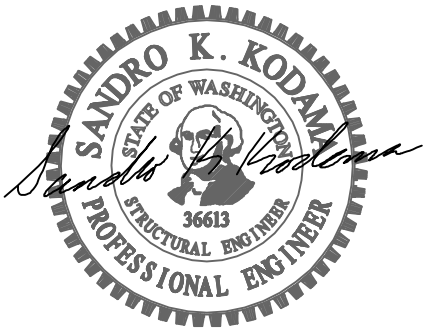
QUANTUM
CONSULTING ENGINEERS

September 15, 2022

STRUCTURAL CALCULATIONS
(Permit Submittal)

INTRACHAT HOANG RESIDENCE
7929 East Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 22252.01
Lindal Job Number: 42255



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42255 INTRACHAT HOANG RESIDENCE
7929 EAST MERCER WAY
MERCER ISLAND WA, 98040

QUANTUM JOB NUMBER: 22252.01

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42252 INTRACHAT RESIDENCE
7929 EAST MERCER WAY
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 22252.01

DESIGN CRITERIA

QUANTUM | CONSULTING ENGINEERS

STRUCTURAL DESIGN CRITERIA

INTRACHAT HOANG RESIDENCE
7929 EAST MERCER WAY
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 22252.01

CODE CRITERIA:

BUILDING CODE ..... 2018 INTERNATIONAL BUILDING CODE
BUILDING DEPARTMENT ..... CITY OF MERCER ISLAND
WIND CRITERIA ..... 98 MPH; EXPOSURE "B"
..... RISK CATEGORY = II
..... K_{ZT}= 1.43
SEISMIC ZONE ..... SDC = D
..... SITE CLASS = D
..... WOOD PANEL BEARING SHEAR WALLS, R = 6.5
..... I_E = 1.0
..... S_S = 1.46, S_1 = 0.50
..... S_{DS} = 0.97, S_{D1} = 0.60
SNOW ..... 25 PSF
RAIN ON SNOW SURCHARGE (FLAT ROOF) ..... 5 PSF
LIVE LOAD (RESIDENTIAL) ..... 40 PSF
LIVE LOAD (RESIDENTIAL EXTERIOR DECKS AND BALCONIES) ..... 60 PSF

SOILS CRITERIA:

FROST DEPTH ..... 18" MIN.
SOILS CONSULTANT ..... NELSON GEOTECHNICAL ASSOCIATES, INC.
SOILS REPORT NUMBER ..... #1276521
SOILS REPORT DATE ..... JANUARY 14, 2022
ACTIVE SOIL PRESSURE (RESTRAINED / UNRESTRAINED) ..... 60 PCF / 40 PCF
SEISMIC SURCHARGE PRESSURE ..... 8H PSF
PASSIVE SOIL PRESSURE ..... 150 PCF

MATERIALS CRITERIA:

CONCRETE (28 DAY STRENGTH):

FOUNDATION/S.O.G. ..... F'C=3,000 PSI

REINFORCING STEEL:

GRADE 60 ..... FY=60,000 PSI

WOOD FRAMING:

2X, 3X, & 4X FRAMING MBRS ..... SPF #1/#2
6X FRAMING MBRS ..... DF#1
GLULAM BEAMS ..... 24F-V4 (V8 @ CONT. AND CANT. MBRS)
PARALLAM BEAMS ..... 2.2 E PSL
LSL MEMBERS – BEAMS & HEADERS ..... 1.55 E LSL
WOOD SHTG ..... APA RATED

STRUCTURAL DESIGN CRITERIA

INTRACHAT HOANG RESIDENCE
7929 EAST MERCER WAY
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 22252.01

ASSEMBLY WEIGHTS

ROOF LOADS				**COMMENTS**
MEMBRANE ROOFING		2.0	PSF	
5/8” PLYWOOD SHEATHING		1.8	PSF	
ROOF JOISTS @ 16” O.C.		2.2	PSF	
R38 INSULATION		1.0	PSF	
LIGHTS, DUCTS		0.5	PSF	
5/8” GWB		2.8	PSF	
PV ALLOWANCE		4.0	PSF	INCL. W/ MISC. FOR SEISMIC
MISCELLANEOUS		0.7	PSF	
	ROOF DL	16.0	PSF	SL = 30 PSF

FLOOR LOAD				
HARDWOOD FLOORING		3.0	PSF	
3/4" SHEATHING		2.3	PSF	
FLOOR JOISTS @ 16” O.C.		2.5	PSF	
LIGHTS, DUCTS		0.8	PSF	
5/8” GWB		2.8	PSF	
MISCELLANEOUS		0.6	PSF	
	FLOOR DL	12.0	PSF	LL = 40 PSF

DECK LOAD				
DECK BOARDS		2.9	PSF	
2X RIPPED SLEEPERS		1.0	PSF	
MEMBRANE ROOF		2.0	PSF	
3/4" SHEATHING		2.3	PSF	
FLOOR JOISTS @ 16” O.C.		2.5	PSF	
LIGHTS, DUCTS		0.8	PSF	
5/8” GWB		2.8	PSF	
MISCELLANEOUS		0.6	PSF	
	FLOOR DL	15.0	PSF	LL = 60 PSF

ZEN GARDEN LOAD

2” PEBBLES		20.0	PSF	
2X RIPPED SLEEPERS		1.0	PSF	
MEMBRANE ROOF		2.0	PSF	
3/4" SHEATHING		2.3	PSF	
FLOOR JOISTS @ 16” O.C.		2.5	PSF	
LIGHTS, DUCTS		0.8	PSF	
5/8” GWB		2.8	PSF	
MISCELLANEOUS		0.6	PSF	
	FLOOR DL	32.0	PSF	LL = 100 PSF

TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

ROOF SNOW LOAD[a] (psf)	WIND DESIGN				SEISMIC DESIGN CATEGORY	SUBJECT TO DAMAGE FROM			OUTDOOR DESIGN TEMP (F) - Heat/Cool	ICE BARRIER UNDERLAYMENT REQUIRED	FLOOD HAZARD[e]	AIR FREZING INDEX	MEAN ANNUAL TEMP
	Speed[b] (mph)	Topographic effects[c]	Special wind region	Windborne debris zone		Weathering[d]	Frost line depth	Termite					
25	110	Yes	No	No	D2	Moderate	12”	Slight to Moderate	83/24	No	N.A.	113	53

MANUAL J DESIGN CRITERIA							
Elevation	**Latitude**	**Winter heating**	**Summer cooling**	**Altitude correction factor**	**Indoor design temperature**	**Design temperature cooling**	**Heating temperature difference**
338 feet	47°34'39''	72ºF max	75ºF min	0.99	72ºF	75ºF	48ºF
Cooling temperature difference	**Wind velocity heating**	**Wind velocity cooling**	**Coincident wet bulb**	**Daily range**	**Winter humidity**	**Summer humidity**	
8ºF	N.A.	N.A.	66	Medium	75%	68%	

a. This is the minimum roof snow load. When using this snow load it will be left to the engineer's judgment whether to consider drift or sliding snow. However, rain on snow surcharge of 5 psf must be considered for roof slopes less than 5 degrees.

b. The 110 mph Ultimate Design Wind Speed (3-second gust) as adopted by the 2018 IRC/ASCE 7-10 (or if using the IBC for structural design, the 98 mph Basic Design Wind Speed as adopted by the 2018 IBC/ASCE 7-16 may be used).

c. Wind exposure category and Topographic effects (Wind Speed-up Kzt factor) shall be determined on a site-specific basis by the Engineer of Record (components and cladding need not consider topographic effects unless otherwise determined by the engineer of record).

d. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216 or C 652.

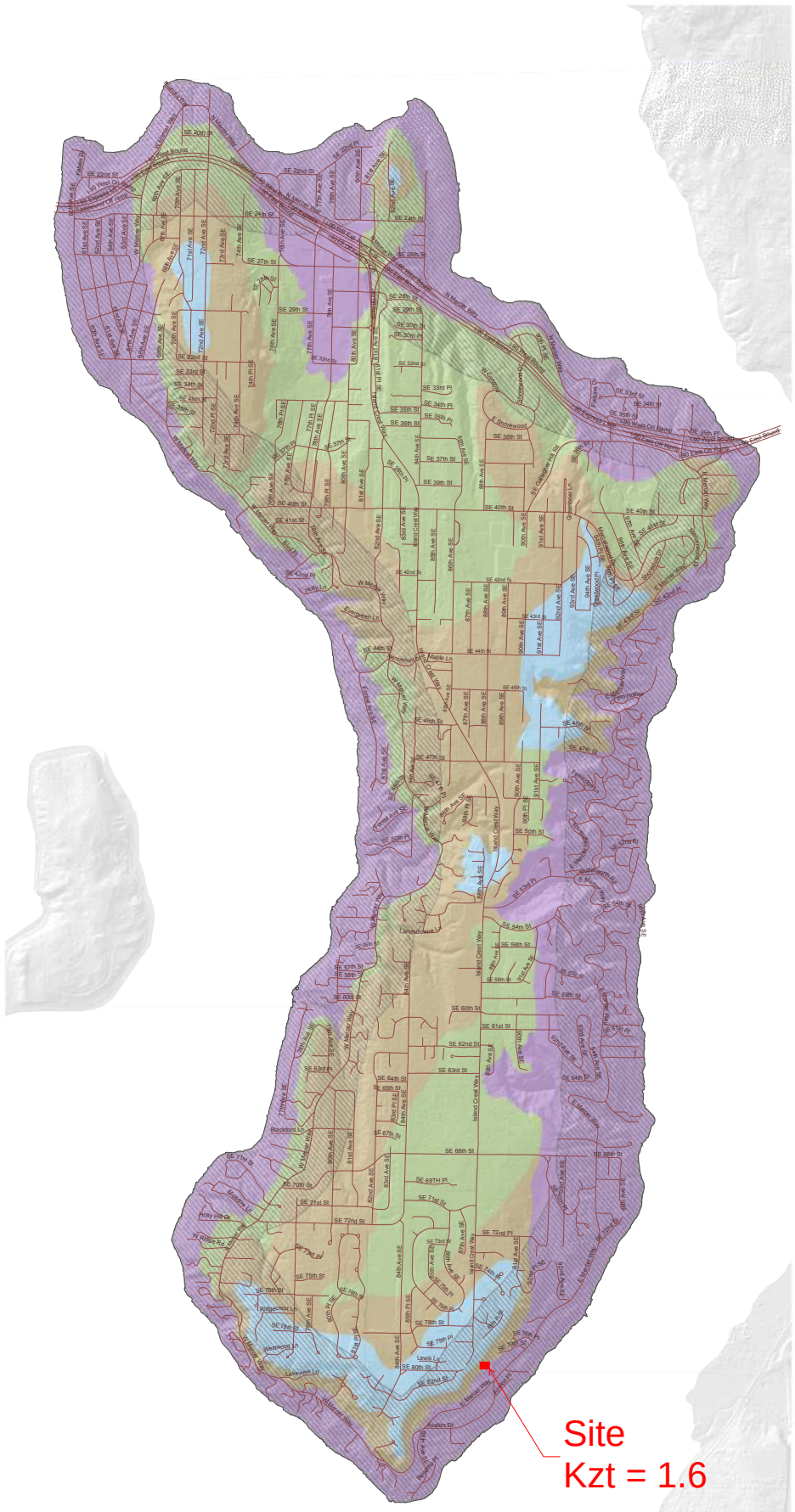
e. The City of Mercer Island participates in the National Flood Insurance Program (NFIP); Regular Program (No Special Flood Hazard Area). Further NFIP participation information: CID 530083, Initial FHBM Identified 06/28/74, Initial FIRM Identified 05/16/95, Current Effective Map Date (NSFHA), Reg-Emer Date 06/30/97, 53033C0654G effective 8/19/2020.

Mercer Island Wind Exposure and Wind Speed-Up (Topographic Effect)

by Development Services Group (DSG), City of Mercer Island
April 2009

6

0 0.5 1 Kilometers
0 0.5 1 Miles
1:12,000
T N



WIND EXPOSURE CATEGORIES & WIND SPEED-UP FACTORS
(ICC Section 1609 & ASCE 7-05 Chapter 6)

It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the Kzt factor to be utilized for each specific project. The Kzt factors and wind exposure categories indicated on this map are the minimum values accepted by the City of Mercer Island without requiring the design professional to submit additional calculations and supporting topographic documentation (to verify the values utilized in their wind load determination).

Please note – The Kzt values indicated on this map are approximations based upon periodic calculations of representative samplings around Mercer Island. These values are intended for City of Mercer Island's plan review purposes only.

WIND EXPOSURE CATEGORIES:

Wind Exposure Category	
	Exposure 'C' (1500 feet from Lake)
	Exposure 'B' (all other areas)

WIND SPEED-UP (TOPOGRAPHIC EFFECT) - K_zt Factor :

K_zt Factor	
	$K_zt = 1.0$
	$K_zt = 1.3$
	$K_zt = 1.6$
	$K_zt = 1.9$

GENERAL NOTES FOR WIND EXPOSURE AND WIND SPEED-UP MAP

This map is the Wind Exposure Category and Wind Speed-up (Topographic Effects) Map for the City of Mercer island. This map shows the minimum wind exposure category and the minimum wind speed-up, "K_zt" factor, which will be accepted without site specific documentation and calculation.

Other wind speed phenomena may occur on Mercer Island that is not specifically indentified on this map. It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the appropriate design wind speed and exposure category for their specific project and location.

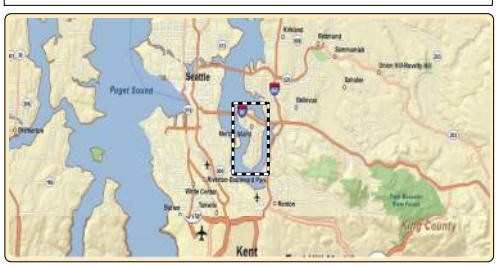
This map is for the sole use of the staff of the City of Mercer Island's Development Services Group (DSG) for the purposes of permit application evaluation. This map provides DSG staff a general assessment of Wind Exposure Category and Wind Speed-up (Topographic Effects). All areas have not been specifically evaluated and there may be locations that are not correctly represented on this map. It is the responsibility of individual property owners and map users to evaluate risk associated with their proposed development. No site-specific assessment of risk is implied or otherwise indicated by the City of Mercer Island with this map.

Information about data used for the map, references, and data limitation are all described the associated "Read Me" document. The digital version of this map is accompanied by a meta data file containing pertinent information about map construction. This data map is available on the City of Mercer Island website.

The City of Mercer Island is using guidance provided within ICC Section 1609 & ASCE 7-05 Chapter 6 regarding definitions used when creating this map.

DEFINITIONS:

K_zt factor:	The topographic effect of wind speed-up at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, that meet all of the conditions noted in ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, Section 6.5.7.
Exposure B:	The wind exposure category that applies where the site in question is located a minimum of 1500 feet from the shoreline and the mean roof height is less than or equal to 30 feet per IBC 2006 section 1609.4.3.
Exposure C:	The wind exposure category that applies where the site in question is located within 1500 feet from the shoreline per IBC 2006 section 1609.4.3.
Wind Speed:	Minimum 85 mph 3-second gust per IRC Figure R301.2(4)



Search Information

Address: 7929 E Mercer Way, Mercer Island, WA 98040, USA

Coordinates: 47.531256, -122.2212357

Elevation: 192 ft

Timestamp: 2022-06-01T19:41:29.063Z

Hazard Type: Wind

ASCE 7-16

MRI 10-Year	67 mph
MRI 25-Year	73 mph
MRI 50-Year	78 mph
MRI 100-Year	83 mph
Risk Category I	92 mph
Risk Category II	97 mph
Risk Category III	104 mph
Risk Category IV	108 mph

ASCE 7-10

MRI 10-Year	72 mph
MRI 25-Year	79 mph
MRI 50-Year	85 mph
MRI 100-Year	91 mph
Risk Category I	100 mph
Risk Category II	110 mph
Risk Category III-IV	115 mph

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

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Wind Loads - Main Wind Force Resisting System

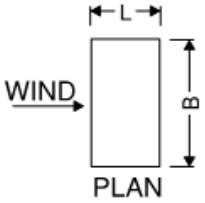
ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, h<160ft

Wind Load Criteria

Risk Category:	**II**	Table 1.5-1	K_e:	**1**	Section 26.10.1
Basic Wind Speed:	**98 mph**	Figure 26.5.1	K_d:	**0.85**	Section 26.6
Exposure Category:	**B**	Section 26.7.3	G:	**0.85**	Section 26.11
K_{zt}:	**1.60**	Section 26.8	Wall Height:	**25.0 ft**	

L/B Ratio:

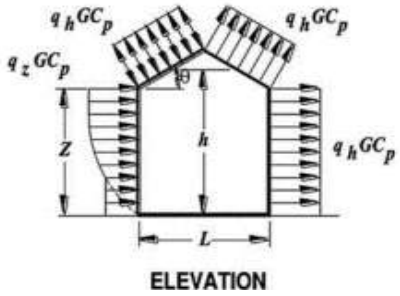
Short Dimension:	**43.5 ft**
Long Dimension:	**64.7 ft**
Transverse Wind L/B:	0.6726457
Longitudinal Wind L/B:	1.5



*NOTE: INTERNAL BUILDING PRESSURE CANCEL EACH OTHER OUT IN ENCLOSED BUILDING

Wall Pressures:

K_h & K_z:	0.665	At Top of Wall
K_z:	0.57	0 ft to 15 ft



ELEVATION

	Transverse Wind Direction	Longitudinal Wind Direction	
Top of Wall:	**24.6 psf**	**22.7 psf**	ASCE EQ 27.3-1
0 ft to 15 ft Wall:	**22.4 psf**	**20.6 psf**	ASCE EQ 27.3-1

*Enveloped Leeward and Windward Pressure

*All Values Ultimate (multiply x0.6 for ASD)

Wind Loads - Main Wind Force Resisting System (Cont.)

ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, h<160ft

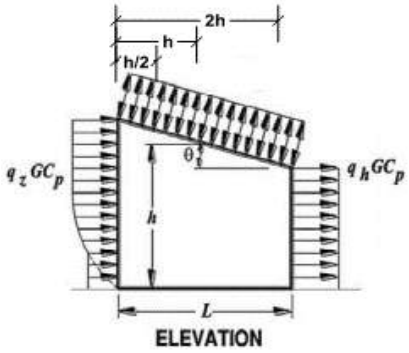
Roof Pressure:

Slope:	0.0:12	=	0.0	DEGREES
Mean Roof HT:	25.0 ft			
Building Length:	**68.0 ft**	Normal to Ridge		
K_h & K_z:	0.665	At Mean Roof Ht		

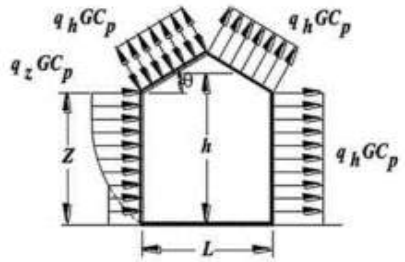
FLAT ROOF

Windward Pressure

	LC 1	LC 2	*Horizontal Projected Pressure:* LC 1	LC 2
0 to h/2	**-21.0 psf**	**0.6 psf**	**0.0 psf**	**0.0 psf**
h/2 to h	**-21.0 psf**	**0.6 psf**	**0.0 psf**	**0.0 psf**
h to 2h	**-13.5 psf**	**0.6 psf**	**0.0 psf**	**0.0 psf**
>2h	**-9.7 psf**	**0.6 psf**	**0.0 psf**	**0.0 psf**



ELEVATION



ELEVATION

*Negative indicates pressure away from surface
*Total horizontal shear shall not be less than that determined by neglecting roof wind forces
*All Values Ultimate (multiply x0.6 for ASD)

Roof Overhang (PSF)

P_{ovh}:	**-36.1 psf**	**0.0 psf**	

Minimum Total Projected Horizontal Pressure (PSF) **8.0 psf** ASCE 27.1.5

Wind Loads - Components and Cladding

ASCE 7-16 Chapter 30.3 & 30.5 - Part 1 and Part 3 Enclosed Buildings With h<160 FT

Wind Load Criteria

Risk Category:	II	Table 1.5-1	K_d:	0.85	Section 26.6		
Basic Wind Speed:	98 mph	Figure 26.5.1	Roof Type:	Flat			
Exposure Category:	B	Section 26.7.3	Roof Slope:	0.0:12	=	0.0	DEG
K_{zt}:	1.60	Section 26.8	Mean Roof Height:	25.0 ft			
K_e:	1.00	Section 26.10.1	Wall Height:	25.0 ft			

Zone Dimensions

Least Horiz. BLDG Dimension: 110 ft

a: 10.0 ft

2a: 20.0 ft

Wall Pressures

K_z: 0.575 Table 26.10-1 0-15 ft (PART 3)

K_h: 0.665 Table 26.10-1

Effective Wind Area: Zone 4: 400 ft^2

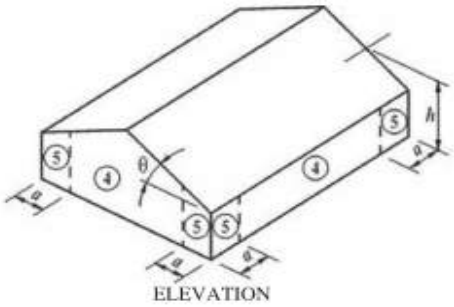
Zone 5: 400 ft^2

	At Top of Wall		0 FT TO 15 FT (>60' bldg)	
Load Case	4	5	4	5
1	18.4	18.4		
2	-20.4	-20.7		

*Negative indicates pressure away from surface

*Okay to interpolate between 15ft and top of wall (>60' bldg)

*All Values Ultimate (multiply x0.6 for ASD)



Roof Pressures

K_h: 0.665 Table 26.10-1

Overhang?: No

Effective Wind Area:

Zone 1:	75 ft^2	Zone 2:	100 ft^2	Zone 3:	100 ft^2
Zone 1':	75 ft^2	Zone 2e:	100 ft^2	Zone 3e:	100 ft^2
		Zone 2n:	100 ft^2	Zone 3r:	100 ft^2
		Zone 2r:	100 ft^2	Zone 3':	100 ft^2
		Zone 2':	100 ft^2		

Zone (PSF)

Load Case	1	1'
1	8.7	8.7
2	-33.8	-16.0

Load Case	2	2e	2n	2r	2'
1	18.4	-	-	-	-
2	-43.4	-	-	-	-

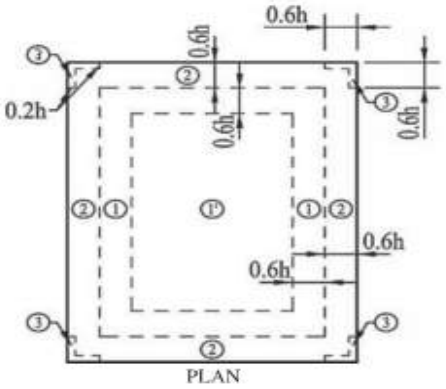
Load Case	3	3e	3r	3'
1	18.4	-	-	-
2	-43.4	-	-	-

*Negative indicates pressure away from surface

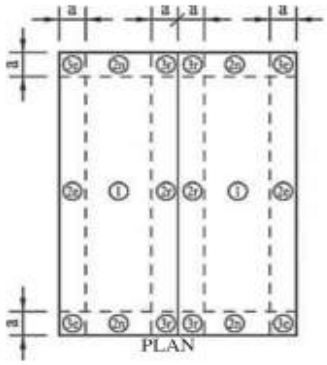
*All Values Ultimate (multiply x0.6 for ASD)

Wind Loads - Components and Cladding (Cont.)

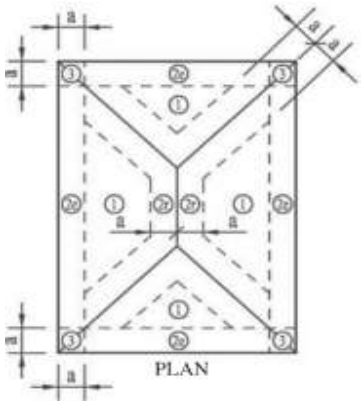
ASCE 7-16 Chapter 30 - Part 4 Enclosed Buildings With h<160 FT (Simplified)



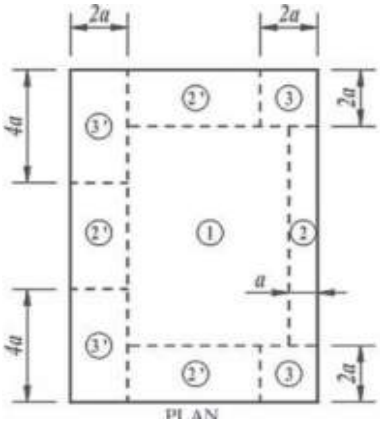
ASCE FIG 30.3-2A
FLAT/GABLE ROOF θ <= 7°



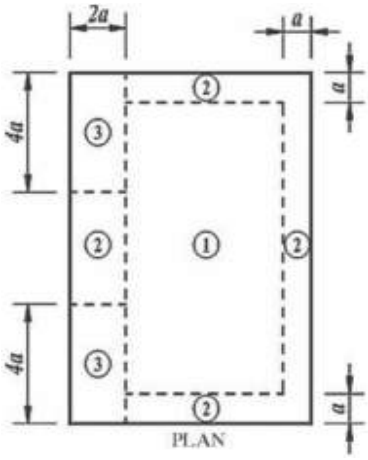
ASCE FIG 30.3-2B to D
GABLE ROOF 7°< θ <= 45°



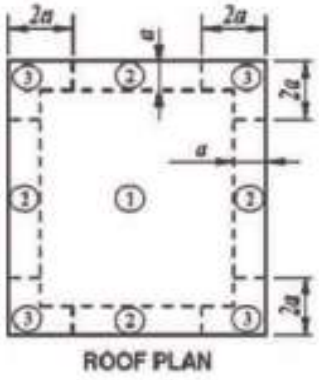
ASCE FIG 30.3-2E to I
HIP ROOF 7°< θ <= 45°



ASCE FIG 30.3-5A
Monoslope ROOF 3°< θ <= 10°



ASCE FIG 30.3-5B
Monoslope ROOF 10°< θ <= 30°



ASCE FIG 30.5-1
ROOF H > 60ft, θ <= 7°

Wind Loads Criteria

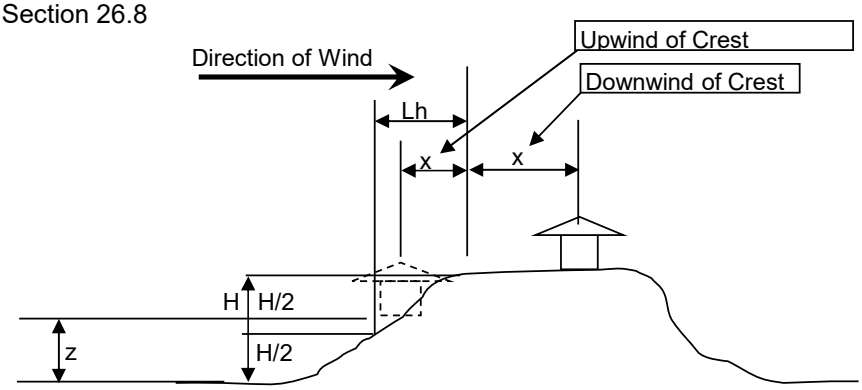
ASCE 7-16

Wind Load Criteria

Risk Category:	II	Table 1.5-1	Roof Type:	Flat	<=3deg
Basic Wind Speed:	98	Figure 26.5.1	Roof Slope:	0.0:12	0.0 DEG
Exposure Category:	B	Section 26.7.3	Mean Roof HT:	25.0 ft	UP TO 160FT
Ground Elevation:	0 ft		Parapet:	No	
Wall Ht:	25.0 ft				UP TO 160FT

Wind Topographic Factor, K_{zt}:

per Section 26.8



Terrain Type:	2-dimensional escarpments
Direction:	Upwind of Crest

L_h:	900 ft	*DIST UPWIND OF CREST TO HALF HT OF HILL OR ESCARP.*
H:	290 ft	*HT. OF HILL OR ESCARP. RELATIVE TO THE UPWIND TERRAIN*
x:	170 ft	*DIST. (UPWIND OR DOWNWIND) FROM THE CREST TO THE BUILDING*
z:	25 ft	*HEIGHT ABOVE GROUND SURFACE AT BUILDING SITE*

K_{zt}: 1.43 *EQUATION 26.8-1*

K_{zt}: 1.60 *MANUALLY INPUT*

K_e: 1.000 ASCE 26.10.1

K_d: 0.85 ASCE 26.6

Hazards by Location

Search Information

Address: 7929 E Mercer Way, Mercer Island, WA 98040, USA

Coordinates: 47.531256, -122.2212357

Elevation: 192 ft

Timestamp: 2022-06-01T19:42:19.903Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: II

Site Class: D

Basic Parameters

Name	Value	Description
S_S	1.46	MCE_R ground motion (period=0.2s)
S_1	0.504	MCE_R ground motion (period=1.0s)
S_{MS}	1.46	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	0.974	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.902	Coefficient of risk (0.2s)
CR_1	0.898	Coefficient of risk (1.0s)
PGA	0.624	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.687	Site modified peak ground acceleration

T_L	6	Long-period transition period (s)
SsRT	1.46	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.619	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	4.317	Factored deterministic acceleration value (0.2s)
S1RT	0.504	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.561	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.636	Factored deterministic acceleration value (1.0s)
PGAd	1.423	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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Seismic Base Shear for the Equivalent Lateral Force Procedure

Per IBC 2018 & ASCE 7-16

Structure: **Intrachat Residence**
Address: **7929 East Mercer Way Mercer Island WA**
Latitude: Longitude:

Structure Classification

Risk Category : **II** per ASCE Table 1.5-1

Seismic Force-Resisting System: **Light-Framed Wood Walls Sheathed with Structural Panels**

R:	**6 1/2**	per ASCE Table 12.2-1
W_o:	**3**	per ASCE Table 12.2-1
C_d:	**4**	per ASCE Table 12.2-1
h_n (ft):	**30.00**	height above the base to the highest level of the structure

Site Ground Motion

Reg. Structure/5 Stories Max: **No** Per ASCE 12.8.1.3

S_1 (g-sec): **0.50** S_S (g-sec): **1.46**

Site Class: **D** **Per Geotechnical Report** per ASCE 11.4.3

F_v **1.80** F_a **1.00**

S_{M1} (g-sec):	**0.91**	S_{MS} (g-sec):	**1.46**	per ASCE 11.4.4
S_{D1} (g-sec):	**0.60**	S_{DS} (g-sec):	**0.97**	per ASCE 11.4.5

SDC: **D** per ASCE 11.6

I_E: **1.00** per ASCE Table 1.5-2

Fundamental Period per ASCE 12.8.2

Period Method: **Approximate Fundamental Period**
Structure Type: **All Other Structural Systems**
T_L (sec): **6.00** ASCE Figures 22-14 through 22-17
T_S: 0.62

Ta (sec): 0.26 Ct * hnx per ASCE Eq. 12.8-7

T_{use} (sec): **0.26** <= TL

Equivalent Lateral Force Procedure Design Base Shear per ASCE 12.8

C_s:	0.15	= S_{DS} / (R/I_E) per ASCE Eq. 12.8-2
$C_{s\text{-}max}$:	0.36	= S_{D1} / (T_a*R/I_E) for T <= T_L per ASCE Eq. 12.8-3
$C_{s\text{-}max}$:	8	= S_{D1}*T_L / (T_a^2*R/I_E) for T > T_L per ASCE Eq. 12.8-4
$C_{s\text{-}min}$:	0.04	per ASCE Eq. 12.8-5
$C_{s\text{-}min}$:	--	= 0.5S_1 / (R/I_E) for S_1 => 0.6g per ASCE Eq. 12.8-6
$C_{s\text{-}use}$:	0.150	

V : 0.150 W = $C_{S\text{-}use}$ * W per ASCE Eq. 12.8-1

Vert. Distribution of Seismic Forces for the Equiv. Lateral Force Procedure

Per IBC 2018 & ASCE 7-16

Structure: **Intrachat Residence**

Seismic Parameters

I_E:	1.00	per ASCE Table 1.5-2
S_{DS} (g-sec):	0.97	per ASCE 11.4.4
Period (Sec):	0.26	per ASCE 12.8.2.1
k:	1.00	per ASCE 12.8.3

Vertical Distribution of Seismic Forces per ASCE 12.8.3

$F_x = C_{vx}V$ per ASCE Eq. 12.8-11

$C_{vx} = (w_x h_x^k)/(\Sigma w_i h_i^k)$ per ASCE Eq. 12.8-12

Level	h_x (ft)	w_x (k)	% of W_{total}	$w_x * h_x^k$	C_{vx} (%)	F_x (k)	V_x (k)	Fx (W)
Roof	30.17	74.15	42.0%	2237.1	61.2%	16.16		0.22
Second	19.67	45.98	26.1%	904.3	24.7%	6.53	16.16	0.14
First	9.17	56.31	31.9%	516.4	14.1%	3.73	22.69	0.07
							26.42	

Total WT (k): 176.44 Sum: 3658

$C_{s\text{-}use}$: 0.150

V (k): 26.42 per ASCE 12.8.1

Vertical Distribution of Seismic Diaphragm Forces per ASCE 12.10.1.1

$F_{px} = (SF_i/Sw_i) * w_{px}$ per ASCE Eq 12.10-1

$F_{px\text{-}max} = 0.4*S_{DS}*I_E*w_{px}$ per per ASCE 12.10.1.1

$F_{px\text{-}min} = 0.2*S_{DS}*I_E*w_{px}$ per per ASCE 12.10.1.1

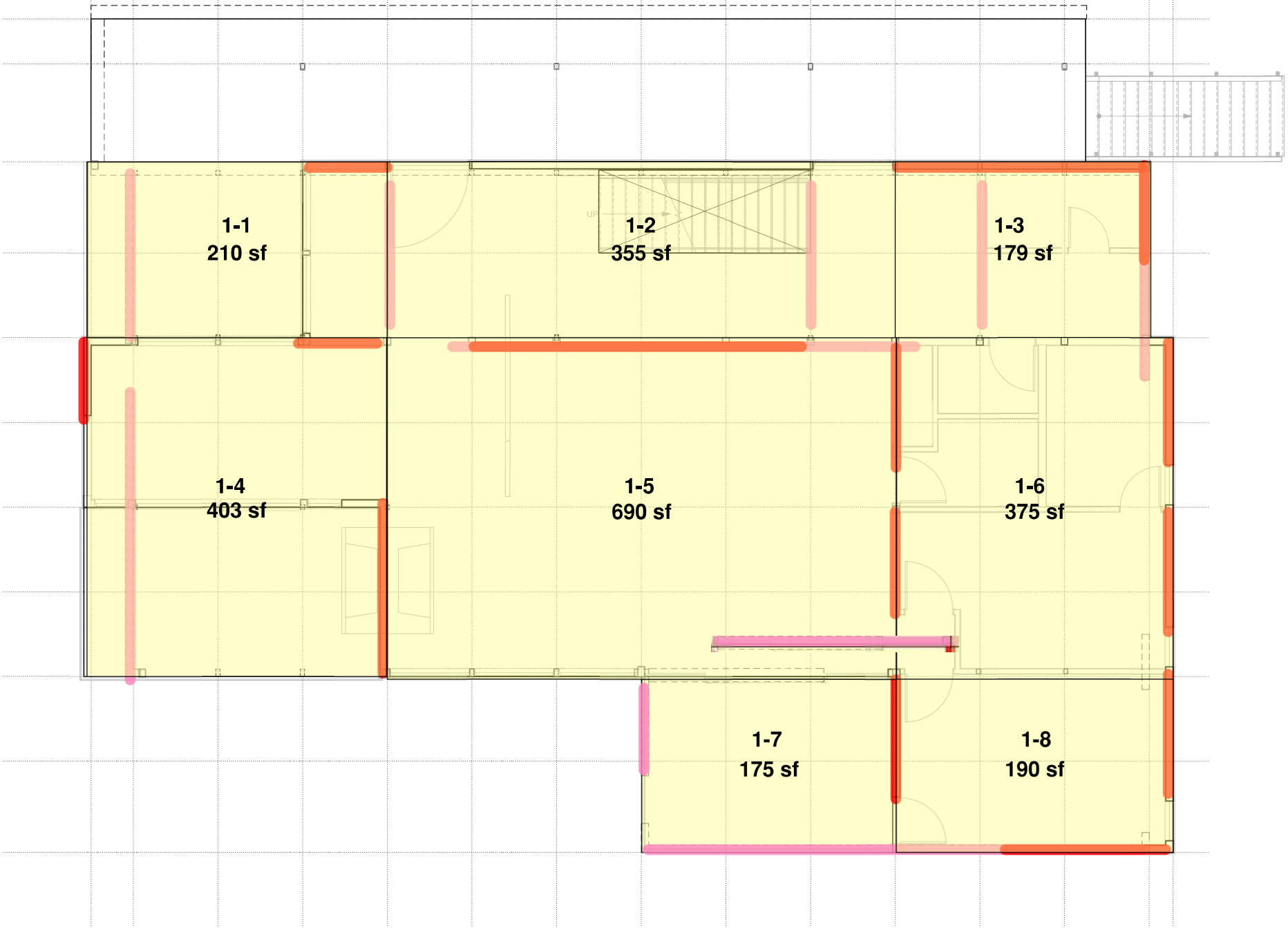
Level	w_{px} (k)	Σw_i (k)	F_x (k)	ΣF_i (k)	F_{px} (k)	Notes	Diaphragm/Story Force Ratio
Roof	74.15	74.15	16.16	16.16	16.16		1.000
Second	45.98	120.13	6.53	22.69	8.95	= Fp-min	1.370
First	56.31	176.44	3.73	26.42	10.96	= Fp-min	2.939

