 PSI	50.00 PSI
Short Direction	Long Direction				
50.00 PSI	50.00 PSI				
Minimum Permissible Prestress :					

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	20	10	5	2	
Depth :	15.0	15.0	15.0	15.0	Inches
Width :	14.0	14.0	14.0	14.0	Inches
Tendons :	2	0	1	1	
Cover :	6.00	6.00	6.00	6.00	Inches

Average beam spacing used in analysis

PTISlab 3.5

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 Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

SUMMARY OF INPUT DATA - Continued

Soil Properties

Soil Label :	Soil
Allowable Bearing Pressure :	1,000.0 PSF
	<u>Center Lift</u> <u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet 5.10 Feet
Differential Soil Movement, y_m :	0.470 Inches 1.100 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	100.00 PSF
Total Perimeter Load :	2,190.00 PLF
Smallest Load Intensity :	1,910.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Project Title : Legacy at Livermore PT Slab Segment 7
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

PTI EXCEPTION SUMMARY

The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.

NO PTI EXCEPTIONS EXIST

PTISlab 3.5

Geostructural Tool Kit, Inc.

Registered To : Peoples Associates Structural Engineers, Inc

Serial Number : 100-350-144

Project Title : Legacy at Livermore PT Slab Segment 7
Project Engineer : DEK

Project Number : 18-234
Project Date : February 6, 2019
Report Date : Jan. 31, 2019
Report Number : E8884-04-05

Geotechnical Report : GEOCON Consultants

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	3,720.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	32 PCI
Slab Thickness (Ribbed Slab) :	7.75 Inch
Slab Thickness (Uniform Thickness Foundation) :	11.25 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment (7.75 Inch Thick Slab) :	4.02 Ft-K/Ft
Applied Moment (Uniform Thickness Foundation) :	7.98 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.379	1.800
Applied Stress (7.75 Inch Thick Slab) :	-0.351	0.453
Applied Stress (Uniform Thickness Foundation) :	-0.326	0.431

Prestress at Line Load (7.75 In. Thick Slab) :	51.3 PSI
Prestress at Line Load (Uniform Thickness Foundation) :	52.3 PSI

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

Project: spread footing

Location: 4' Sq Footing

Footing

[2015 International Building Code(2012 NDS)]

Footing Size: 4.0 FT x 4.0 FT x 24.00 IN

Reinforcement: #6 Bars @ 10.00 IN. O.C. E/W / (5) min.

Section Footing Design Adequate



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FOOTING PROPERTIES

Allowable Soil Bearing Pressure: $Q_s = 3500$ psf
Concrete Compressive Strength: $F'_c = 3000$ psi
Reinforcing Steel Yield Strength: $F_y = 60000$ psi
Concrete Reinforcement Cover: $c = 3$ in

FOOTING SIZE

Width: $W = 4$ ft
Length: $L = 4$ ft
Depth: $\text{Depth} = 24$ in
Effective Depth to Top Layer of Steel: $d = 19.88$ in

COLUMN AND BASEPLATE SIZE

Column Type: Steel
Column Width: $m = 4$ in
Column Depth: $n = 4$ in
Baseplate Width: $bsw = 6$ in
Baseplate Length: $bsl = 6$ in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure: $Q_u = 634$ psf
Effective Allowable Soil Bearing Pressure: $Q_e = 3200$ psf
Required Footing Area: $A_{req} = 3.17$ sf
Area Provided: $A = 16.00$ sf

Baseplate Bearing:

Bearing Required: $\text{Bear} = 14304$ lb
Allowable Bearing: $\text{Bear-A} = 119340$ lb

One Way Shear Calculations (One Way Shear):

Beam Shear: $V_{u1} = 484$ lb
Allowable Beam Shear: $V_{c1} = 78379$ lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter: $B_o = 99.5$ in
Punching Shear: $V_{u2} = 10463$ lb
Allowable Punching Shear (ACI 11-35): $vc2-a = 487420$ lb
Allowable Punching Shear (ACI 11-36): $vc2-b = 811550$ lb
Allowable Punching Shear (ACI 11-37): $vc2-c = 324947$ lb
Controlling Allowable Punching Shear: $vc2 = 324947$ lb

Bending Calculations:

Factored Moment: $M_u = 68875$ in-lb
Nominal Moment Strength: $M_n = 2305020$ in-lb

Reinforcement Calculations:

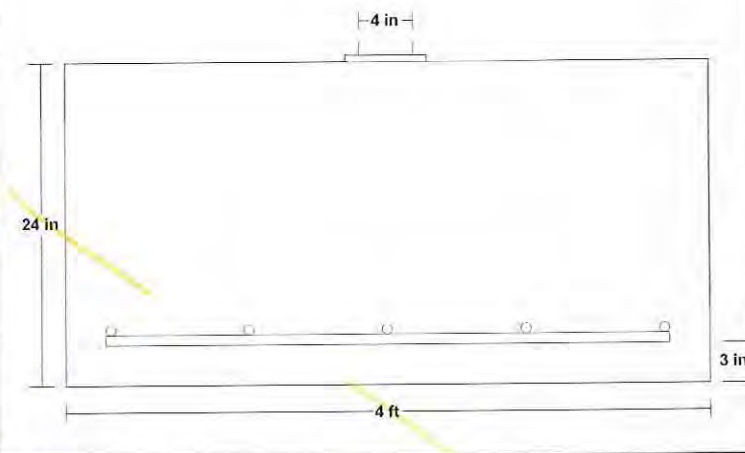
Concrete Compressive Block Depth: $a = 1.08$ in
Steel Required Based on Moment: $A_s(1) = 0.06$ in²
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4): $A_s(2) = 2.07$ in²
Controlling Reinforcing Steel: $A_{s-reqd} = 2.07$ in²
Selected Reinforcement: #6's @ 10.0 in. o.c. e/w (5) Min.
Reinforcement Area Provided: $A_s = 2.21$ in²

Development Length Calculations:

Development Length Required: $L_d = 15$ in
Development Length Supplied: $L_{d-sup} = 18.5$ in

Note: Plain concrete adequate for bending,
therefore adequate development length not required.

LOADING DIAGRAM



FOOTING LOADING

Live Load: $PL = 5340$ lb
Dead Load: $PD = 4800$ lb
Total Load: $PT = 10140$ lb
Ultimate Factored Load: $P_u = 14304$ lb
Weight to resist uplift w/ 1.5 F.S.: $U.R. = 3093$ lb

NOTES

Project: spread footing

Location: 5' Sq Footing Supporting B3.5 @ Amenties
Footing

[2015 International Building Code(2012 NDS)]

Footing Size: 5.0 FT x 5.0 FT x 24.00 IN

Reinforcement: #6 Bars @ 10.00 IN. O.C. E/W / (6) min.

Section Footing Design Adequate



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FOOTING PROPERTIES

Allowable Soil Bearing Pressure: $Q_s = 3500$ psf
Concrete Compressive Strength: $F'_c = 3000$ psi
Reinforcing Steel Yield Strength: $F_y = 60000$ psi
Concrete Reinforcement Cover: $c = 3$ in

FOOTING SIZE

Width: $W = 5$ ft
Length: $L = 5$ ft
Depth: $\text{Depth} = 24$ in
Effective Depth to Top Layer of Steel: $d = 19.88$ in

COLUMN AND BASEPLATE SIZE

Column Type: Steel
Column Width: $m = 4$ in
Column Depth: $n = 4$ in
Baseplate Width: $bsw = 6$ in
Baseplate Length: $bsl = 6$ in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure: $Q_u = 2245$ psf
Effective Allowable Soil Bearing Pressure: $Q_e = 3200$ psf
Required Footing Area: $A_{req} = 17.54$ sf
Area Provided: $A = 25.00$ sf

Baseplate Bearing:

Bearing Required: $\text{Bear} = 78141$ lb
Allowable Bearing: $\text{Bear-A} = 119340$ lb

Beam Shear Calculations (One Way Shear):

Beam Shear: $V_{u1} = 9930$ lb
Allowable Beam Shear: $V_{c1} = 97974$ lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter: $B_o = 99.5$ in
Punching Shear: $V_{u2} = 64710$ lb
Allowable Punching Shear (ACI 11-35): $vc2-a = 487420$ lb
Allowable Punching Shear (ACI 11-36): $vc2-b = 811550$ lb
Allowable Punching Shear (ACI 11-37): $vc2-c = 324947$ lb
Controlling Allowable Punching Shear: $vc2 = 324947$ lb

Bending Calculations:

Factored Moment: $M_u = 492452$ in-lb
Nominal Moment Strength: $M_n = 2769121$ in-lb

Reinforcement Calculations:

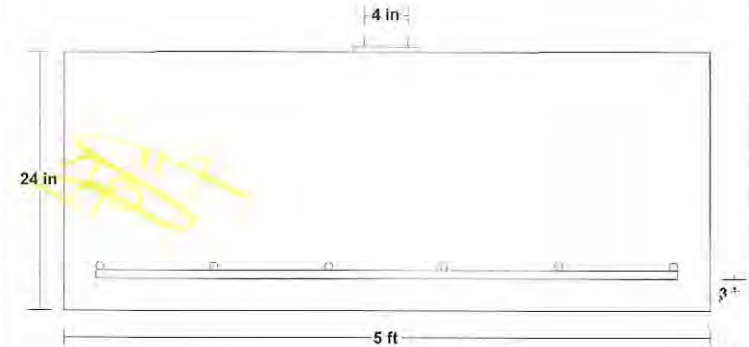
Concrete Compressive Block Depth: $a = 1.04$ in
Steel Required Based on Moment: $A_s(1) = 0.46$ in²
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4): $A_s(2) = 2.59$ in²
Controlling Reinforcing Steel: $A_{s-reqd} = 2.59$ in²
Selected Reinforcement: #6's @ 10.0 in. o.c. e/w (6) Min.
Reinforcement Area Provided: $A_s = 2.65$ in²

Development Length Calculations:

Development Length Required: $L_d = 15$ in
Development Length Supplied: $L_{d-sup} = 24.5$ in

Note: Plain concrete adequate for bending,
therefore adequate development length not required.

LOADING DIAGRAM



FOOTING LOADING

Live Load: $PL = 26996$ lb
Dead Load: $PD = 29123$ lb
Total Load: $PT = 56119$ lb
Ultimate Factored Load: $P_u = 78141$ lb
Weight to resist uplift w/ 1.5 F.S.: $U.R. = 4833$ lb

NOTES

Project: spread footing

Location: 5' Sq Footing Supporting Moment Frame
Footing

[2015 International Building Code(2012 NDS)]

Footing Size: 5.0 FT x 5.0 FT x 30.00 IN

Reinforcement: #7 Bars @ 10.00 IN. O.C. E/W / (6) min.

Section Footing Design Adequate



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StruCalc Version 9.0.3.0

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of**FOOTING PROPERTIES**

Allowable Soil Bearing Pressure: $Q_s = 4655$ psf
 Concrete Compressive Strength: $F'_c = 3000$ psi
 Reinforcing Steel Yield Strength: $F_y = 60000$ psi
 Concrete Reinforcement Cover: $c = 3$ in

FOOTING SIZE

Width: $W = 5$ ft
 Length: $L = 5$ ft
 Depth: $\text{Depth} = 30$ in
 Effective Depth to Top Layer of Steel: $d = 25.69$ in

COLUMN AND BASEPLATE SIZE

Column Type: Steel
 Column Width: $m = 8$ in
 Column Depth: $n = 18.5$ in
 Baseplate Width: $bsw = 8$ in
 Baseplate Length: $bsl = 18.5$ in

FOOTING CALCULATIONS**Bearing Calculations:**

Ultimate Bearing Pressure: $Q_u = 2200$ psf
 Effective Allowable Soil Bearing Pressure: $Q_e = 4280$ psf
 Required Footing Area: $A_{req} = 12.85$ sf
 Area Provided: $A = 25.00$ sf

Baseplate Bearing:

Bearing Required: $\text{Bear} = 77000$ lb
 Allowable Bearing: $\text{Bear-A} = 490620$ lb

Beam Shear Calculations (One Way Shear):

Beam Shear: $V_{u1} = 401$ lb
 Allowable Beam Shear: $V_{c1} = 126627$ lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter: $B_o = 155.75$ in
 Punching Shear: $V_{u2} = 45161$ lb
 Allowable Punching Shear (ACI 11-35): $vc2-a = 612984$ lb
 Allowable Punching Shear (ACI 11-36): $vc2-b = 1412942$ lb
 Allowable Punching Shear (ACI 11-37): $vc2-c = 657403$ lb
 Controlling Allowable Punching Shear: $vc2 = 612984$ lb

Bending Calculations:

Factored Moment: $M_u = 433767$ in-lb
 Nominal Moment Strength: $M_n = 4864415$ in-lb

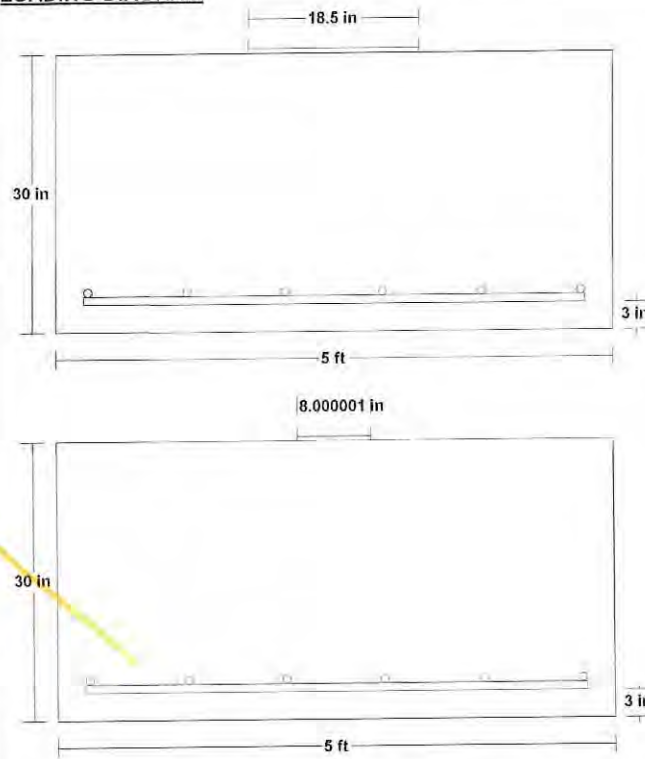
Reinforcement Calculations:

Concrete Compressive Block Depth: $a = 1.41$ in
 Steel Required Based on Moment: $A_s(1) = 0.31$ in²
 Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4): $A_s(2) = 3.24$ in²
 Controlling Reinforcing Steel: $A_{s-reqd} = 3.24$ in²
 Selected Reinforcement: #7's @ 10.0 in. o.c. e/w (6) Min.
 Reinforcement Area Provided: $A_s = 3.61$ in²

Development Length Calculations:

Development Length Required: $L_d = 15$ in
 Development Length Supplied: $L_{d-sup} = 23$ in

Note: Plain concrete adequate for bending,
 therefore adequate development length not required.

NOTES**LOADING DIAGRAM****FOOTING LOADING**

Live Load: $PL = 0$ lb
 Dead Load: $PD = 55000$ lb
 Total Load: $PT = 55000$ lb
 Ultimate Factored Load: $P_u = 77000$ lb
 Weight to resist uplift w/ 1.5 F.S.: $U.R. = 6042$ lb

APPENDIX A

SIMPSON ATS TIE DOWN CALCS

Strong-Rod™ Anchor Tiedown System

Component capacities for

Legacy Livermore

Livermore, CA

Prepared for

PASE

Structural Date of Plans

N/A

Architectural Date of Plans

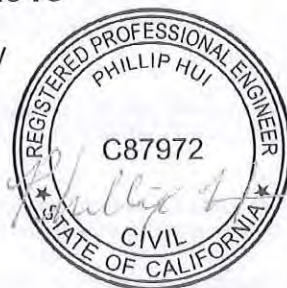
N/A

Date of Input

Feb 04, 2019

Input by

V.T.



02/05/2019

**SIMPSON STRONG-TIE COMPANY INC.**

5956 W. Las Positas Blvd., Pleasanton, CA 94588.

(800) 999-5099

www.strongtie.com

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Id	Max. Cumulative Capacities (kips)
11	15.01
12	15.01
13	15.01
13 (Tall)	15.10
21	28.40, 13.39
22	30.57, 15.01
22 (Tall)	38.44, 15.56
23	36.10, 15.56
31	38.59, 24.62, 9.61
32	48.93, 28.40, 13.39
33	50.56, 30.02, 15.01
41	48.62, 34.64, 19.63, 9.61
42	59.13, 38.59, 24.62, 9.61
43	69.47, 48.93, 28.40, 13.39
44	69.47, 48.93, 28.40, 13.39

Global Options:

Vertical Deflection Limit per Floor: 0.200

Code: 2015 IBC

Lumber:

Plate Species: DFL

Stud Species: DFL

Shrinkage estimates are based on an assumed initial moisture content of 19% and final of 9%

Notes:

- (1) Anchor Tiedown System capacities are based on Allowable Stress Design (ASD).
- (2) The following calculations are provided for justifying that Simpson Strong-Tie Anchor Tiedown System component capacities meet or exceed the design forces provided & determined by the Designer. Simpson Strong-Tie has not confirmed and is not responsible for any of the design, engineering, calculations or derivation of the structural forces related to the building.
- (3) The designer is responsible for evaluating the effects of lumber shrinkage and ATS elongation on shearwall drift. Simpson Strong-Tie has not confirmed and is not responsible for verifying the shearwall system's adherence to building code drift requirements or its performance in consideration of structural deformation compatibility.
- (4) The maximum cumulative capacities shown above are at each level for each system, starting at the lowest level. These are based on the lowest capacity of the ATS component. Refer to the following pages for a detailed breakdown of each system's component capacities.
- (5) Do not weld products listed unless this publication specifically identifies a product as acceptable for welding, or unless specific approval for welding is provided in writing by Simpson Strong-Tie. Some steels have poor weldability and a tendency to crack when welded. Cracked steel will not carry load and must be replaced.

COMMENTS:

SIMPSON

Strong-Tie

®

SIMPSON STRONG-TIE COMPANY INC.

5956 W. Las Positas Blvd., Pleasanton, CA 94588.

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5956 W. Las Positas Blvd., Pleasanton, CA 94588.

(800) 999-5099

www.strongtie.com

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 11

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
1	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	10.51	0.011	68
		PL9-3X8.5	Plate in Bearing	15.01	10.51	0.019	70
	Inc. Bearing: 10.51 (kips)	ATS-SR6H	Rod in Tension	19.88	10.51	0.127	53
	Cum. Tension: 10.51 (kips)	HSCNW3/4	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	15.01	10.51		70

Notes:

(1) Run Termination: Top Plates

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 12

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
1	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	12.27	0.012	79
		PL9-3X8.5	Plate in Bearing	15.01	12.27	0.026	82
	Inc. Bearing: 12.27 (kips)	ATS-SR6H	Rod in Tension	19.88	12.27	0.149	62
	Cum. Tension: 12.27 (kips)	HSCNW3/4	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	15.01	12.27		82

Notes:

(1) Run Termination: Top Plates

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 13

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
1	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	14.46	0.014	93
		PL9-3X8.5	Plate in Bearing	15.01	14.46	0.037	96
	Inc. Bearing: 14.46 (kips)	ATS-SR7H	Rod in Tension	27.06	14.46	0.127	53
	Cum. Tension: 14.46 (kips)	ATS-HSC77	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	15.01	14.46		96

Notes:

(1) Run Termination: Top Plates

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 13 (Tall)

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
1	Plate Height: 19.40 (ft)	ATS-ATUD9	Take up Device	15.56	14.46	0.014	93
		PL9-5X5.5	Plate in Bearing	17.37	14.46	0.028	83
	Inc. Bearing: 14.46 (kips)	ATS-SR6H	Rod in Tension	19.88	14.46	0.087	73
	Cum. Tension: 14.46 (kips)	HSCNW3/4	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	15.10²	14.46		96

Notes:

(1) Run Termination: Bridge Block

(2) Maximum tension capacity at this level is limited by the nail design for the bridge block

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 21

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
2	Plate Height: 9.25 (ft)	RTUD6	Take up Device	20.83	10.51	0.062	50
		BPRTUD5-6C	Plate in Bearing	13.39	10.51	0.024	79
	Inc. Bearing: 10.51 (kips)	ATS-SR6H	Rod in Tension	19.88	10.51	0.112	53
	Cum. Tension: 10.51 (kips)	ATS-HSC96	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	13.39	10.51		78
1	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	12.27	0.012	79
	Floor Depth: 12.63 (in)	PL9-3X8.5	Plate in Bearing	15.01	12.27	0.026	82
	Inc. Bearing: 12.27 (kips)	ATS-SR9H	Rod in Tension	44.73	22.78	0.135	51
	Cum. Tension: 22.78 (kips)	ATS-HSC99	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	28.40	22.78		80

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 22

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
2	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	12.27	0.012	79
		PL9-3X8.5	Plate in Bearing	15.01	12.27	0.026	82
	Inc. Bearing: 12.27 (kips)	ATS-SR6H	Rod in Tension	19.88	12.27	0.136	62
	Cum. Tension: 12.27 (kips)	ATS-HSC96	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	15.01	12.27		82
1	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	14.46	0.014	93
	Floor Depth: 12.63 (in)	PL9-3X12	Plate in Bearing	21.57	14.46	0.018	67
	Inc. Bearing: 14.46 (kips)	ATS-SR9H	Rod in Tension	44.73	26.73	0.159	60
	Cum. Tension: 26.73 (kips)	ATS-HSC99	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	30.57	26.73		87

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 22 (Tall)

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
2	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	12.27	0.012	79
		PL9-5X5.5	Plate in Bearing	17.37	12.27	0.019	71
	Inc. Bearing: 12.27 (kips)	ATS-SR6H	Rod in Tension	19.88	12.27	0.135	62
	Cum. Tension: 12.27 (kips)	ATS-C126	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	15.56	12.27		79
1	Plate Height: 19.40 (ft)	ATS-ATUD14	Take up Device	24.39	14.46	0.014	59
	Floor Depth: 12.63 (in)	PL14-5X8.5	Plate in Bearing	24.60	14.46	0.016	59
	Inc. Bearing: 14.46 (kips)	ATS-R12	Rod in Tension	38.44	26.73	0.170	70
	Cum. Tension: 26.73 (kips)	ATS-C129	Coupler				
	Shrinkage: 0.29 (in)		Max.Tension Capacity	38.44	26.73		70

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 23

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
2	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	14.46	0.014	93
		PL9-3X12	Plate in Bearing	21.57	14.46	0.018	67
	Inc. Bearing: 14.46 (kips)	ATS-SR6H	Rod in Tension	19.88	14.46	0.159	73
	Cum. Tension: 14.46 (kips)	ATS-HSC106	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	15.56	14.46		93
1	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	16.65	0.015	68
	Floor Depth: 12.63 (in)	PL14-3X12	Plate in Bearing	20.54	16.65	0.026	81
	Inc. Bearing: 16.65 (kips)	ATS-SR10H	Rod in Tension	55.22	31.11	0.147	56
	Cum. Tension: 31.11 (kips)	ATS-HSC109	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	36.10	31.11		86

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 31

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
3	Plate Height: 9.25 (ft)	RTUD6	Take up Device	20.83	8.47	0.061	41
		BPRTUD5-6B	Plate in Bearing	10.30	8.47	0.027	82
	Inc. Bearing: 8.47 (kips)	ATS-R6	Rod in Tension	9.61	8.47	0.091	88
	Cum. Tension: 8.47 (kips)	ATS-C86	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	9.61	8.47		88
2	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	10.51	0.011	68
	Floor Depth: 12.63 (in)	PL9-3X8.5	Plate in Bearing	15.01	10.51	0.019	70
	Inc. Bearing: 10.51 (kips)	ATS-SR8H	Rod in Tension	35.34	18.98	0.132	54
	Cum. Tension: 18.98 (kips)	ATS-HSC108	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	24.62	18.98		77
1	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	12.27	0.013	50
	Floor Depth: 12.63 (in)	PL14-3X8.5	Plate in Bearing	13.98	12.27	0.031	88
	Inc. Bearing: 12.27 (kips)	ATS-SR10H	Rod in Tension	55.22	31.25	0.148	57
	Cum. Tension: 31.25 (kips)	ATS-HSC109	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	38.59	31.25		81