QUANTUM | CONSULTING ENGINEERS

42252 INTRACHAT RESIDENCE
7929 EAST MERCER WAY
MERCER ISLAND, WA 98040

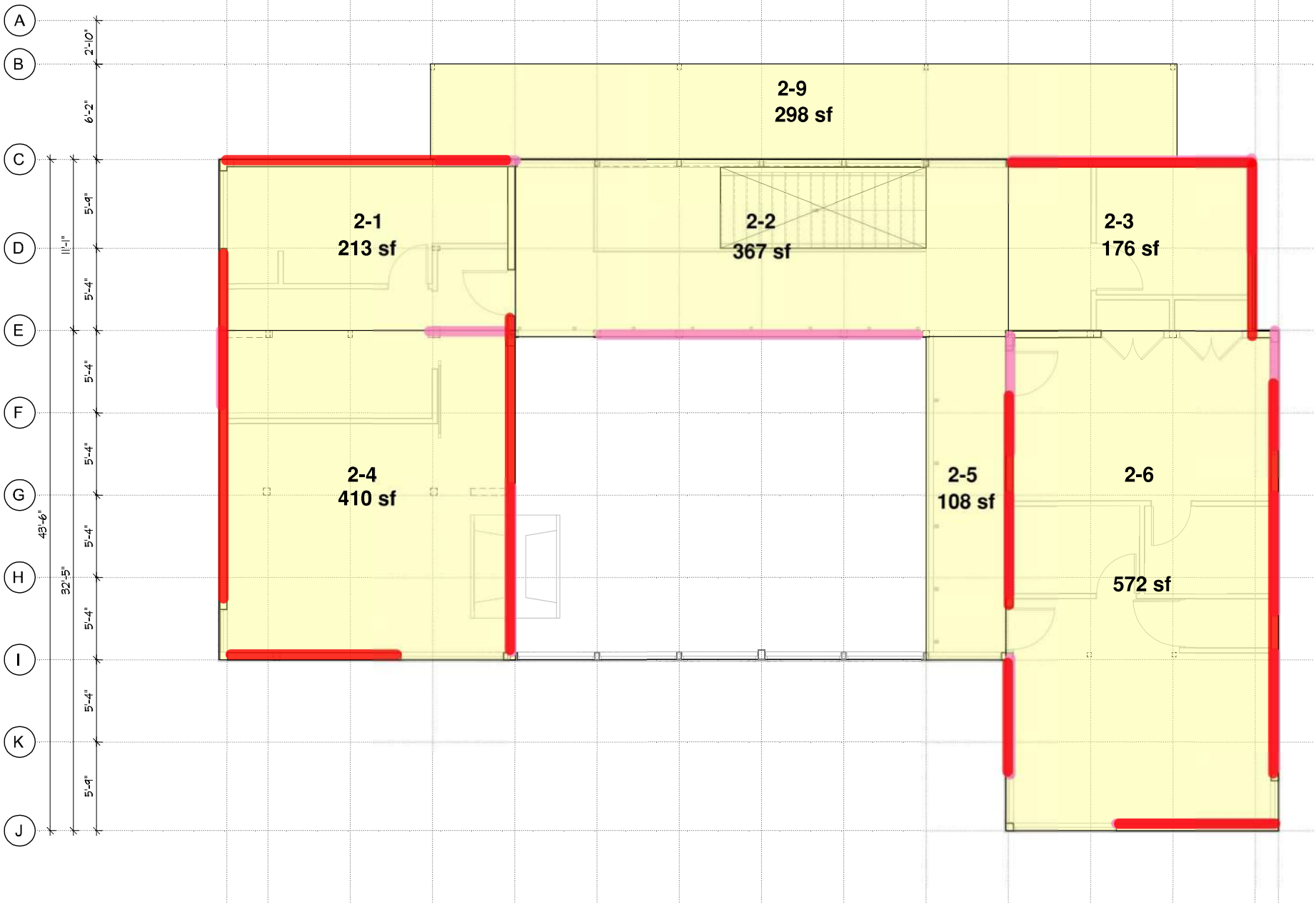
QUANTUM JOB NUMBER: 22252.01

LATERAL FRAMING DESIGN



FIRST FLOOR FRAMING PLAN

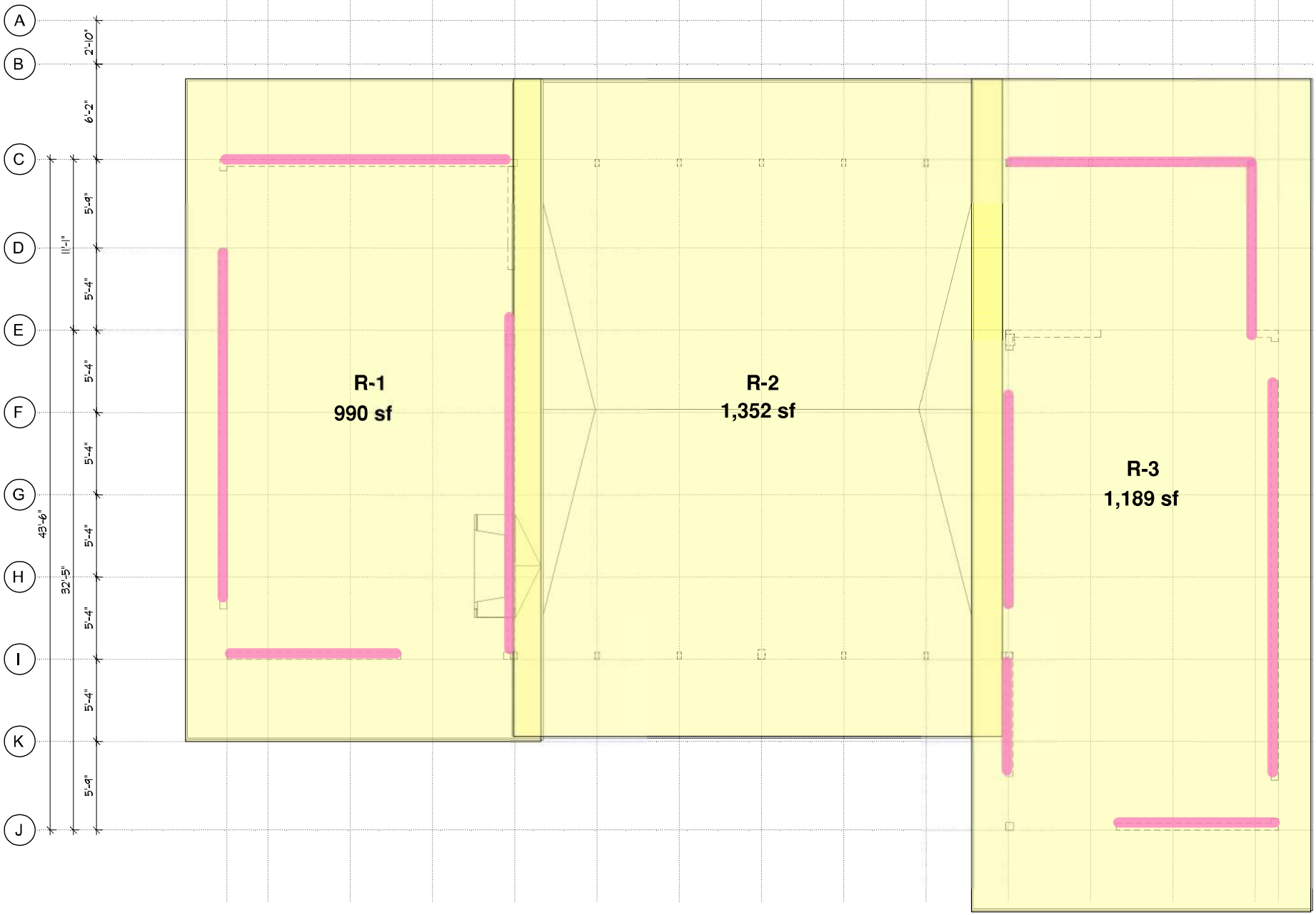
SCALE: 1/4" = 1'-0"



SECOND FLOOR FRAMING PLAN

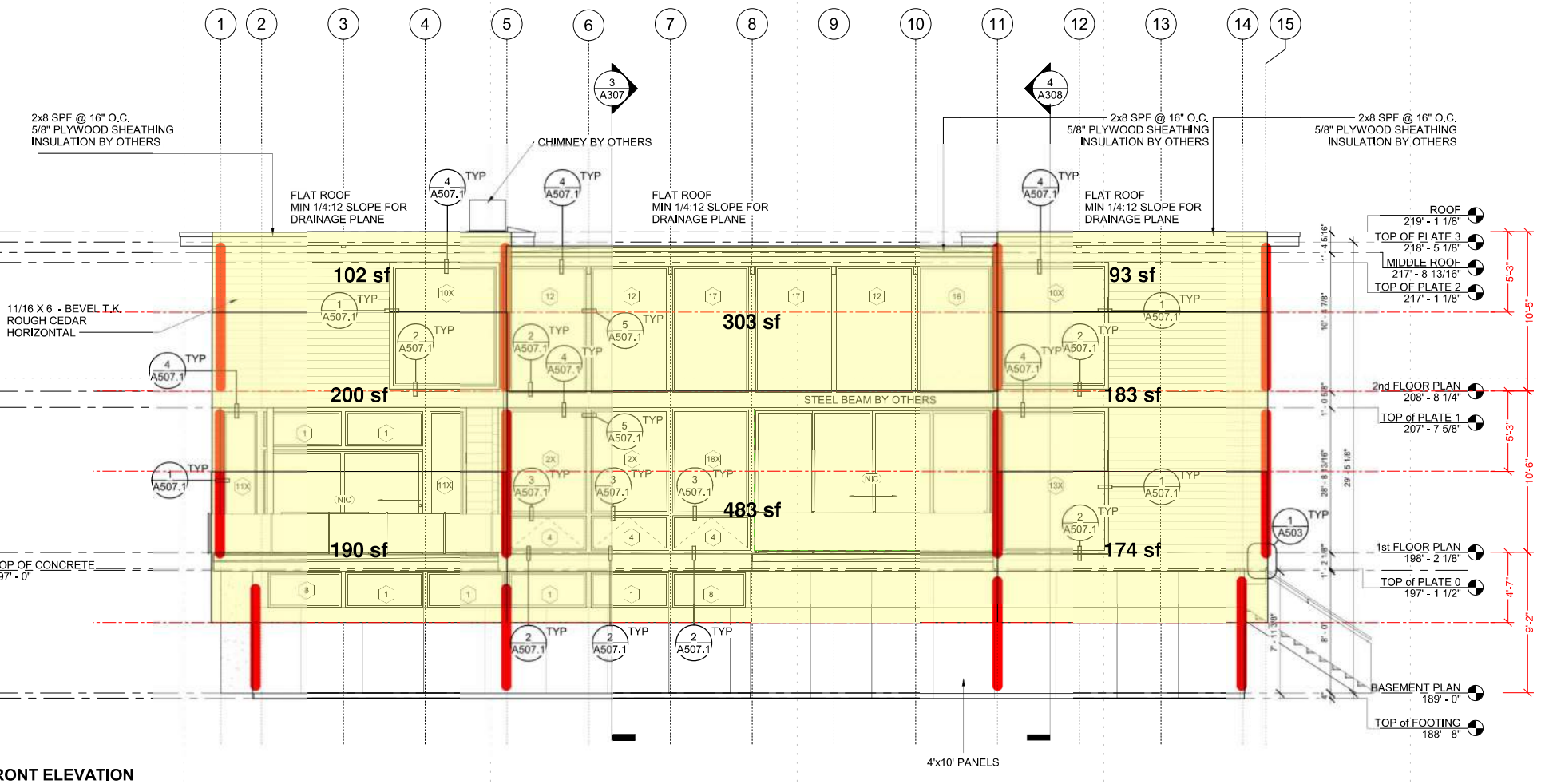
SCALE: 1/4" = 1'-0"

File: 252-s202.dwg Plotted: Thu, 06/02/2022 3:39 pm



ROOF FRAMING PLAN

SCALE: 1/4" = 1'-0"



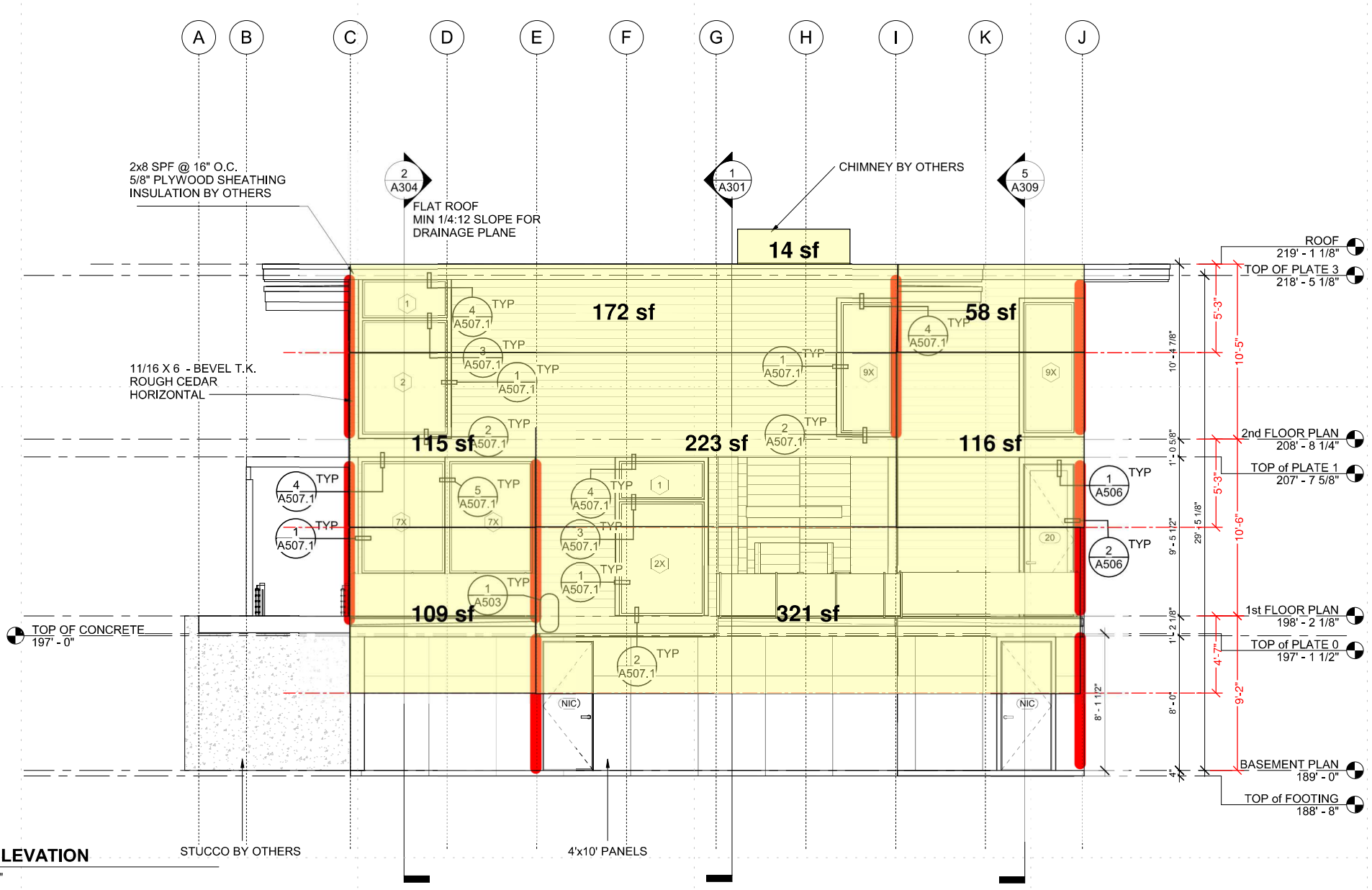
RONT ELEVATION

" = 1'-0"

Elevation Notes

SCALE 1/4" = 1'-0"

1. CAULK ALL JOINTS SUBJECT TO AIR and/or WATER INFILTRATI SUCH AS AROUND DOORS, WINDOWS, and BEAMS PROTRUDI THROUGH EXTERIOR WALLS OF BUILDING.
2. EXTERIOR SIDING SHALL BE
   - 11/16"x6" BEVEL T.K. ROUGH CEDAR HORIZONTAL. FACE N PER EXTERIOR WALL DETAILS.
3. ROOFING IS BY OTHERS.
4. WINDOWS ARE
   - MARVIN ESSENTIAL WITH LOW-E / ARGON GLAZING.
5. ALL OPENING WINDOWS WHERE THE SILL IS WITHIN 24" OF TI FLOOR AND AND THE EXTERIOR WALKING OR ROOF SURFA IS 72" OR MORE BELOW THE WINDOW WILL REQUIRE A 4" MAXIMUM WINDOW LIMITER.
6. SWINGING EXTERIOR DOORS IN EXPOSED LOCATIONS MAY REQUIRE THE ADDITION OF CUSTOMER SUPPLIED STORM DOORS TO ASSIST WITH PREVENTING AIR AND WATER INFILTRATION.
7. EXPOSED GLU-LAM BEAM ENDS ARE TO BE CAPPED WITH FASCIA MATERIAL. SEE ROOF DETAILS FOR INFORMATION.
8. GRADE MUST SLOPE AWAY FROM BUILDING.
9. CONTRACTOR TO VERIFY GRADE LOCATION
10. WHEREVER POSSIBLE, LINDAL CEDAR HOMES INC. RECOMMENDS THE USE OF FUTTER AND DOWNSPOUT SYSTEMS. THE DOWNSPOUTS SHOULD DRAIN A MINIMUM OF 5'-0" AWAY FROM THE FOUNDATION OR TO AN APPROVED DRAINAGE SYSTEM.
11. WHEN PLANS ARE ON 11"x17" SHEETS, REDUCE SCALE BY HA FOR PROPER DIMENSION.



1 **LEFT ELEVATION**
1/4" = 1'-0"

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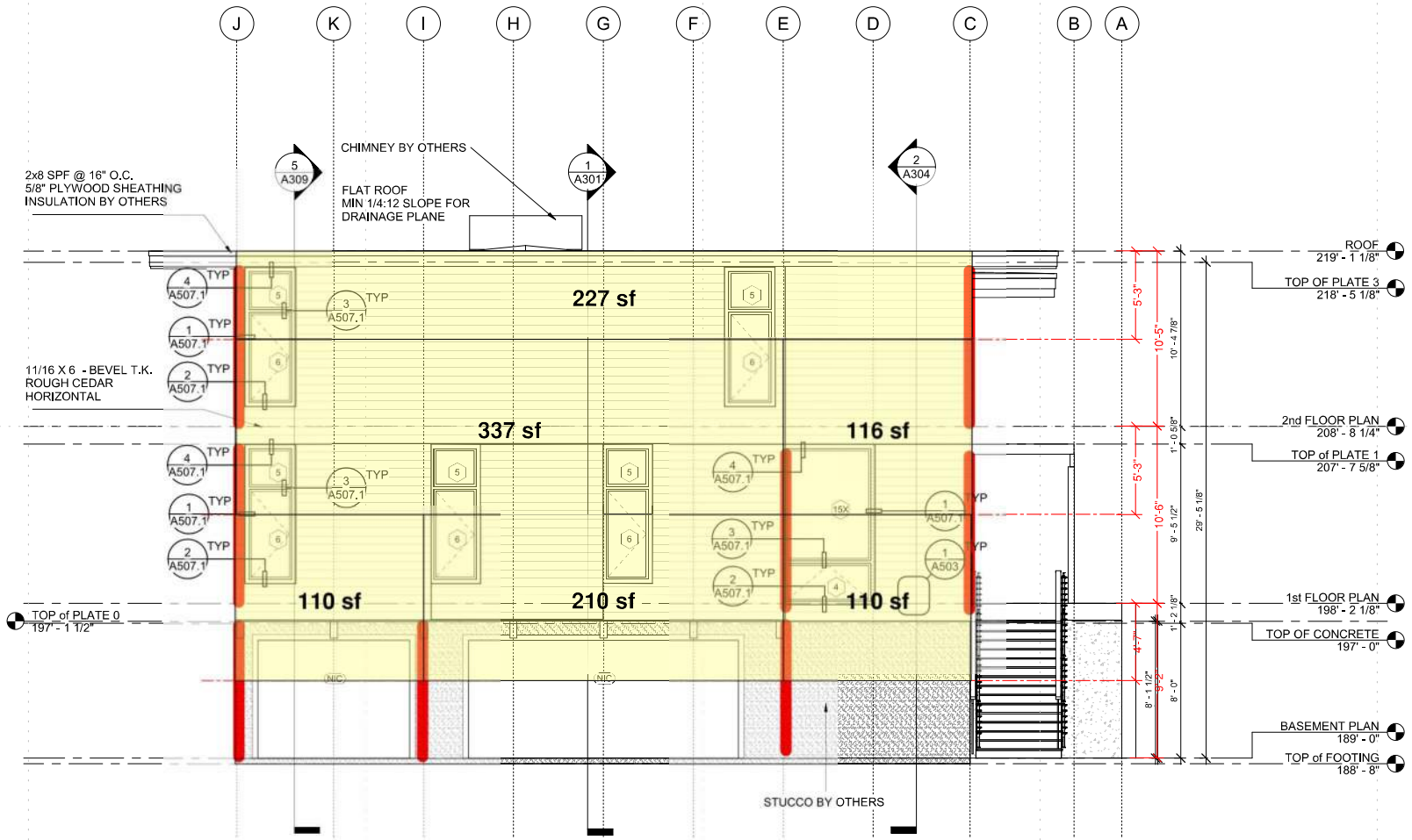

1 **RIGHT ELEVATION**

1/4" = 1'-0"

Elevation Notes

SCALE 1/4" = 1'-0"

1. CAULK ALL JOINTS SUBJECT TO AIR and/or WATER INFILTRATI SUCH AS AROUND DOORS, WINDOWS, and BEAMS PROTRUDI THROUGH EXTERIOR WALLS OF BUILDING.
2. EXTERIOR SIDING SHALL BE
   - 11/16"x6" BEVEL T.K. ROUGH CEDAR HORIZONTAL. FACE N PER EXTERIOR WALL DETAILS.
3. ROOFING IS BY OTHERS.
4. WINDOWS ARE
   - MARVIN ESSENTIAL WITH LOW-E / ARGON GLAZING.
5. ALL OPENING WINDOWS WHERE THE SILL IS WITHIN 24" OF TI FLOOR AND AND THE EXTERIOR WALKING OR ROOF SURFA IS 72" OR MORE BELOW THE WINDOW WILL REQUIRE A 4" MAXIMUM WINDOW LIMITER.
6. SWINGING EXTERIOR DOORS IN EXPOSED LOCATIONS MAY REQUIRE THE ADDITION OF CUSTOMER SUPPLIED STORM DOORS TO ASSIST WITH PREVENTING AIR AND WATER INFILTRATION.
7. EXPOSED GLU-LAM BEAM ENDS ARE TO BE CAPPED WITH FASCIA MATERIAL. SEE ROOF DETAILS FOR INFORMATION.
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11. WHEN PLANS ARE ON 11"x17" SHEETS, REDUCE SCALE BY HA FOR PROPER DIMENSION.