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 32

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
3	Plate Height: 9.25 (ft)	RTUD6	Take up Device	20.83	10.51	0.062	50
		BPRTUD5-6C	Plate in Bearing	13.39	10.51	0.024	79
	Inc. Bearing: 10.51 (kips)	ATS-SR6H	Rod in Tension	19.88	10.51	0.112	53
	Cum. Tension: 10.51 (kips)	ATS-HSC86	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	13.39	10.51		78
2	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	12.27	0.012	79
	Floor Depth: 12.63 (in)	PL9-3X8.5	Plate in Bearing	15.01	12.27	0.026	82
	Inc. Bearing: 12.27 (kips)	ATS-SR8H	Rod in Tension	35.34	22.78	0.158	64
	Cum. Tension: 22.78 (kips)	ATS-HSC118	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	28.40	22.78		80
1	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	14.46	0.014	59
	Floor Depth: 12.63 (in)	PL14-3X12	Plate in Bearing	20.54	14.46	0.019	70
	Inc. Bearing: 14.46 (kips)	ATS-HSR11	Rod in Tension	66.82	37.24	0.150	56
	Cum. Tension: 37.24 (kips)	ATS-HSC119	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	48.93	37.24		76

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 33

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
3	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	12.27	0.012	79
		PL9-3X8.5	Plate in Bearing	15.01	12.27	0.026	82
	Inc. Bearing: 12.27 (kips)	ATS-SR6H	Rod in Tension	19.88	12.27	0.136	62
	Cum. Tension: 12.27 (kips)	ATS-HSC96	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	15.01	12.27		82
2	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	14.46	0.014	93
	Floor Depth: 12.63 (in)	PL9-3X8.5	Plate in Bearing	15.01	14.46	0.037	96
	Inc. Bearing: 14.46 (kips)	ATS-SR9H	Rod in Tension	44.73	26.73	0.147	60
	Cum. Tension: 26.73 (kips)	ATS-HSC129	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	30.02	26.73		89
1	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	16.65	0.015	68
	Floor Depth: 12.63 (in)	PL14-3X12	Plate in Bearing	20.54	16.65	0.026	81
	Inc. Bearing: 16.65 (kips)	ATS-HSR12	Rod in Tension	79.52	43.38	0.145	55
	Cum. Tension: 43.38 (kips)	ATS-HSC129	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	50.56	43.38		86

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 41

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
4	Plate Height: 9.25 (ft)	RTUD6	Take up Device	20.83	8.47	0.061	41
		BPRTUD5-6B	Plate in Bearing	10.30	8.47	0.027	82
	Inc. Bearing: 8.47 (kips)	ATS-R6	Rod in Tension	9.61	8.47	0.091	88
	Cum. Tension: 8.47 (kips)	ATS-C76	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	9.61	8.47		88
3	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	8.47	0.009	54
	Floor Depth: 12.63 (in)	PL9-3X5.5	Plate in Bearing	10.03	8.47	0.029	84
	Inc. Bearing: 8.47 (kips)	ATS-SR7H	Rod in Tension	27.06	16.94	0.154	63
	Cum. Tension: 16.94 (kips)	ATS-HSC97	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	19.63	16.94		86
2	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	10.51	0.011	68
	Floor Depth: 12.63 (in)	PL9-3X8.5	Plate in Bearing	15.01	10.51	0.019	70
	Inc. Bearing: 10.51 (kips)	ATS-SR9H	Rod in Tension	44.73	27.45	0.151	61
	Cum. Tension: 27.45 (kips)	ATS-HSC129	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	34.64	27.45		79
1	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	12.27	0.013	50
	Floor Depth: 12.63 (in)	PL14-3X8.5	Plate in Bearing	13.98	12.27	0.031	88
	Inc. Bearing: 12.27 (kips)	ATS-HSR12	Rod in Tension	79.52	39.72	0.133	50
	Cum. Tension: 39.72 (kips)	ATS-HSC129	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	48.62	39.72		82

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.



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Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 42

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
4	Plate Height: 9.25 (ft)	RTUD6	Take up Device	20.83	8.47	0.061	41
		BPRTUD5-6B	Plate in Bearing	10.30	8.47	0.027	82
	Inc. Bearing: 8.47 (kips)	ATS-R6	Rod in Tension	9.61	8.47	0.091	88
	Cum. Tension: 8.47 (kips)	ATS-C86	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	9.61	8.47		88
3	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	10.51	0.011	68
	Floor Depth: 12.63 (in)	PL9-3X8.5	Plate in Bearing	15.01	10.51	0.019	70
	Inc. Bearing: 10.51 (kips)	ATS-SR8H	Rod in Tension	35.34	18.98	0.132	54
	Cum. Tension: 18.98 (kips)	ATS-HSC108	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	24.62	18.98		77
2	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	12.27	0.013	50
	Floor Depth: 12.63 (in)	PL14-3X8.5	Plate in Bearing	13.98	12.27	0.031	88
	Inc. Bearing: 12.27 (kips)	ATS-SR10H	Rod in Tension	55.22	31.25	0.136	57
	Cum. Tension: 31.25 (kips)	ATS-HSC1210	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	38.59	31.25		81
1	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	14.46	0.014	59
	Floor Depth: 12.63 (in)	PL14-3X12	Plate in Bearing	20.54	14.46	0.019	70
	Inc. Bearing: 14.46 (kips)	ATS-HSR12	Rod in Tension	79.52	45.71	0.153	57
	Cum. Tension: 45.71 (kips)	ATS-HSC129	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	59.13	45.71		77

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 43

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
4	Plate Height: 9.25 (ft)	RTUD6	Take up Device	20.83	10.51	0.062	50
		BPRTUD5-6C	Plate in Bearing	13.39	10.51	0.024	79
	Inc. Bearing: 10.51 (kips)	ATS-SR6H	Rod in Tension	19.88	10.51	0.112	53
	Cum. Tension: 10.51 (kips)	ATS-HSC86	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	13.39	10.51		78
3	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	12.27	0.012	79
	Floor Depth: 12.63 (in)	PL9-3X8.5	Plate in Bearing	15.01	12.27	0.026	82
	Inc. Bearing: 12.27 (kips)	ATS-SR8H	Rod in Tension	35.34	22.78	0.158	64
	Cum. Tension: 22.78 (kips)	ATS-HSC108	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	28.40	22.78		80
2	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	14.46	0.014	59
	Floor Depth: 12.63 (in)	PL14-3X12	Plate in Bearing	20.54	14.46	0.019	70
	Inc. Bearing: 14.46 (kips)	ATS-SR10H	Rod in Tension	55.22	37.24	0.161	67
	Cum. Tension: 37.24 (kips)	ATS-HSC1410	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	48.93	37.24		76
1	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	16.65	0.015	68
	Floor Depth: 12.63 (in)	PL14-3X12	Plate in Bearing	20.54	16.65	0.026	81
	Inc. Bearing: 16.65 (kips)	ATS-HSR14	Rod in Tension	108.24	53.89	0.138	50
	Cum. Tension: 53.89 (kips)	ATS-HSC149	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	69.47	53.89		78

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.



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Job Id: ES-190602

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Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Run Configuration: 44

Level	Specification	Selected	Description/Notes	Capacity (kips)	Demand (kips)	Defl (in)	D/C Ratio
4	Plate Height: 9.25 (ft)	RTUD6	Take up Device	20.83	10.51	0.062	50
		BPRTUD5-6C	Plate in Bearing	13.39	10.51	0.024	79
	Inc. Bearing: 10.51 (kips)	ATS-SR6H	Rod in Tension	19.88	10.51	0.112	53
	Cum. Tension: 10.51 (kips)	ATS-HSC86	Coupler				
	Shrinkage: 0.11 (in)		Max.Tension Capacity	13.39	10.51		78
3	Plate Height: 9.25 (ft)	ATS-ATUD9	Take up Device	15.56	12.27	0.012	79
	Floor Depth: 12.63 (in)	PL9-3X8.5	Plate in Bearing	15.01	12.27	0.026	82
	Inc. Bearing: 12.27 (kips)	ATS-SR8H	Rod in Tension	35.34	22.78	0.158	64
	Cum. Tension: 22.78 (kips)	ATS-HSC108	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	28.40	22.78		80
2	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	14.46	0.014	59
	Floor Depth: 12.63 (in)	PL14-3X12	Plate in Bearing	20.54	14.46	0.019	70
	Inc. Bearing: 14.46 (kips)	ATS-SR10H	Rod in Tension	55.22	37.24	0.161	67
	Cum. Tension: 37.24 (kips)	ATS-HSC1410	Coupler				
	Shrinkage: 0.17 (in)		Max.Tension Capacity	48.93	37.24		76
1	Plate Height: 9.25 (ft)	ATS-ATUD14	Take up Device	24.39	16.65	0.015	68
	Floor Depth: 12.63 (in)	PL14-3X12	Plate in Bearing	20.54	16.65	0.026	81
	Inc. Bearing: 16.65 (kips)	ATS-HSR14	Rod in Tension	108.24	53.89	0.138	50
	Cum. Tension: 53.89 (kips)	ATS-HSC149	Coupler				
	Shrinkage: 0.23 (in)		Max.Tension Capacity	69.47	53.89		78

Notes:

(1) Run Termination: Top Plates

(2) The maximum tension capacity of the system at any level cannot exceed the summation of the controlling component capacities of levels above.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

System Deflection Check

Level	Rod Elongation (in)		TUD	Take-up Device Deflection					Bearing Plate Deformation		Total Δ (in)	Total Deform. Limit
	Δ_{rod} (in)	Rod Elongation Limit		Δ_R (in)	Δ_A (in)	TUD D/C Ratio (%)	Actual Δ_A (in)	Total Δ_{TUD} (in)	Bearing Plate D/C Ratio (%)	$\Delta_{bearing}$ (in)		
Run ID: 11												
1	0.127	-	ATS-ATUD9	0.002	0.013	68	0.009	0.011	70	0.019	0.157	0.200
Run ID: 12												
1	0.149	-	ATS-ATUD9	0.002	0.013	79	0.010	0.012	82	0.026	0.187	0.200
Run ID: 13												
1	0.127	-	ATS-ATUD9	0.002	0.013	93	0.012	0.014	96	0.037	0.178	0.200
Run ID: 13 (Tall)												
1	0.087	-	ATS-ATUD9	0.002	0.013	93	0.012	0.014	83	0.028	0.129	0.200
Run ID: 21												
2	0.112	-	RTUD6	0.057	0.010	50	0.005	0.062	79	0.024	0.198	0.200
1	0.135	-	ATS-ATUD9	0.002	0.013	79	0.010	0.012	82	0.026	0.173	0.200
Run ID: 22												
2	0.136	-	ATS-ATUD9	0.002	0.013	79	0.010	0.012	82	0.026	0.174	0.200
1	0.159	-	ATS-ATUD9	0.002	0.013	93	0.012	0.014	67	0.018	0.191	0.200
Run ID: 22 (Tall)												
2	0.135	-	ATS-ATUD9	0.002	0.013	79	0.010	0.012	71	0.019	0.166	0.200
1	0.170	-	ATS-ATUD14	0.005	0.015	59	0.009	0.014	59	0.016	0.200	0.200
Run ID: 23												
2	0.159	-	ATS-ATUD9	0.002	0.013	93	0.012	0.014	67	0.018	0.191	0.200
1	0.147	-	ATS-ATUD14	0.005	0.015	68	0.010	0.015	81	0.026	0.188	0.200
Run ID: 31												
3	0.091	-	RTUD6	0.057	0.010	41	0.004	0.061	82	0.027	0.179	0.200
2	0.132	-	ATS-ATUD9	0.002	0.013	68	0.009	0.011	70	0.019	0.162	0.200
1	0.148	-	ATS-ATUD14	0.005	0.015	50	0.008	0.013	88	0.031	0.192	0.200
Run ID: 32												
3	0.112	-	RTUD6	0.057	0.010	50	0.005	0.062	79	0.024	0.198	0.200
2	0.158	-	ATS-ATUD9	0.002	0.013	79	0.010	0.012	82	0.026	0.196	0.200
1	0.150	-	ATS-ATUD14	0.005	0.015	59	0.009	0.014	70	0.019	0.183	0.200
Run ID: 33												
3	0.136	-	ATS-ATUD9	0.002	0.013	79	0.010	0.012	82	0.026	0.174	0.200
2	0.147	-	ATS-ATUD9	0.002	0.013	93	0.012	0.014	96	0.037	0.198	0.200
1	0.145	-	ATS-ATUD14	0.005	0.015	68	0.010	0.015	81	0.026	0.186	0.200
Run ID: 41												
4	0.091	-	RTUD6	0.057	0.010	41	0.004	0.061	82	0.027	0.179	0.200
3	0.154	-	ATS-ATUD9	0.002	0.013	54	0.007	0.009	84	0.029	0.192	0.200
2	0.151	-	ATS-ATUD9	0.002	0.013	68	0.009	0.011	70	0.019	0.181	0.200
1	0.133	-	ATS-ATUD14	0.005	0.015	50	0.008	0.013	88	0.031	0.177	0.200

System Deflection Check Continued

Level	Rod Elongation (in)		Take-up Device Deflection						Bearing Plate Deformation		Total Δ (in)	Total Deform. Limit
	Δ_{rod} (in)	Rod Elongation Limit	TUD	Δ_R (in)	Δ_A (in)	TUD D/C Ratio (%)	Actual Δ_A (in)	Total Δ_{TUD} (in)	Bearing Plate D/C Ratio (%)	$\Delta_{bearing}$ (in)		
Run ID: 42												
4	0.091	-	RTUD6	0.057	0.010	41	0.004	0.061	82	0.027	0.179	0.200
3	0.132	-	ATS-ATUD9	0.002	0.013	68	0.009	0.011	70	0.019	0.162	0.200
2	0.136	-	ATS-ATUD14	0.005	0.015	50	0.008	0.013	88	0.031	0.180	0.200
1	0.153	-	ATS-ATUD14	0.005	0.015	59	0.009	0.014	70	0.019	0.186	0.200
Run ID: 43												
4	0.112	-	RTUD6	0.057	0.010	50	0.005	0.062	79	0.024	0.198	0.200
3	0.158	-	ATS-ATUD9	0.002	0.013	79	0.010	0.012	82	0.026	0.196	0.200
2	0.161	-	ATS-ATUD14	0.005	0.015	59	0.009	0.014	70	0.019	0.194	0.200
1	0.138	-	ATS-ATUD14	0.005	0.015	68	0.010	0.015	81	0.026	0.179	0.200
Run ID: 44												
4	0.112	-	RTUD6	0.057	0.010	50	0.005	0.062	79	0.024	0.198	0.200
3	0.158	-	ATS-ATUD9	0.002	0.013	79	0.010	0.012	82	0.026	0.196	0.200
2	0.161	-	ATS-ATUD14	0.005	0.015	59	0.009	0.014	70	0.019	0.194	0.200
1	0.138	-	ATS-ATUD14	0.005	0.015	68	0.010	0.015	81	0.026	0.179	0.200

Notes:

(1) Rod Elongation, TUD D/C Ratio, and Bearing Plate D/C Ratio values are taken from the run configuration pages.

(2) Δ_R and Δ_A values are listed in ICC-ES ESR-2320.

(3) Actual $\Delta_A = \Delta_A \times (\text{TUD D/C Ratio})$.

(4) $\Delta_{TUD \text{ Total}} = \Delta_R + \text{Actual } \Delta_A$.

(5) $\Delta_{bearing}$ is interpolated between 0.02" and 0.04" when the Demand/Capacity Ratio is between 73% and 100% of bearing capacity perpendicular to grain. $\Delta_{bearing}$ is interpolated between 0" and 0.02" when the Demand/Capacity Ratio is between 0% and 73% of bearing capacity perpendicular to grain. See 2005 NDS Section 4.2.6 for additional information.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Rod Design

Level	Plate Height (ft)	Floor Depth (in)	Tension Demand P (kips)	Model No.	Dia, d (in)	Ag (sq.in)	Ae (sq.in)	Fu (ksi)	Fy (ksi)	Tension Capacity (kips)	Elong. (in)
-------	-------------------	------------------	-------------------------	-----------	-------------	------------	------------	----------	----------	-------------------------	-------------

Run ID: 11

1	9.25	N/A	10.51	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.127
---	------	-----	-------	----------	-------	-------	-------	-----	----	-------	-------

Run ID: 12

1	9.25	N/A	12.27	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.149
---	------	-----	-------	----------	-------	-------	-------	-----	----	-------	-------

Run ID: 13

1	9.25	N/A	14.46	ATS-SR7H	0.875	0.601	0.462	120	92	27.06	0.127
---	------	-----	-------	----------	-------	-------	-------	-----	----	-------	-------

Run ID: 13 (Tall)

1	19.40	N/A	14.46	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.087
---	-------	-----	-------	----------	-------	-------	-------	-----	----	-------	-------

Run ID: 21

2	9.25	N/A	10.51	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.112
1	9.25	12.63	22.78	ATS-SR9H	1.125	0.994	0.763	120	92	44.73	0.135

Run ID: 22

2	9.25	N/A	12.27	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.136
	9.25	12.63	26.73	ATS-SR9H	1.125	0.994	0.763	120	92	44.73	0.159

Run ID: 22 (Tall)

2	9.25	N/A	12.27	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.135
1	19.40	12.63	26.73	ATS-R12	1.500	1.767	1.405	58	36	38.44	0.170

Run ID: 23

2	9.25	N/A	14.46	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.159
1	9.25	12.63	31.11	ATS-SR10H	1.250	1.227	0.969	120	92	55.22	0.147

Run ID: 31

3	9.25	N/A	8.47	ATS-R6	0.750	0.442	0.334	58	36	9.61	0.091
2	9.25	12.63	18.98	ATS-SR8H	1.000	0.785	0.606	120	92	35.34	0.132
1	9.25	12.63	31.25	ATS-SR10H	1.250	1.227	0.969	120	92	55.22	0.148

Run ID: 32

3	9.25	N/A	10.51	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.112
2	9.25	12.63	22.78	ATS-SR8H	1.000	0.785	0.606	120	92	35.34	0.158
1	9.25	12.63	37.24	ATS-HSR11	1.375	1.485	1.155	120	92	66.82	0.150

Run ID: 33

3	9.25	N/A	12.27	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.136
2	9.25	12.63	26.73	ATS-SR9H	1.125	0.994	0.763	120	92	44.73	0.147
1	9.25	12.63	43.38	ATS-HSR12	1.500	1.767	1.405	120	92	79.52	0.145

Run ID: 41

4	9.25	N/A	8.47	ATS-R6	0.750	0.442	0.334	58	36	9.61	0.091
3	9.25	12.63	16.94	ATS-SR7H	0.875	0.601	0.462	120	92	27.06	0.154
2	9.25	12.63	27.45	ATS-SR9H	1.125	0.994	0.763	120	92	44.73	0.151
1	9.25	12.63	39.72	ATS-HSR12	1.500	1.767	1.405	120	92	79.52	0.133

Rod Design Continued

Level	Plate Height (ft)	Floor Depth (in)	Tension Demand P (kips)	Model No.	Dia, d (in)	Ag (sq.in)	Ae (sq.in)	Fu (ksi)	Fy (ksi)	Tension Capacity (kips)	Elong. (in)
-------	-------------------	------------------	-------------------------	-----------	-------------	------------	------------	----------	----------	-------------------------	-------------

Run ID: 42

4	9.25	N/A	8.47	ATS-R6	0.750	0.442	0.334	58	36	9.61	0.091
3	9.25	12.63	18.98	ATS-SR8H	1.000	0.785	0.606	120	92	35.34	0.132
2	9.25	12.63	31.25	ATS-SR10H	1.250	1.227	0.969	120	92	55.22	0.136
1	9.25	12.63	45.71	ATS-HSR12	1.500	1.767	1.405	120	92	79.52	0.153

Run ID: 43

4	9.25	N/A	10.51	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.112
3	9.25	12.63	22.78	ATS-SR8H	1.000	0.785	0.606	120	92	35.34	0.158
2	9.25	12.63	37.24	ATS-SR10H	1.250	1.227	0.969	120	92	55.22	0.161
1	9.25	12.63	53.89	ATS-HSR14	1.750	2.405	1.899	120	92	108.24	0.138

Run ID: 44

4	9.25	N/A	10.51	ATS-SR6H	0.750	0.442	0.334	120	92	19.88	0.112
3	9.25	12.63	22.78	ATS-SR8H	1.000	0.785	0.606	120	92	35.34	0.158
2	9.25	12.63	37.24	ATS-SR10H	1.250	1.227	0.969	120	92	55.22	0.161
1	9.25	12.63	53.89	ATS-HSR14	1.750	2.405	1.899	120	92	108.24	0.138

Notes:

(1) Rod Area (Ag) = $(3.14) (d^2) / 4$

(2) Allowable Rod capacity = $0.75 * Fu * Ag / 2.0$ for 13th ED AISC.

(3) Rod elongation = $PL / (Ae * E)$, E = 29,000 ksi.

(4) Effective Area (Ae) = $0.7854 * (d_b - 0.9743/n)^2$ where d_b = bolt diameter & n = number of threads per inch.

(5) Elongation at first level is based on the effective area of the anchor bolt projecting 4 inches out of concrete, and the effective area of the Rod for the remaining distance to the sole plate above. Elongation of elevated levels is based on the effective area of the Rod from the level below projecting 6 inches above the sole plate, and the effective area of the Rod at that level, for the remaining distance to the sole plate above.

(6) Elongation for Strong-Rod XL's is based on the effective area of 2.41 in² of the length of the larger diameter, plus the effective area of a 1.125" diameter threaded rod over the remaining length, plus the effective area of any anchor bolts over a 4" projection where they occur.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Bearing Plate Design

Level	Bearing Demand (kips)	Model No.	W (in)	L (in)	Hole Dia (in)	Bearing Factor	Wall Plate or Wood Beam Species	Fc perp (ksi)	Bearing Area (in ²)	Allowable Capacity (kips)
-------	-----------------------	-----------	--------	--------	---------------	----------------	---------------------------------	---------------	---------------------------------	---------------------------

Run ID: 11

1	10.51	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
---	-------	-----------	------	------	--------	------	-----	-------	--------	-------

Run ID: 12

1	12.27	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
---	-------	-----------	------	------	--------	------	-----	-------	--------	-------

Run ID: 13

1	14.46	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
---	-------	-----------	------	------	--------	------	-----	-------	--------	-------

Run ID: 13 (Tall)

1	14.46	PL9-5X5.5	5.00	5.50	1.1875	1.07	DFL	0.625	26.015	17.37
---	-------	-----------	------	------	--------	------	-----	-------	--------	-------

Run ID: 21

2	10.51	BPRTUD5-6C	3.00	7.50	1.0000	1.00	DFL	0.625	21.418	13.39
1	12.27	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01

Run ID: 22

2	12.27	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
1	14.46	PL9-3X12	3.00	12.00	1.1875	1.00	DFL	0.625	34.515	21.57

Run ID: 22 (Tall)

2	12.27	PL9-5X5.5	5.00	5.50	1.1875	1.07	DFL	0.625	26.015	17.37
1	14.46	PL14-5X8.5	5.00	8.50	1.8125	1.00	DFL	0.625	39.358	24.60

Run ID: 23

2	14.46	PL9-3X12	3.00	12.00	1.1875	1.00	DFL	0.625	34.515	21.57
1	16.65	PL14-3X12	3.00	12.00	1.8125	1.00	DFL	0.625	32.858	20.54

Run ID: 31

3	8.47	BPRTUD5-6B	3.00	5.50	1.0000	1.07	DFL	0.625	15.418	10.30
2	10.51	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
1	12.27	PL14-3X8.5	3.00	8.50	1.8125	1.00	DFL	0.625	22.358	13.98

Run ID: 32

3	10.51	BPRTUD5-6C	3.00	7.50	1.0000	1.00	DFL	0.625	21.418	13.39
2	12.27	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
1	14.46	PL14-3X12	3.00	12.00	1.8125	1.00	DFL	0.625	32.858	20.54

Run ID: 33

3	12.27	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
2	14.46	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
1	16.65	PL14-3X12	3.00	12.00	1.8125	1.00	DFL	0.625	32.858	20.54

Run ID: 41

4	8.47	BPRTUD5-6B	3.00	5.50	1.0000	1.07	DFL	0.625	15.418	10.30
3	8.47	PL9-3X5.5	3.00	5.50	1.1875	1.07	DFL	0.625	15.015	10.03
2	10.51	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
1	12.27	PL14-3X8.5	3.00	8.50	1.8125	1.00	DFL	0.625	22.358	13.98



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(800) 999-5099

www.strongtie.com

Bearing Plate Design Continued

Level	Bearing Demand (kips)	Model No.	W (in)	L (in)	Hole Dia (in)	Bearing Factor	Wall Plate or Wood Beam Species	Fc perp (ksi)	Bearing Area (in ²)	Allowable Capacity (kips)
-------	-----------------------	-----------	--------	--------	---------------	----------------	---------------------------------	---------------	---------------------------------	---------------------------

Run ID: 42

4	8.47	BPRTUD5-6B	3.00	5.50	1.0000	1.07	DFL	0.625	15.418	10.30
3	10.51	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
2	12.27	PL14-3X8.5	3.00	8.50	1.8125	1.00	DFL	0.625	22.358	13.98
1	14.46	PL14-3X12	3.00	12.00	1.8125	1.00	DFL	0.625	32.858	20.54

Run ID: 43

4	10.51	BPRTUD5-6C	3.00	7.50	1.0000	1.00	DFL	0.625	21.418	13.39
3	12.27	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
2	14.46	PL14-3X12	3.00	12.00	1.8125	1.00	DFL	0.625	32.858	20.54
1	16.65	PL14-3X12	3.00	12.00	1.8125	1.00	DFL	0.625	32.858	20.54

Run ID: 44

4	10.51	BPRTUD5-6C	3.00	7.50	1.0000	1.00	DFL	0.625	21.418	13.39
3	12.27	PL9-3X8.5	3.00	8.50	1.1875	1.00	DFL	0.625	24.015	15.01
2	14.46	PL14-3X12	3.00	12.00	1.8125	1.00	DFL	0.625	32.858	20.54
1	16.65	PL14-3X12	3.00	12.00	1.8125	1.00	DFL	0.625	32.858	20.54

Notes:

(1) Bearing area factor, $C_b = (l_b + 0.375) / l_b$ for $l_b < 6$, $C_b = 1.00$ for $l_b \geq 6$.

(2) The plate bending capacity is evaluated and included in the allowable load rating.

(3) When bearing plate is at top level, the Designer is responsible for checking the bending and shear of the double top plates.

Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Nail Design for Bridge Block

Level	Tension Demand, P (kips)	Fastener	Total Minimum Fasteners	Stud Species	Allow. Load Per Fastener (100) (kips)	Allow. Load Per Fastener (160) (kips)	Allowable Load (kips)
-------	--------------------------	----------	-------------------------	--------------	---------------------------------------	---------------------------------------	-----------------------

Run ID: 13 (Tall)

1	14.46	10d	80	DFL	0.118	0.189	15.10
---	-------	-----	----	-----	-------	-------	-------

Notes:

- (1) Load duration factor, $C_d = 1.6$.
- (2) Use half of the required fasteners each side to connect full height studs to cripple studs.
- (3) Minimum edge distances per NDS shall be met.
- (4) All pertinent information and notes in the most current Simpson Strong-Tie catalog apply.

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5956 W. Las Positas Blvd., Pleasanton, CA 94588.

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Job Id: ES-190602

Date of Input: Feb 04, 2019

Job Name: Legacy Livermore

Structural Date of Plans: N/A

Architectural Date of Plans: N/A

Cripple Stud Design for Bridge Block

Level	Tension Demand (kips)	Location	Type	Lumber	Species	Total Area (sq.in)	Fc perp (ksi)	Bearing Cap. (kips)
-------	-----------------------	----------	------	--------	---------	--------------------	---------------	---------------------

Run ID: 13 (Tall)

1	14.46	EA Side	4x	N/A	-	-	-	-
	14.46	EA Side	6x	(2) 2x6	DFL	33.000	0.625	20.63

Notes:

- (1) Bearing capacity always governs over stability capacity for bridge block. Therefore, only bearing capacity is calculated.
- (2) Column bearing factor $C_b = 1.0$
- (3) Bearing capacity = $(F_c \text{ perp})(A)(C_b)$. Load duration factor does not apply.
- (4) $F_c \text{ perp}$ is based on the Bridge block header species.
- (5) The lumber listed is the number of cripple studs on each side of the rod.
- (6) Lumber listed in grey cells fits into 4" nominal walls. Lumber listed in white cells fits into 6" nominal walls.

APPENDIX B

STRUCTURAL CALCULATIONS FOR HARDY FRAME

Hardy Frame®
Special Moment Frame Calculations

Model #: HFSMF – 1901101
Tracking #: 1901101

Project:
Legacy at Livermore
First & S. L Street, Livermore, CA

by

MiTek USA, Inc.
1732 Palma Drive, Suite 200
Ventura, California 93003

(800) 754-3030

February 1st, 2019

Note: MiTek warrants that this design of the Hardy Frame® Special Moment Frame is appropriate for the loads and geometry outlined herein. It is the responsibility of the Specifier to verify that the geometry and loading meet the requirements of the application for which this product has been specified.

Warning Notice: These calculations are only applicable for use when using a SidePlate® connection design prepared by a registered design professional of MiTek USA, Inc. or it's subsidiary, SidePlate Systems, Inc.

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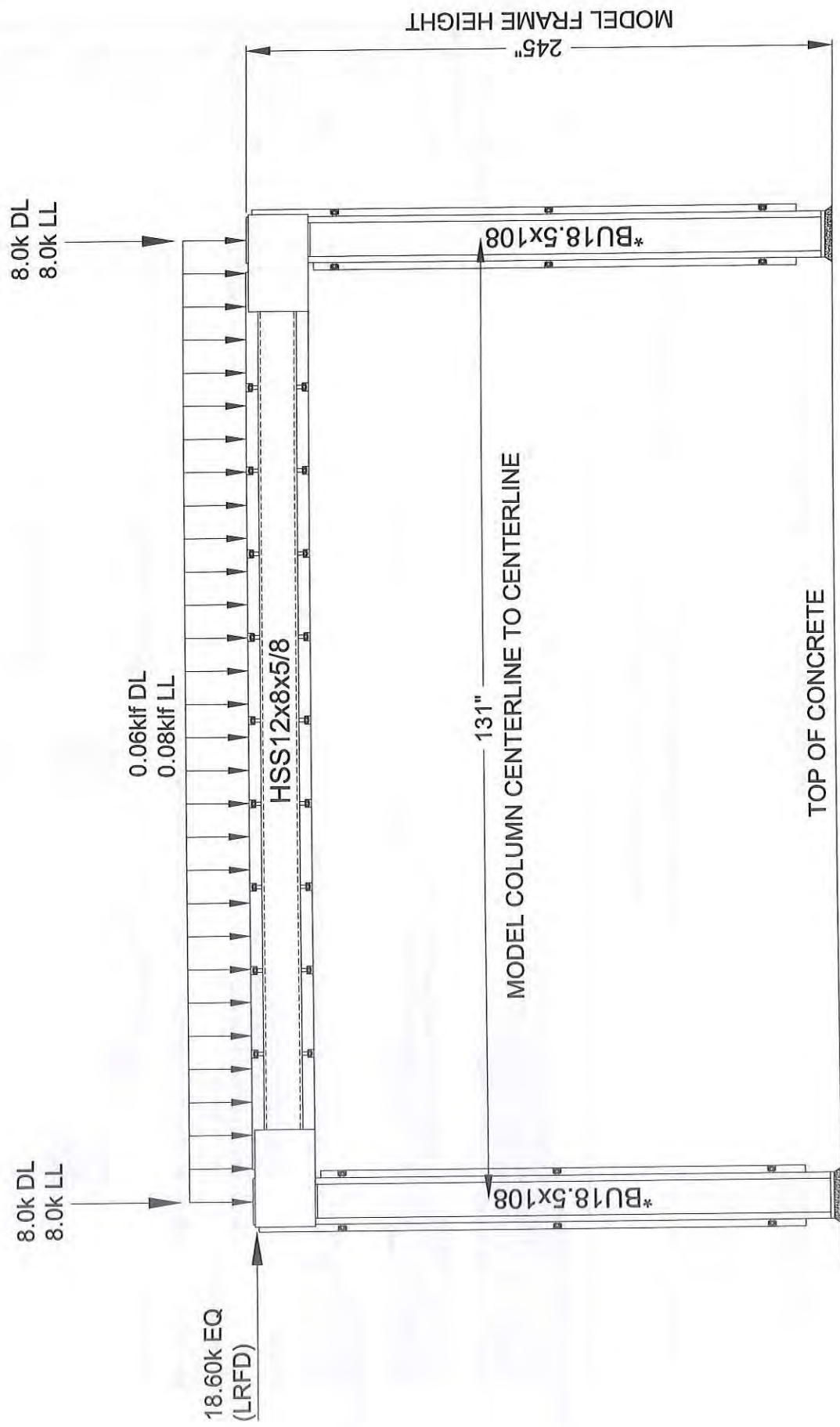
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HARDY FRAME SPECIAL MOMENT FRAME LOADING DIAGRAM

HFSMF-1901101 (REFERENCE #: 1901101)



MOMENT FRAME FRONT ELEVATION VIEW
(PINNED BASE CONFIGURATION)

*MOMENT FRAME SHOWN IS NOT IN SCALE

*BU = BUILT-UP COLUMNS

Tracking #: 1901101

Model #: HFSMF-1901101

Frame Quantity: 2

Model Geometry and Fabrication Parameters:

Top of 3x Nailer Elev. at 1': 245 in

Top of Beam Elev. at 1': 242 1/2 in

Floor Joists are bearing

Beam(s): HSS12x8x5/8
Columns: BU18.5x108

W_{in}: 112 1/2 in
W_{out}: 151 in

Col CL Span: 131 in

Clear Height Dimension
h₁: 228 in

Depth of Floor System
F1:

3/4" shear studs per wood connection (Bay 1): 9

Which shall be evenly spaced within 4 inches to 3 feet apart

3/4" shear studs per steel connection (Bay 1): 4

Governing Codes and Standards:

Codes: 2012 & 2015 IBC, 2013 & 2016 CBC, AISC 341-10 & AISC 341-16

Steel Frame (Beam, Column, Base Plate, Anchor Bolts): LRFD

Structural Wood Nailer & Steel Stud Shear Transfer: ASD

SidePlate® Pre-qualified Moment Connection Design: AISC 358 S2-14 & AISC 358-16, CH. 11

Design Factors of Safety:

Stress and vertical beam deflection limited to 99% of code allowable for all designs.

Lateral frame deflection limited to 99% of code allowable for all designs.

Beam Deflection Checks:

L/120: DL only

L/240: DL+LL

L/360: LL only

Frame Design Input:

SAP Frame Modeling Software

V20.11

Model represents P-Δ effects, fully rigid panel zone & SidePlate® connection stiffness

Material:

Column: ASTM A572 Grade 50

Beam: ASTM A500 Grade B (F_y=46ksi)

Connection Plate: ASTM A572 Grade 50

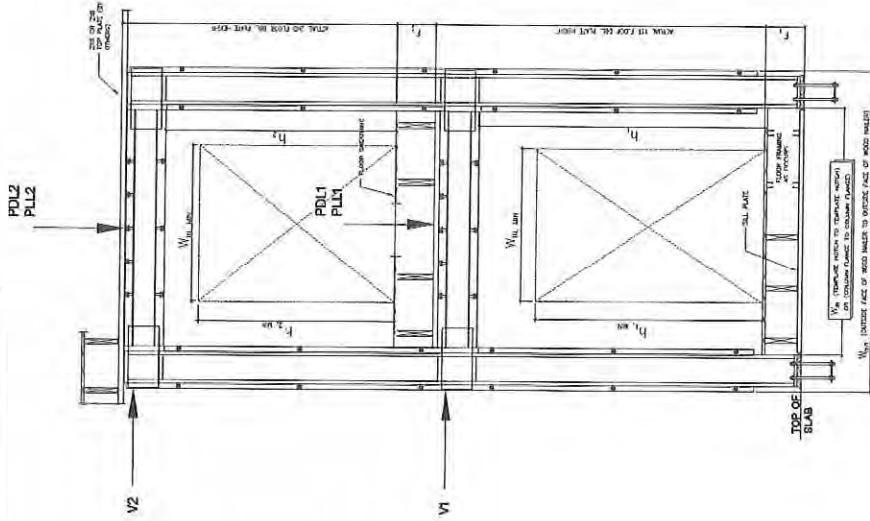
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Column Base Fixity:

Beam Loads: Refer to Non-Standard Specification Sheet for Engineer's Loading Criteria

In-Plane Shear, V:

	EQ Loading		WIND Loading (Stress)	
	LRFD	ASD	LRFD	ASD
1st Story:	18.57 k	13.00 k	1st Story:	-
2nd Story:	-	-	2nd Story:	-
3rd Story:	-	-	3rd Story:	-
4th Story:	-	-	4th Story:	-
WIND Loading (Drift)				
	LRFD		ASD	
	LRFD	ASD	LRFD	ASD
1st Story:	-	-	1st Story:	-
2nd Story:	-	-	2nd Story:	-
3rd Story:	-	-	3rd Story:	-
4th Story:	-	-	4th Story:	-



Tracking #: 1901101

Model #: HFSMF-1901101

Frame Quantity: 2

Story Drift and Loading Summary:

Load	R	C _d	Level	Story Height h (in)	Inter-story Drift Limit (in) @	LRFD ^①		Minimum total number of 3/4" DIA studs req'd for wood connection @	Minimum total number of 3/4" DIA studs req'd for steel connection @
EQ	6.5	4.0	1	242.5	4.8500	Elastic Drift Δ _e (in) @	Amplified Drift = C _d *Δ _e	Inter-story Drift Ratio = C _d *Δ _e /h (EQ) or = Δ _e /h (WIND)	1.91%
			2			1.1607	4.6428		9
			3						
			4						
WIND	-	-	1						
			2						
			3						
			4						

Column Base Reactions (Unfactored) @:

Load Case	Shear / Column (k)	Axial / Column (k)	Moment / Column (k-in)
DL	0.07	11.25	
LL	0.04	8.44	
EQ @	9.48	34.79	
WIND			

① As required per code, story drift is checked at an LRFD level load.

② Seismic Inter-story Drift (IDR) Limit:

③ Wind Inter-story Drift Limit (For 50 yrs MRI):

④ Story drift (Δ_e) are values reported from SAP2000 model.

⑤ From Table 12B ANSI/AISC 360-15, G=0.5, 2 1/2" member (2-1/2" nailer countersunk 3/4" = 1 3/4" nailer), stud cap = 960 lb * 1.6 = 1536 lb / stud

⑥ Nominal shear strength of ASTM A36 Threaded bolts from AISC Table J3.2 and Equation J3-1, 0.450 * 60 ksi * 3/4" bolt area = 11928 lb / stud

⑦ It is assumed that shear distributed uniformly across the entire frame length.

⑧ If applicable, the reactions can be used for grade beam design after applying appropriate load factors

⑨ EQ & HD load values do not include overstrength (Q) factor and redundancy factor (ρ).

Base Plate Checks (LRFD - See supporting calculations)

Base plate material is ASTM A36.

Check Concrete Crushing ((1.2+0.2S_{DS})/D+1.0L±QE or 1.2D+1.0L±W)

Max Axial Load:

127.2 kips

Available Axial Load Capacity:

592.6 kips

OK

Check Uplift on Base Plate ((0.9-0.2S_{DS})/D±QE or 0.9D±W)

Max Uplift:

95.1 kips

Available Uplift Capacity:

113.9 kips

OK

Base plate Weld Check

(Checked using combined shear and uplift)

Resultant force on welds:

99.3 kips

Weld Capacity:

124.3 kips

OK

Check Concrete Shear Breakout ((1.2+0.2S_{DS})/D+1.0L±QE or 1.2D+1.0L±W)

Max Shear Transfer:

28.6 kips

Available Shear Capacity:

36.0 kips

OK

Stress Check Summary:

Column Stress Ratio:

0.424

Beam Stress Ratio:

0.259

Beam Deflection Checks:

L/120: DL only

0.002

Strong Column - Weak Beam Check:

Strong Col.-Weak Bm. OK

Strength Ratio A/B = 1.100

Greater Than 1 - OK

Column Axial Stress Ratio:

0.052

L/360: LL only

0.002

< 1.0

OK

L/240: DL+LL

0.002

< 1.0

OK

SidePlate® Connection Design:

The SidePlate® connection design used to complete the Hardy Frame® moment frame design is prepared by a registered design professional of SidePlate Systems, Inc. using the SidePlate® Connection Design Software

SidePlate FRAME® Connection Design:

One-Sided Connection (A-Series)

Project: HFSMF-1901101-Legacy at Livermore
 EOR: Elliott Kwok, PASE
 SP Eng: Francis Liu
 Date: 1/31/2019

Framing Level: TYP
 Column Grid: TYP
 Connection ID: A1(a)

USER INPUT SUMMARY

General Proj. Type: R=4.5,8 (IMF,SMF)
 Connection Config.: Type A (Exterior)
 Design Method: Load Case 1 (Mp Only)

Design Check Alerts	Legend	1) Span to Depth	4) Compatibility	7) Col. Web Shear
Design Limit Checks:	OK	2) Compactness	5) Col Flange Strength	
Special Considerations:	OK	3) SCWB	6) Col. Panel Zone Shear	

Member Size & Dimensions

Beam 1:	Beam 2:	Column:
Beam Size: HSS12X8X5/8	Beam Size: N/A	Column Size: BU18.5X108
C to C Span: 10.92 ft	C to C Span: N/A	Adjacent Column 1: BU18.5X108
Beam Fixity: Fix-Fix	Beam Fixity: N/A	Adjacent Column 2: N/A
		Story Heights
		Above Joint: 0.00 ft
		Below Joint: 20.50 ft
		Base Fixity: Pin

Loading Conditions

Factored Loads (a) 1.2D + f ₁ L + 0.2S ; (b) +QE					
Beam Loads:	Beam 1:	Beam 2:	Column Axial Loads:		Perpendicular Loads:
Gravity DL+LL @Hinge (a):	2.0 kips	N/A	Compression (a) + (b):	130.0 kips	Moment (a):
Axial (amplified):	0.0 kips	N/A	Tension (0 if N/A):	100.0 kips	Shear (a):
Associated Mom. @Hinge:	6345 kip-in	N/A			Axial (amplified):
					Left Side: 0.0 kip-in
					Right Side: 0.0 kip-in

Material Properties	Fy (ksi)	Fu (ksi)	Ry	C _{pr}	Miscellaneous
Beam 1 Material: A500 Gr. B	46	58	1.4	1.20	Cover Plate Type: N/A
Beam 2 Material: N/A	N/A	N/A	N/A	N/A	Weld 6: Required
Column Material: A572 Gr.50	50	65			Pendicular Member: Vertical Shear Element (VSE*) Type:
Plate Material: A572 Gr.50	50	65			Left: Right: Beam 1: Beam 2:
Electrode: E70XX	N/A	70			N/A N/A

OUTPUT SUMMARY

Design Limit Checks

Beam 1 Limit Checks:	Beam 2 Limit Checks:
Hinge-to-Hinge Span to Beam Depth Limits: • 6.0	Hinge-to-Hinge Span to Beam Depth Limits:
1) H-H Span to Depth: 6.20 > 6.00 OK	1) H-H Span to Depth: N/A
2) Compactness (b/l): 13.81 > 10.80 > 2.0 OK	2) Compactness N/A
Connection Limit Checks: See Page 4 for Checks 3), 5) and 6)	
3) Strong Column-Weak Beam Ratio: 1.10 > 1.00 OK	
4) Compatibility: i) - Beam/Column Width: 8.00 = 8.00 OK	
ii) - Weld/Flange Thickness: Beam 1 Weld 5 N/A	
Weld 2 OK Beam 2 Weld 5 N/A	
5) Column Flange Strength DCR: 0.93 < 1.00 OK	
6) Col. Panel Zone Shear: 0.62 < 1.00 OK	7) Col. Web Shear: 0.33 < 1.00 OK

Design Limit Check Notes

Connection Schedule

*Note: Welds [2] and [7] indicate reinforcing fillet weld sizes if HSS sections are used for the column and beams respectively

CNXX ID	A1(a)	Plate Thickness (in)	Weld Size (in)				Dimensions (in)			
Column Size			1	2	3		Gap	Dim A	Dim B	Dim C
BU18.5X108		1 1/2 3/8	5/16	9/16	5/16					
Beam 1 Size			4	5	5a	6	7			
HSS12X8X5/8		N/A N/A	N/A	N/A	N/A	1/4	1/4	3	15	15 1/2
Beam 2 Size			4	5	5a	6	7	Gap	Dim A	Dim B
N/A		N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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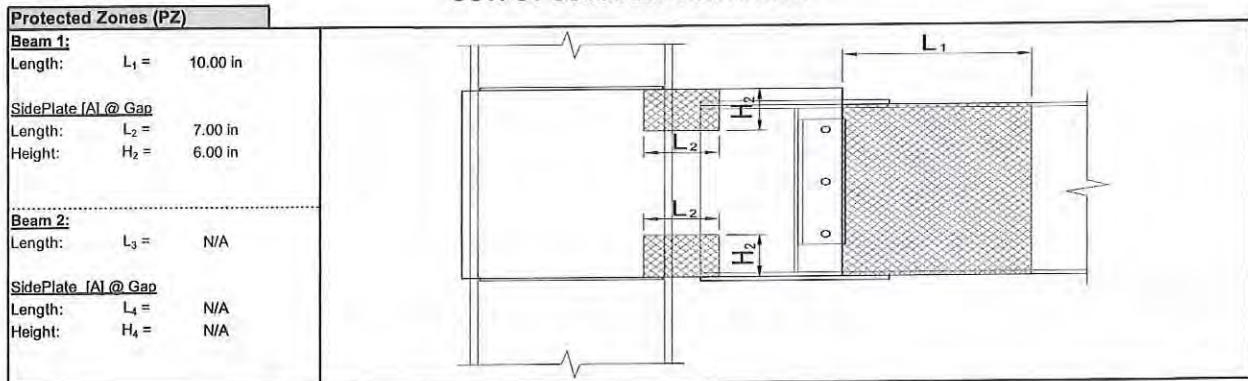
SidePlate FRAME® Connection Design:

One-Sided Connection (A-Series)

Project: HFSMF-1901101-Legacy at Livermore
 EOR: Elliott Kwok, PASE
 SP Eng: Francis Liu
 Date: 1/31/2019

Framing Level: TYP
 Column Grid: TYP
 Connection ID: A1(a)

OUTPUT SUMMARY CONTINUED



Connection Modeling Parameters			
Beam 1:			
Depth of Connection:	15 1/2	in	(Dimension B)
$I_{x, conn}$:	1328	in ⁴	(3.3 $I_{x, bm}$)
Beam 2:			
Depth of Connection:	N/A	in	(Dimension B)
$I_{x, conn}$:	N/A	in ⁴	(N/A $I_{x, bm}$)

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Framing Level: TYP
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 Connection ID: A1(a)