Diaphragm Load Seismic Distribution

Structure: Intrachat Residence
Address: 7929 East Mercer Way Mercer Island WA
Floor: Roof Level
Direction: Both Direction

Fx: 0.218 W From QCE Seismic Spreadsheet.
DL = 16 psf + 5 psf for Walls

Area	Floor						Total	Seismic
	Area	*Weight*	*Area*	*Weight*	*Area*	*Weight*	Weight	Force
R-1	990 sqft	21 psf					20.79 k	4.53 k
R-2	1352 sqft	21 psf					28.39 k	6.19 k
R-3	1189 sqft	21 psf					24.97 k	5.44 k
							0.00 k	0.00 k
							0.00 k	0.00 k
							0.00 k	0.00 k
							0.00 k	0.00 k
							0.00 k	0.00 k
							0.00 k	0.00 k
	3531 sqft						74.15 k	16.16 k

Percent of Diaphragm Supported By Shear Wall

Area	*Grid 1*	*Grid 5*	*Grid 11*	*Grid 14*	*Grid C*		*Grid I*	*Grid J*	
R-1	50%	50%			50%		50%		
R-2		50%	50%		50%		30%	20%	
R-3			50%	50%	50%			50%	
0									
0									
0									
0									
0									
0									
0									

Seismic Force:	2.27 k	5.36 k	5.81 k	2.72 k	8.08 k	0.00 k	4.12 k	3.96 k	0.00 k

Diaphragm Load Seismic Distribution

Structure: Intrachat Residence
Address: 7929 East Mercer Way Mercer Island WA
Floor: Second Floor
Direction: Both Direction

Fx: 0.142 W From QCE Seismic Spreadsheet.
DL = 12 psf +10 psf for Walls

Area	Floor						Total	Seismic
	Area	*Weight*	*Area*	*Weight*	*Area*	*Weight*	**Weight**	**Force**
2-1	213 sqft	22 psf					4.69 k	0.67 k
2-2	367 sqft	22 psf					8.07 k	1.15 k
2-3	176 sqft	22 psf					3.87 k	0.55 k
2-4	410 sqft	22 psf					9.02 k	1.28 k
2-5	108 sqft	22 psf					2.38 k	0.34 k
2-6	572 sqft	22 psf					12.58 k	1.79 k
							0.00 k	0.00 k
							0.00 k	0.00 k
2-9	298 sqft	18 psf					5.36 k	0.76 k
							0.00 k	0.00 k
	2144 sqft						45.98 k	6.53 k

Percent of Diaphragm Supported By Shear Wall

Area	*Grid 1*	*Grid 5*	*Grid 11*	*Grid 14*	*Grid C*	*Grid E*		*Grid J*	
2-1	50%	50%			50%	50%			
2-2		50%	50%		50%	50%			
2-3			50%	50%	50%	50%			
2-4	50%	50%				100%			
2-5			100%			60%		40%	
2-6			50%	50%		50%		50%	
0									
0									
2-9		45%	50%	5%	100%				
0									
Seismic Force:	0.97 k	1.89 k	2.46 k	1.21 k	1.94 k	3.56 k	0.00 k	1.03 k	0.00 k
Wall Above	2.27 k	5.36 k	5.81 k	2.72 k	8.08 k	4.12 k		3.96 k	0.00 k
Total	3.24 k	7.25 k	8.28 k	3.93 k	10.02 k	7.68 k	0.00 k	4.99 k	0.00 k
						(Grid I transfers to Grid E)			

Diaphragm Load Seismic Distribution

Structure: Intrachat Residence
Address: 7929 East Mercer Way Mercer Island WA
Floor: First Floor
Direction: Both Direction

Fx: 0.066 W From QCE Seismic Spreadsheet.
Floor DL = 12 psf + 10 psf for Walls
Deck DL = 15 psf + 6 psf for Walls

Area	Floor						Total	Seismic
	Area	*Weight*	*Area*	*Weight*	*Area*	*Weight*	**Weight**	**Force**
1-1	210 sqft	21 psf					4.41 k	0.29 k
1-2	355 sqft	22 psf					7.81 k	0.52 k
1-3	179 sqft	22 psf					3.94 k	0.26 k
1-4	403 sqft	22 psf					8.87 k	0.59 k
1-5	690 sqft	22 psf					15.18 k	1.01 k
1-6	375 sqft	22 psf					8.25 k	0.55 k
1-7	175 sqft	21 psf					3.68 k	0.24 k
1-8	190 sqft	22 psf					4.18 k	0.28 k
							0.00 k	0.00 k
							0.00 k	0.00 k
	2577 sqft						56.31 k	3.73 k

Percent of Diaphragm Supported By Shear Wall

Area	*Grid 1*	*Grid 5*	*Grid 11*	*Grid 14*	*Grid C*	*Grid E*		*Grid J*	
1-1	50%	50%			50%	50%			
1-2		50%	50%		50%	50%			
1-3			50%	50%	50%	50%			
1-4	50%	50%				67%		33%	
1-5		50%	50%			67%		33%	
1-6			50%	50%		67%		33%	
1-7		25%	75%			33%		67%	
1-8			50%	50%		33%		67%	

Seismic Force:	0.44 k	1.26 k	1.49 k	0.54 k	0.54 k	2.14 k	0.00 k	1.05 k	0.00 k
Wall Above	3.24 k	7.25 k	8.28 k	3.93 k	10.02 k	7.68 k	0.00 k	4.99 k	0.00 k
Total	3.68 k	8.51 k	9.76 k	4.47 k	10.56 k	9.82 k	0.00 k	6.04 k	0.00 k
					(FND Wall)				

Diaphragm Load Wind Distribution

Structure: McCormick Residence
Address: 2515 Nob Hill Pl N. Seattle WA
Floor: All Levels
Direction: North - South

Shear Wall	Area 1		Area 2		Wall Above	Load
	Area	*WL*	*Area*	*WL*	*WL*	
Roof Level						
Grid 1	51 sqft	24.6 psf				1.25 k
Grid 5	51 sqft	24.6 psf	152 sqft	24.6 psf		4.98 k
Grid 11	152 sqft	24.6 psf	47 sqft	24.6 psf		4.87 k
Grid 14	47 sqft	24.6 psf				1.14 k
Second Flr						
Grid 1	100 sqft	24.6 psf			1.25 k	3.71 k
Grid 5	100 sqft	24.6 psf			4.98 k	7.44 k
Grid 11	92 sqft	24.6 psf			4.87 k	7.12 k
Grid 14	92 sqft	24.6 psf			1.14 k	3.39 k
						0.00 k
Roof Level						
Grid C	114 sqft	24.6 psf				2.79 k
						0.00 k
Grid I	86 sqft	24.6 psf	14 sqft	24.6 psf		2.46 k
Grid J	114 sqft	24.6 psf				2.79 k
Second Flr						
Grid C	58 sqft	24.6 psf			2.79 k	4.22 k
Grid E	223 sqft	24.6 psf	58 sqft	24.6 psf	2.46 k	9.36 k
						0.00 k
Grid J	169 sqft	24.6 psf			2.79 k	6.94 k
						0.00 k
First Flr						
Grid C	55 sqft	24.6 psf			4.22 k	5.57 k
Grid E	55 sqft	24.6 psf	161 sqft	24.6 psf	9.36 k	14.66 k
Grid J	161 sqft	24.6 psf			6.94 k	10.89 k
						0.00 k
						0.00 k

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Roof Level North South**

Sds = **0.97**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory of Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**1**	**23.33**	-	-	-	-	-	-	-	-	-
SW Segment	1.10	23.33	9.50	0.41	S-P-F #1/#2	0.42	Interstory	9.50	12.0	12.5	16.0
SW GRID	**5**	**20.50**	-	-	-	-	-	-	-	-	-
SW Segment	5.10	20.50	9.50	0.46	S-P-F #1/#2	0.42	Interstory	9.50	12.0	14.0	16.0
SW GRID	**11**	**21.67**	-	-	-	-	-	-	-	-	-
SW Segment	11.10	8.00	9.50	1.19	S-P-F #1/#2	0.42	Interstory	9.50	12.0	11.0	16.0
SW Segment	11.20	13.67	9.50	0.69	S-P-F #1/#2	0.42	Interstory	9.50	12.0	13.5	16.0
SW GRID	**14**	**38.00**	-	-	-	-	-	-	-	-	-
SW Segment	14.10	26.00	9.50	0.37	S-P-F #1/#2	0.42	Interstory	9.50	12.0	11.0	16.0
SW Segment	14.20	12.00	9.50	0.79	S-P-F #1/#2	0.42	Interstory	9.50	12.0	11.0	16.0

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**1**	2265	1255	-	-	-	-	-	-
SW Segment	1.10	2265	1255	7326			**SW-6**	**2**	**No Strap**
SW GRID	**5**	5359	4982				-	-	-
SW Segment	5.10	5359	4982	6929	1000	1000	**SW-6**	**2**	**No Strap**
SW GRID	**11**	5814	4871				-	-	-
SW Segment	11.10	2146	1798	2320			**SW-6**	**2**	**MSTC40 (3070 max.)**
SW Segment	11.20	3668	3073	4511			**SW-6**	**2**	**MSTC40 (3070 max.)**
SW GRID	**14**	2721	1144				-	-	-
SW Segment	14.10	1861	783	7540			**SW-6**	**2**	**No Strap**
SW Segment	14.20	859	361	3480			**SW-6**	**2**	**No Strap**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Roof Level North South**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.10	97	1.00	106	54	58	106	SW-6	416	OK	Seismic
5.10	261	1.00	284	243	264	284	SW-6	416	OK	Seismic
11.10	268	1.00	292	225	244	292	SW-6	416	OK	Seismic
11.20	268	1.00	292	225	244	292	SW-6	416	OK	Seismic
14.10	72	1.00	78	30	33	78	SW-6	416	OK	Seismic
14.20	72	1.00	78	30	33	78	SW-6	416	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
1.10	23.33	23.12	0.90%	No	
5.10	20.50	20.29	1.03%	No	
11.10	8.00	7.79	2.67%	No	
11.20	13.67	13.46	1.55%	No	
14.10	26.00	25.79	0.81%	No	
14.20	12.00	11.79	1.77%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Roof Level North South**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
1.10	646		646	307		307	3663	3663
5.10	1738		1738	1385		1385	4465	4465
11.10	1784		1784	1281		1281	1160	1160
11.20	1784		1784	1281		1281	2256	2256
14.10	476		476	172		172	3770	3770
14.20	476		476	172		172	1740	1740

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
1.10	1891	1055	1891	1055	**1055**	**No Strap**	**0**	**OK**
5.10	1294	334	1294	334	**334**	**No Strap**	**0**	**OK**
11.10	-585	-1246	-585	-1246	**-1246**	**MSTC40 (3070 max.)**	**-2323**	**OK**
11.20	72	-737	72	-737	**-737**	**MSTC40 (3070 max.)**	**-2323**	**OK**
14.10	2090	1274	2090	1274	**1274**	**No Strap**	**0**	**OK**
14.20	872	332	872	332	**332**	**No Strap**	**0**	**OK**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 2nd Floor North South**

Sds = **0.97**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory of Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**1**	**5.00**	-	-	-	-	-	-	-	-	-
SW Segment	1.10	5.00	9.50	1.90	S-P-F #1/#2	0.42	Interstory	9.50	12.0	4.0	12.0
SW GRID	**5**	**11.00**	-	-	-	-	-	-	-	-	-
SW Segment	5.10	11.00	9.50	0.86	S-P-F #1/#2	0.42	Interstory	9.50	12.0	4.0	12.0
Grid 5 calc not used. See calc on following sheets for SW w/ opening											
SW GRID	**11**	**14.50**	-	-	-	-	-	-	-	-	-
SW Segment	11.10	7.50	9.50	1.27	S-P-F #1/#2	0.42	Interstory	9.50	12.0	9.0	12.0
SW Segment	11.20	7.00	9.50	1.36	S-P-F #1/#2	0.42	Base	9.50	12.0	9.0	12.0
SW GRID	**14**	**29.83**	-	-	-	-	-	-	-	-	-
SW Segment	14.10	8.50	9.80	1.15	S-P-F #1/#2	0.42	Interstory	9.50	12.0	9.0	12.0
SW Segment	14.20	7.50	9.50	1.27	S-P-F #1/#2	0.42	Interstory	9.50	12.0	9.0	12.0
SW Segment	14.20	8.00	9.50	1.19	S-P-F #1/#2	0.42	Interstory	9.50	12.0	9.0	12.0
SW Segment	14.20	5.83	9.50	1.63	S-P-F #1/#2	0.42	Interstory	9.50	12.0	9.0	12.0

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**1**	3239	3715	-	-	-	-	-	-
SW Segment	1.10	3239	3715	810	800	800	**SW-3**	**2**	**MSTC66B3 (4490DF, 4490HF)**
SW GRID	**5**	7249	7442				-	-	-
SW Segment	5.10	7249	7442	1782	700	700	**SW-3**	**2**	**MSTC66 (5850 max.)**
SW GRID	**11**	8275	7122				-	-	-
SW Segment	11.10	4280	3684	1665	500	500	**SW-3**	**2**	**MSTC48B3 (3975DF, 3900HF)**
SW Segment	11.20	3995	3438	1554	500	500	**SW-3**	**2**	**HDU5 (5645DF, 4340HF)**
SW GRID	**14**	3928	3395				-	-	-
SW Segment	14.10	1119	967	1887	500	500	**SW-6**	**2**	**MSTC48B3 (3975DF, 3900HF)**
SW Segment	14.20	988	854	1665			**SW-6**	**2**	**MSTC48B3 (3975DF, 3900HF)**
SW Segment	14.20	1053	910	1776			**SW-6**	**2**	**MSTC48B3 (3975DF, 3900HF)**
SW Segment	14.20	768	663	1294			**SW-6**	**2**	**MSTC48B3 (3975DF, 3900HF)**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 2nd Floor North South**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.10	648	1.00	704	743	808	704	SW-3	784	OK	Seismic
5.10	659	1.00	716	677	735	716	SW-3	784	OK	Seismic
11.10	571	1.00	620	491	534	620	SW-3	784	OK	Seismic
11.20	571	1.00	620	491	534	620	SW-3	784	OK	Seismic
14.10	132	1.00	143	114	124	143	SW-6	416	OK	Seismic
14.20	132	1.00	143	114	124	143	SW-6	416	OK	Seismic
14.20	132	1.00	143	114	124	143	SW-6	416	OK	Seismic
14.20	132	1.00	143	114	124	143	SW-6	416	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
1.10	5.00	4.79	4.35%	No	
5.10	11.00	10.79	1.93%	No	
11.10	7.50	7.29	2.86%	No	
11.20	7.00	6.52	7.43%	No	
14.10	8.50	8.29	2.51%	No	
14.20	7.50	7.29	2.86%	No	
14.20	8.00	7.79	2.67%	No	
14.20	5.83	5.62	3.71%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 2nd Floor North South**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
1.10	4308		4308	4235		4235	1205	1205
5.10	4382		4382	3856		3856	1591	1591
11.10	3795	**1246**	5041	2800	**585**	3385	1333	1333
11.20	3795	**737**	4532	2800		2800	1277	1277
14.10	876		876	649		649	1444	1444
14.20	876		876	649		649	833	833
14.20	876		876	649		649	888	888
14.20	876		876	649		649	647	647

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status	
1.10	-3512	-3748	-3512	-3748	**-3748**	**MSTC66B3 (4490DF, 4490HF)**	**-4490**	**OK**	
5.10	-2901	-3644	-2901	-3644	**-3644**	**MSTC66 (5850 max.)**	**-5499**	**OK**	
11.10	-2585	-4422	-2585	-4422	**-4422**	**MSTC48B3 (3975DF, 3900HF)**	**-3900**	**OK**	x2
11.20	-2033	-3940	-2033	-3940	**-3940**	**HDU5 (5645DF, 4340HF)**	**-4340**	**OK**	
14.10	217	-206	217	-206	**-206**	**MSTC48B3 (3975DF, 3900HF)**	**-3900**	**OK**	
14.20	-149	-489	-149	-489	**-489**	**MSTC48B3 (3975DF, 3900HF)**	**-3900**	**OK**	
14.20	-116	-463	-116	-463	**-463**	**MSTC48B3 (3975DF, 3900HF)**	**-3900**	**OK**	
14.20	-260	-575	-260	-575	**-575**	**MSTC48B3 (3975DF, 3900HF)**	**-3900**	**OK**	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 2nd Floor North South**

Sds = **0.97**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark	L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory of Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID 5_OT	**11.00**	-	-	-	-	-	-	-	-	-
SW Segment 5.10	11.00	9.50	0.86	S-P-F #1/#2	0.42	Interstory	9.50	12.0	4.0	12.0
SW GRID 5_V	**6.67**	-	-	-	-	-	-	-	-	-
SW Segment 5.10	3.08	3.50	1.14	S-P-F #1/#2	0.42	Interstory	3.50	12.0	4.0	12.0
SW Segment 5.20	3.58	3.50	0.98	S-P-F #1/#2	0.42	Interstory	3.50	12.0	4.0	12.0
SW GRID 14	**0.00**	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark	EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID			-	-	-	-	-	-
				800	800			
SW GRID 5_OT	7249	7442				-	-	-
SW Segment 5.10	7249	7442	1782	700	700	**SW-3**	**2**	**MSTC66 (5850 max.)**
SW GRID 5_V	7249	7442				-	-	-
SW Segment 5.10	3353	3442	277	500	500	**2SW-4**	**2**	**No Strap**
SW Segment 5.20	3896	4000	322	500	500	**2SW-4**	**2**	**No Strap**
SW GRID 14						-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 2nd Floor North South**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
5.10	659	1.00	716	677	735	716	SW-3	784	OK	Seismic
5.10	1087	1.00	1182	1116	1213	1182	2SW-4	1216	OK	Seismic
5.20	1087	1.00	1182	1116	1213	1182	2SW-4	1216	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
	0.00	-0.21	100.00%	No	
5.10	11.00	10.79	1.93%	No	
5.10	3.08	2.87	7.25%	No	
5.20	3.58	3.37	6.17%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 2nd Floor North South**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
5.10	4382		4382	3856		3856	1591	1591
5.10	2664	**1246**	3910	2344	**585**	2930	639	639
5.20	2664	**737**	3401	2344		2344	661	661

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
						MSTC66B3 (4490DF, 4490HF)		
5.10	-2901	-3644	-2901	-3644	**-3644**	**MSTC66 (5850 max.)**	**-5499**	**OK**
5.10	-2546	-3613	-2546	-3613	**-3613**	**No Strap**	**0**	*****NG*****
5.20	-1948	-3094	-1948	-3094	**-3094**	**No Strap**	**0**	*****NG*****
						MSTC48B3 (3975DF, 3900HF)		
						MSTC48B3 (3975DF, 3900HF)		
						MSTC48B3 (3975DF, 3900HF)		
						MSTC48B3 (3975DF, 3900HF)		

OK, see calc below

Force transfers to panel above opening
L = 9.5'-3.5'
L = 6'
P = 6' (1520 plf / 2)
P = 4560 lb > 3613 lb OK

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 1st Floor North South**

Sds = **0.97**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory of Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**1**	**28.50**	-	-	-	-	-	-	-	-	-
SW Segment	1.10	18.00	8.17	0.45	S-P-F #1/#2	0.42	Base	8.17	12.0	4.0	15.0
SW Segment	1.20	10.50	8.17	0.78	S-P-F #1/#2	0.42	Base	8.17	12.0	4.0	15.0
SW GRID	**5**	**10.50**	-	-	-	-	-	-	-	-	-
SW Segment	5.10	10.50	8.17	0.78	S-P-F #1/#2	0.42	Base	8.17	12.0	9.0	12.0
SW GRID	**11**	**21.00**	-	-	-	-	-		-	-	-
SW Segment	11.10	10.50	8.17	0.78	S-P-F #1/#2	0.42	Base	8.17	12.0	12.0	12.0
SW Segment	11.20	10.50	8.17	0.78	S-P-F #1/#2	0.42	Base	8.17	12.0	11.0	12.0
SW GRID	**14**	**16.50**	-	-	-	-	-		-	-	-
SW Segment	14.10	3.50	8.17	2.33	S-P-F #1/#2	0.42	Base	8.17	12.0	9.0	5.5
SW Segment	14.20	13.00	8.17	0.63	S-P-F #1/#2	0.42	Base	8.17	12.0	9.0	5.5