SUMMARY OF DESIGN PARAMETERS

Member Properties

Beam 1:				Beam 2:				Column:			
Depth:	(d _b)	12.0 in		Depth:	(d _b)	N/A		Depth:	(d _b)	18.5 in	
Width:	(b _f)	8.0 in		Width:	(b _f)	N/A		Flange Width:	(b _f)	8.00 in	
Horizontal Thickness:	(t _f)	0.581 in		Horizontal Thickness:	(t _f)	N/A		Flange Thickness:	(t _f)	1.50 in	
Vertical Thickness:	(t _w)	0.581 in		Vertical Thickness:	(t _w)	N/A		Web Thickness:	(t _w)	0.5 in	
Plastic Modulus:	(Z _x)	82.1 in ³		Plastic Modulus:	(Z _x)	N/A		Plastic Modulus:	(Z _x)	234 in ³	
Moment of Inertia:	(I _x)	397 in ⁴		Moment of Inertia:	(I _x)	N/A		Moment of Inertia:	(I _x)	1894 in ⁴	

Critical Design Loads

Load Case One: Full Mp w/o Axial Load

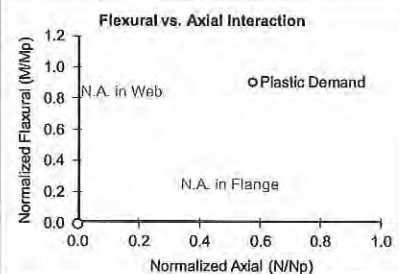
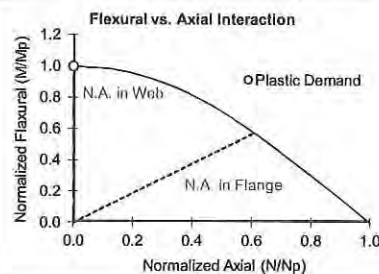
$$M_{pr} = R_y C_{pr} Z_x F_y \quad V_p = 2 M_{pr} / L'$$

where L' = Span from Hinge to Hinge

Beam 1:			
Hardening Ratio:	C _{pr}	1.20	
Max Moment at Plastic Hinge:	M _{pr}	6345 kip-in	
	L'	75 in	
Max Seismic Shear:	V _p	170 kip	
Beam 2:			
Hardening Ratio:	C _{pr}	N/A	
Max Moment at Plastic Hinge:	M _{pr}	N/A	
	L'	N/A	
Max Seismic Shear:	V _p	N/A	

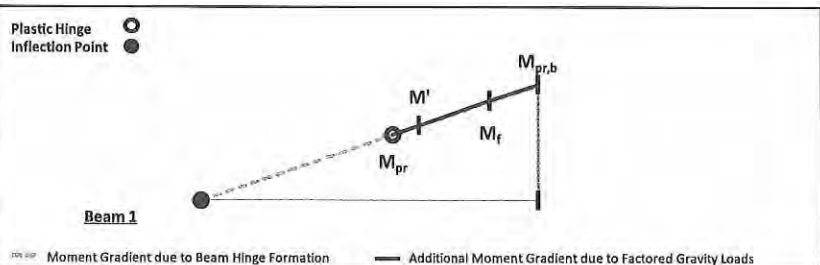
Load Case Two: Combined Factored Beam Moment and Axial Loads

Beam 1				Beam 2			
Inc. Axial Yield Area	Axial (kips)	PH Moment (kip-in)	Shear (kips)	Inc. Axial Yield Area	Axial (kips)	PH Moment (kip-in)	Shear (kips)
0	0	6345	170	0	N/A	N/A	N/A
1/4Web	247	6176	166	1/4Web	N/A	N/A	N/A
1/2Web	494	5669	162	1/2Web	N/A	N/A	N/A
3/4Web	741	4824	129	3/4Web	N/A	N/A	N/A
1 Web	988	3641	98	1 Web	N/A	N/A	N/A
W+1/4F	1146	2761	74	W+1/4F	N/A	N/A	N/A
W+1/2F	1305	1861	50	W+1/2F	N/A	N/A	N/A
W+3/4F	1464	941	25	W+3/4F	N/A	N/A	N/A
Full Beam	1623	0	0	Full Beam	N/A	N/A	N/A
Design Demand	0	6345	170	Design Demand	N/A	N/A	N/A



Moment Amplification

Beam 1:			
Max Mom. @ Plastic Hinge	M _{pr}	6345 kip-in	
Max Mom. @ Cover Plate	M'	7241 kip-in	
Max Mom. @ Column Face	M _f	9619 kip-in	
Max Mom. @ Column CL	M _{pr,b}	11213 kip-in	
Beam 2:			
Max Mom. @ Plastic Hinge	M _{pr}	N/A kip-in	
Max Mom. @ Cover Plate	M'	N/A kip-in	
Max Mom. @ Column Face	M _f	N/A kip-in	
Max Mom. @ Column CL	M _{pr,b}	N/A kip-in	



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 EOR: Elliott Kwok, PASE
 SP Eng: Francis Liu
 Date: 1/31/2019

Framing Level: TYP
 Column Grid: TYP
 Connection ID: A1(a)

MEMBER AND PLATE DESIGN

Strong Column-Weak Beam				Column Capacity:					
Demand from Beam:	Beam 1:	Beam 2:		Top:	Bottom:				
$Z_{eb} = Z_x(L/L')$:	144	N/A	in ³	$Z_{ec} = Z_x(H/H')$:	0	246	in ³		
$M_v = V_g(S_h + d_c/2)$:	57	N/A	kip-in	P_u/A_g :	0	4	ksi		
$M_{pb} = 1.1R_yF_yZ_{eb} + M_v$:	10283	N/A	kip-in	$M_{pc} = Z_{ec}(F_y - P_u/A_g)$:	0	11315	kip-in		
	$\Sigma M'_{pb}$:	10283	kip-in		$\Sigma M'_{pc}$:	11315	kip-in	$\Sigma M'_{pc}/\Sigma M'_{pb}$:	1.10 OK

Col. Flange Stress Check				Col. Shear Checks			
Demand:				Column Panel Zone Shear Check			
Max Prob. Moment at Bottom of SP				Demand:			
Max Uplift Force				2x Strength of Weld [3]			
Flexural + Uplift Stress				R_u :			
				238 kips			
Capacity:				Column Web Shear Check			
Yield Stress				Demand:			
				Shear in column from beam M_p			
σ_y :				V_c :			
50 ksi				91 kips			
DCR:				Capacity:			
σ_u/σ_y :				Panel Zone Shear			
0.93				R_n :			
OK				382 kips			
				$P_r \leq 0.75 F_c$			
				DCR:			
				R_u/R_n :			
				0.62			
				DCR:			
				V_c/V_n :			
				0.33			
				OK			

Side Plate Design				Cover Plate Design			
Demand:				Demand:			
Max Mom. at Col. Face				Max Shear at Cover Plate			
M_u :				R_u :			
9618.9 kip-in				N/A kip			
Side Plate Capacity:				Cover Plate Capacity:			
t_{sp} :				t_{cp} :			
1 1/2 in				N/A in			
Dim B:				$R_{n,cp}$:			
15 1/2 in				N/A kip			
$M_{n,sp}$:				DCR:			
9910.3 kip-in				$R_u/R_{n,cp}$:			
DCR:				N/A			
$M_u/M_{n,sp}$:							
0.97							
OK							
Buckling Checks:							
L_{rg} :							
t_{sp} :							
L/t :							
L/t Limit:							
Beam 1:	Between Cover Plates:	12	1 1/2	8	75.60	OK	
	Extension Above Beam:	2	1 1/2	1.3	7.22	OK	
Beam 2:	Between Cover Plates:	N/A	N/A	N/A	N/A	OK	
	Extension Above Beam:	N/A	N/A	N/A	N/A	OK	

Vertical Shear Elem. Design				Horiz. Shear Plate Design			
Demand:				Demand:			
Max Shear at V.S.E.				Force in Weld [1]			
R_u :				R_u :			
N/A kip				146.8 kip			
V.S.E. Capacity:				H.S.P. Capacity:			
t_{vse} :				t_{hsp} :			
N/A in				3/8 in			
$R_{n,vse}$:				$R_{n,hsp}$:			
N/A kip				166.9 kip			
DCR:				DCR:			
$R_u/R_{n,vse}$:				$R_u/R_{n,hsp}$:			
N/A				0.88			
				OK			

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Project: HFSMF-1901101-Legacy at Livermore
 EOR: Elliott Kwok, PASE
 SP Eng: Francis Liu
 Date: 1/31/2019

Framing Level: TYP
 Column Grid: TYP
 Connection ID: A1(a)

WELD DESIGN SUMMARY

Weld Group 1 (Beam 1)

Weld [4] =	N/A	Weld [5] =	N/A	Weld [5a] =	N/A
------------	-----	------------	-----	-------------	-----

Weld Group 2 (Beam 1)

(Δ = Deformation of Weld)

Weld [6] (9.676" Vertical Length) =	1/4	Weld [7] Throat (11.5" Horiz. Length) =	27/47
X Max Δ = 0.024 in @ 24.3,-4.6 O Min Δ = 0.019 in @ 24.3,0.2		X Max Δ = 0.070 in @ 23.7,6 O Min Δ = 0.050 in @ 18,6	
Load Case 1: Nn = 0 kip Mn = 8654 kip-in Mu = 8111 kip-in DCR = 0.94 OK	Moment vs. Axial Tension Interaction 	Load Case 1 ♦ Instantaneous Center 	
Load Case 2: Nn = 0 kip Mn = 8654 kip-in Mu = 8111 kip-in DCR = 0.94 OK			

Weld Group 3

(Δ = Deformation of Weld)

Weld [1] =	5/16	Weld [2] (11.5" Vertical Length) =	9/16	Weld [3] =	5/16
(14.75" Horiz. Length)		Beam 1:	Beam 2:	(11.24" Horiz. Length)	
X Max Δ = 0.034 in O Min Δ = 0.034 in		X Max Δ = 0.078 in O Max Δ = 0.024 in	X Max Δ = N/A O Max Δ = N/A	Max Δ = 0.034 in Min Δ = 0.034 in	
Load Case 1: Mn = 13509 kip-in Mu = 12574 kip-in DCR = 0.93 OK	Nn = 0 kip Nu = 0 kip DCR = 1 OK	Load Case 1 ♦ Instantaneous Center (Beam 1) 	Load Case 2 ♦ Instantaneous Center (Beam 1) 		
Load Case 2: Mn = 13509 kip-in Mu = 12574 kip-in DCR = 0.93 OK	Nn = 0 kip Nu = 0 kip DCR = 1 OK				

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SidePlate FRAME® Connection Design:

One-Sided Connection (A-Series)

Project: HF5MF-1901101-Legacy at Livermore
 EOR: Elliott Kwok, PASE
 SP Eng: Francis Liu
 Date: 1/31/2019

Framing Level: TYP
 Column Grid: TYP
 Connection ID: A1(a)

WELD DESIGN SUMMARY

Weld Group 1 (Beam 2)	Weld [4] = N/A	Weld [5] = N/A	Weld [5a] = N/A
-----------------------	----------------	----------------	-----------------

Weld Group 2 (Beam 2)	(Δ = Deformation of Weld)	
Weld [6] (" Vertical Length) = N/A	Weld [7] (" Horiz. Length) = #VALUE!	
☒ Max Δ = ☐ Min Δ =	☒ Max Δ = ☐ Min Δ =	
Load Case 1: ☒ Nn = 0 kip Mn = 2676 kip-in ##### ##### Load Case 2: ☐ Nn = N/A kip ##### ##### #####	Moment vs. Axial Tension Interaction $m = M/M_p$ $n = N/N_p$	Load Case 1 ☒ Instantaneous Center 30 20 10 0 -10 -20 -30 0 5 10 15

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Per AISC341-16 Seismic Provisions Section D1, Table D1.1.

Beam Section: HSS12x8x5/8

Section Type: Rolled HSS

Section Material: A500Gr46

b/t: 10.8

E, Modulus of Elasticity (ksi): 29000

F_y , Yield Strength (ksi): 46

R_y , Ratio of Expected Yield Strength (ksi): 1.4

Limiting Width to Thickness Ratio for Highly Ductile HSS Members $= 0.65 \sqrt{\frac{E}{R_y F_y}} = \mathbf{13.79}$

Flange Width to Thickness Ratio (b/t) = 10.80 < 13.79 Section is Highly Ductile

Column Section Requirements for Ductile Members

Per AISC341-16 Seismic Provisions Section D1. Table D1.1.

(Calculation and table yield equivalent and similar results with AISC341-10 Seismic Provision)

Column Section: BU18.5x108

Section Type: Built-Up Wide Flange

Section Material: A572Gr50

b/t_f : 2.666667

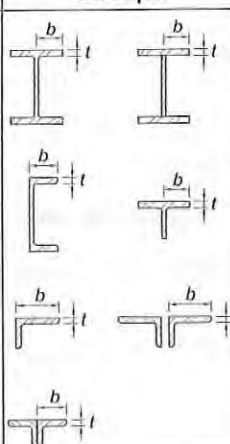
h/t_w : 31

C_a , Column Axial Stress Ratio: 0.052

R_y , Ratio of Expected Yield Strength (ksi): 1.1

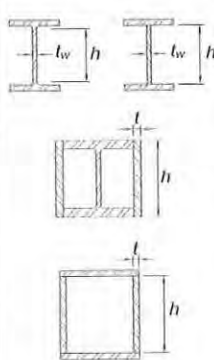
E, Modulus of Elasticity (ksi): 29000

F_y , Yield Strength (ksi): 50

Description of Element	Width-to-Thickness Ratio	Limiting Width-to-Thickness Ratio		Example
		λ_{hd} Highly Ductile Members	λ_{md} Moderately Ductile Members	
Unstiffened Elements Flanges of rolled or built-up I-shaped sections, channels and tees; legs of single angles or double-angle members with separators; outstanding legs of pairs of angles in continuous contact	b/t	$0.32 \sqrt{\frac{E}{R_y F_y}}$	$0.40 \sqrt{\frac{E}{R_y F_y}}$	

Limiting Width to Thickness Ratio for Flange of Highly Ductile Members = $0.32 \sqrt{E/(R_y F_y)} = 7.35$

Flange Width to Thickness Ratio (b/t_f) = 2.67 < 7.35 Section is Highly Ductile

Description of Element	Width-to-Thickness Ratio	Limiting Width-to-Thickness Ratio		Example
		λ_{hd} Highly Ductile Members	λ_{md} Moderately Ductile Members	
Where used in beams, columns, or links, as webs in flexure, or combined axial and flexure: 1) Webs of rolled or built-up I-shaped sections or channels [b] 2) Side plates of boxed I-shaped sections 3) Webs of built-up box sections	h/t_w h/t h/t	For $C_a \leq 0.114$ $2.57 \sqrt{\frac{E}{R_y F_y}} (1 - 1.04 C_a)$ For $C_a > 0.114$ $0.88 \sqrt{\frac{E}{R_y F_y}} (2.68 - C_a)$ $\geq 1.57 \sqrt{\frac{E}{R_y F_y}}$ where $C_a = \frac{P_u}{\phi_c P_y}$ (LRFD) $C_a = \frac{\Omega_c P_a}{P_y}$ (ASD) $P_y = R_y F_y A_g$	For $C_a \leq 0.114$ $3.96 \sqrt{\frac{E}{R_y F_y}} (1 - 3.04 C_a)$ For $C_a > 0.114$ $1.29 \sqrt{\frac{E}{R_y F_y}} (2.12 - C_a)$ $\geq 1.57 \sqrt{\frac{E}{R_y F_y}}$ where $C_a = \frac{P_u}{\phi_c P_y}$ (LRFD) $C_a = \frac{\Omega_c P_a}{P_y}$ (ASD) $P_y = R_y F_y A_g$	

Limiting Width to Thickness Ratio for Web of Highly Ductile Members = $2.57 \sqrt{E/(R_y F_y)} (1 - 1.04 C_a) = 55.82$

Web Length to Thickness Ratio (h/t_w) = 31.00 < 55.82 Section is Highly Ductile

Member Requirements – Lateral Beam Bracing for Beam – AISC 358 Chapter 11

Per AISC 358-11S2 Section 11.3.1(7) "Lateral bracing of HSS beams shall be provided in conformance with Appendix 1, Section 1.2.3(b) of the AISC Specification, taking $M'_1/M_2 = -1$ in AISC Specification Equation A-1-7. The segment of the beam connected to the SidePlates shall be considered to be braced. Supplemental top and bottom beam flange bracing at the expected hinge is not required."

For HSS Section:

$$L_{pd} = \left[0.17 - 0.10 \left(\frac{M'_1}{M_2} \right) \right] \frac{r_y E}{F_y} = [0.17 - 0.10(-1)] \frac{r_y E}{F_y} = 0.27 \frac{r_y E}{F_y}$$

For Wide Flange Section:

$$L_{pd} = 0.086 \frac{r_y E}{F_y}$$

Design Section Properties:

Section Type: HSS
SidePlate Dimension A: 15.0 in
Nominal Clear Span, W_{in} : 112.5 in

Beam Section: HSS12x8x5/8
 r_y (Minor Axis): 3.16

Beam Lateral Bracing Requirement Summary

Unbraced Length of Beam Segment, L_b : 82.5 in
(Length of beam segment not connected to the SidePlates)

Limiting Laterally Unbraced Length, L_{pd} : 538.0 in

L_b/L_{pd} : 0.153 < 1

Beam Lateral Bracing: Not Required

Min. Number of Bracing: N/A

Required Strength and Stiffness for Stability Bracing (AISC 360-10 Appendix 6, Section 6.2, A-6-3 & A-6-4):

Required Strength for Nodal Bracing (AISC 360-10 Appendix 6, Section 6.2, A-6-3):

$$P_{rb} = 0.01 P_r$$

Required Stiffness for Nodal Bracing (AISC 360-10 Appendix 6, Section 6.2, A-6-4):

$$\beta_{rb} = \frac{1}{\phi} \left(\frac{8P_r}{L_b} \right)$$

Design Section Properties:

Column Axial Compression: 128.0 kips

Column Unbraced Length: 245.0 in

Stability Bracing Requirement Summary

Required Strength Nodal Bracing: 1.28 kips

Required Stiffness Nodal Bracing: 5.57 kips/in



SAP2000 Analysis Report

Prepared by
MiTek USA, Inc.

Model Name: HFSMF-1901101

1. Model geometry

1. Model geometry

This section provides model geometry information, including items such as joint coordinates, joint restraints, and element connectivity.

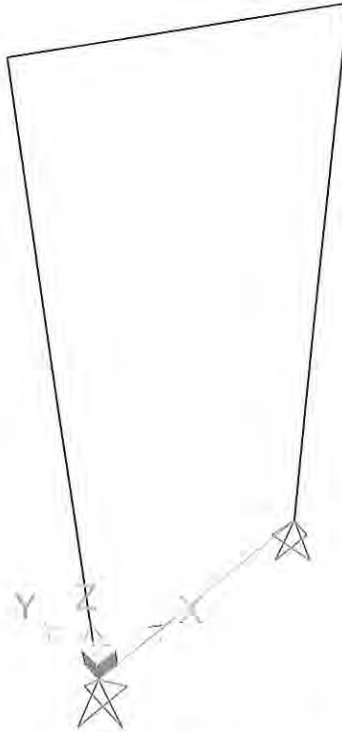


Figure 1: Finite element model

1.1. Joint coordinates

Table 1: Joint Coordinates

Table 1: Joint Coordinates					
Joint	CoordSys	CoordType	GlobalX in	GlobalY in	GlobalZ in
1	GLOBAL	Cartesian	0.	0.	0.
2	GLOBAL	Cartesian	131.	0.	0.
3	GLOBAL	Cartesian	0.	0.	245.
6	GLOBAL	Cartesian	131.	0.	245.

1.2. Joint restraints

2. Material properties

Table 2: Joint Restraint Assignments

Table 2: Joint Restraint Assignments						
Joint	U1	U2	U3	R1	R2	R3
1	Yes	Yes	Yes	No	No	No
2	Yes	Yes	Yes	No	No	No

1.3. Element connectivity

Table 3: Connectivity - Frame

Table 3: Connectivity - Frame			
Frame	JointI	JointJ	Length in
1	1	3	245.
2	2	6	245.
5	3	6	131.

Table 4: Frame Section Assignments

Table 4: Frame Section Assignments			
Frame	AnalSect	DesignSect	MatProp
1	BU18.5x108	BU18.5x108	Default
2	BU18.5x108	BU18.5x108	Default
5	HSS12x8x5/8_A	HSS12x8x5/8_A	Default

2. Material properties

This section provides material property information for materials used in the model.

Table 5: Material Properties 02 - Basic Mechanical Properties

Table 5: Material Properties 02 - Basic Mechanical Properties						
Material	UnitWeight Kip/in3	UnitMass Kip-s2/in4	E1 Kip/in2	G12 Kip/in2	U12	A1 1/F
4000Psi	8.6806E-05	2.2483E-07	3604.997	1502.082	0.2	5.5000E-06
A416Gr270	2.8356E-04	7.3446E-07	28500.			6.5000E-06
A500GrB46	2.8356E-04	7.3446E-07	29000.	11153.846	0.3	6.5000E-06
A572Gr50	2.8356E-04	7.3446E-07	29000.	11153.846	0.3	6.5000E-06
A615Gr60	2.8356E-04	7.3446E-07	29000.			6.5000E-06
A992Fy50	2.8356E-04	7.3446E-07	29000.	11153.846	0.3	6.5000E-06

3. Section properties

Table 6: Material Properties 03a - Steel Data

Table 6: Material Properties 03a - Steel Data			
Material	Fy Kip/in2	Fu Kip/in2	FinalSlope
A500GrB46	46.	58.	-0.1
A572Gr50	50.	65.	-0.1
A992Fy50	50.	65.	-0.1

Table 7: Material Properties 03b - Concrete Data

Table 7: Material Properties 03b - Concrete Data			
Material	Fc Kip/in2	eFc Kip/in2	FinalSlope
4000Psi	4.	4.	-0.1

Table 8: Material Properties 03e - Rebar Data

Table 8: Material Properties 03e - Rebar Data			
Material	Fy Kip/in2	Fu Kip/in2	FinalSlope
A615Gr60	60.	90.	-0.1

Table 9: Material Properties 03f - Tendon Data

Table 9: Material Properties 03f - Tendon Data			
Material	Fy Kip/in2	Fu Kip/in2	FinalSlope
A416Gr270	245.1	270.	-0.1

3. Section properties

This section provides section property information for objects used in the model.

3.1. Frames

Table 10: Frame Section Properties 01 - General, Part 1 of 4

Table 10: Frame Section Properties 01 - General, Part 1 of 4								
SectionName	Material	Shape	t3 in	t2 in	tf in	tw in	t2b in	tfb in
BU18.5x108	A572Gr50	I/Wide Flange	18.5	8.	1.5	0.5	8.	1.5
HSS12X8X.625	A500GrB46	Box/Tube	12.	8.	0.581	0.581		
HSS12x8x5/8_A		Nonprismatic						
HSS12x8x5/8SD_A	A572Gr50	SD Section						

3. Section properties

Table 10: Frame Section Properties 01 - General, Part 2 of 4

Table 10: Frame Section Properties 01 - General, Part 2 of 4

SectionName	Area in2	TorsConst in4	I33 in4	I22 in4	I23 in4	AS2 in2	AS3 in2
BU18.5x108	31.75	16.51	1893.66	128.16	0.	9.25	20.
HSS12X8X.625	21.	454.	397.	210.	0.	13.94	9.3
HSS12x8x5/8_A							
HSS12x8x5/8SD_A	68.39	1174.41	1358.47	1281.1	0.	52.69	13.85

Table 10: Frame Section Properties 01 - General, Part 3 of 4

Table 10: Frame Section Properties 01 - General, Part 3 of 4

SectionName	S33 in3	S22 in3	Z33 in3	Z22 in3	R33 in	R22 in
BU18.5x108	204.72	32.04	234.03	48.97	7.7229	2.0091
HSS12X8X.625	66.17	52.5	82.1	61.9	4.348	3.1623
HSS12x8x5/8_A						
HSS12x8x5/8SD_A	173.5	232.93	260.46	280.96	4.4569	4.3281

Table 10: Frame Section Properties 01 - General, Part 4 of 4

Table 10: Frame Section Properties 01 - General, Part 4 of 4

SectionName	AMod	A2Mod	A3Mod	JMod	I2Mod	I3Mod	MMod	WMod
BU18.5x108	1.	1.	1.	1.	1.	1.	1.	1.
HSS12X8X.625	1.	1.	1.	1.	1.	1.	1.	1.
HSS12x8x5/8_A								
HSS12x8x5/8SD_A	1.	1.	1.	1.	1.	1.	1.	1.

Table 11: Frame Section Properties 05 - Nonprismatic

Table 11: Frame Section Properties 05 - Nonprismatic

SectionName	SegmentNum	StartSect	EndSect	AbsLength in	VarLength	EI33Var	EI22Var
HSS12x8x5/8_A	1	HSS12x8x5/8SD_A	HSS12x8x5/8SD_A	15.		Linear	Linear
HSS12x8x5/8_A	2	HSS12X8X.625	HSS12X8X.625		1.	Linear	Linear
HSS12x8x5/8_A	3	HSS12x8x5/8SD_A	HSS12x8x5/8SD_A	15.		Linear	Linear

3.2. Solids

4. Load patterns

Table 12: Solid Property Definitions

Table 12: Solid Property Definitions				
SolidProp	Material	MatAngleA Degrees	MatAngleB Degrees	MatAngleC Degrees
Solid1	4000Psi	0.	0.	0.

4. Load patterns

This section provides loading information as applied to the model.

4.1. Definitions

Table 13: Load Pattern Definitions

Table 13: Load Pattern Definitions			
LoadPat	DesignType	SelfWtMult	AutoLoad
Dead	Dead	1.	
Live	Live	0.	
Seismic	Quake	0.	None

5. Load cases

This section provides load case information.

5.1. Definitions

Table 14: Load Case Definitions, Part 1 of 2

Table 14: Load Case Definitions, Part 1 of 2						
Case	Type	InitialCond	ModalCase	BaseCase	MassSource	DesActOpt
Dead	LinStatic	Zero				Prog Det
MODAL	LinModal	Zero				Prog Det
Self-Weight	LinStatic	Zero				Prog Det
Live	LinStatic	Zero				Prog Det
Roof Live	LinStatic	Zero				Prog Det
Snow	LinStatic	Zero				Prog Det
Rain	LinStatic	Zero				Prog Det
Wind	LinStatic	Zero				Prog Det
Seismic	LinStatic	Zero				Prog Det
Hold-Down	LinStatic	Zero				Prog Det

5. Load cases

Table 14: Load Case Definitions, Part 2 of 2

Table 14: Load Case Definitions, Part 2 of 2

Case	DesignAct
Dead	Non-Composite
MODAL	Other
Self-Weight	Non-Composite
Live	Short-Term Composite
Roof Live	Short-Term Composite
Snow	Short-Term Composite
Rain	Other
Wind	Short-Term Composite
Seismic	Short-Term Composite
Hold-Down	Short-Term Composite

5.2. Static case load assignments

Table 15: Case - Static 1 - Load Assignments

Table 15: Case - Static 1 - Load Assignments

Case	LoadType	LoadName	LoadSF
Dead	Load pattern	Dead	1.
Self-Weight	Load pattern	Self-Weight	1.
Live	Load pattern	Live	1.
Roof Live	Load pattern	Roof Live	1.
Snow	Load pattern	Snow	1.
Rain	Load pattern	Rain	1.
Wind	Load pattern	Wind	1.
Seismic	Load pattern	Seismic	1.
Hold-Down	Load pattern	Hold-Down	1.

5.3. Response spectrum case load assignments

Table 16: Function - Response Spectrum - User

Table 16: Function - Response Spectrum - User

Name	Period Sec	Accel	FuncDamp
UNIFRS	0.	1.	0.05
UNIFRS	1.	1.	

6. Load combinations

5.4. Joint Load Assignments

Table 17: Joint Loads - Force, Part 1 of 2

Table 17: Joint Loads - Force, Part 1 of 2							
Joint	LoadPat	CoordSys	F1 Kip	F2 Kip	F3 Kip	M1 Kip-in	M2 Kip-in
3	Seismic	GLOBAL	18.6	0.	0.	0.	0.

Table 17: Joint Loads - Force, Part 2 of 2

Table 17: Joint Loads - Force, Part 2 of 2			
Joint	LoadPat	M3 Kip-in	GUID
3	Seismic	0.	c6afc66c-8c86-40ff-ad62-0859fdd8c8dc

6. Load combinations

This section provides load combination information.

Table 18: Combination Definitions

Table 18: Combination Definitions			
ComboName	ComboType	CaseName	ScaleFactor
D1(DL)	Linear Add	Dead	1.
D2(LL + Lr)	Linear Add	Live	1.
D2(LL + Lr)		Roof Live	1.
D3(DL + LL + Lr)	Linear Add	Dead	1.
D3(DL + LL + Lr)		Live	1.
D3(DL + LL + Lr)		Roof Live	1.
D4(DL + LL + S)	Linear Add	Dead	1.
D4(DL + LL + S)		Live	1.
D4(DL + LL + S)		Snow	1.
D5(DL + LL + R)	Linear Add	Dead	1.
D5(DL + LL + R)		Live	1.
D5(DL + LL + R)		Rain	1.
D6(W)	Linear Add	Wind	0.6
D7(E)	Linear Add	Seismic	1.
D7(E)		Hold-Down	1.
S1	Linear Add	Dead	1.4
S2(A)	Linear Add	Dead	1.2
S2(A)		Live	1.6
S2(A)		Roof Live	0.5
S2(B)	Linear Add	Dead	1.2
S2(B)		Live	1.6
S2(B)		Snow	0.5
S2(C)	Linear Add	Dead	1.2
S2(C)		Live	1.6
S2(C)		Rain	0.5

6. Load combinations

Table 18: Combination Definitions

ComboName	ComboType	CaseName	ScaleFactor
S3(A)	Linear Add	Dead	1.2
S3(A)		Live	0.5
S3(A)		Roof Live	1.6
S3(B)	Linear Add	Dead	1.2
S3(B)		Live	0.5
S3(B)		Snow	1.6
S3(C)	Linear Add	Dead	1.2
S3(C)		Live	0.5
S3(C)		Rain	1.6
S3(D)	Linear Add	Dead	1.2
S3(D)		Roof Live	1.6
S3(D)		Wind	0.5
S3(E)	Linear Add	Dead	1.2
S3(E)		Snow	1.6
S3(E)		Wind	0.5
S3(F)	Linear Add	Dead	1.2
S3(F)		Rain	1.6
S3(F)		Wind	0.5
S3(G)	Linear Add	Dead	1.2
S3(G)		Roof Live	1.6
S3(G)		Wind	-0.5
S3(H)	Linear Add	Dead	1.2
S3(H)		Snow	1.6
S3(H)		Wind	-0.5
S3(I)	Linear Add	Dead	1.2
S3(I)		Rain	1.6
S3(I)		Wind	-0.5
S4(A)	Linear Add	Dead	1.2
S4(A)		Live	1.
S4(A)		Roof Live	0.5
S4(A)	Linear Add	Wind	1.
S4(B)		Dead	1.2
S4(B)		Live	1.
S4(B)		Snow	0.7
S4(B)	Linear Add	Wind	1.
S4(C)		Dead	1.2
S4(C)		Live	1.
S4(C)		Rain	0.5
S4(C)	Linear Add	Wind	1.
S4(D)		Dead	1.2
S4(D)		Live	1.
S4(D)		Roof Live	0.5
S4(D)	Linear Add	Wind	-1.
S4(E)		Dead	1.2
S4(E)		Live	1.
S4(E)		Snow	0.7
S4(E)	Linear Add	Wind	-1.
S4(F)		Dead	1.2
S4(F)		Live	1.
S4(F)		Rain	0.5
S4(F)	Linear Add	Wind	-1.
S5(A)		Dead	1.28
S5(A)		Live	1.
S5(A)		Snow	0.7

6. Load combinations

Table 18: Combination Definitions

ComboName	ComboType	CaseName	ScaleFactor
S5(A)		Seismic	1.
S5(A)		Hold-Down	3.
S5(B)	Linear Add	Dead	1.28
S5(B)		Live	1.
S5(B)		Snow	0.7
S5(B)		Seismic	-1.
S5(B)		Hold-Down	-3.
S5(C)	Linear Add	Dead	1.28
S5(C)		Live	1.
S5(C)		Snow	0.7
S5(C)		Seismic	3.
S5(C)		Hold-Down	3.
S5(D)	Linear Add	Dead	1.28
S5(D)		Live	1.
S5(D)		Snow	0.7
S5(D)		Seismic	-3.
S5(D)		Hold-Down	-3.
S6(A)	Linear Add	Dead	0.9
S6(A)		Wind	1.
S6(B)	Linear Add	Dead	0.9
S6(B)		Wind	-1.
S7(A)	Linear Add	Dead	0.82
S7(A)		Seismic	1.
S7(A)		Hold-Down	3.
S7(B)	Linear Add	Dead	0.82
S7(B)		Seismic	-1.
S7(B)		Hold-Down	-3.
S7(C)	Linear Add	Dead	0.82
S7(C)		Seismic	3.
S7(C)		Hold-Down	3.
S7(D)	Linear Add	Dead	0.82
S7(D)		Seismic	-3.
S7(D)		Hold-Down	-3.
Vgravity(A)	Linear Add	Dead	1.2
Vgravity(A)		Live	1.
Vgravity(A)		Roof Live	0.5
Vgravity(A)		Snow	0.7
Vgravity(A)		Hold-Down	1.
Vgravity(B)	Linear Add	Dead	1.2
Vgravity(B)		Live	1.
Vgravity(B)		Roof Live	0.5
Vgravity(B)		Snow	0.7
Vgravity(B)		Hold-Down	-1.
Vgravity	Envelope	Vgravity(A)	1.
Vgravity		Vgravity(B)	1.
S(ENV)	Envelope	S1	1.
S(ENV)		S2(A)	1.
S(ENV)		S2(B)	1.
S(ENV)		S3(A)	1.
S(ENV)		S3(B)	1.
S(ENV)		S3(C)	1.
S(ENV)		S3(D)	1.
S(ENV)		S3(E)	1.
S(ENV)		S3(F)	1.

6. Load combinations

Table 18: Combination Definitions

ComboName	ComboType	CaseName	ScaleFactor
S(ENV)		S3(G)	1.
S(ENV)		S3(H)	1.
S(ENV)		S3(I)	1.
S(ENV)		S4(A)	1.
S(ENV)		S4(B)	1.
S(ENV)		S4(C)	1.
S(ENV)		S4(D)	1.
S(ENV)		S4(E)	1.
S(ENV)		S4(F)	1.
S(ENV)		S5(A)	1.
S(ENV)		S5(B)	1.
S(ENV)		S6(A)	1.
S(ENV)		S6(B)	1.
S(ENV)		S7(A)	1.
S(ENV)		S7(B)	1.
SCWB(ENV)	Envelope	S5(C)	1.
SCWB(ENV)		S5(D)	1.
SCWB(ENV)		S7(C)	1.
SCWB(ENV)		S7(D)	1.
SCWB(ENV)		Vgravity	1.
ALL(ENV)	Envelope	S(ENV)	1.
ALL(ENV)		SCWB(ENV)	1.

7. Structure results

This section provides structure results, including items such as structural periods and base reactions.

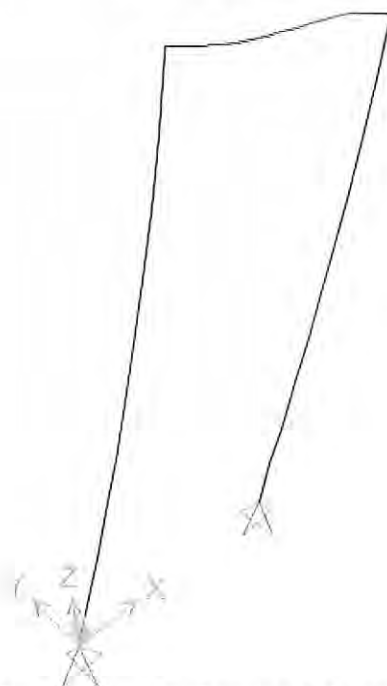


Figure 2: Deformed shape

7.1. Mass summary

Table 19: Assembled Joint Masses, Part 1 of 2

Table 19: Assembled Joint Masses, Part 1 of 2								
Joint	MassSource	U1	U2	U3	R1	R2	R3	CenterX
		Kip-s2/in	Kip-s2/in	Kip-s2/in	Kip-in-s2	Kip-in-s2	Kip-in-s2	in
1	MSSSRC1	0.0029	0.0029	0.0029	0.	0.	0.	0.
2	MSSSRC1	0.0029	0.0029	0.0029	0.	0.	0.	131.
3	MSSSRC1	0.0031	0.0031	0.0031	0.	0.	0.	0.
6	MSSSRC1	0.0031	0.0031	0.0031	0.	0.	0.	131.
~1	MSSSRC1	6.090E-04	6.090E-04	6.090E-04	0.	0.	0.	9.25
~2	MSSSRC1	0.001	0.001	0.001	0.	0.	0.	24.25
~3	MSSSRC1	0.001	0.001	0.001	0.	0.	0.	106.75
~4	MSSSRC1	6.090E-04	6.090E-04	6.090E-04	0.	0.	0.	121.75
SumAccelUX	MSSSRC1	0.0151	0.	0.	0.	0.	0.	65.5
SumAccelUY	MSSSRC1	0.	0.0151	0.	0.	0.	0.	65.5
SumAccelUZ	MSSSRC1	0.	0.	0.0151	0.	0.	0.	65.5

Table 19: Assembled Joint Masses, Part 2 of 2

Table 19: Assembled Joint Masses, Part 2 of 2			
Joint	MassSource	CenterY	CenterZ
		in	in
1	MSSSRC1	0.	0.

7. Structure results

Table 19: Assembled Joint Masses, Part 2 of 2

Joint	MassSource	CenterY in	CenterZ in
2	MSSSRC1	0.	0.
3	MSSSRC1	0.	245.
6	MSSSRC1	0.	245.
~1	MSSSRC1	0.	245.
~2	MSSSRC1	0.	245.
~3	MSSSRC1	0.	245.
~4	MSSSRC1	0.	245.
SumAccelUX	MSSSRC1	0.	152.517
SumAccelUY	MSSSRC1	0.	152.517
SumAccelUZ	MSSSRC1	0.	152.517

7.2. Modal results

Table 20: Modal Participating Mass Ratios

Table 20: Modal Participating Mass Ratios

OutputCase	StepNum	Period Sec	UX	UY	UZ	SumUX	SumUY	SumUZ
MODAL	1.	0.152149	0.9998	0.	0.	0.9998	0.	0.
MODAL	2.	0.007933	0.	0.	0.8509	0.9998	0.	0.8509
MODAL	3.	0.006719	1.812E-06	0.	0.	0.9998	0.	0.8509
MODAL	4.	0.005043	0.	0.	0.1392	0.9998	0.	0.9901
MODAL	5.	0.002873	0.	0.	0.0099	0.9998	0.	1.
MODAL	6.	0.002842	1.906E-04	0.	0.	1.	0.	1.
MODAL	7.	0.001011	1.165E-06	0.	0.	1.	0.	1.
MODAL	8.	0.000991	0.	0.	4.484E-06	1.	0.	1.
MODAL	9.	0.000348	3.551E-14	0.	4.737E-07	1.	0.	1.
MODAL	10.	0.000348	3.149E-07	0.	5.352E-14	1.	0.	1.
MODAL	11.	0.000273	3.531E-15	0.	5.528E-08	1.	0.	1.
MODAL	12.	0.000273	3.416E-08	0.	5.612E-15	1.	0.	1.

7.3. Base reactions

Table 21: Base Reactions

Table 21: Base Reactions

OutputCase	GlobalFX Kip	GlobalFY Kip	GlobalFZ Kip	GlobalMX Kip-in	GlobalMY Kip-in	GlobalMZ Kip-in
Dead	-1.582E-14	0.	22.498	0.	-1473.645	0.
Live	-8.001E-15	0.	16.873	0.	-1105.203	0.
Seismic	-18.6	0.	-1.249E-11	0.	-4557.	0.

8. Joint results

This section provides joint results, including items such as displacements and reactions.

Table 22: Joint Displacements

Table 22: Joint Displacements							
Joint	OutputCase	U1 in	U2 in	U3 in	R1 Radians	R2 Radians	R3 Radians
1	Dead	0.	0.	0.	0.	-0.000012	0.
1	Live	0.	0.	0.	0.	-6.051E-06	0.
1	Seismic	0.	0.	0.	0.	0.006297	0.
2	Dead	0.	0.	0.	0.	0.000012	0.
2	Live	0.	0.	0.	0.	6.051E-06	0.
2	Seismic	0.	0.	0.	0.	0.006349	0.
3	Dead	0.000142	0.	-0.0027	0.	0.000023	0.
3	Live	0.000072	0.	-0.002245	0.	0.000012	0.
3	Seismic	1.160708	0.	0.009256	0.	0.001923	0.
6	Dead	-0.000142	0.	-0.0027	0.	-0.000023	0.
6	Live	-0.000072	0.	-0.002245	0.	-0.000012	0.
6	Seismic	1.158436	0.	-0.009256	0.	0.001804	0.
~1	Dead	0.000142	0.	-0.002914	0.	0.000023	0.
~1	Live	0.000072	0.	-0.002354	0.	0.000012	0.
~1	Seismic	1.160627	0.	-0.008525	0.	0.001918	0.
~2	Dead	0.000152	0.	-0.003293	0.	0.000025	0.
~2	Live	0.000079	0.	-0.002548	0.	0.000013	0.
~2	Seismic	1.155408	0.	-0.031231	0.	0.001261	0.
~3	Dead	-0.000152	0.	-0.003293	0.	-0.000025	0.
~3	Live	-0.000079	0.	-0.002548	0.	-0.000013	0.
~3	Seismic	1.153552	0.	0.028524	0.	0.001165	0.
~4	Dead	-0.000142	0.	-0.002914	0.	-0.000023	0.
~4	Live	-0.000072	0.	-0.002354	0.	-0.000012	0.
~4	Seismic	1.158444	0.	0.007424	0.	0.001799	0.

Table 23: Joint Reactions

Table 23: Joint Reactions							
Joint	OutputCase	F1 Kip	F2 Kip	F3 Kip	M1 Kip-in	M2 Kip-in	M3 Kip-in
1	Dead	0.073	0.	11.249	0.	0.	0.
1	Live	0.037	0.	8.437	0.	0.	0.
1	Seismic	-9.122	0.	-34.786	0.	0.	0.
2	Dead	-0.073	0.	11.249	0.	0.	0.
2	Live	-0.037	0.	8.437	0.	0.	0.
2	Seismic	-9.478	0.	34.786	0.	0.	0.

9. Frame results

This section provides frame force results.

9. Frame results

Table 24: Element Forces - Frames, Part 1 of 2

Table 24: Element Forces - Frames, Part 1 of 2					
Frame	Station in	OutputCase	P Kip	V2 Kip	V3 Kip
1	0.	Dead	-11.249	-0.073	0.
1	114.75	Dead	-10.216	-0.073	0.
1	229.5	Dead	-9.183	-0.073	0.
1	0.	Live	-8.437	-0.037	0.
1	114.75	Live	-8.437	-0.037	0.
1	229.5	Live	-8.437	-0.037	0.
1	0.	Seismic	34.786	9.122	0.
1	114.75	Seismic	34.786	9.122	0.
1	229.5	Seismic	34.786	9.122	0.
1	0.	S1	-15.749	-0.102	0.
1	114.75	S1	-14.303	-0.102	0.
1	229.5	S1	-12.856	-0.102	0.
1	0.	S2(A)	-26.998	-0.147	0.
1	114.75	S2(A)	-25.758	-0.147	0.
1	229.5	S2(A)	-24.518	-0.147	0.
1	0.	S2(B)	-26.998	-0.147	0.
1	114.75	S2(B)	-25.758	-0.147	0.
1	229.5	S2(B)	-24.518	-0.147	0.
1	0.	S2(C)	-26.998	-0.147	0.
1	114.75	S2(C)	-25.758	-0.147	0.
1	229.5	S2(C)	-24.518	-0.147	0.
1	0.	S3(A)	-17.717	-0.106	0.
1	114.75	S3(A)	-16.478	-0.106	0.
1	229.5	S3(A)	-15.238	-0.106	0.
1	0.	S3(B)	-17.717	-0.106	0.
1	114.75	S3(B)	-16.478	-0.106	0.
1	229.5	S3(B)	-15.238	-0.106	0.
1	0.	S3(C)	-17.717	-0.106	0.
1	114.75	S3(C)	-16.478	-0.106	0.
1	229.5	S3(C)	-15.238	-0.106	0.
1	0.	S3(D)	-13.499	-0.088	0.
1	114.75	S3(D)	-12.259	-0.088	0.
1	229.5	S3(D)	-11.02	-0.088	0.
1	0.	S3(E)	-13.499	-0.088	0.
1	114.75	S3(E)	-12.259	-0.088	0.
1	229.5	S3(E)	-11.02	-0.088	0.
1	0.	S3(F)	-13.499	-0.088	0.
1	114.75	S3(F)	-12.259	-0.088	0.
1	229.5	S3(F)	-11.02	-0.088	0.
1	0.	S3(G)	-13.499	-0.088	0.
1	114.75	S3(G)	-12.259	-0.088	0.
1	229.5	S3(G)	-11.02	-0.088	0.
1	0.	S3(H)	-13.499	-0.088	0.
1	114.75	S3(H)	-12.259	-0.088	0.
1	229.5	S3(H)	-11.02	-0.088	0.
1	0.	S3(I)	-13.499	-0.088	0.
1	114.75	S3(I)	-12.259	-0.088	0.
1	229.5	S3(I)	-11.02	-0.088	0.
1	0.	S4(A)	-21.936	-0.125	0.
1	114.75	S4(A)	-20.696	-0.125	0.
1	229.5	S4(A)	-19.456	-0.125	0.
1	0.	S4(B)	-21.936	-0.125	0.
1	114.75	S4(B)	-20.696	-0.125	0.