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**1**	3679	3715	-	-	-	-	-	-
SW Segment	1.10	2323	2346	2845	500	500	**SW-6**	**2**	**No HD**
SW Segment	1.20	1355	1369	1659	500	500	**SW-6**	**2**	**HDU2 (3075DF,2215HF)**
SW GRID	**5**	8511	7442				-	-	-
SW Segment	5.10	8511	7442	2163	1000	1000	**SW-2**	**2**	**HDU5 (5645DF, 4340HF)**
SW GRID	**11**	9761	7122				-	-	-
SW Segment	11.10	4881	3561	2541	500	500	**SW-2**	**2**	**HDU2 (3075DF,2215HF)**
SW Segment	11.20	4881	3561	2415	500	500	**SW-2**	**2**	**HDU2 (3075DF,2215HF)**
SW GRID	**14**	4470	3395				-	-	-
SW Segment	14.10	948	720	516	500	500	**SW-6**	**2**	**HDU2 (3075DF,2215HF)**
SW Segment	14.20	3522	2675	1918	500	500	**SW-6**	**2**	**HDU2 (3075DF,2215HF)**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 1st Floor North South**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.10	129	1.00	140	130	142	140	SW-6	416	OK	Seismic
1.20	129	1.00	140	130	142	140	SW-6	416	OK	Seismic
5.10	811	1.00	881	709	770	881	SW-2	1024	OK	Seismic
11.10	465	1.00	505	339	369	505	SW-2	1024	OK	Seismic
11.20	465	1.00	505	339	369	505	SW-2	1024	OK	Seismic
14.10	271	0.96	307	206	233	307	SW-6	416	OK	Seismic
14.20	271	1.00	294	206	224	294	SW-6	416	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
1.10	18.00	17.63	2.13%	No	
1.20	10.50	10.02	4.84%	No	
5.10	10.50	10.02	4.84%	No	
11.10	10.50	10.02	4.84%	No	
11.20	10.50	10.02	4.84%	No	
14.10	3.50	3.02	16.06%	No	
14.20	13.00	12.52	3.87%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 1st Floor North South**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
1.10	738		738	639		639	1922	1922
1.20	738		738	639		639	1330	1330
5.10	4636		4636	3474		3474	2082	2082
11.10	2658		2658	1662		1662	1771	1771
11.20	2658		2658	1662		1662	1708	1708
14.10	1549		1549	1009		1009	758	758
14.20	1549		1549	1009		1009	1459	1459

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status	
1.10	515	154	515	154	**154**	**No HD**	**0**	**OK**	
1.20	159	-121	159	-121	**-121**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**	
5.10	-2225	-3669	-2225	-3669	**-3669**	**HDU5 (5645DF, 4340HF)**	**-4340**	**OK**	
11.10	-600	-1836	-600	-1836	**-1836**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**	x2
11.20	-638	-1866	-638	-1866	**-1866**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**	
14.10	-554	-1197	-554	-1197	**-1197**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**	
14.20	-133	-872	-133	-872	**-872**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 1st Floor North South**

Sds = **0.97**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory of Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**8**	**6.17**	-	-	-	-	-	-	-	-	-
SW Segment	8.10	6.17	8.00	1.30	S-P-F #1/#2	0.42	Base	8.00	12.0	4.0	15.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID		**0.00**	-	-	-	-	-		-	-	-
SW GRID		**0.00**	-	-	-	-	-		-	-	-

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**8**	624		-	-	-	-	-	-
SW Segment	8.10	624	0	963			**SW-6**	**2**	**HDU2 (3075DF,2215HF)**
SW GRID							-	-	-
SW GRID							-	-	-
SW GRID							-	-	-

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 1st Floor North South**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
8.10	101	1.00	110	0	0	110	SW-6	416	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
8.10	6.17	5.69	8.52%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below 1st Floor North South**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
8.10	567		567	0		0	481	481

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
8.10	289	-343	289	-343	**-343**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**

x2

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Roof Level East West**

Sds = **0.97**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory of Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**C**	**35.50**	-	-	-	-	-	-	-	-	-
SW Segment	C.1	19.33	9.50	0.49	S-P-F #1/#2	0.42	Interstory	9.50	12.0	6.0	16.0
SW Segment	C.2	16.17	9.50	0.59	S-P-F #1/#2	0.42	Interstory	9.00	12.0	6.0	16.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID	**I**	**11.75**	-	-	-	-	-	-	-	-	-
SW Segment	I.1	11.75	9.50	0.81	S-P-F #1/#2	0.42	Interstory	9.50	12.0	6.0	16.0
SW GRID	**J**	**10.50**	-	-	-	-	-	-	-	-	-
SW Segment	J.1	10.50	9.50	0.90	S-P-F #1/#2	0.42	Interstory	9.50	12.0	6.0	16.0

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**C**	8079	2792	-	-	-	-	-	-
SW Segment	C.1	4399	1520	4059	1500	1500	**SW-6**	**2**	**No Strap**
SW Segment	C.2	3680	1272	3299	1500	1500	**SW-6**	**2**	**No Strap**
SW GRID							-	-	-
SW GRID	**I**	4121	2460				-	-	-
SW Segment	I.1	4121	2460	2468	1500	500	**SW-6**	**2**	**MSTC48B3 (3975DF, 3900HF)**
SW GRID	**J**	3958	2792				-	-	-
SW Segment	J.1	3958	2792	2205	500	500	**SW-6**	**2**	**MSTC52 (4610 max.)**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Roof Level East West**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	**APA Rated, 7/16", 8d Common**	6	**520**	**416**	**730**	**584**	**10**
SW-4	**APA Rated, 7/16", 8d Common**	4	**760**	**608**	**1065**	**852**	**13**
SW-3	**APA Rated, 7/16", 8d Common**	3	**980**	**784**	**1370**	**1096**	**15**
SW-2	**APA Rated, 7/16", 8d Common**	2	**1280**	**1024**	**1790**	**1432**	**20**
2SW-4	**APA Rated, 7/16", 8d Common**	4	**1520**	**1216**	**2130**	**1704**	**26**
2SW-3	**APA Rated, 7/16", 8d Common**	3	**1960**	**1568**	**2740**	**2192**	**30**
2SW-2	**APA Rated, 7/16", 8d Common**	2	**2560**	**2048**	**3580**	**2864**	**40**

****See SDPWS Table 4.3A Note 2**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
C.1	228	1.00	247	79	85	**247**	**SW-6**	**416**	**OK**	**Seismic**
C.2	228	1.00	247	79	85	**247**	**SW-6**	**416**	**OK**	**Seismic**
I.1	351	1.00	381	209	228	**381**	**SW-6**	**416**	**OK**	**Seismic**
J.1	377	1.00	410	266	289	**410**	**SW-6**	**416**	**OK**	**Seismic**

***NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ**

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
C.1	19.33	19.12	1.09%	**No**	
C.2	16.17	15.96	1.31%	**No**	
I.1	11.75	11.54	1.81%	**No**	
J.1	10.50	10.29	2.02%	**Yes**	**8.75**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Roof Level East West**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
C.1	1513		1513	448		448	3530	3530
C.2	1434		1434	425		425	3149	3149
I.1	2332		2332	1193		1193	2734	1734
J.1	3008		3008	1819		1819	1603	1603

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
C.1	1669	125	1669	125	**125**	**No Strap**	**0**	**OK**
C.2	1465	28	1465	28	**28**	**No Strap**	**0**	**OK**
I.1	447	-1063	-153	-1528	**-1528**	**MSTC48B3 (3975DF, 3900HF)**	**-3900**	**OK**
J.1	-857	-2264	-857	-2264	**-2264**	**MSTC52 (4610 max.)**	**-3653**	**OK**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Seoncd Floor East West**

Sds = **0.97**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark		L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory of Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**C**	**21.67**	-	-	-	-	-	-	-	-	-
SW Segment	C.1	5.50	9.50	1.73	S-P-F #1/#2	0.42	Base	9.50	12.0	6.0	12.0
SW Segment	C.2	16.17	9.50	0.59	S-P-F #1/#2	0.42	Base	9.00	12.0	6.0	12.0
SW GRID	**E**	**21.75**	-	-	-	-	-	-	-	-	-
SW Segment	E.1	21.75	9.50	0.44	S-P-F #1/#2	0.42	Interstory	9.00	12.0	3.0	12.0
SW GRID		**0.00**	-	-	-	-	-	-	-	-	-
SW GRID	**J**	**10.50**	-	-	-	-	-	-	-	-	-
SW Segment	J.1	10.50	9.50	0.90	S-P-F #1/#2	0.42	Interstory	9.50	12.0	4.0	12.0

Shear Wall Loads and Summary

SW Mark		EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID	**C**	10023	4219	-	-	-	-	-	-
SW Segment	C.1	2544	1071	1023	1000	1000	**SW-4**	**2**	**HDU2 (3075DF,2215HF)**
SW Segment	C.2	7479	3148	2911	500	500	**SW-4**	**2**	**HDU2 (3075DF,2215HF)**
SW GRID	**E**	7681	9360				-	-	-
SW Segment	E.1	7681	9360	3132	500	500	**SW-6**	**2**	**MSTC52 (4610 max.)**
SW GRID							-	-	-
SW GRID	**J**	3958	6937				-	-	-
SW Segment	J.1	3958	6937	1701	500	500	**SW-4**	**2**	**MSTC66 (5850 max.)**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Seoncd Floor East West**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
C.1	463	1.00	503	195	212	503	SW-4	608	OK	Seismic
C.2	463	1.00	503	195	212	503	SW-4	608	OK	Seismic
E.1	353	1.00	384	430	468	384	SW-6	416	OK	Seismic
J.1	377	1.00	410	661	718	718	SW-4	852	OK	Wind

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
C.1	5.50	5.02	9.66%	No	
C.2	16.17	15.69	3.09%	No	
E.1	21.75	21.54	0.97%	No	
J.1	10.50	10.29	2.02%	Yes	8.75

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below Seoncd Floor East West**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
C.1	3076		3076	1110		1110	1512	1512
C.2	2914		2914	1051		1051	1955	1955
E.1	2225		2225	2324		2324	2066	2066
J.1	3008		3008	4519		4519	1351	1351

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
C.1	-203	-2374	-203	-2374	**-2374**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**
C.2	122	-2006	122	-2006	**-2006**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**
E.1	-1084	-1266	-1084	-1266	**-1266**	**MSTC52 (4610 max.)**	**-3653**	**OK**
J.1	-3709	-2381	-3709	-2381	**-3709**	**MSTC66 (5850 max.)**	**-5499**	**OK**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below First Floor East West**

Sds = **0.97**
Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = **17.25**

Shear Wall Line Information

SW Mark	L_{SW} (ft)	Wall Pier h_{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory of Base?	h_{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID	**0.00**	-	-	-	-	-	-	-	-	-
SW GRID E	**30.00**	-	-	-	-	-	-	-	-	-
SW Segment E.1	30.00	8.17	0.27	S-P-F #1/#2	0.42	Base	8.17	12.0	4.0	12.0
SW GRID	**0.00**	-	-	-	-	-	-	-	-	-
SW GRID J	**32.00**	-	-	-	-	-	-	-	-	-
SW Segment J.1	32.00	8.17	0.26	S-P-F #1/#2	0.42	Base	8.17	12.0	4.0	12.0

Shear Wall Loads and Summary

SW Mark	EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holdown
SW GRID			-	-	-	-	-	-
SW GRID E	9821	14662				-	-	-
SW Segment E.1	9821	14662	4381	500	500	**SW-6**	**2**	**HDU5 (5645DF, 4340HF)**
SW GRID						-	-	-
SW GRID J	6041	10886				-	-	-
SW Segment J.1	6041	10886	4673	500	500	**SW-6**	**2**	**HDU2 (3075DF,2215HF)**

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below First Floor East West**

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 7/16", 8d Common	6	520	416	730	584	10
SW-4	APA Rated, 7/16", 8d Common	4	760	608	1065	852	13
SW-3	APA Rated, 7/16", 8d Common	3	980	784	1370	1096	15
SW-2	APA Rated, 7/16", 8d Common	2	1280	1024	1790	1432	20
2SW-4	APA Rated, 7/16", 8d Common	4	1520	1216	2130	1704	26
2SW-3	APA Rated, 7/16", 8d Common	3	1960	1568	2740	2192	30
2SW-2	APA Rated, 7/16", 8d Common	2	2560	2048	3580	2864	40

**See SDPWS Table 4.3A Note 2

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Aspect Ratio Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Adjusted Wind Shear (plf)	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
E.1	327	1.00	356	489	531	**531**	**SW-6**	**584**	**OK**	**Wind**
J.1	189	1.00	205	340	370	**370**	**SW-6**	**584**	**OK**	**Wind**

***NOTE:** CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
E.1	30.00	29.52	1.64%	**Yes**	**23.00**
J.1	32.00	31.52	1.54%	**No**	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2018, ASCE 7-16, SDPWS 2015 & NDS 2018

Structure: **Intrachat Residence**
Floor Level: **Walls Below First Floor East West**

Shear Wall End Axial Load (ASD)

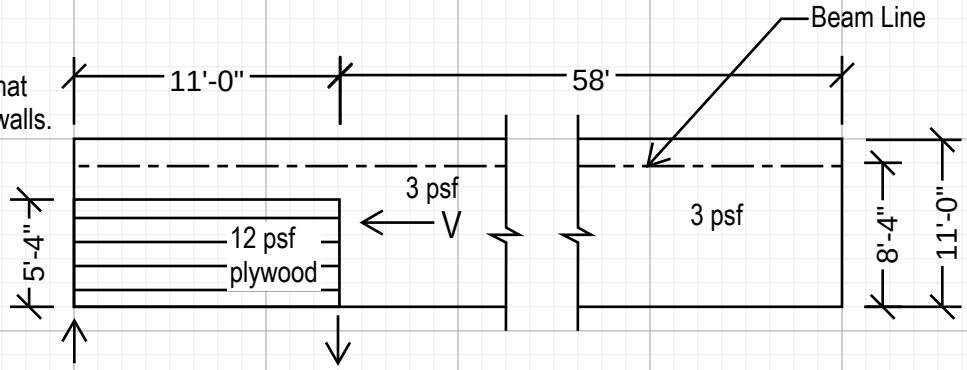
SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
E.1	2442	**1266**	3708	3125	**1084**	4209	2691	2691
J.1	1080	**1191**	2270	1668	**1854**	3522	2837	2837

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holdown	Holdown Capacity (lb)	Status
E.1	-2595	-2459	-2595	-2459	**-2595**	**HDU5 (5645DF, 4340HF)**	**-4340**	**OK**
J.1	-1820	-954	-1820	-954	**-1820**	**HDU2 (3075DF,2215HF)**	**-2215**	**OK**

Trellis Lateral Design

Canopy roof is a cantilevered diaphragm that drags the trellis load back to grid C shear walls. Canopy diaphragm is sheathed with 5/8" sheathing (8d nails @ 6" o.c. at edges).



v_{all} = 360 plf (0.92) / 2
v_{all} = 166 plf

Seismic Mass:
W = 3 psf (11') (58' + 5.33') + 12 psf (5.5') (11')
W = 2816 lb

Cs = 0.15
Cs effective at second floor based on vertical distribution is 0.14, use 0.15 (conservative)

V = 2816 lb (0.15)
V = 423 lb
V_{asd} = 2.5 (0.7) (423 lb)
V_{asd} = 740 lb
v_{asd} = 740 lb / 11'
v_{asd} = 68 plf < 166 plf OK

T = C = 740 lb (5.5' / 11')
T = C = 370 lb < 955 lb OK (LSTA15)
Use LSTA15 strap back to blocking.

Check beams in weak axis to to verify beams are adequate for week axis seismic load.

V = 740 lb / 3 beams
V = 246 lb

M = 246 lb (5.5') (12)
M = 16236 lb-in

S = 10.5 $(3.125)^2$ / 6
S = 18.5 in^2

M/S = 877 psi
f'b = 2000 psi OK

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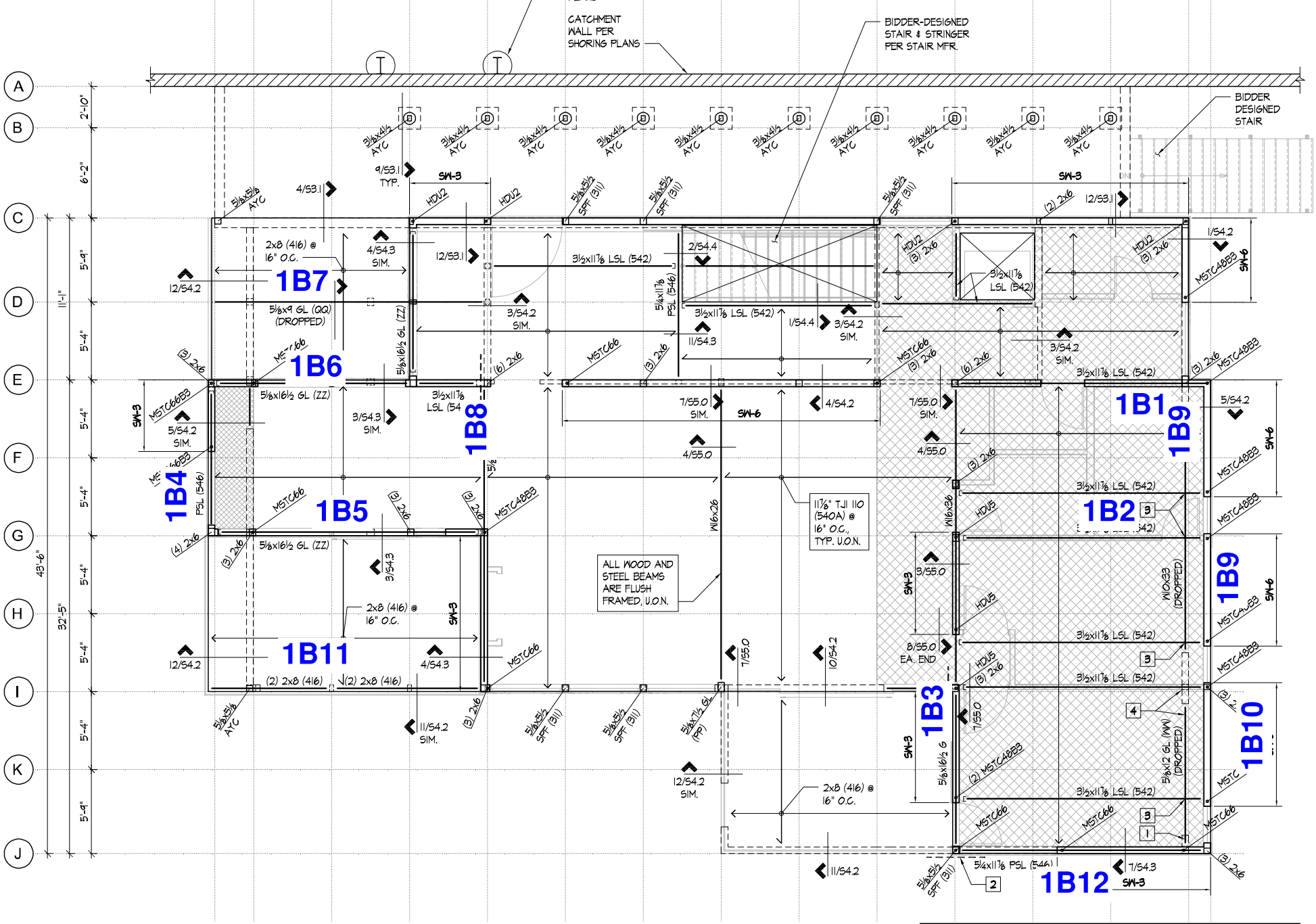
INTRACHAT HOANG RESIDENCE	06/23/2022	22252.01
project	**date**	**job no.**
	drawn by:	
LINDAL CEDAR HOMES	TVM	
client	**design by:**	**sheet no.**

QUANTUM | CONSULTING ENGINEERS

42252 INTRACHAT RESIDENCE
7929 EAST MERCER WAY
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 22252.01

GRAVITY DESIGN



FIRST FLOOR FRAMING PLAN

SCALE: 1/4" = 1'-0"

HANGER SCHEDULE			
MEMBER	LINDAL PART NO.	HANGER	LINDAL PART NO.
11⅞" TJI 110	540A	ITS1.56/11.88	780-230
3½x11⅞ LSL	542	HUC412	780-412
5¼x11⅞ PSL	546	HGUS5.50/10	-
5⅛x16½ GL	ZZ	HGJTZ	-

LEGEND:

KEY NOTES

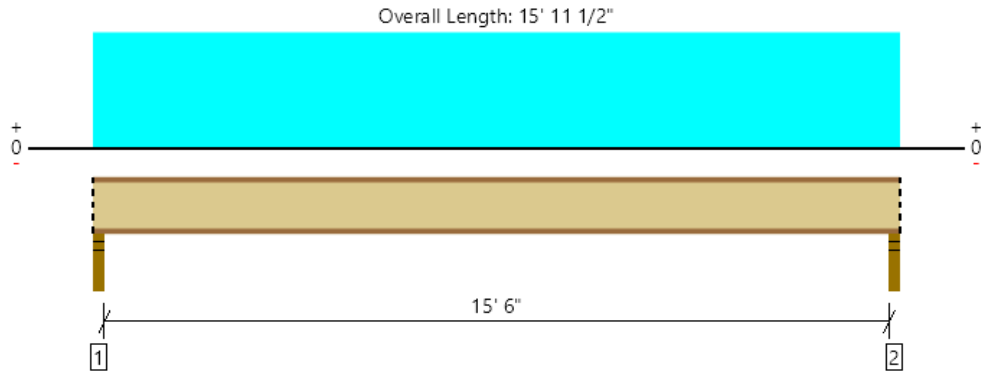
1 RUN

2 CS16

3 LTS

4 (2)

First Floor, Typical Joist
1 piece(s) 11 7/8" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	553 @ 1 3/4"	1174 (2.75")	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	537 @ 2 3/4"	1560	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2127 @ 7' 11 3/4"	3160	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.245 @ 7' 11 3/4"	0.392	Passed (L/768)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.318 @ 7' 11 3/4"	0.783	Passed (L/591)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	49	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	2.75"	2.75"	1.75"	128	426	553	Blocking
2 - Stud wall - HF	2.75"	2.75"	1.75"	128	426	553	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 10" o/c	
Bottom Edge (Lu)	16' o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 11 1/2"	16"	12.0	40.0	Default Load

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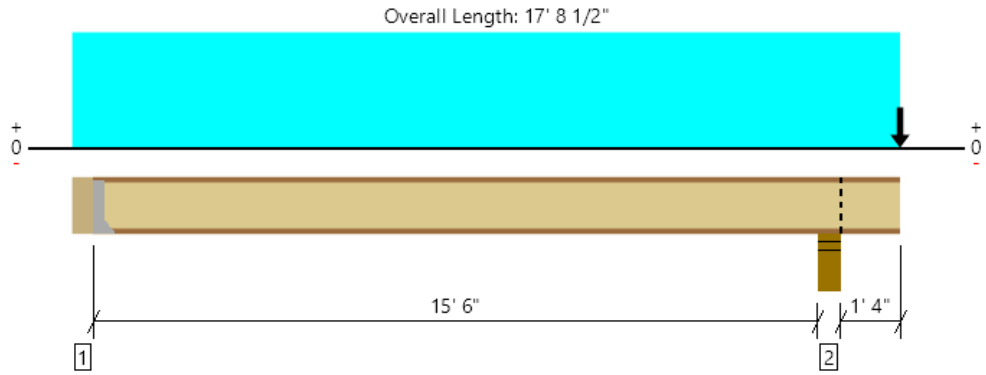
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

First Floor, Typical Cantilever Joist

1 piece(s) 11 7/8" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1964 @ 16' 1 3/4"	2350 (5.25")	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1568 @ 16' 4 1/2"	1794	Passed (87%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-2402 @ 16' 1 3/4"	3634	Passed (66%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.248 @ 8' 3 3/8"	0.393	Passed (L/760)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.134 @ 17' 8 1/2"	0.200	Passed (2L/280)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	45	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (0.2").
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Hanger on 11 7/8" HF beam	5.00"	Hanger[1]	1.75" / - [2]	58	442/-27	-56	500/-4	See note [1]
2 - Stud wall - HF	5.50"	5.50"	3.62"	958	1005	616	2174	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 6" o/c	
Bottom Edge (Lu)	3' 7" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

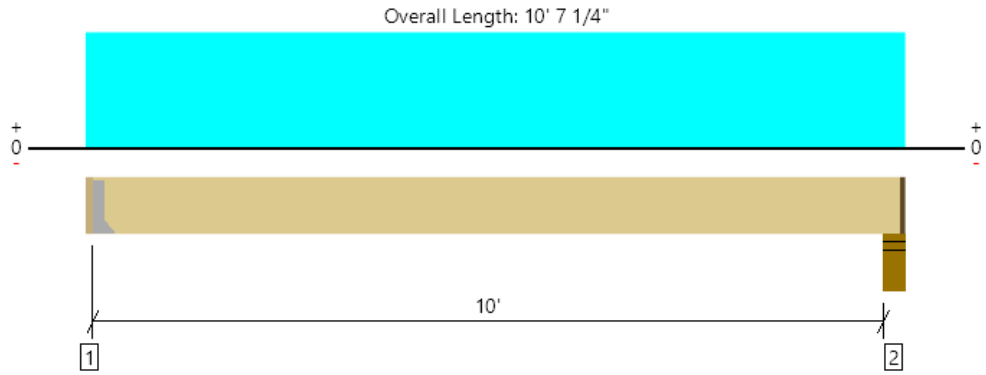
Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 17' 8 1/2"	16"	12.0	40.0	-	Default Load
2 - Point (PLF)	17' 8 1/2"	16"	220.0	-	-	Exterior Wall
3 - Point (PLF)	17' 8 1/2"	16"	105.0	340.0	-	Second Floor
4 - Point (PLF)	17' 8 1/2"	16"	225.0	-	420.0	Roof

First Floor, Deck Joists

1 piece(s) 2 x 8 SPF No.1/No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	504 @ 1 3/4"	956 (1.50")	Passed (53%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	444 @ 9"	979	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1271 @ 5' 2 1/4"	1322	Passed (96%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.279 @ 5' 2 1/4"	0.336	Passed (L/434)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.349 @ 5' 2 1/4"	0.504	Passed (L/347)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 7 1/4" HF ledgerOnMasonry	1.75"	Hanger[1]	1.50"	104	415	519	See note [1]
2 - Stud wall - HF	5.50"	4.25"	1.50"	108	433	542	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' o/c	
Bottom Edge (Lu)	10' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS26	1.75"	N/A	4-10dx1.5	3-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 10' 7 1/4"	16"	15.0	60.0	Default Load

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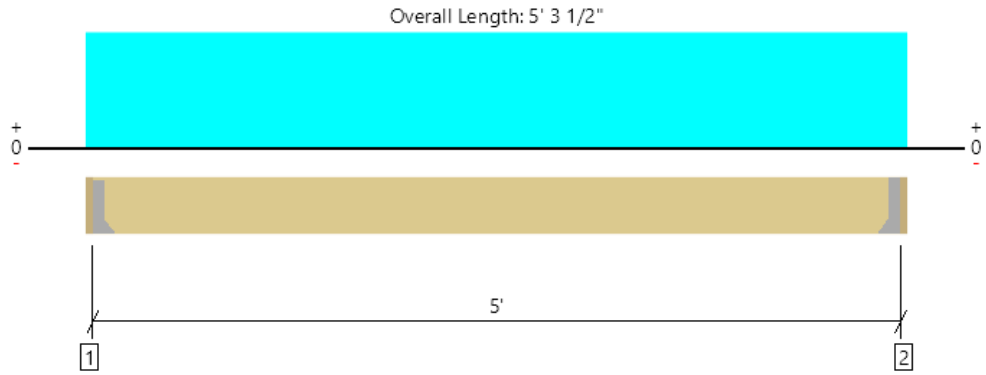
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

First Floor, Zen Garden Joists

1 piece(s) 2 x 8 SPF No.1/No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	440 @ 1 3/4"	956 (1.50")	Passed (46%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	334 @ 9"	979	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	550 @ 2' 7 3/4"	1322	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.028 @ 2' 7 3/4"	0.167	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.037 @ 2' 7 3/4"	0.250	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 7 1/4" HF ledgerOnMasonry	1.75"	Hanger[1]	1.50"	113	353	466	See note [1]
2 - Hanger on 7 1/4" HF ledgerOnMasonry	1.75"	Hanger[1]	1.50"	113	353	466	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' o/c	
Bottom Edge (Lu)	5' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LU26	1.50"	N/A	6-10dx1.5	4-10dx1.5	
2 - Face Mount Hanger	LU26	1.50"	N/A	6-10dx1.5	4-10dx1.5	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 5' 3 1/2"	16"	32.0	100.0	Default Load

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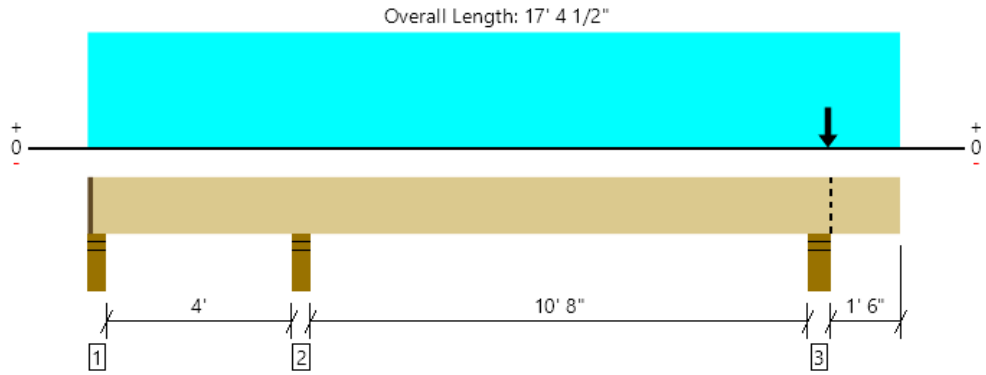
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

First Floor, 1B1: Grid E
1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5308 @ 4' 6 3/4"	6694 (4.50")	Passed (79%)	--	1.0 D + 1.0 L (Adj Spans)
Shear (lbs)	2500 @ 5' 8 7/8"	8590	Passed (29%)	1.00	1.0 D + 1.0 L (Adj Spans)
Moment (Ft-lbs)	-5366 @ 4' 6 3/4"	15953	Passed (34%)	1.00	1.0 D + 1.0 L (Adj Spans)
Live Load Defl. (in)	0.075 @ 10' 7 3/16"	0.277	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.140 @ 10' 7 1/16"	0.554	Passed (L/951)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -633 lbs uplift at support located at 3". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - HF	4.50"	3.25"	1.50"	-43	571/-590	-	528/-633	1 1/4" Rim Board
2 - Stud wall - SPF	4.50"	4.50"	3.57"	2556	2752	-	5308	None
3 - Stud wall - HF	5.50"	5.50"	4.21"	2866	1550	2590	5971	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 3" o/c	
Bottom Edge (Lu)	17' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 4 1/2"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 17' 4 1/2" (Front)	6'	12.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 17' 4 1/2" (Front)	18'	8.0	-	-	Wall
3 - Point (lb)	15' 10" (Front)	N/A	1401	-	2590	Linked from: RB12 Grid E, Support 2

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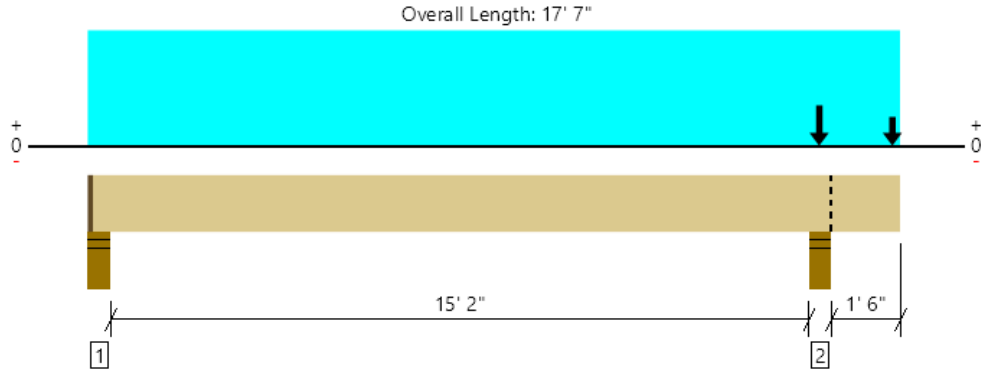
ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

First Floor, 1B1: Grid E + SW

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	8592 @ 15' 10 1/4"	11694 (5.50")	Passed (73%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3156 @ 14' 7 5/8"	12053	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	14142 @ 8' 9/16"	29854	Passed (47%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.207 @ 8' 1 1/8"	0.388	Passed (L/902)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.404 @ 8' 15/16"	0.776	Passed (L/462)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Stud wall - HF	5.50"	4.25"	1.78"	1881	1943	-	-65	220/-220	3824	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	4.04"	3658	2301	2590	714	2410/-2410	8592	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 6" o/c	
Bottom Edge (Lu)	17' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 7"	N/A	19.5	--	--	--	--	
1 - Uniform (PSF)	0 to 17' 7" (Front)	6'	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 17' 7" (Front)	18'	8.0	-	-	-	-	Wall
3 - Point (lb)	17' 5" (Front)	N/A	-	-	-	649	2190	SW Grid 15
4 - Point (lb)	15' 10" (Front)	N/A	1401	-	2590	-	-	Linked from: RB12 Grid E, Support 2

Weyerhaeuser Notes

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

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

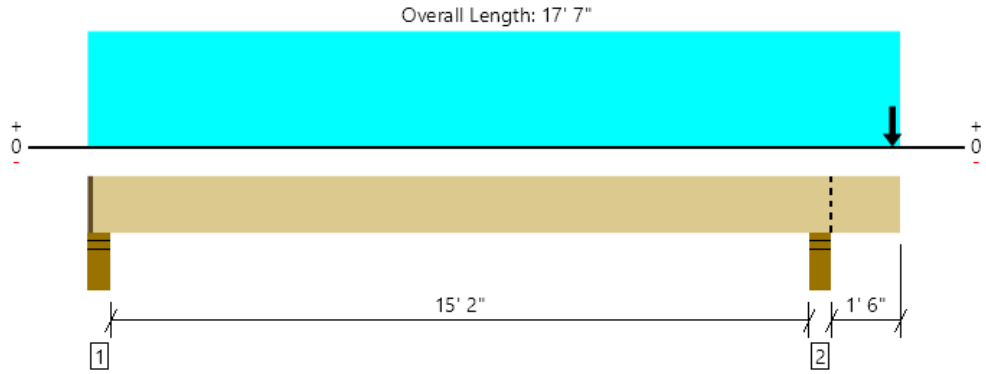
Weyerhaeuser

First Floor, 1B2: SW Transfer

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL

An excessive uplift of -1854 lbs at support located at 15' 10 1/4" failed this product.

ok, beam flush framed with joist hanger at end to resist uplift.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3341 @ 15' 10 1/4"	7796 (5.50")	Passed (43%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	2241 @ 17' 7/8"	13743	Passed (16%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	4053 @ 8' 5/16"	15953	Passed (25%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.090 @ 17' 7"	0.200	Passed (2L/464)	--	1.0 D + 0.7 E (All Spans)
Total Load Defl. (in)	0.315 @ 8' 4 11/16"	0.776	Passed (L/591)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Wind	Seismic	Factored	
1 - Stud wall - HF	5.50"	4.25"	1.50"	774	324	-109	315/-315	1180	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	2.36"	930	383	1191	3445/-3445	3341/-1854	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 6" o/c	
Bottom Edge (Lu)	17' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 7"	N/A	13.0	--	--	--	
1 - Uniform (PSF)	0 to 17' 7" (Front)	1'	12.0	40.0	-	-	Default Load
2 - Uniform (PSF)	0 to 17' 7" (Front)	9'	8.0	-	-	-	Wall
3 - Point (lb)	17' 5" (Front)	N/A	-	-	1082	3130	

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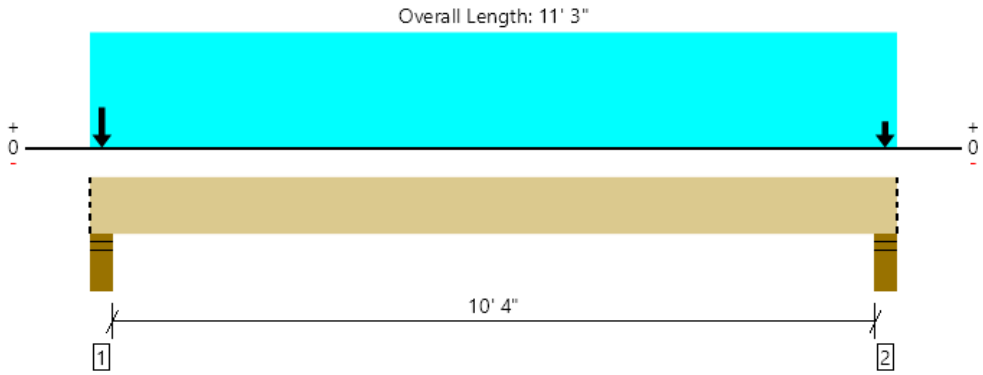
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

First Floor, 1B3: Grid 11

1 piece(s) 5 1/8" x 15" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	11807 @ 4"	11980 (5.50")	Passed (99%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4382 @ 1' 8 1/2"	13581	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	15663 @ 5' 7 1/2"	38438	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.074 @ 5' 7 1/2"	0.265	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.122 @ 5' 7 1/2"	0.529	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 7".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	5.42"	5401	3825	4717	11807	Blocking
2 - Stud wall - SPF	5.50"	5.50"	3.86"	3759	3825	2386	8417	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 3" o/c	
Bottom Edge (Lu)	11' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 3"	N/A	18.7	--	--	
1 - Uniform (PSF)	0 to 11' 3" (Front)	8'	12.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 11' 3" (Front)	18'	12.0	-	-	Wall
3 - Uniform (PSF)	0 to 11' 3" (Front)	9'	12.0	40.0	-	Second Floor
4 - Point (lb)	2" (Front)	N/A	2933	-	4717	Linked from: RB3: Cantilever Beam, Support 1
5 - Point (lb)	11' 1" (Front)	N/A	1291	-	2386	Linked from: RB4: Support Beam, Support 1

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

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

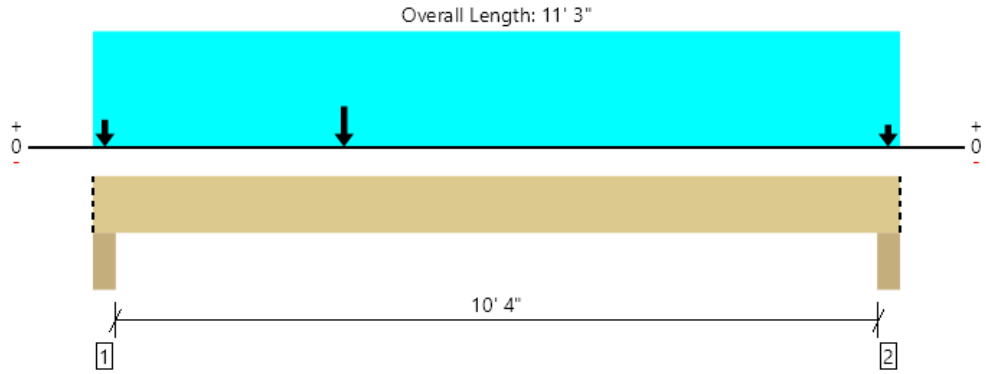
Weyerhaeuser

First Floor, 1B3: Grid 11 + SW

1 piece(s) 5 1/8" x 15" 24F-V8 DF Glulam

An excessive uplift of -3409 lbs at support located at 4" failed this product.

ok, strap provided to resist uplift



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	16794 @ 4"	18322 (5.50")	Passed (92%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	8702 @ 1' 8 1/2"	21730	Passed (40%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	26932 @ 3' 6"	61500	Passed (44%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Neg Moment (Ft-lbs)	-17964 @ 3' 6"	61500	Passed (29%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.149 @ 5' 3 11/16"	0.265	Passed (L/854)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.196 @ 5' 4 5/8"	0.529	Passed (L/647)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 7".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 7".
- -584 lbs uplift at support located at 10' 11". Strapping or other restraint may be required.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Column - HF	5.50"	5.50"	5.04"	5401	3825	4717	3271	9498/-9498	16794/-3409	Blocking
2 - Column - HF	5.50"	5.50"	3.17"	3759	3825	2386	1396	4056/-4056	10546/-584	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 3" o/c	
Bottom Edge (Lu)	11' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 11' 3"	N/A	18.7	--	--	--	--	
1 - Uniform (PSF)	0 to 11' 3" (Front)	8'	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 11' 3" (Front)	18'	12.0	-	-	-	-	Wall
3 - Uniform (PSF)	0 to 11' 3" (Front)	9'	12.0	40.0	-	-	-	Second Floor
4 - Point (lb)	3' 6" (Front)	N/A	-	-	-	4667	13554	SW Grid 11
5 - Point (lb)	2" (Front)	N/A	2933	-	4717	-	-	Linked from: RB3: Cantilever Beam, Support 1
6 - Point (lb)	11' 1" (Front)	N/A	1291	-	2386	-	-	Linked from: RB4: Support Beam, Support 1

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

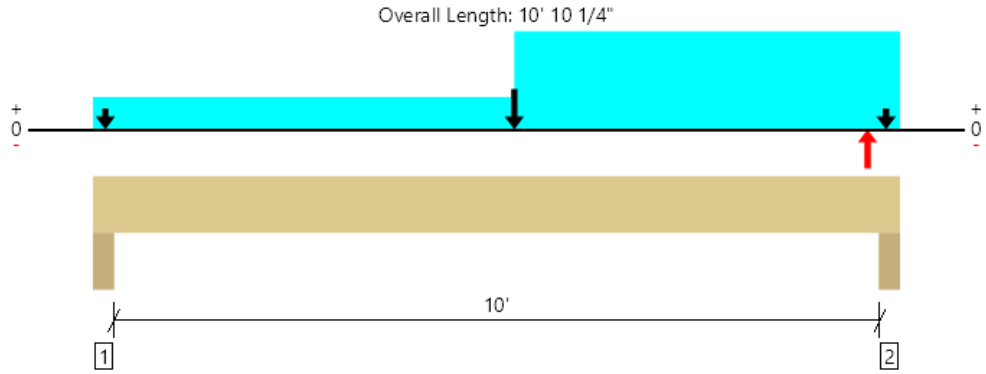
First Floor, 1B4: Grid 1 + SW

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL

ok, strap provided to resist uplift

An excessive uplift of -3057 lbs at support located at 3 5/8" failed this product.