9. Frame results

Table 24: Element Forces - Frames, Part 1 of 2

Frame	Station in	OutputCase	P Kip	V2 Kip	V3 Kip
1	229.5	S4(B)	-19.456	-0.125	0.
1	0.	S4(C)	-21.936	-0.125	0.
1	114.75	S4(C)	-20.696	-0.125	0.
1	229.5	S4(C)	-19.456	-0.125	0.
1	0.	S4(D)	-21.936	-0.125	0.
1	114.75	S4(D)	-20.696	-0.125	0.
1	229.5	S4(D)	-19.456	-0.125	0.
1	0.	S4(E)	-21.936	-0.125	0.
1	114.75	S4(E)	-20.696	-0.125	0.
1	229.5	S4(E)	-19.456	-0.125	0.
1	0.	S4(F)	-21.936	-0.125	0.
1	114.75	S4(F)	-20.696	-0.125	0.
1	229.5	S4(F)	-19.456	-0.125	0.
1	0.	S5(A)	11.951	8.991	0.
1	114.75	S5(A)	13.273	8.991	0.
1	229.5	S5(A)	14.595	8.991	0.
1	0.	S5(B)	-57.622	-9.253	0.
1	114.75	S5(B)	-56.3	-9.253	0.
1	229.5	S5(B)	-54.977	-9.253	0.
1	0.	S6(A)	-10.124	-0.066	0.
1	114.75	S6(A)	-9.194	-0.066	0.
1	229.5	S6(A)	-8.265	-0.066	0.
1	0.	S6(B)	-10.124	-0.066	0.
1	114.75	S6(B)	-9.194	-0.066	0.
1	229.5	S6(B)	-8.265	-0.066	0.
1	0.	S7(A)	25.562	9.062	0.
1	114.75	S7(A)	26.409	9.062	0.
1	229.5	S7(A)	27.256	9.062	0.
1	0.	S7(B)	-44.011	-9.182	0.
1	114.75	S7(B)	-43.163	-9.182	0.
1	229.5	S7(B)	-42.316	-9.182	0.
2	0.	Dead	-11.249	0.073	0.
2	114.75	Dead	-10.216	0.073	0.
2	229.5	Dead	-9.183	0.073	0.
2	0.	Live	-8.437	0.037	0.
2	114.75	Live	-8.437	0.037	0.
2	229.5	Live	-8.437	0.037	0.
2	0.	Seismic	-34.786	9.478	0.
2	114.75	Seismic	-34.786	9.478	0.
2	229.5	Seismic	-34.786	9.478	0.
2	0.	S1	-15.749	0.102	0.
2	114.75	S1	-14.303	0.102	0.
2	229.5	S1	-12.856	0.102	0.
2	0.	S2(A)	-26.998	0.147	0.
2	114.75	S2(A)	-25.758	0.147	0.
2	229.5	S2(A)	-24.518	0.147	0.
2	0.	S2(B)	-26.998	0.147	0.
2	114.75	S2(B)	-25.758	0.147	0.
2	229.5	S2(B)	-24.518	0.147	0.
2	0.	S2(C)	-26.998	0.147	0.
2	114.75	S2(C)	-25.758	0.147	0.
2	229.5	S2(C)	-24.518	0.147	0.
2	0.	S3(A)	-17.717	0.106	0.
2	114.75	S3(A)	-16.478	0.106	0.

9. Frame results

Table 24: Element Forces - Frames, Part 1 of 2

Frame	Station in	OutputCase	P Kip	V2 Kip	V3 Kip
2	229.5	S3(A)	-15.238	0.106	0.
2	0.	S3(B)	-17.717	0.106	0.
2	114.75	S3(B)	-16.478	0.106	0.
2	229.5	S3(B)	-15.238	0.106	0.
2	0.	S3(C)	-17.717	0.106	0.
2	114.75	S3(C)	-16.478	0.106	0.
2	229.5	S3(C)	-15.238	0.106	0.
2	0.	S3(D)	-13.499	0.088	0.
2	114.75	S3(D)	-12.259	0.088	0.
2	229.5	S3(D)	-11.02	0.088	0.
2	0.	S3(E)	-13.499	0.088	0.
2	114.75	S3(E)	-12.259	0.088	0.
2	229.5	S3(E)	-11.02	0.088	0.
2	0.	S3(F)	-13.499	0.088	0.
2	114.75	S3(F)	-12.259	0.088	0.
2	229.5	S3(F)	-11.02	0.088	0.
2	0.	S3(G)	-13.499	0.088	0.
2	114.75	S3(G)	-12.259	0.088	0.
2	229.5	S3(G)	-11.02	0.088	0.
2	0.	S3(H)	-13.499	0.088	0.
2	114.75	S3(H)	-12.259	0.088	0.
2	229.5	S3(H)	-11.02	0.088	0.
2	0.	S3(I)	-13.499	0.088	0.
2	114.75	S3(I)	-12.259	0.088	0.
2	229.5	S3(I)	-11.02	0.088	0.
2	0.	S4(A)	-21.936	0.125	0.
2	114.75	S4(A)	-20.696	0.125	0.
2	229.5	S4(A)	-19.456	0.125	0.
2	0.	S4(B)	-21.936	0.125	0.
2	114.75	S4(B)	-20.696	0.125	0.
2	229.5	S4(B)	-19.456	0.125	0.
2	0.	S4(C)	-21.936	0.125	0.
2	114.75	S4(C)	-20.696	0.125	0.
2	229.5	S4(C)	-19.456	0.125	0.
2	0.	S4(D)	-21.936	0.125	0.
2	114.75	S4(D)	-20.696	0.125	0.
2	229.5	S4(D)	-19.456	0.125	0.
2	0.	S4(E)	-21.936	0.125	0.
2	114.75	S4(E)	-20.696	0.125	0.
2	229.5	S4(E)	-19.456	0.125	0.
2	0.	S4(F)	-21.936	0.125	0.
2	114.75	S4(F)	-20.696	0.125	0.
2	229.5	S4(F)	-19.456	0.125	0.
2	0.	S5(A)	-57.622	9.609	0.
2	114.75	S5(A)	-56.3	9.609	0.
2	229.5	S5(A)	-54.977	9.609	0.
2	0.	S5(B)	11.951	-9.347	0.
2	114.75	S5(B)	13.273	-9.347	0.
2	229.5	S5(B)	14.595	-9.347	0.
2	0.	S6(A)	-10.124	0.066	0.
2	114.75	S6(A)	-9.194	0.066	0.
2	229.5	S6(A)	-8.265	0.066	0.
2	0.	S6(B)	-10.124	0.066	0.
2	114.75	S6(B)	-9.194	0.066	0.

9. Frame results

Table 24: Element Forces - Frames, Part 1 of 2

Frame	Station in	OutputCase	P Kip	V2 Kip	V3 Kip
2	229.5	S6(B)	-8.265	0.066	0.
2	0.	S7(A)	-44.011	9.538	0.
2	114.75	S7(A)	-43.163	9.538	0.
2	229.5	S7(A)	-42.316	9.538	0.
2	0.	S7(B)	25.562	-9.418	0.
2	114.75	S7(B)	26.409	-9.418	0.
2	229.5	S7(B)	27.256	-9.418	0.
5	9.25	Dead	-0.073	-0.818	0.
5	24.25	Dead	-0.073	-0.452	0.
5	24.25	Dead	-0.073	-0.452	0.
5	44.875	Dead	-0.073	-0.226	0.
5	65.5	Dead	-0.073	-4.906E-13	0.
5	86.125	Dead	-0.073	0.226	0.
5	106.75	Dead	-0.073	0.452	0.
5	106.75	Dead	-0.073	0.452	0.
5	121.75	Dead	-0.073	0.818	0.
5	9.25	Live	-0.037	-0.375	0.
5	24.25	Live	-0.037	-0.275	0.
5	24.25	Live	-0.037	-0.275	0.
5	44.875	Live	-0.037	-0.138	0.
5	65.5	Live	-0.037	-3.992E-13	0.
5	86.125	Live	-0.037	0.137	0.
5	106.75	Live	-0.037	0.275	0.
5	106.75	Live	-0.037	0.275	0.
5	121.75	Live	-0.037	0.375	0.
5	9.25	Seismic	-9.478	34.786	0.
5	24.25	Seismic	-9.478	34.786	0.
5	24.25	Seismic	-9.478	34.786	0.
5	44.875	Seismic	-9.478	34.786	0.
5	65.5	Seismic	-9.478	34.786	0.
5	86.125	Seismic	-9.478	34.786	0.
5	106.75	Seismic	-9.478	34.786	0.
5	106.75	Seismic	-9.478	34.786	0.
5	121.75	Seismic	-9.478	34.786	0.
5	9.25	S1	-0.102	-1.145	0.
5	24.25	S1	-0.102	-0.633	0.
5	24.25	S1	-0.102	-0.633	0.
5	44.875	S1	-0.102	-0.316	0.
5	65.5	S1	-0.102	-6.868E-13	0.
5	86.125	S1	-0.102	0.316	0.
5	106.75	S1	-0.102	0.633	0.
5	106.75	S1	-0.102	0.633	0.
5	121.75	S1	-0.102	1.145	0.
5	9.25	S2(A)	-0.147	-1.581	0.
5	24.25	S2(A)	-0.147	-0.982	0.
5	24.25	S2(A)	-0.147	-0.982	0.
5	44.875	S2(A)	-0.147	-0.491	0.
5	65.5	S2(A)	-0.147	-1.227E-12	0.
5	86.125	S2(A)	-0.147	0.491	0.
5	106.75	S2(A)	-0.147	0.982	0.
5	106.75	S2(A)	-0.147	0.982	0.
5	121.75	S2(A)	-0.147	1.581	0.
5	9.25	S2(B)	-0.147	-1.581	0.
5	24.25	S2(B)	-0.147	-0.982	0.

9. Frame results

Table 24: Element Forces - Frames, Part 1 of 2

Frame	Station in	OutputCase	P Kip	V2 Kip	V3 Kip
5	24.25	S2(B)	-0.147	-0.982	0.
5	44.875	S2(B)	-0.147	-0.491	0.
5	65.5	S2(B)	-0.147	-1.227E-12	0.
5	86.125	S2(B)	-0.147	0.491	0.
5	106.75	S2(B)	-0.147	0.982	0.
5	106.75	S2(B)	-0.147	0.982	0.
5	121.75	S2(B)	-0.147	1.581	0.
5	9.25	S2(C)	-0.147	-1.581	0.
5	24.25	S2(C)	-0.147	-0.982	0.
5	24.25	S2(C)	-0.147	-0.982	0.
5	44.875	S2(C)	-0.147	-0.491	0.
5	65.5	S2(C)	-0.147	-1.227E-12	0.
5	86.125	S2(C)	-0.147	0.491	0.
5	106.75	S2(C)	-0.147	0.982	0.
5	106.75	S2(C)	-0.147	0.982	0.
5	121.75	S2(C)	-0.147	1.581	0.
5	9.25	S3(A)	-0.106	-1.169	0.
5	24.25	S3(A)	-0.106	-0.68	0.
5	24.25	S3(A)	-0.106	-0.68	0.
5	44.875	S3(A)	-0.106	-0.34	0.
5	65.5	S3(A)	-0.106	-7.883E-13	0.
5	86.125	S3(A)	-0.106	0.34	0.
5	106.75	S3(A)	-0.106	0.68	0.
5	106.75	S3(A)	-0.106	0.68	0.
5	121.75	S3(A)	-0.106	1.169	0.
5	9.25	S3(B)	-0.106	-1.169	0.
5	24.25	S3(B)	-0.106	-0.68	0.
5	24.25	S3(B)	-0.106	-0.68	0.
5	44.875	S3(B)	-0.106	-0.34	0.
5	65.5	S3(B)	-0.106	-7.883E-13	0.
5	86.125	S3(B)	-0.106	0.34	0.
5	106.75	S3(B)	-0.106	0.68	0.
5	106.75	S3(B)	-0.106	0.68	0.
5	121.75	S3(B)	-0.106	1.169	0.
5	9.25	S3(C)	-0.106	-1.169	0.
5	24.25	S3(C)	-0.106	-0.68	0.
5	24.25	S3(C)	-0.106	-0.68	0.
5	44.875	S3(C)	-0.106	-0.34	0.
5	65.5	S3(C)	-0.106	-7.883E-13	0.
5	86.125	S3(C)	-0.106	0.34	0.
5	106.75	S3(C)	-0.106	0.68	0.
5	106.75	S3(C)	-0.106	0.68	0.
5	121.75	S3(C)	-0.106	1.169	0.
5	9.25	S3(D)	-0.088	-0.981	0.
5	24.25	S3(D)	-0.088	-0.542	0.
5	24.25	S3(D)	-0.088	-0.542	0.
5	44.875	S3(D)	-0.088	-0.271	0.
5	65.5	S3(D)	-0.088	-5.887E-13	0.
5	86.125	S3(D)	-0.088	0.271	0.
5	106.75	S3(D)	-0.088	0.542	0.
5	106.75	S3(D)	-0.088	0.542	0.
5	121.75	S3(D)	-0.088	0.981	0.
5	9.25	S3(E)	-0.088	-0.981	0.
5	24.25	S3(E)	-0.088	-0.542	0.

9. Frame results

Table 24: Element Forces - Frames, Part 1 of 2

Frame	Station in	OutputCase	P Kip	V2 Kip	V3 Kip
5	24.25	S3(E)	-0.088	-0.542	0.
5	44.875	S3(E)	-0.088	-0.271	0.
5	65.5	S3(E)	-0.088	-5.887E-13	0.
5	86.125	S3(E)	-0.088	0.271	0.
5	106.75	S3(E)	-0.088	0.542	0.
5	106.75	S3(E)	-0.088	0.542	0.
5	121.75	S3(E)	-0.088	0.981	0.
5	9.25	S3(F)	-0.088	-0.981	0.
5	24.25	S3(F)	-0.088	-0.542	0.
5	24.25	S3(F)	-0.088	-0.542	0.
5	44.875	S3(F)	-0.088	-0.271	0.
5	65.5	S3(F)	-0.088	-5.887E-13	0.
5	86.125	S3(F)	-0.088	0.271	0.
5	106.75	S3(F)	-0.088	0.542	0.
5	106.75	S3(F)	-0.088	0.542	0.
5	121.75	S3(F)	-0.088	0.981	0.
5	9.25	S3(G)	-0.088	-0.981	0.
5	24.25	S3(G)	-0.088	-0.542	0.
5	24.25	S3(G)	-0.088	-0.542	0.
5	44.875	S3(G)	-0.088	-0.271	0.
5	65.5	S3(G)	-0.088	-5.887E-13	0.
5	86.125	S3(G)	-0.088	0.271	0.
5	106.75	S3(G)	-0.088	0.542	0.
5	106.75	S3(G)	-0.088	0.542	0.
5	121.75	S3(G)	-0.088	0.981	0.
5	9.25	S3(H)	-0.088	-0.981	0.
5	24.25	S3(H)	-0.088	-0.542	0.
5	24.25	S3(H)	-0.088	-0.542	0.
5	44.875	S3(H)	-0.088	-0.271	0.
5	65.5	S3(H)	-0.088	-5.887E-13	0.
5	86.125	S3(H)	-0.088	0.271	0.
5	106.75	S3(H)	-0.088	0.542	0.
5	106.75	S3(H)	-0.088	0.542	0.
5	121.75	S3(H)	-0.088	0.981	0.
5	9.25	S3(I)	-0.088	-0.981	0.
5	24.25	S3(I)	-0.088	-0.542	0.
5	24.25	S3(I)	-0.088	-0.542	0.
5	44.875	S3(I)	-0.088	-0.271	0.
5	65.5	S3(I)	-0.088	-5.887E-13	0.
5	86.125	S3(I)	-0.088	0.271	0.
5	106.75	S3(I)	-0.088	0.542	0.
5	106.75	S3(I)	-0.088	0.542	0.
5	121.75	S3(I)	-0.088	0.981	0.
5	9.25	S4(A)	-0.125	-1.356	0.
5	24.25	S4(A)	-0.125	-0.817	0.
5	24.25	S4(A)	-0.125	-0.817	0.
5	44.875	S4(A)	-0.125	-0.409	0.
5	65.5	S4(A)	-0.125	-9.879E-13	0.
5	86.125	S4(A)	-0.125	0.409	0.
5	106.75	S4(A)	-0.125	0.817	0.
5	106.75	S4(A)	-0.125	0.817	0.
5	121.75	S4(A)	-0.125	1.356	0.
5	9.25	S4(B)	-0.125	-1.356	0.
5	24.25	S4(B)	-0.125	-0.817	0.

9. Frame results

Table 24: Element Forces - Frames, Part 1 of 2

Frame	Station in	OutputCase	P Kip	V2 Kip	V3 Kip
5	24.25	S4(B)	-0.125	-0.817	0.
5	44.875	S4(B)	-0.125	-0.409	0.
5	65.5	S4(B)	-0.125	-9.879E-13	0.
5	86.125	S4(B)	-0.125	0.409	0.
5	106.75	S4(B)	-0.125	0.817	0.
5	106.75	S4(B)	-0.125	0.817	0.
5	121.75	S4(B)	-0.125	1.356	0.
5	9.25	S4(C)	-0.125	-1.356	0.
5	24.25	S4(C)	-0.125	-0.817	0.
5	24.25	S4(C)	-0.125	-0.817	0.
5	44.875	S4(C)	-0.125	-0.409	0.
5	65.5	S4(C)	-0.125	-9.879E-13	0.
5	86.125	S4(C)	-0.125	0.409	0.
5	106.75	S4(C)	-0.125	0.817	0.
5	106.75	S4(C)	-0.125	0.817	0.
5	121.75	S4(C)	-0.125	1.356	0.
5	9.25	S4(D)	-0.125	-1.356	0.
5	24.25	S4(D)	-0.125	-0.817	0.
5	24.25	S4(D)	-0.125	-0.817	0.
5	44.875	S4(D)	-0.125	-0.409	0.
5	65.5	S4(D)	-0.125	-9.879E-13	0.
5	86.125	S4(D)	-0.125	0.409	0.
5	106.75	S4(D)	-0.125	0.817	0.
5	106.75	S4(D)	-0.125	0.817	0.
5	121.75	S4(D)	-0.125	1.356	0.
5	9.25	S4(E)	-0.125	-1.356	0.
5	24.25	S4(E)	-0.125	-0.817	0.
5	24.25	S4(E)	-0.125	-0.817	0.
5	44.875	S4(E)	-0.125	-0.409	0.
5	65.5	S4(E)	-0.125	-9.879E-13	0.
5	86.125	S4(E)	-0.125	0.409	0.
5	106.75	S4(E)	-0.125	0.817	0.
5	106.75	S4(E)	-0.125	0.817	0.
5	121.75	S4(E)	-0.125	1.356	0.
5	9.25	S4(F)	-0.125	-1.356	0.
5	24.25	S4(F)	-0.125	-0.817	0.
5	24.25	S4(F)	-0.125	-0.817	0.
5	44.875	S4(F)	-0.125	-0.409	0.
5	65.5	S4(F)	-0.125	-9.879E-13	0.
5	86.125	S4(F)	-0.125	0.409	0.
5	106.75	S4(F)	-0.125	0.817	0.
5	106.75	S4(F)	-0.125	0.817	0.
5	121.75	S4(F)	-0.125	1.356	0.
5	9.25	S5(A)	-9.609	33.364	0.
5	24.25	S5(A)	-9.609	33.933	0.
5	24.25	S5(A)	-9.609	33.933	0.
5	44.875	S5(A)	-9.609	34.36	0.
5	65.5	S5(A)	-9.609	34.786	0.
5	86.125	S5(A)	-9.609	35.213	0.
5	106.75	S5(A)	-9.609	35.64	0.
5	106.75	S5(A)	-9.609	35.64	0.
5	121.75	S5(A)	-9.609	36.208	0.
5	9.25	S5(B)	9.347	-36.208	0.
5	24.25	S5(B)	9.347	-35.64	0.

9. Frame results

Table 24: Element Forces - Frames, Part 1 of 2

Frame	Station in	OutputCase	P Kip	V2 Kip	V3 Kip
5	24.25	S5(B)	9.347	-35.64	0.
5	44.875	S5(B)	9.347	-35.213	0.
5	65.5	S5(B)	9.347	-34.786	0.
5	86.125	S5(B)	9.347	-34.36	0.
5	106.75	S5(B)	9.347	-33.933	0.
5	106.75	S5(B)	9.347	-33.933	0.
5	121.75	S5(B)	9.347	-33.364	0.
5	9.25	S6(A)	-0.066	-0.736	0.
5	24.25	S6(A)	-0.066	-0.407	0.
5	24.25	S6(A)	-0.066	-0.407	0.
5	44.875	S6(A)	-0.066	-0.203	0.
5	65.5	S6(A)	-0.066	-4.415E-13	0.
5	86.125	S6(A)	-0.066	0.203	0.
5	106.75	S6(A)	-0.066	0.407	0.
5	106.75	S6(A)	-0.066	0.407	0.
5	121.75	S6(A)	-0.066	0.736	0.
5	9.25	S6(B)	-0.066	-0.736	0.
5	24.25	S6(B)	-0.066	-0.407	0.
5	24.25	S6(B)	-0.066	-0.407	0.
5	44.875	S6(B)	-0.066	-0.203	0.
5	65.5	S6(B)	-0.066	-4.415E-13	0.
5	86.125	S6(B)	-0.066	0.203	0.
5	106.75	S6(B)	-0.066	0.407	0.
5	106.75	S6(B)	-0.066	0.407	0.
5	121.75	S6(B)	-0.066	0.736	0.
5	9.25	S7(A)	-9.538	34.116	0.
5	24.25	S7(A)	-9.538	34.416	0.
5	24.25	S7(A)	-9.538	34.416	0.
5	44.875	S7(A)	-9.538	34.601	0.
5	65.5	S7(A)	-9.538	34.786	0.
5	86.125	S7(A)	-9.538	34.972	0.
5	106.75	S7(A)	-9.538	35.157	0.
5	106.75	S7(A)	-9.538	35.157	0.
5	121.75	S7(A)	-9.538	35.457	0.
5	9.25	S7(B)	9.418	-35.457	0.
5	24.25	S7(B)	9.418	-35.157	0.
5	24.25	S7(B)	9.418	-35.157	0.
5	44.875	S7(B)	9.418	-34.972	0.
5	65.5	S7(B)	9.418	-34.786	0.
5	86.125	S7(B)	9.418	-34.601	0.
5	106.75	S7(B)	9.418	-34.416	0.
5	106.75	S7(B)	9.418	-34.416	0.
5	121.75	S7(B)	9.418	-34.116	0.