An excessive uplift of -2658 lbs at support located at 10' 6 5/8" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	11406 @ 10' 6 5/8"	16816 (5.13")	Passed (68%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	7616 @ 9' 5 1/4"	19285	Passed (39%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	32979 @ 5' 8"	47766	Passed (69%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	-0.292 @ 5' 8"	0.342	Passed (L/421)	--	0.6 D - 0.7 E (All Spans)
Total Load Defl. (in)	0.372 @ 5' 8"	0.512	Passed (L/331)	--	1.0 D + 0.7 E (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Column - SPF	5.13"	5.13"	2.99"	3222	434	3352	3271	7130/-7130	9805/-3057	None
2 - Column - SPF	5.13"	5.13"	3.48"	3888	434	4599	-3271	7130/-7130	11406/-2658	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 10" o/c	
Bottom Edge (Lu)	10' 10" o/c	

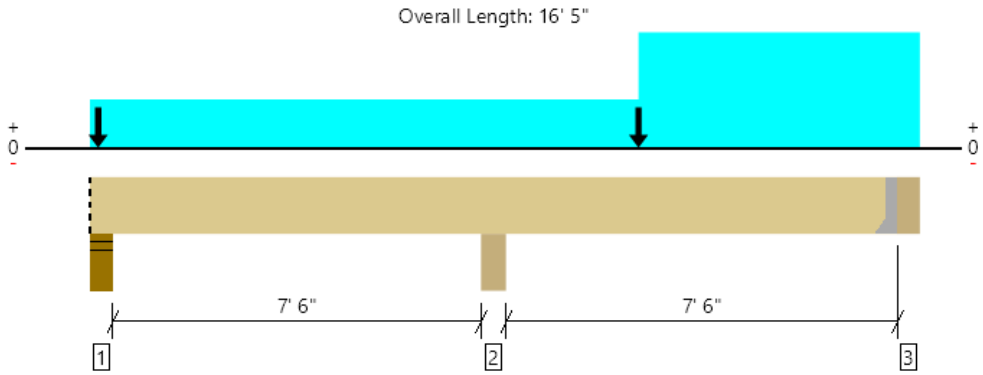
•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 10' 10 1/4"	N/A	19.5	--	--	--	--	
1 - Uniform (PSF)	0 to 10' 10 1/4" (Front)	2'	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 10' 10 1/4" (Front)	18'	12.0	-	-	-	-	Wall
3 - Point (lb)	5' 8" (Front)	N/A	550	-	1000	-	-	RB3
4 - Point (lb)	5' 8" (Front)	N/A	-	-	-	7058	15385	SW Grid 1
5 - Point (lb)	10' 5" (Front)	N/A	-	-	-	-7058	-15385	SW Grid 1
6 - Uniform (PSF)	5' 8" to 10' 10 1/4" (Front)	14'	16.0	-	30.0	-	-	Roof
7 - Point (lb)	2" (Front)	N/A	1291	-	2386	-	-	Linked from: RB4: Support Beam, Support 1
8 - Point (lb)	10' 8" (Front)	N/A	1291	-	2386	-	-	Linked from: RB4: Support Beam, Support 2

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

First Floor, 1B5: Dining Grid G
1 piece(s) 3 1/8" x 16 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4450 @ 15' 11 1/2"	4450 (2.19")	Passed (100%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	6054 @ 9' 10"	9109	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	9932 @ 11' 5 15/16"	28359	Passed (35%)	1.00	1.0 D + 1.0 L (Alt Spans)
Neg Moment (Ft-lbs)	-8189 @ 8' 2 1/2"	21860	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.036 @ 12' 1 13/16"	0.194	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.046 @ 12' 1 15/16"	0.387	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 6' 7 15/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 6' 1 7/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	4.99"	1342	4967/-635	6309	Blocking
2 - Column - SPF	6.00"	6.00"	4.66"	2192	7266	9459	None
3 - Hanger on 16 1/2" DF beam	5.50"	Hanger[1]	2.19"	1091	3811	4902	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

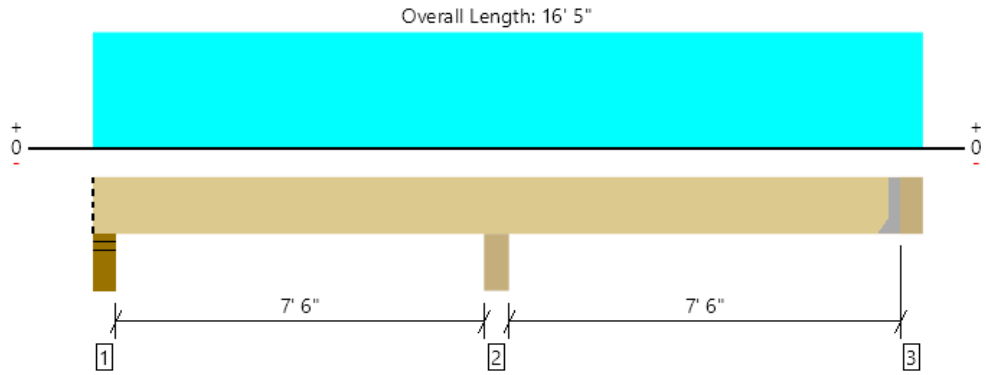
Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' o/c	
Bottom Edge (Lu)	16' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
3 - Face Mount Hanger	HGUS3.25/12	4.00"	N/A	56-10d	20-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

First Floor, 1B6: Dining Grid E
1 piece(s) 3 1/8" x 16 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3294 @ 15' 11 1/2"	3294 (1.62")	Passed (100%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	3316 @ 6' 7"	9109	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5552 @ 3' 7 3/4"	28359	Passed (20%)	1.00	1.0 D + 1.0 L (Alt Spans)
Neg Moment (Ft-lbs)	-7711 @ 8' 2 1/2"	21860	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.021 @ 4' 7/8"	0.197	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.026 @ 4'	0.394	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 6' 7 9/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 3' 10 7/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	2.91"	893	2793/-350	3687	Blocking
2 - Column - SPF	6.00"	6.00"	4.86"	2642	7227	9869	None
3 - Hanger on 16 1/2" DF beam	5.50"	Hanger[1]	1.62"	900	2851/-34	3751	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' o/c	
Bottom Edge (Lu)	16' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
3 - Face Mount Hanger	THA218-2	1.75"	N/A	22-16d	6-16d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 15' 11 1/2"	N/A	12.5	--	
1 - Uniform (PSF)	0 to 16' 5" (Front)	3'	42.0	100.0	Zen Garden Load
2 - Uniform (PSF)	11' to 16' 5" (Front)	10'	-	-	Wall Load
3 - Uniform (PSF)	0 to 16' 5" (Front)	11'	12.0	40.0	Upper Level Framing

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

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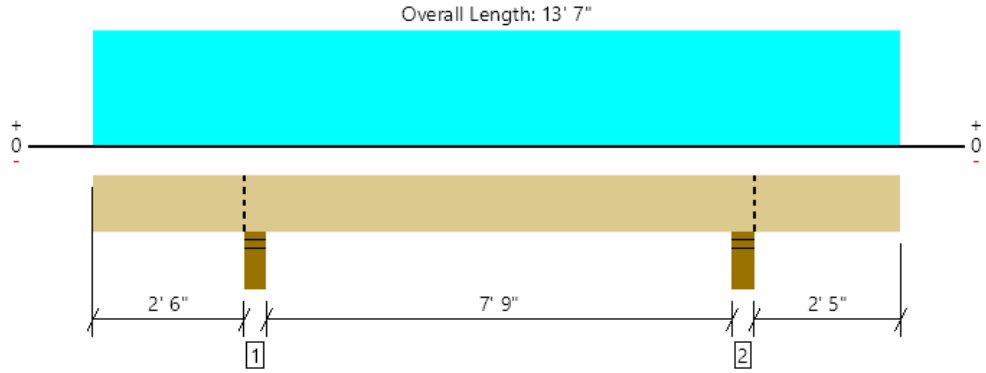
First Floor, 1B7: Zen Garden Grid D
1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6178 @ 2' 8 3/4"	11980 (5.50")	Passed (52%)	--	1.0 D + 1.0 L (Adj Spans)
Shear (lbs)	2977 @ 3' 8 1/2"	8149	Passed (37%)	1.00	1.0 D + 1.0 L (Adj Spans)
Pos Moment (Ft-lbs)	6319 @ 6' 10 1/8"	13838	Passed (46%)	1.00	1.0 D + 1.0 L (Alt Spans)
Neg Moment (Ft-lbs)	-3215 @ 2' 8 3/4"	10666	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.109 @ 6' 10"	0.205	Passed (L/901)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.133 @ 6' 10 1/16"	0.410	Passed (L/743)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 7' 7 13/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 3' 9 1/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	5.50"	5.50"	2.84"	1806	4372	6178	Blocking
2 - Stud wall - SPF	5.50"	5.50"	2.79"	1769	4306	6075	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 7" o/c	
Bottom Edge (Lu)	13' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 13' 7"	N/A	11.2	--	
1 - Uniform (PSF)	0 to 13' 7" (Front)	6'	42.0	100.0	Zen Garden Load

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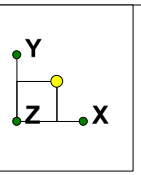
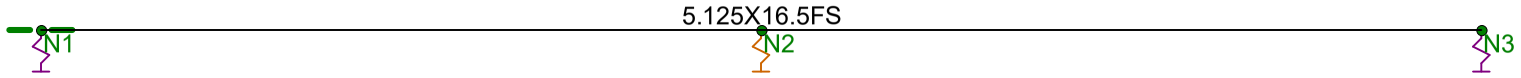
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

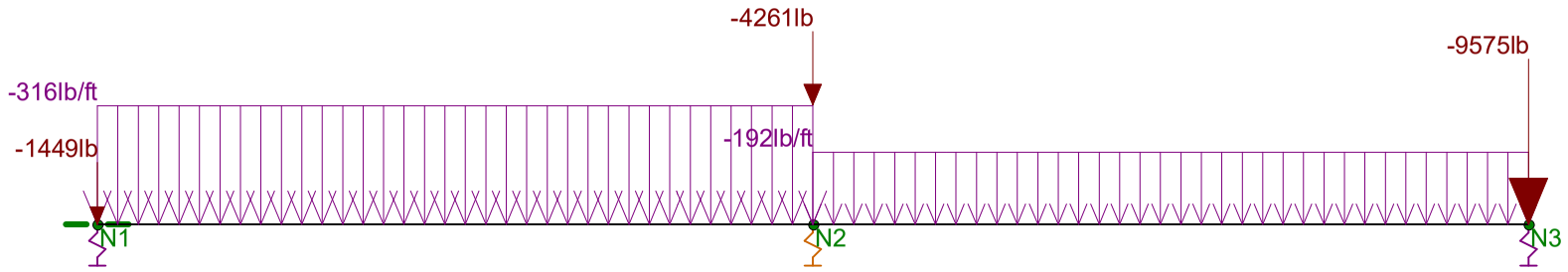
ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser





QCE	1B8	
TVM		July 29, 2022 at 8:13 AM
22252.01		1B8.r2d



Loads: BLC 1, Dead

QCE	1B8	
TVM		July 29, 2022 at 8:14 AM
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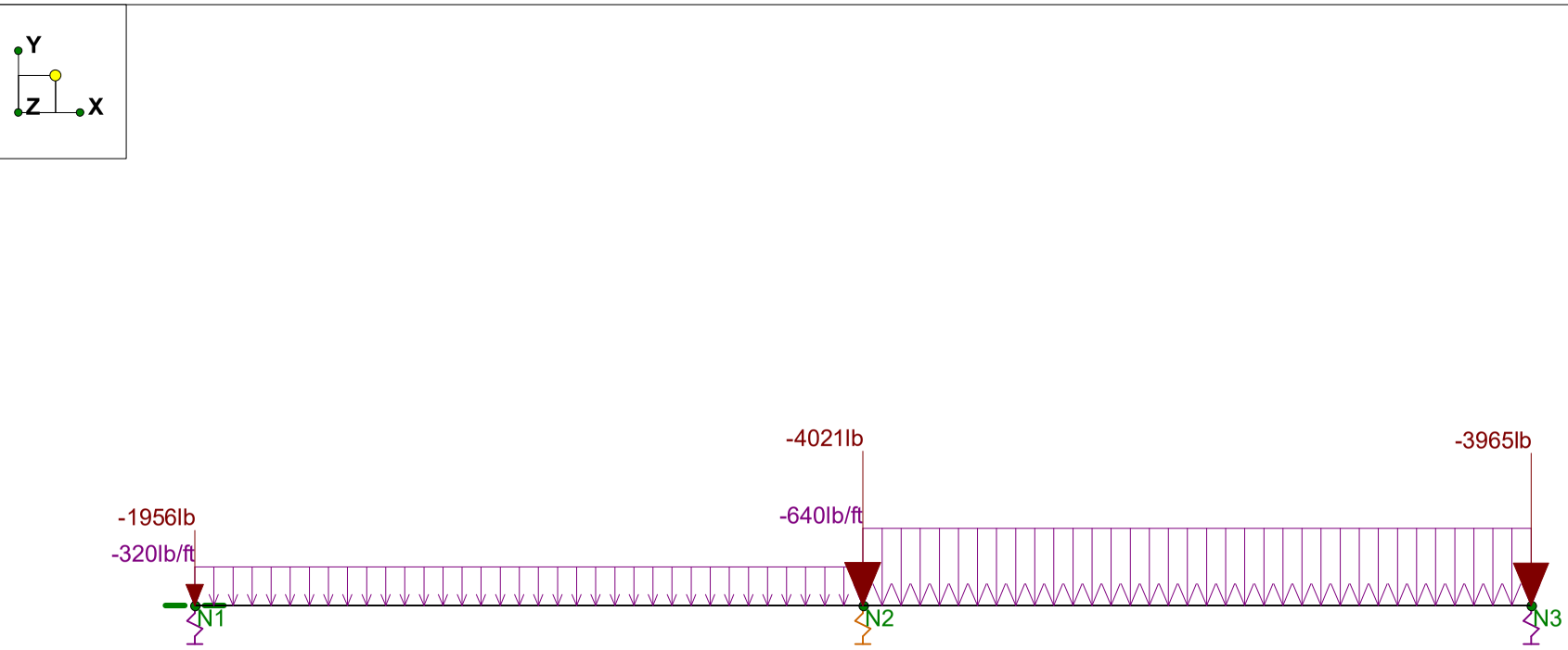
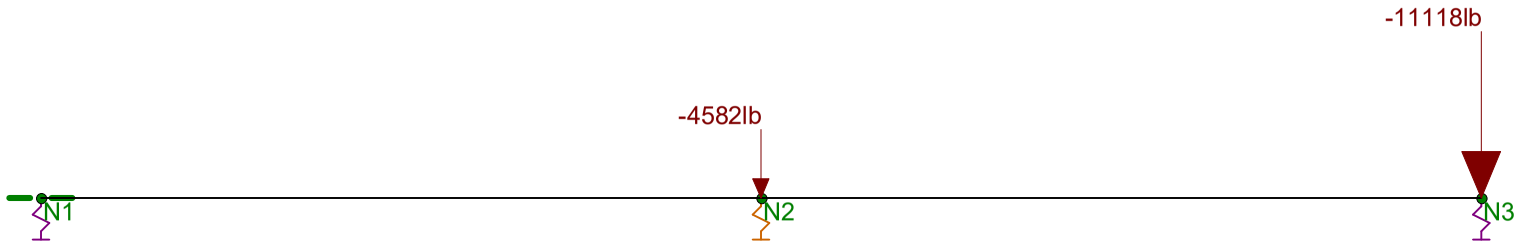