Table 24: Element Forces - Frames, Part 2 of 2

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
1	0.	Dead	0.	0.	0.
1	114.75	Dead	0.	0.	8.4
1	229.5	Dead	0.	0.	16.801
1	0.	Live	0.	0.	-8.882E-16

9. Frame results

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
1	114.75	Live	0.	0.	4.257
1	229.5	Live	0.	0.	8.514
1	0.	Seismic	0.	0.	9.095E-13
1	114.75	Seismic	0.	0.	-1046.78
1	229.5	Seismic	0.	0.	-2093.56
1	0.	S1	0.	0.	0.
1	114.75	S1	0.	0.	11.76
1	229.5	S1	0.	0.	23.521
1	0.	S2(A)	0.	0.	-1.421E-15
1	114.75	S2(A)	0.	0.	16.892
1	229.5	S2(A)	0.	0.	33.783
1	0.	S2(B)	0.	0.	-1.421E-15
1	114.75	S2(B)	0.	0.	16.892
1	229.5	S2(B)	0.	0.	33.783
1	0.	S2(C)	0.	0.	-1.421E-15
1	114.75	S2(C)	0.	0.	16.892
1	229.5	S2(C)	0.	0.	33.783
1	0.	S3(A)	0.	0.	-4.441E-16
1	114.75	S3(A)	0.	0.	12.209
1	229.5	S3(A)	0.	0.	24.418
1	0.	S3(B)	0.	0.	-4.441E-16
1	114.75	S3(B)	0.	0.	12.209
1	229.5	S3(B)	0.	0.	24.418
1	0.	S3(C)	0.	0.	-4.441E-16
1	114.75	S3(C)	0.	0.	12.209
1	229.5	S3(C)	0.	0.	24.418
1	0.	S3(D)	0.	0.	0.
1	114.75	S3(D)	0.	0.	10.08
1	229.5	S3(D)	0.	0.	20.161
1	0.	S3(E)	0.	0.	0.
1	114.75	S3(E)	0.	0.	10.08
1	229.5	S3(E)	0.	0.	20.161
1	0.	S3(F)	0.	0.	0.
1	114.75	S3(F)	0.	0.	10.08
1	229.5	S3(F)	0.	0.	20.161
1	0.	S3(G)	0.	0.	0.
1	114.75	S3(G)	0.	0.	10.08
1	229.5	S3(G)	0.	0.	20.161
1	0.	S3(H)	0.	0.	0.
1	114.75	S3(H)	0.	0.	10.08
1	229.5	S3(H)	0.	0.	20.161
1	0.	S3(I)	0.	0.	0.
1	114.75	S3(I)	0.	0.	10.08
1	229.5	S3(I)	0.	0.	20.161
1	0.	S4(A)	0.	0.	-8.882E-16
1	114.75	S4(A)	0.	0.	14.337
1	229.5	S4(A)	0.	0.	28.675
1	0.	S4(B)	0.	0.	-8.882E-16
1	114.75	S4(B)	0.	0.	14.337
1	229.5	S4(B)	0.	0.	28.675
1	0.	S4(C)	0.	0.	-8.882E-16
1	114.75	S4(C)	0.	0.	14.337
1	229.5	S4(C)	0.	0.	28.675
1	0.	S4(D)	0.	0.	-8.882E-16

9. Frame results

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
1	114.75	S4(D)	0.	0.	14.337
1	229.5	S4(D)	0.	0.	28.675
1	0.	S4(E)	0.	0.	-8.882E-16
1	114.75	S4(E)	0.	0.	14.337
1	229.5	S4(E)	0.	0.	28.675
1	0.	S4(F)	0.	0.	-8.882E-16
1	114.75	S4(F)	0.	0.	14.337
1	229.5	S4(F)	0.	0.	28.675
1	0.	S5(A)	0.	0.	9.086E-13
1	114.75	S5(A)	0.	0.	-1031.771
1	229.5	S5(A)	0.	0.	-2063.541
1	0.	S5(B)	0.	0.	-9.104E-13
1	114.75	S5(B)	0.	0.	1061.789
1	229.5	S5(B)	0.	0.	2123.579
1	0.	S6(A)	0.	0.	0.
1	114.75	S6(A)	0.	0.	7.56
1	229.5	S6(A)	0.	0.	15.121
1	0.	S6(B)	0.	0.	0.
1	114.75	S6(B)	0.	0.	7.56
1	229.5	S6(B)	0.	0.	15.121
1	0.	S7(A)	0.	0.	9.095E-13
1	114.75	S7(A)	0.	0.	-1039.892
1	229.5	S7(A)	0.	0.	-2079.784
1	0.	S7(B)	0.	0.	-9.095E-13
1	114.75	S7(B)	0.	0.	1053.668
1	229.5	S7(B)	0.	0.	2107.337
2	0.	Dead	0.	0.	1.776E-15
2	114.75	Dead	0.	0.	-8.4
2	229.5	Dead	0.	0.	-16.801
2	0.	Live	0.	0.	1.776E-15
2	114.75	Live	0.	0.	-4.257
2	229.5	Live	0.	0.	-8.514
2	0.	Seismic	0.	0.	9.095E-13
2	114.75	Seismic	0.	0.	-1087.57
2	229.5	Seismic	0.	0.	-2175.14
2	0.	S1	0.	0.	2.487E-15
2	114.75	S1	0.	0.	-11.76
2	229.5	S1	0.	0.	-23.521
2	0.	S2(A)	0.	0.	4.974E-15
2	114.75	S2(A)	0.	0.	-16.892
2	229.5	S2(A)	0.	0.	-33.783
2	0.	S2(B)	0.	0.	4.974E-15
2	114.75	S2(B)	0.	0.	-16.892
2	229.5	S2(B)	0.	0.	-33.783
2	0.	S2(C)	0.	0.	4.974E-15
2	114.75	S2(C)	0.	0.	-16.892
2	229.5	S2(C)	0.	0.	-33.783
2	0.	S3(A)	0.	0.	3.020E-15
2	114.75	S3(A)	0.	0.	-12.209
2	229.5	S3(A)	0.	0.	-24.418
2	0.	S3(B)	0.	0.	3.020E-15
2	114.75	S3(B)	0.	0.	-12.209
2	229.5	S3(B)	0.	0.	-24.418
2	0.	S3(C)	0.	0.	3.020E-15

9. Frame results

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
2	114.75	S3(C)	0.	0.	-12.209
2	229.5	S3(C)	0.	0.	-24.418
2	0.	S3(D)	0.	0.	2.132E-15
2	114.75	S3(D)	0.	0.	-10.08
2	229.5	S3(D)	0.	0.	-20.161
2	0.	S3(E)	0.	0.	2.132E-15
2	114.75	S3(E)	0.	0.	-10.08
2	229.5	S3(E)	0.	0.	-20.161
2	0.	S3(F)	0.	0.	2.132E-15
2	114.75	S3(F)	0.	0.	-10.08
2	229.5	S3(F)	0.	0.	-20.161
2	0.	S3(G)	0.	0.	2.132E-15
2	114.75	S3(G)	0.	0.	-10.08
2	229.5	S3(G)	0.	0.	-20.161
2	0.	S3(H)	0.	0.	2.132E-15
2	114.75	S3(H)	0.	0.	-10.08
2	229.5	S3(H)	0.	0.	-20.161
2	0.	S3(I)	0.	0.	2.132E-15
2	114.75	S3(I)	0.	0.	-10.08
2	229.5	S3(I)	0.	0.	-20.161
2	0.	S4(A)	0.	0.	3.908E-15
2	114.75	S4(A)	0.	0.	-14.337
2	229.5	S4(A)	0.	0.	-28.675
2	0.	S4(B)	0.	0.	3.908E-15
2	114.75	S4(B)	0.	0.	-14.337
2	229.5	S4(B)	0.	0.	-28.675
2	0.	S4(C)	0.	0.	3.908E-15
2	114.75	S4(C)	0.	0.	-14.337
2	229.5	S4(C)	0.	0.	-28.675
2	0.	S4(D)	0.	0.	3.908E-15
2	114.75	S4(D)	0.	0.	-14.337
2	229.5	S4(D)	0.	0.	-28.675
2	0.	S4(E)	0.	0.	3.908E-15
2	114.75	S4(E)	0.	0.	-14.337
2	229.5	S4(E)	0.	0.	-28.675
2	0.	S4(F)	0.	0.	3.908E-15
2	114.75	S4(F)	0.	0.	-14.337
2	229.5	S4(F)	0.	0.	-28.675
2	0.	S5(A)	0.	0.	9.135E-13
2	114.75	S5(A)	0.	0.	-1102.579
2	229.5	S5(A)	0.	0.	-2205.159
2	0.	S5(B)	0.	0.	-9.054E-13
2	114.75	S5(B)	0.	0.	1072.561
2	229.5	S5(B)	0.	0.	2145.121
2	0.	S6(A)	0.	0.	1.599E-15
2	114.75	S6(A)	0.	0.	-7.56
2	229.5	S6(A)	0.	0.	-15.121
2	0.	S6(B)	0.	0.	1.599E-15
2	114.75	S6(B)	0.	0.	-7.56
2	229.5	S6(B)	0.	0.	-15.121
2	0.	S7(A)	0.	0.	9.110E-13
2	114.75	S7(A)	0.	0.	-1094.458
2	229.5	S7(A)	0.	0.	-2188.916
2	0.	S7(B)	0.	0.	-9.080E-13

9. Frame results

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
2	114.75	S7(B)	0.	0.	1080.682
2	229.5	S7(B)	0.	0.	2161.363
5	9.25	Dead	0.	0.	-8.754
5	24.25	Dead	0.	0.	0.768
5	24.25	Dead	0.	0.	0.635
5	44.875	Dead	0.	0.	7.625
5	65.5	Dead	0.	0.	9.955
5	86.125	Dead	0.	0.	7.625
5	106.75	Dead	0.	0.	0.635
5	106.75	Dead	0.	0.	0.768
5	121.75	Dead	0.	0.	-8.754
5	9.25	Live	0.	0.	-5.045
5	24.25	Live	0.	0.	-0.17
5	24.25	Live	0.	0.	-0.238
5	44.875	Live	0.	0.	4.016
5	65.5	Live	0.	0.	5.434
5	86.125	Live	0.	0.	4.016
5	106.75	Live	0.	0.	-0.238
5	106.75	Live	0.	0.	-0.17
5	121.75	Live	0.	0.	-5.045
5	9.25	Seismic	0.	0.	1987.393
5	24.25	Seismic	0.	0.	1465.599
5	24.25	Seismic	0.	0.	1448.255
5	44.875	Seismic	0.	0.	730.788
5	65.5	Seismic	0.	0.	13.322
5	86.125	Seismic	0.	0.	-704.145
5	106.75	Seismic	0.	0.	-1421.612
5	106.75	Seismic	0.	0.	-1404.267
5	121.75	Seismic	0.	0.	-1926.061
5	9.25	S1	0.	0.	-12.256
5	24.25	S1	0.	0.	1.076
5	24.25	S1	0.	0.	0.888
5	44.875	S1	0.	0.	10.675
5	65.5	S1	0.	0.	13.937
5	86.125	S1	0.	0.	10.675
5	106.75	S1	0.	0.	0.888
5	106.75	S1	0.	0.	1.076
5	121.75	S1	0.	0.	-12.256
5	9.25	S2(A)	0.	0.	-18.576
5	24.25	S2(A)	0.	0.	0.651
5	24.25	S2(A)	0.	0.	0.381
5	44.875	S2(A)	0.	0.	15.576
5	65.5	S2(A)	0.	0.	20.64
5	86.125	S2(A)	0.	0.	15.576
5	106.75	S2(A)	0.	0.	0.381
5	106.75	S2(A)	0.	0.	0.651
5	121.75	S2(A)	0.	0.	-18.576
5	9.25	S2(B)	0.	0.	-18.576
5	24.25	S2(B)	0.	0.	0.651
5	24.25	S2(B)	0.	0.	0.381
5	44.875	S2(B)	0.	0.	15.576
5	65.5	S2(B)	0.	0.	20.64
5	86.125	S2(B)	0.	0.	15.576
5	106.75	S2(B)	0.	0.	0.381

9. Frame results

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
5	106.75	S2(B)	0.	0.	0.651
5	121.75	S2(B)	0.	0.	-18.576
5	9.25	S2(C)	0.	0.	-18.576
5	24.25	S2(C)	0.	0.	0.651
5	24.25	S2(C)	0.	0.	0.381
5	44.875	S2(C)	0.	0.	15.576
5	65.5	S2(C)	0.	0.	20.64
5	86.125	S2(C)	0.	0.	15.576
5	106.75	S2(C)	0.	0.	0.381
5	106.75	S2(C)	0.	0.	0.651
5	121.75	S2(C)	0.	0.	-18.576
5	9.25	S3(A)	0.	0.	-13.027
5	24.25	S3(A)	0.	0.	0.837
5	24.25	S3(A)	0.	0.	0.643
5	44.875	S3(A)	0.	0.	11.158
5	65.5	S3(A)	0.	0.	14.663
5	86.125	S3(A)	0.	0.	11.158
5	106.75	S3(A)	0.	0.	0.643
5	106.75	S3(A)	0.	0.	0.837
5	121.75	S3(A)	0.	0.	-13.027
5	9.25	S3(B)	0.	0.	-13.027
5	24.25	S3(B)	0.	0.	0.837
5	24.25	S3(B)	0.	0.	0.643
5	44.875	S3(B)	0.	0.	11.158
5	65.5	S3(B)	0.	0.	14.663
5	86.125	S3(B)	0.	0.	11.158
5	106.75	S3(B)	0.	0.	0.643
5	106.75	S3(B)	0.	0.	0.837
5	121.75	S3(B)	0.	0.	-13.027
5	9.25	S3(C)	0.	0.	-13.027
5	24.25	S3(C)	0.	0.	0.837
5	24.25	S3(C)	0.	0.	0.643
5	44.875	S3(C)	0.	0.	11.158
5	65.5	S3(C)	0.	0.	14.663
5	86.125	S3(C)	0.	0.	11.158
5	106.75	S3(C)	0.	0.	0.643
5	106.75	S3(C)	0.	0.	0.837
5	121.75	S3(C)	0.	0.	-13.027
5	9.25	S3(D)	0.	0.	-10.505
5	24.25	S3(D)	0.	0.	0.922
5	24.25	S3(D)	0.	0.	0.761
5	44.875	S3(D)	0.	0.	9.15
5	65.5	S3(D)	0.	0.	11.946
5	86.125	S3(D)	0.	0.	9.15
5	106.75	S3(D)	0.	0.	0.761
5	106.75	S3(D)	0.	0.	0.922
5	121.75	S3(D)	0.	0.	-10.505
5	9.25	S3(E)	0.	0.	-10.505
5	24.25	S3(E)	0.	0.	0.922
5	24.25	S3(E)	0.	0.	0.761
5	44.875	S3(E)	0.	0.	9.15
5	65.5	S3(E)	0.	0.	11.946
5	86.125	S3(E)	0.	0.	9.15
5	106.75	S3(E)	0.	0.	0.761

9. Frame results

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
5	106.75	S3(E)	0.	0.	0.922
5	121.75	S3(E)	0.	0.	-10.505
5	9.25	S3(F)	0.	0.	-10.505
5	24.25	S3(F)	0.	0.	0.922
5	24.25	S3(F)	0.	0.	0.761
5	44.875	S3(F)	0.	0.	9.15
5	65.5	S3(F)	0.	0.	11.946
5	86.125	S3(F)	0.	0.	9.15
5	106.75	S3(F)	0.	0.	0.761
5	106.75	S3(F)	0.	0.	0.922
5	121.75	S3(F)	0.	0.	-10.505
5	9.25	S3(G)	0.	0.	-10.505
5	24.25	S3(G)	0.	0.	0.922
5	24.25	S3(G)	0.	0.	0.761
5	44.875	S3(G)	0.	0.	9.15
5	65.5	S3(G)	0.	0.	11.946
5	86.125	S3(G)	0.	0.	9.15
5	106.75	S3(G)	0.	0.	0.761
5	106.75	S3(G)	0.	0.	0.922
5	121.75	S3(G)	0.	0.	-10.505
5	9.25	S3(H)	0.	0.	-10.505
5	24.25	S3(H)	0.	0.	0.922
5	24.25	S3(H)	0.	0.	0.761
5	44.875	S3(H)	0.	0.	9.15
5	65.5	S3(H)	0.	0.	11.946
5	86.125	S3(H)	0.	0.	9.15
5	106.75	S3(H)	0.	0.	0.761
5	106.75	S3(H)	0.	0.	0.922
5	121.75	S3(H)	0.	0.	-10.505
5	9.25	S3(I)	0.	0.	-10.505
5	24.25	S3(I)	0.	0.	0.922
5	24.25	S3(I)	0.	0.	0.761
5	44.875	S3(I)	0.	0.	9.15
5	65.5	S3(I)	0.	0.	11.946
5	86.125	S3(I)	0.	0.	9.15
5	106.75	S3(I)	0.	0.	0.761
5	106.75	S3(I)	0.	0.	0.922
5	121.75	S3(I)	0.	0.	-10.505
5	9.25	S4(A)	0.	0.	-15.55
5	24.25	S4(A)	0.	0.	0.752
5	24.25	S4(A)	0.	0.	0.524
5	44.875	S4(A)	0.	0.	13.166
5	65.5	S4(A)	0.	0.	17.38
5	86.125	S4(A)	0.	0.	13.166
5	106.75	S4(A)	0.	0.	0.524
5	106.75	S4(A)	0.	0.	0.752
5	121.75	S4(A)	0.	0.	-15.55
5	9.25	S4(B)	0.	0.	-15.55
5	24.25	S4(B)	0.	0.	0.752
5	24.25	S4(B)	0.	0.	0.524
5	44.875	S4(B)	0.	0.	13.166
5	65.5	S4(B)	0.	0.	17.38
5	86.125	S4(B)	0.	0.	13.166
5	106.75	S4(B)	0.	0.	0.524

9. Frame results

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
5	106.75	S4(B)	0.	0.	0.752
5	121.75	S4(B)	0.	0.	-15.55
5	9.25	S4(C)	0.	0.	-15.55
5	24.25	S4(C)	0.	0.	0.752
5	24.25	S4(C)	0.	0.	0.524
5	44.875	S4(C)	0.	0.	13.166
5	65.5	S4(C)	0.	0.	17.38
5	86.125	S4(C)	0.	0.	13.166
5	106.75	S4(C)	0.	0.	0.524
5	106.75	S4(C)	0.	0.	0.752
5	121.75	S4(C)	0.	0.	-15.55
5	9.25	S4(D)	0.	0.	-15.55
5	24.25	S4(D)	0.	0.	0.752
5	24.25	S4(D)	0.	0.	0.524
5	44.875	S4(D)	0.	0.	13.166
5	65.5	S4(D)	0.	0.	17.38
5	86.125	S4(D)	0.	0.	13.166
5	106.75	S4(D)	0.	0.	0.524
5	106.75	S4(D)	0.	0.	0.752
5	121.75	S4(D)	0.	0.	-15.55
5	9.25	S4(E)	0.	0.	-15.55
5	24.25	S4(E)	0.	0.	0.752
5	24.25	S4(E)	0.	0.	0.524
5	44.875	S4(E)	0.	0.	13.166
5	65.5	S4(E)	0.	0.	17.38
5	86.125	S4(E)	0.	0.	13.166
5	106.75	S4(E)	0.	0.	0.524
5	106.75	S4(E)	0.	0.	0.752
5	121.75	S4(E)	0.	0.	-15.55
5	9.25	S4(F)	0.	0.	-15.55
5	24.25	S4(F)	0.	0.	0.752
5	24.25	S4(F)	0.	0.	0.524
5	44.875	S4(F)	0.	0.	13.166
5	65.5	S4(F)	0.	0.	17.38
5	86.125	S4(F)	0.	0.	13.166
5	106.75	S4(F)	0.	0.	0.524
5	106.75	S4(F)	0.	0.	0.752
5	121.75	S4(F)	0.	0.	-15.55
5	9.25	S5(A)	0.	0.	1971.143
5	24.25	S5(A)	0.	0.	1466.413
5	24.25	S5(A)	0.	0.	1448.829
5	44.875	S5(A)	0.	0.	744.564
5	65.5	S5(A)	0.	0.	31.498
5	86.125	S5(A)	0.	0.	-690.369
5	106.75	S5(A)	0.	0.	-1421.037
5	106.75	S5(A)	0.	0.	-1403.453
5	121.75	S5(A)	0.	0.	-1942.311
5	9.25	S5(B)	0.	0.	-2003.643
5	24.25	S5(B)	0.	0.	-1464.785
5	24.25	S5(B)	0.	0.	-1447.68
5	44.875	S5(B)	0.	0.	-717.012
5	65.5	S5(B)	0.	0.	4.855
5	86.125	S5(B)	0.	0.	717.921
5	106.75	S5(B)	0.	0.	1422.186

10. Material take-off

Table 24: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	T Kip-in	M2 Kip-in	M3 Kip-in
5	106.75	S5(B)	0.	0.	1405.081
5	121.75	S5(B)	0.	0.	1909.811
5	9.25	S6(A)	0.	0.	-7.879
5	24.25	S6(A)	0.	0.	0.692
5	24.25	S6(A)	0.	0.	0.571
5	44.875	S6(A)	0.	0.	6.862
5	65.5	S6(A)	0.	0.	8.959
5	86.125	S6(A)	0.	0.	6.862
5	106.75	S6(A)	0.	0.	0.571
5	106.75	S6(A)	0.	0.	0.692
5	121.75	S6(A)	0.	0.	-7.879
5	9.25	S6(B)	0.	0.	-7.879
5	24.25	S6(B)	0.	0.	0.692
5	24.25	S6(B)	0.	0.	0.571
5	44.875	S6(B)	0.	0.	6.862
5	65.5	S6(B)	0.	0.	8.959
5	86.125	S6(B)	0.	0.	6.862
5	106.75	S6(B)	0.	0.	0.571
5	106.75	S6(B)	0.	0.	0.692
5	121.75	S6(B)	0.	0.	-7.879
5	9.25	S7(A)	0.	0.	1980.215
5	24.25	S7(A)	0.	0.	1466.229
5	24.25	S7(A)	0.	0.	1448.775
5	44.875	S7(A)	0.	0.	737.04
5	65.5	S7(A)	0.	0.	21.484
5	86.125	S7(A)	0.	0.	-697.893
5	106.75	S7(A)	0.	0.	-1421.091
5	106.75	S7(A)	0.	0.	-1403.637
5	121.75	S7(A)	0.	0.	-1933.239
5	9.25	S7(B)	0.	0.	-1994.571
5	24.25	S7(B)	0.	0.	-1464.969
5	24.25	S7(B)	0.	0.	-1447.734
5	44.875	S7(B)	0.	0.	-724.536
5	65.5	S7(B)	0.	0.	-5.159
5	86.125	S7(B)	0.	0.	710.397
5	106.75	S7(B)	0.	0.	1422.132
5	106.75	S7(B)	0.	0.	1404.897
5	121.75	S7(B)	0.	0.	1918.883

10. Material take-off

This section provides a material take-off.

Table 25: Material List 2 - By Section Property

Table 25: Material List 2 - By Section Property

Section	ObjectType	NumPieces	TotalLength in	TotalWeight Kip
HSS12x8x5/8_A	Frame	1	131.	1.432
BU18.5x108	Frame	2	490.	4.412

11. Design preferences

This section provides the design preferences for each type of design, which typically include material reduction factors, framing type, stress ratio limit, deflection limits, and other code specific items.

11.1. Steel design

Table 26: Preferences - Steel Design - AISC 360-10, Part 1 of 4

Table 26: Preferences - Steel Design - AISC 360-10, Part 1 of 4								
THDesign	FrameType	PatLLF	SRatioLimit	MaxIter	SDC	SeisCode	SeisLoad	ImpFactor
Step-by-Step	SMF	0.75	0.95	1	D	No	No	1.

Table 26: Preferences - Steel Design - AISC 360-10, Part 2 of 4

Table 26: Preferences - Steel Design - AISC 360-10, Part 2 of 4								
SystemRho	SystemSds	SystemR	SystemCd	Omega0	Provision	AMethod	SOMethod	SRMethod
1.	0.4	6.5	4.	3.	LRFD	Effective Length	General 2nd Order	No Modification

Table 26: Preferences - Steel Design - AISC 360-10, Part 3 of 4

Table 26: Preferences - Steel Design - AISC 360-10, Part 3 of 4								
NLCoeff	PhiB	PhiC	PhiTY	PhiTF	PhiV	PhiVRolledI	PhiVT	PlugWeld
1.	0.9	0.9	0.9	0.75	0.9	1.	0.9	Yes

Table 26: Preferences - Steel Design - AISC 360-10, Part 4 of 4

Table 26: Preferences - Steel Design - AISC 360-10, Part 4 of 4							
HSSWelding	HSSReduce T	CheckDefl	DLRat	SDLAndLLR at	LLRat	TotalRat	NetRat
ERW	No	Yes	240.	240.	360.	180.	180.

11.2. Concrete design

Table 27: Preferences - Concrete Design - ACI 318-14, Part 1 of 2

Table 27: Preferences - Concrete Design - ACI 318-14, Part 1 of 2								
THDesign	NumCurves	NumPoints	MinEccen	PatLLF	UFLimit	SeisCat	Rho	Sds
Envelopes	24	11	Yes	0.75	0.95	D	1.	0.5

12. Design overwrites

Table 27: Preferences - Concrete Design - ACI 318-14, Part 2 of 2

Table 27: Preferences - Concrete Design - ACI 318-14, Part 2 of 2					
PhiT	PhiCTied	PhiCSpiral	PhiV	PhiVSeismic	PhiVJoint
0.9	0.65	0.75	0.75	0.6	0.85

11.3. Aluminum design

Table 28: Preferences - Aluminum Design - AA-ASD 2000

Table 28: Preferences - Aluminum Design - AA-ASD 2000			
FrameType	SRatioLimit	LatFact	UseLatFact
Moment Frame	1.	1.333333	No

11.4. Cold formed design

Table 29: Preferences - Cold Formed Design - AISI-ASD96

Table 29: Preferences - Cold Formed Design - AISI-ASD96								
FrameType	SRatioLimit	OmegaBS	OmegaBUS	OmegaBLTB	OmegaVS	OmegaVNS	OmegaT	OmegaC
Braced Frame	1.	1.67	1.67	1.67	1.67	1.5	1.67	1.8

12. Design overwrites

This section provides the design overwrites for each type of design, which are assigned to individual members of the structure.

12.1. Steel design

Table 30: Overwrites - Steel Design - AISC 360-10, Part 1 of 7

Table 30: Overwrites - Steel Design - AISC 360-10, Part 1 of 7						
Frame	DesignSect	FrameType	Fy Kip/in2	RLLF	AreaRatio	XLMajor
5	Program Determined	Program Determined	0.	0.	0.	0.
1	Program Determined	Program Determined	0.	0.	0.	0.
2	Program Determined	Program Determined	0.	0.	0.	0.

Table 30: Overwrites - Steel Design - AISC 360-10, Part 2 of 7**Table 30: Overwrites - Steel Design - AISC 360-10, Part 2 of 7**

Frame	XLMinor	XLlTB	K1Major	K1Minor	K2Major	K2Minor	KLtB
5	0.	0.	0.	0.	0.	0.	0.
1	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.	0.	0.

Table 30: Overwrites - Steel Design - AISC 360-10, Part 3 of 7**Table 30: Overwrites - Steel Design - AISC 360-10, Part 3 of 7**

Frame	CmMajor	CmMinor	Cb	B1Major	B1Minor	B2Major	B2Minor
5	0.	0.	0.	0.	0.	0.	0.
1	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.	0.	0.

Table 30: Overwrites - Steel Design - AISC 360-10, Part 4 of 7**Table 30: Overwrites - Steel Design - AISC 360-10, Part 4 of 7**

Frame	HSSReduce T	HSSWelding	Omega0	Ry	Pnc Kip	Pnt Kip	Mn3 Kip-in
5	Program Determined	Program Determined	0.	0.	0.	0.	0.
1	Program Determined	Program Determined	0.	0.	0.	0.	0.
2	Program Determined	Program Determined	0.	0.	0.	0.	0.

Table 30: Overwrites - Steel Design - AISC 360-10, Part 5 of 7**Table 30: Overwrites - Steel Design - AISC 360-10, Part 5 of 7**

Frame	Mn2 Kip-in	Vn2 Kip	Vn3 Kip	CheckDefl	DeflType	DLRat	SDLAndLLR at
5	0.	0.	0.	Program Determined	Program Determined	0.	0.
1	0.	0.	0.	Program Determined	Program Determined	0.	0.
2	0.	0.	0.	Program Determined	Program Determined	0.	0.

Table 30: Overwrites - Steel Design - AISC 360-10, Part 6 of 7**Table 30: Overwrites - Steel Design - AISC 360-10, Part 6 of 7**

Frame	LLRat	TotalRat	NetRat	DLAbs in	SDLAndLLA bs in	LLAbs in	TotalAbs in
5	0.	0.	0.	0.	0.	0.	0.
1	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.	0.	0.

13. Design summary

Table 30: Overwrites - Steel Design - AISC 360-10, Part 7 of 7

Table 30: Overwrites - Steel Design - AISC 360-10, Part 7 of 7

Frame	NetAbs	SpecCambe r	DCLimit
	in	in	
5	0.	0.	0.
1	0.	0.	0.
2	0.	0.	0.

13. Design summary

This section provides the design summary for each type of design, which highlights the controlling demand/capacity ratio and it's associated combination and location in each member.

13.1. Steel design

Table 31: Steel Design 1 - Summary Data - AISC 360-10, Part 1 of 2

Table 31: Steel Design 1 - Summary Data - AISC 360-10, Part 1 of 2

Frame	DesignSect	DesignType	Status	Ratio	RatioType
5	HSS12x8x5/8_A	Beam	No Messages	0.424099	PMM
1	BU18.5x108	Column	No Messages	0.251648	PMM
2	BU18.5x108	Column	No Messages	0.259395	PMM

Table 31: Steel Design 1 - Summary Data - AISC 360-10, Part 2 of 2

Table 31: Steel Design 1 - Summary Data - AISC 360-10, Part 2 of 2

Frame	Combo	Location in	ErrMsg	WarnMsg
5	S5(A)	106.75	No Messages	No Messages
1	S5(B)	229.5	No Messages	No Messages
2	S5(A)	229.5	No Messages	No Messages

SAP2000

Project _____
Job Number _____
Engineer _____

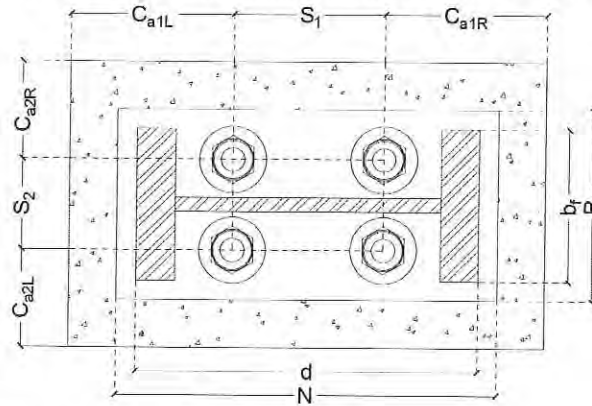
AISC 360-10 STEEL SECTION CHECK (Deflection Details)
Units : Kip, in, F

Frame : 5 X Mid: 65.500 Combo: D5(DL + LL + R) Design Type: Beam
Length: 131.000 Y Mid: 0.000 Shape: HSS12x8x5/8_A Frame Type: SMF
Loc : 0.000 Z Mid: 245.000 Class: Slender Princpl Rot: 0.000 degrees

DEFLECTION CHECK (ComboD5(DL +))

Type	Consider	Deflection	Limit	Ratio	Status
Dead Load	Yes	9.298E-04	0.546	0.002	OK
Super DL+LL	Yes	5.684E-04	0.546	0.001	OK
Live Load	Yes	5.684E-04	0.364	0.002	OK
Total Load	Yes	0.001	0.728	0.002	OK
Total-Camber	Yes	0.001	0.728	0.002	OK

Hardy Frame Special Moment Frame Base Plate Design



Seismic Properties		
SDC	D	
ϕ_{Risk}	0.75	
Reactions		
P_{nt}	127.2	kips
P_{vt}	95.1	kips
V_u	28.6	kips
Column		
Name	BU18.5x108	
b_f	8	in
d	18.5	in
t_f	1.5	in
t_w	0.5	in
t_{sp}	1.5	in
Base Plate		
Material	A572 Gr 50	
B	11	in
N	19.5	in
t_p	1 1/8	in
Plc Frame	No	
F_y	50	ksi
Anchor Bolts		
Type	Cast-In	
Material	A193 B7	
Washer	3	in
t_{washer}	1/2	in
n	4	bolts
Φ	3/4	in
W	1 1/4	in
F_u	125	ksi
s_1	6	in
s_2	4	in
h_{ef}	18	in
Foundation		
F'_c	2500	psi
h_f	24	in
C_{a1L}	21	in
C_{a1R}	21	in
C_{a2L}	21	in
C_{a2R}	21	in
Weld		
t_w	5/16	in
L	24	in
F_{EXX}	70	ksi
Tension Reinforcement		
Required	Yes	
Bar #	4	
F_y	60	ksi
m	12	
d	0.5	in
A_s	0.2	sq.in
Shear Reinforcement		
Required	Yes	
Bar #	4	
F_y	60	ksi
m	4	
d	0.5	in
A_s	0.2	sq.in
Anchor Shear Ties		
Bar #	3	
F_y	60	ksi
m	4	
s	3	in
Depth	19.5	in
b_w	11	in
d	0.375	in
A_s	0.11	sq.in

Seismic Design Category

Seismic Design Category Risk Factor (ACI 318-14 Section 17.2.3.4.4)

Compressive Axial Demand

Tensile Axial Demand

Shear Demand

Name of Built-Up Shape / W-Shape

Width of Column

Depth of Column

Thickness of Column Flange

Thickness of Column Web

Thickness of SidePlate

Base Plate Material

Width of Base Plate

Length of Base Plate

Thickness of Base Plate

Is This the Base Plate of a Picture Frame?

Yield Strength of Base Plate

Anchorage Type (Cast-In-Place)

Anchorage Material

Washer Diameter

Washer Thickness

of Anchor Bolts (4)

Bolt Diameter

Width Across Bolt Flat

Ultimate Tensile Strength of Anchor Bolt

Spacing Between Anchor Bolt Configuration

Spacing Between Anchor Bolt Configuration

Effective Embedment of Anchor

Compressive Strength of Concrete Footing

Thickness of Footing

Minimum Edge Distance in Longitudinal Dir

Minimum Edge Distance in Longitudinal Dir

Minimum Edge Distance in Out-of-Plane Dir

Minimum Edge Distance in Out-of-Plane Dir

Width of Weld (Column to Base Plate)

Total Length of Weld (Column to Base Plate)

Tensile Ultimate Strength of Weld (70 ksi)

Required Tension Reinforcement?

Bar Size No.

Tension Reinforcement Yield Strength

Number of Tension Reinforcement Bars

Nominal Bar Diameter

Nominal Bar Area

Required Shear Reinforcement?

Bar Size No.

Shear Reinforcement Yield Strength

Number of Shear Reinforcement Bars

Nominal Bar Diameter

Nominal Bar Area

Bar Size No.

Shear Reinforcement Yield Strength

Number of Shear Ties

Spacing

Stem wall depth (in)

Stem wall width (in)

Nominal Bar Diameter

Nominal Bar Area

Hardy Frame Special Moment Frame Base Plate Design

#	LIMIT STATE	DEMAND [kips]	CAPACITY [kips]	DCR	PASS/FAIL
A	Base Plate Uplift Strength (AISC 360-10)	95.1	113.9	0.84	PASS
B	Base Plate Bending Strength (AISC 360-10)	127.2	660.3	0.19	PASS
C	Concrete Bearing Strength (ACI 318-14)	127.2	592.6	0.21	PASS
D	Weld Strength to Base Plate (AISC 360-10)	99.3	167.0	0.59	PASS
E	Steel Strength of Anchor in Tension (AISC 360-10)	95.1	124.3	0.77	PASS
F	Concrete Breakout Strength of Anchor in Tension - Condition B (ACI 318-14)	95.1	34.0	N/A	N/A
G	Concrete Breakout Strength of Anchor in Tension - Condition A (ACI 318-14)	95.1	108.0	0.88	PASS
H	Pullout Strength of Anchor Bolt in Tension (ACI 318-14)	95.1	148.4	0.64	PASS
I	Concrete Side-Face Blowout Strength of a Headed Anchor in Tension (ACI 318-14)	95.1	N/A	N/A	N/A
J	Steel Strength of Anchor in Shear (AISC 360-10)	28.6	74.6	0.38	PASS
K	Concrete Breakout Strength of Anchor in Shear - Condition B (ACI 318-14)	28.6	18.6	N/A	N/A
L	Concrete Breakout Strength of Anchor in Shear - Condition A (ACI 318-14)	28.6	36.0	0.79	PASS
M	Concrete Pryout Strength of Anchor in Shear (ACI 318-14)	28.6	90.7	0.32	PASS
N	Interaction Effects of Combined Tension and Shear (AISC 360-10)	23.8	28.5	0.84	PASS
		7.1	10.0	0.72	PASS
O	Stem Wall Shear Strength (ACI 318-14)	28.6	52.6	0.54	PASS

Hardy Frame Special Moment Frame Base Plate Design

A. Base Plate Uplift Strength (AISC 360-10)

$$\phi R_{nt} = \frac{\phi^n n t_p^2 b_{eff} F_y}{(4)(s_{eff})}$$

ϕ	0.90	LRFD factor (Section F1)
n	4	# of Anchor Bolts
t_p	1.13 in	Thickness of base plate [in]
b_{eff}	3.50 in	Effective width of base plate for resisting moment [in]
F_y	50 ksi	Yield strength of base plate [ksi]
s_{eff}	1.75 in	Spacing between anchor bolt and column web or SidePlate [in]
t_w	0.50 in	Thickness of column web [in]

$$\left(\frac{s_2 - t_w}{2}\right) \text{ or } \left(\frac{s_2 - b_f - 2t_{sp}}{2}\right)$$

$$\phi R_{nt} = 114 \text{ kips}$$

B. Base Plate Bending Strength (AISC 360-10)

$$\phi R_{nt} = \frac{\phi t_p^2 F_y B N}{2l^2}$$

ϕ	0.90	LRFD factor (Section F1)
t_p	1.13 in	Thickness of base plate [in]
F_y	50 ksi	Yield strength of base plate [ksi]
B	1.00 in	Width of base plate [in]
N	19.50 in	Length of base plate [in]
l	3.04 in	maximum of $(m, n, \lambda n')$ [in]

$$\phi R_{nt} = 660 \text{ kips}$$

C. Concrete Bearing Strength (ACI 318-14)

$$\phi P_b = \phi 0.85 f'_c A_1 \sqrt{A_2/A_1} \leq \phi 1.7 f'_c A_1$$

ACI 318-14 Section 14.5.6.1

ϕ	0.65	LRFD factor (ACI 318-14 Section 21.2)
f'_c	2500 psi	Compressive strength of concrete footing [psi]
A_1	214.50 sq.in	Area of the base plate [sq.in]
A_2	2208.00 sq.in	Maximum area of supporting surface similar to loading area [sq.in]

$$\phi P_b = 593 \text{ kips}$$

D. Weld Strength to Base Plate (AISC 360-10)

$$\phi R_{mn} = \phi 0.6 F_{exx} \left(\frac{\sqrt{2}}{2}\right) t_e L$$

ϕ	0.75	LRFD factor (Section J2.4)
F_{exx}	70 ksi	Tensile ultimate strength of weld (Column to Base Plate) [ksi]
t_e	0.31 in	Width of Weld (Column to Base Plate) [in]
L	24.00 in	Total Length of Welds (Column to Base Plate) [in]

$$\phi R_{mn} = 167 \text{ kips}$$

Hardy Frame Special Moment Frame Base Plate Design

E. Steel Strength of Anchor in Tension (AISC 360-10)

$$\phi R_{nt} = n \phi F_{nt} A_b$$

ϕ	0.75	LRFD factor (Section J3.6)
n	4	Number of anchor bolts
F_{nt}	94 ksi	Nominal tensile strength of bolt [ksi] (Table J3.2)
A_b	0.44 sq.in	Nominal unthreaded body area of bolt [sq.in]

$$\phi R_{nt} = 124 \text{ kips}$$

F. Concrete Breakout Strength of Anchor in Tension - Condition B (ACI 318-14)

$$\phi N_{cbg} = \phi \phi_{Risk} \left(\frac{A_{Nc}}{A_{Nco}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$$

ACI 318-14 Section 17.4.2.1

ϕ	0.70	LRFD factor (ACI 318-14 Section 17.3.3)
ϕ_{Risk}	0.75	Seismic Design Category Risk Factor (ACI 318-14 Section 17.2.3.4.4)
A_{nc}	2208.00 sq.in	Projected concrete failure area of an anchor group [sq.in]
A_{nco}	2916.00 sq.in	Projected concrete failure area of a single anchor, if not limited by edge distance or spacing [sq.in]
$\psi_{ec,N}$	1.00	Eccentricity Factor (1.0 because anchor bolt configuration is concentric with column)
$\psi_{ed,N}$	0.93	Edge Proximity Factor
$\psi_{c,N}$	1.00	Concrete Crack Factor
$\psi_{cp,N}$	1.00	Post Installed Anchor Factor (1.00 for cast-in anchors)
N_b	91641 lbs	Basic concrete breakout strength in tension of a single anchor in cracked concrete [lb]

$$\phi N_{cbg} = 34 \text{ kips}$$

G. Concrete Breakout Strength of Anchor in Tension - Condition A (ACI 318-14)

Required ?	Yes	Required Tension Reinforcement?
Bar #	4	Bar Size No.
m	12	Number of Tension Reinforcement Bars
d	0.5	Nominal Bar Diameter [in]
A_s	0.2	Nominal Bar Area [sq.in]
s	2	Spacing [in]
ϕ	0.75	Phi factor for tension loading (ACI 318-14 Section 17.3.3)

$$\phi N_{sr} = 108 \text{ kips}$$

ACI 318-14 Section 17.4.1.2

H. Pullout Strength of Anchor Bolt in Tension (ACI 318-14)

Note: Assume A563 Nut dimensions (AISC 360-10, Table 7-14)

$$\phi N_{pn} = \phi \phi_{Risk} \psi_{c,p} N_p$$

ACI 318-14 Section 17.4.3.1

ϕ	0.70	LRFD factor (ACI 318-14 Section 17.3.3)
ϕ_{Risk}	0.75	Seismic Design Category Risk Factor (ACI 318-14 Section 17.2.3.4.4)
n	4	# of Anchor Bolts (4)
$\psi_{c,p}$	1.00	Pullout Factor (Concrete is assumed cracked at service load level)
A_{brg}	3.53	
N_p	70686 lbs	Pullout strength in tension of a single anchor in cracked concrete [lb]

6.626797

$$\phi N_{pn} = 148.4 \text{ kips}$$

Hardy Frame Special Moment Frame Base Plate Design

I. Concrete Side-Face Blowout Strength of a Headed Anchor in Tension (ACI 318-14)

$$N_{sb} = 160c_a \sqrt{A_{brg} \lambda_a \sqrt{f'_c}}$$

ACI 318-14 Section 17.4.4.1

$$\phi N_{sbg} = \phi \phi_{Risk} \left(1 + \frac{s}{6c_a} \right) N_{sb}$$

ACI 318-14 Section 17.4.4.2

ϕ	0.70	LRFD factor (ACI 318-14 Section 17.3.3)
ϕ_{Risk}	0.75	Seismic Design Category Risk Factor (ACI 318-14 Section 17.2.3.4.4)
h_{ef}	18.00 in	Effective Embedment of Anchor [in]
s_1	6.00 in	Spacing Between Anchor Bolt Configuration [in]
s_2	4.00 in	Spacing Between Anchor Bolt Configuration [in]
c_{a1L}	21.00 in	Foundation dimension [in]
c_{a1R}	21.00 in	Foundation dimension [in]
c_{a2L}	21.00 in	Foundation dimension [in]
c_{a2R}	21.00 in	Foundation dimension [in]
A_{brg}	3.53 sq.in	Net bearing area of the head of anchor bolt [sq.in]
λ_a	1	Lightweight concrete factor
f'_c	2500 psi	Compressive strength of concrete footing [psi]
(1L) ϕN_{sbg}	N/A	Side-Face Blowout Strength for c_{a1L}
(1R) ϕN_{sbg}	N/A	Side-Face Blowout Strength for c_{a1R}
(2L) ϕN_{sbg}	N/A	Side-Face Blowout Strength for c_{a2L}
(2R) ϕN_{sbg}	N/A	Side-Face Blowout Strength for c_{a2R}

ϕN_{sbg}	N/A
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J. Steel Strength of Anchor in Shear (AISC 360-10)

Note: Per AISC Seismic Provisions, strength of bolts shall be checked using AISC J3 in lieu of ACI318.

$$\phi n R_{nv} = \phi n F_{nv} A_b$$

ϕ	0.75	LRFD factor (Section J3.6)
n	4	Number of anchor bolts
F_{nv}	56 ksi	Nominal shear strength of bolt [ksi] (Table J3.2)
A_b	0.44 sq.in	Effective threaded area of anchor bolt [sq.in]

$\phi n R_{nv}$	74.6 kips
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K. Concrete Breakout Strength of Anchor in Shear - Condition B (ACI 318-14)

$$\phi V_{cbg} = \phi \left(\frac{A_{vc}}{A_{vco}} \right) \psi_{ec,v} \psi_{ed,v} \psi_{c,v} \psi_{h,v} V_b$$

ϕ	0.70	LRFD factor (ACI 318-14 Section 17.3.3)
A_{vc}	1104.00 sq.in	Projected concrete failure area of an anchor group [sq.in]
A_{vco}	1152.00 sq.in	Projected concrete failure area of a single anchor, if not limited by corner influences, spacing, or member thickness [sq.in]
$\psi_{ec,v}$	1.00	Eccentricity Factor
$\psi_{ed,v}$	0.96	Edge Proximity Factor
$\psi_{c,v}$	1.00	Concrete Crack Factor
$\psi_{h,v}$	1.00	h Factor
V_b	28800 lbs	Basic concrete breakout strength in shear of a single anchor in cracked concrete [lb]

ϕV_{cbg}	18.6 kips
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Hardy Frame Special Moment Frame Base Plate Design

L. Concrete Breakout Strength of Anchor in Shear - Condition A (ACI 318-14)

Required ?	Yes	Required Tension Reinforcement?
Bar #	4	Bar Size No.
m	4	Number of Shear Reinforcement Bars
d_b	0.5	Nominal Bar Diameter [in]
A_s	0.2	Nominal Bar Area [sq.in]
ϕ	0.75	Phi factor for shear loading

ϕN_{sr} 36.0 kips Capacity based on ACI 318-14 Section 21.2.4.1

M. Concrete Pryout Strength of Anchor in Shear (ACI 318-17)

$$\phi V_{cpb} = \phi K_{cp} N_{cpb}$$

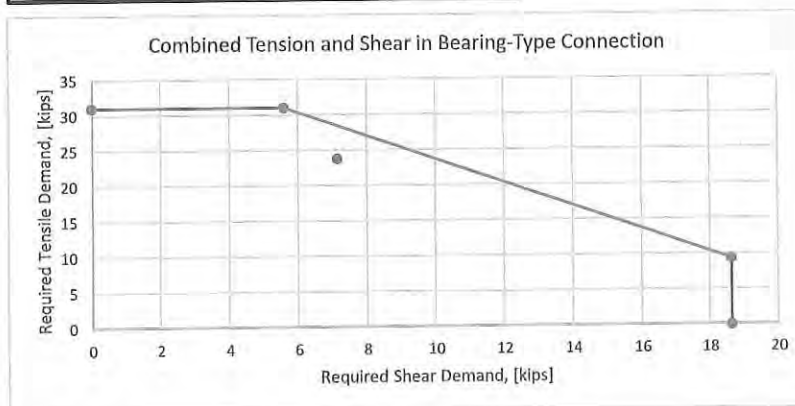
ACI 318-14 Section 17.5.3.1

ϕ	0.70	LRFD factor (ACI 318-14 Section 17.3.3)
K_{cp}	2.0	Coefficient for pryout strength
N_{cpb}	64.76 kips	Shall be taken as nominal concrete breakout strength in tension of a single anchor [lb]

ϕV_{cpb} 91 kips

N. Interaction Effects of Combined Tension and Shear (AISC 360-10)

$$\begin{aligned} &\text{if } f_v \leq 0.3\phi F_{nv}, \phi F_{nt} \geq f_t \\ &\text{if } f_t \leq 0.3\phi F_{nt}, \phi F_{nv} \geq f_v \\ &\text{if } f_v > 0.3\phi F_{nv} \text{ and } f_t > 0.3\phi F_{nt}, \frac{f_t}{\phi F_{nt}} + \frac{f_v}{\phi F_{nv}} \leq 1.3 \end{aligned}$$



ϕ	0.75	LRFD factor (J3.7)
$\phi A_s F_{nt}$	31 kips	Design tensile force [kips]
$\phi A_s F_{nv}$	19 kips	Design shear force [kips]
$A_s f_t$	24 kips	Ultimate tensile demand [kips]
$A_s f_v$	7 kips	Ultimate shear demand [kips]

Hardy Frame Special Moment Frame Base Plate Design

O. Anchor Shear Ties in Stem Wall

Bar #	3	Bar Size No.
S	3	Spacing [in]
d_b	0.375	Nominal Bar Diameter [in]
A_s	0.11	Nominal Bar Area [sq.in]
d_c	12.75	Distance from extreme compression fiber to centroid of longitudinal tension reinforcement [in]
b_w	11	Stem wall width [in]
f'_c	2500 psi	Compressive strength of concrete footing [psi]
λ	1	
ϕ	0.75	Phi factor for shear loading

ϕV_c	11 kips	Capacity based on ACI 318-14 Section 11.5.4.4 through 11.5.4.7
ϕV_s	42 kips	Capacity based on ACI 318-14 Section 22.5.10.5.3

ϕV_n	53 kips
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