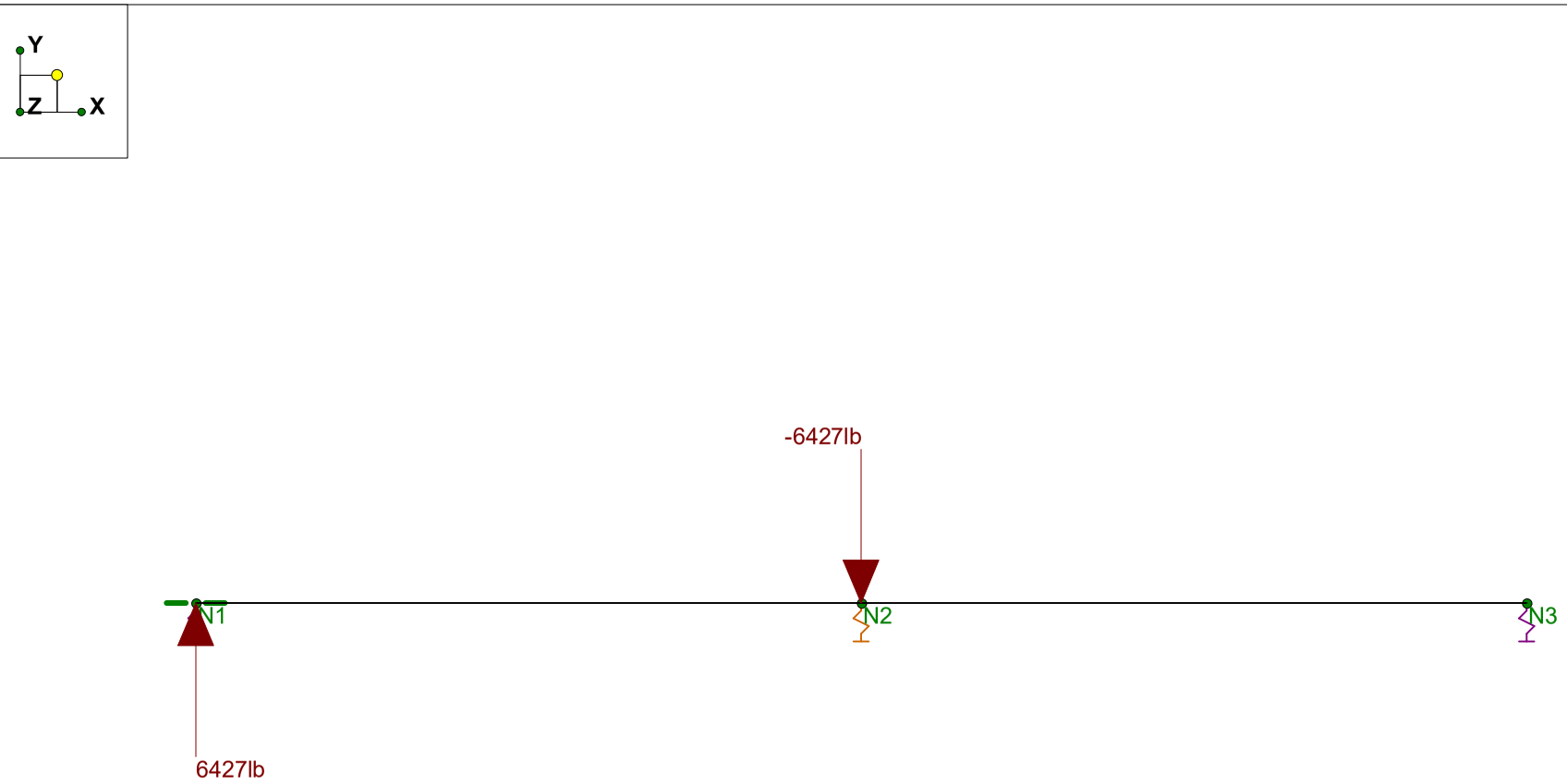
Loads: BLC 2, Live

QCE	1B8	
TVM		July 29, 2022 at 8:15 AM
22252.01		1B8.r2d



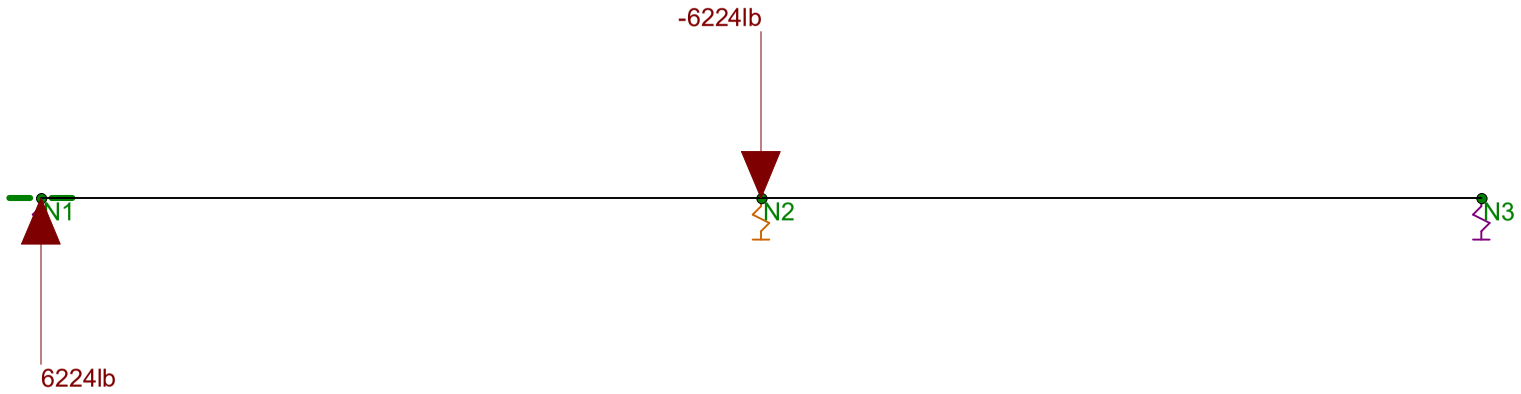
Loads: BLC 3, Snow

QCE	1B8	
TVM		July 29, 2022 at 8:16 AM
22252.01		1B8.r2d



Loads: BLC 4, Wind

QCE	1B8	
TVM		July 29, 2022 at 8:16 AM
22252.01		1B8.r2d



Loads: BLC 5, Seismic

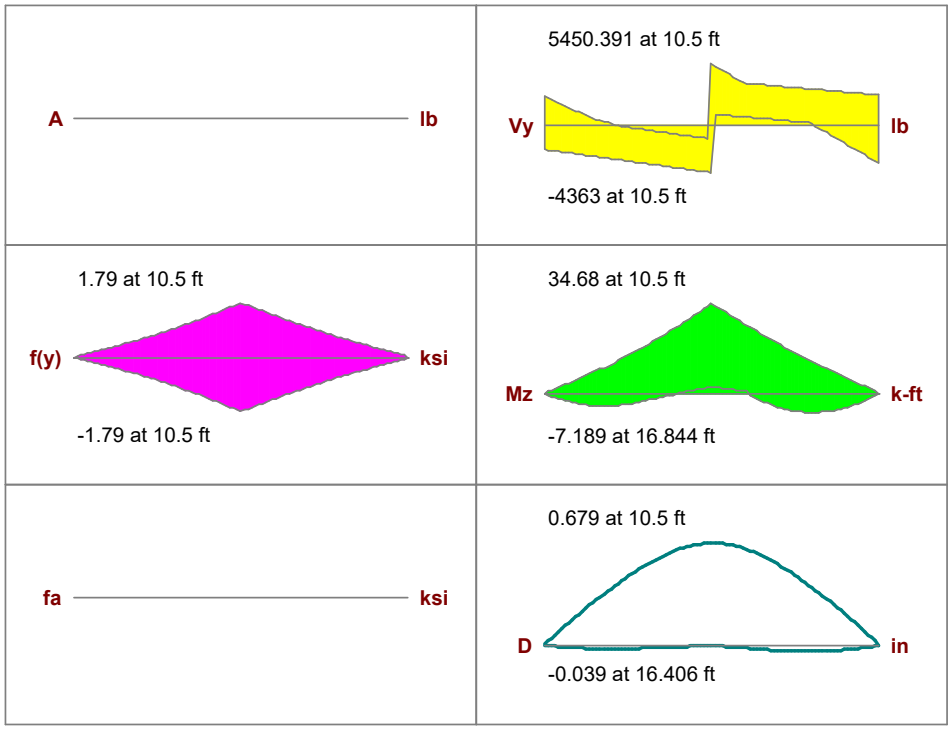
QCE	1B8	
TVM		July 29, 2022 at 8:16 AM
22252.01		1B8.r2d

Load Combinations

	Description	S...	P...	S...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Factor	...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	IBC 16-8	Yes	Y		DL	1																		
2			Y		LL	1																		
3			Y		SL	1																		
4	IBC 16-9	Yes	Y		DL	1	LL	1																
5	IBC 16-10 (b)	Yes	Y		DL	1	SL	1																
6	IBC 16-11 (a)	Yes	Y		DL	1	LL	0.75																
7	IBC 16-11 (b)	Yes	Y		DL	1	LL	0.75	SL	0.75														
8	IBC 16-12 (a) (a)	Yes	Y		DL	1	WL	0.6																
9	IBC 16-12 (a) (b)	Yes	Y		DL	1	WL	-0.6																
10	IBC 16-12 (b) (a)	Yes	Y		DL	1	EL	0.7																
11	IBC 16-12 (b) (b)	Yes	Y		DL	1	EL	-0.7																
12	IBC 16-13 (b) (a)	Yes	Y		DL	1	WL	0.45	LL	0.75	LLS	0.75	SL	0.75										
13	IBC 16-13 (b) (b)	Yes	Y		DL	1	WL	-0.45	LL	0.75	LLS	0.75	SL	0.75										
14	IBC 16-14 (a)	Yes	Y		DL	1	EL	0.5...	LL	0.75	LLS	0.75	SL	0.75										
15	IBC 16-14 (b)	Yes	Y		DL	1	EL	-0....	LL	0.75	LLS	0.75	SL	0.75										
16	IBC 16-15 (a)	Yes	Y		DL	0.6	WL	0.6																
17	IBC 16-15 (b)	Yes	Y		DL	0.6	WL	-0.6																
18	IBC 16-16 (a)	Yes	Y		DL	0.6	EL	0.7																
19	IBC 16-16 (b)	Yes	Y		DL	0.6	EL	-0.7																
20	IBC 16-12 (b) (...	Yes	Y		DL	1	EL	1.75																
21	IBC 16-12 (b) (...	Yes	Y		DL	1	EL	-1.75																
22	IBC 16-16 (a) ...	Yes	Y		DL	0.6	EL	1.75																
23	IBC 16-16 (b) ...	Yes	Y		DL	0.6	EL	-1.75																

Beam: ***M1***

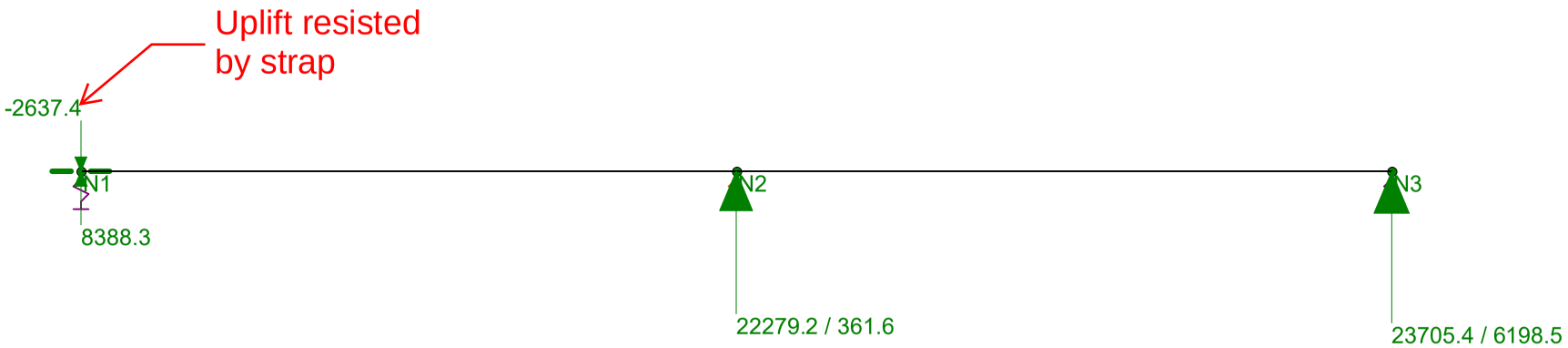
Shape: **5.125X16.5FS**
Material: **DF**
Length: **21 ft**
I Joint: **N1**
J Joint: **N3**
Envelope
Code Check: **0.874 (LC 23)**
Report Based On 97 Sections



AWC NDS-15: ASD Code Check

Max Bending Check	**0.874 (LC 23)**	Max Shear Check	**0.569 (LC 4)**	Max Defl Ratio	**L/370**
Location	**10.5 ft**	Location	**10.5 ft**	Location	**10.5 ft**
Equation	**3.9-3**			Span	**1**

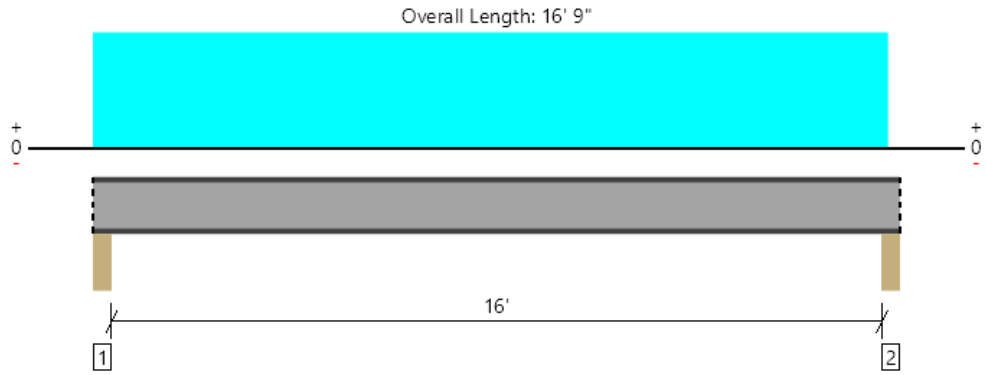
CD	**1.6**	RB	**8.897**	CL	**0.985**
Cr	**1**	Cfu	**1**	CP	**0.459**



Envelope Only Solution
Y-direction Reaction Units are lb and k-ft (Enveloped)

QCE	1B8	
TVM		July 29, 2022 at 8:20 AM
22252.01		1B8.r2d

First Floor, 1B9: Garage Door
1 piece(s) W10X30 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	13905 @ 3"	18955 (4.50")	Passed (73%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	13283 @ 4 1/2"	63000	Passed (21%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	54803 @ 8' 4 1/2"	55960	Passed (98%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.290 @ 8' 4 1/2"	0.542	Passed (L/672)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.528 @ 8' 4 1/2"	0.813	Passed (L/369)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (Cb) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Column - HF	4.50"	4.50"	4.50"	6269	6313	3869	13905	Blocking
2 - Column - HF	4.50"	4.50"	4.50"	6089	6124	3754	13498	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	All Bearing Points	
Bottom Edge (Lu)	All Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 9"	N/A	30.0	--	--	
1 - Uniform (PLF)	0 to 16' 6"	N/A	718.5	753.8	462.0	Linked from: Typical Cantilever Joist, Support 2

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

ForteWEB Software Operator	Job Notes
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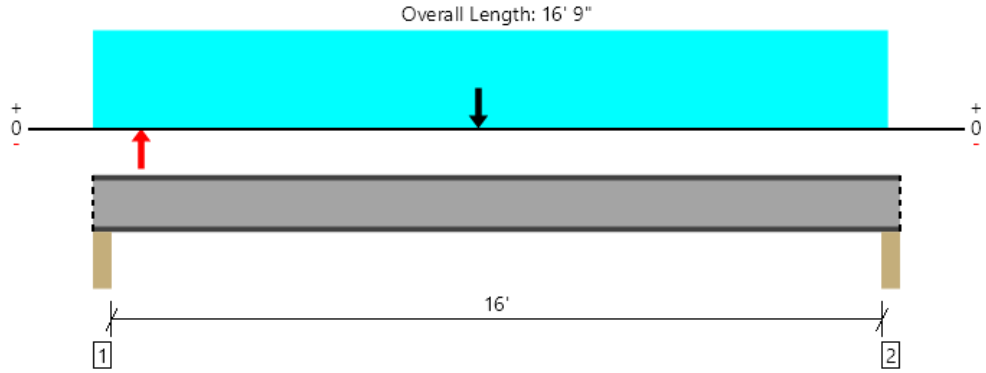
Weyerhaeuser

First Floor, 1B9: Garage Door + SW
1 piece(s) W10X30 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	14684 @ 3"	18955 (4.50")	Passed (77%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	14062 @ 4 1/2"	63000	Passed (22%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	61309 @ 8'	91317	Passed (67%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.339 @ 8' 4 5/8"	0.542	Passed (L/575)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.577 @ 8' 4 9/16"	0.813	Passed (L/338)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (Cb) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Column - HF	4.50"	4.50"	4.50"	6269	6313	3869	-513	1484/-1484	14684	Blocking
2 - Column - HF	4.50"	4.50"	4.50"	6089	6124	3754	513	1484/-1484	14277	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	Continuous	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 16' 9"	N/A	30.0	--	--	--	--	
1 - Point (lb)	1'	N/A	-	-	-	-1191	-3445	1B2 Beam
2 - Point (lb)	8'	N/A	-	-	-	1191	3445	1B2 Beam
3 - Uniform (PLF)	0 to 16' 6"	N/A	718.5	753.8	462.0	-	-	Linked from: Typical Cantilever Joist, Support 2

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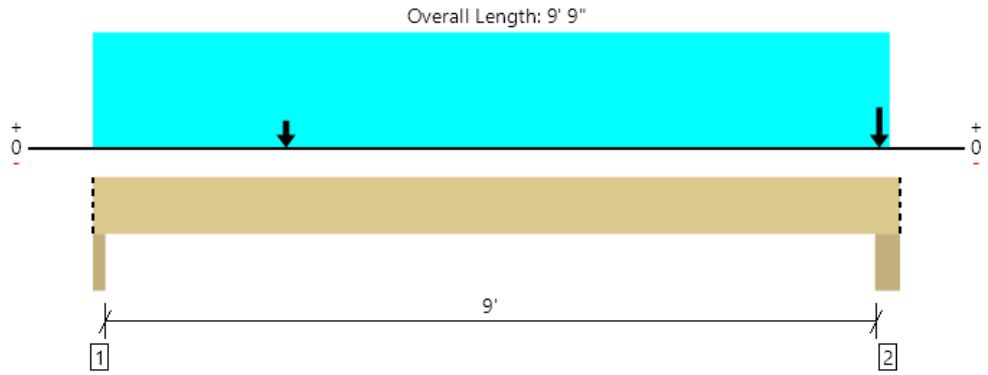
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

First Floor, 1B10: Garage Door + SW
1 piece(s) 5 1/8" x 12" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9192 @ 1 1/2"	9994 (3.00")	Passed (92%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	5205 @ 1' 3"	10865	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	15906 @ 4' 9"	24285	Passed (65%)	1.00	1.0 D + 1.0 L (All Spans)
Neg Moment (Ft-lbs)	-632 @ 2' 4"	38431	Passed (2%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.139 @ 4' 7 13/16"	0.308	Passed (L/800)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.230 @ 4' 8 5/16"	0.463	Passed (L/483)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 1.3% decrease in the moment capacity has been added to account for lateral stability.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 3".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 1' 8 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Column - SPF	3.00"	3.00"	2.76"	3484	3580	2195	907	2623/-2623	9192	Blocking
2 - Column - SPF	6.00"	6.00"	4.89"	7404	3802	7489	284	822/-822	16304	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	All Bearing Points	
Bottom Edge (Lu)	All Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 9' 9"	N/A	14.9	--	--	--	--	
1 - Point (lb)	2' 4" (Front)	N/A	-	-	-	1191	3445	1B2 Beam
2 - Uniform (PLF)	0 to 9' 7 1/2" (Front)	N/A	718.5	753.8	462.0	-	-	Linked from: Typical Cantilever Joist, Support 2
3 - Point (lb)	9' 6" (Front)	N/A	3827	127	5237	-	-	Linked from: 1B12: Garage Grid J, Support 2

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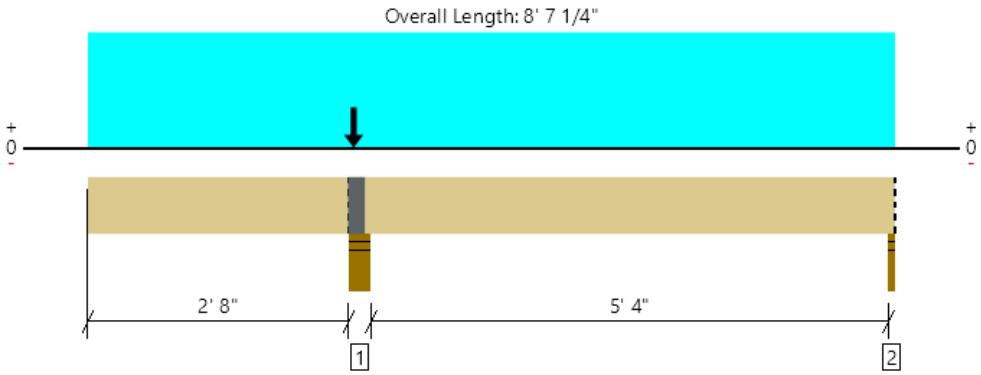
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

First Floor, 1B11: Deck Header

2 piece(s) 2 x 8 SPF No.1/No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1099 @ 8' 7"	2126 (1.75")	Passed (52%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	1114 @ 3' 8 3/4"	1958	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-1700 @ 2' 10 3/4"	2300	Passed (74%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.132 @ 0	0.200	Passed (2L/528)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.143 @ 0	0.290	Passed (2L/488)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- WARNING: The 13834 lbs load above support located at 2' 10 3/4" exceeds squash block capacity. Member design has not considered this load. Special consideration is required by the Designer of Record.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - HF	5.50"	5.50"	2.16"	7636	4935	6140	15942	Blocking, Squash Blocks
2 - Stud wall - HF	1.75"	1.75"	1.50"	182	917/-236	-	1099/-54	Blocking

- Squash Blocks must match bearing length and are assumed to carry all loads applied directly above them, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 7" o/c	
Bottom Edge (Lu)	8' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 7 1/4"	N/A	5.5	--	--	
1 - Uniform (PSF)	0 to 8' 7 1/4" (Front)	5' 4"	15.0	60.0	-	Default Load
2 - Point (lb)	2' 10" (Front)	N/A	7082	2862	6140	Linked from: 2B10: Grid I, Support 1

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

ForteWEB Software Operator	Job Notes
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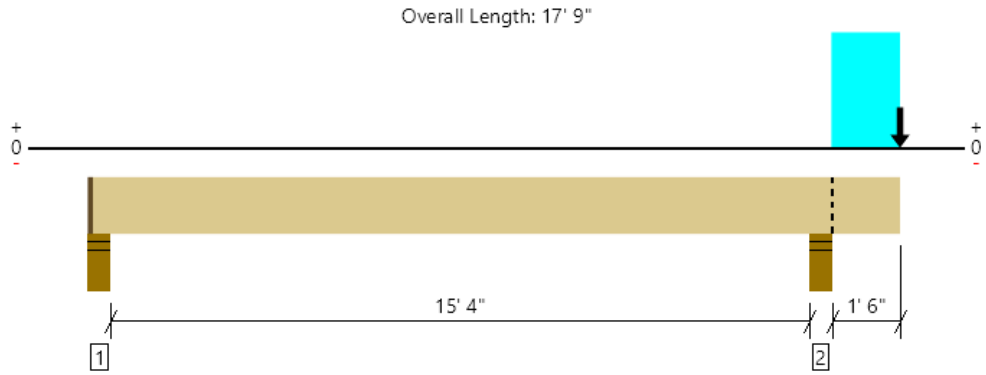
Weyerhaeuser

First Floor, 1B12: Garage Grid J

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9064 @ 16' 1/4"	11694 (5.50")	Passed (78%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	7782 @ 17' 2 7/8"	13861	Passed (56%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-13610 @ 16' 1/4"	34332	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.101 @ 17' 9"	0.200	Passed (2L/408)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.163 @ 17' 9"	0.200	Passed (2L/254)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (0.2").
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -710 lbs uplift at support located at 4". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - HF	5.50"	4.25"	1.50"	-190	-7	-520	-710	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	4.26"	3827	127	5237	9064	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 8" o/c	
Bottom Edge (Lu)	17' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 9"	N/A	19.5	--	--	
1 - Uniform (PSF)	16' 3" to 17' 9" (Front)	2'	12.0	40.0	-	Default Load
2 - Uniform (PSF)	16' 3" to 17' 9" (Front)	18'	12.0	-	-	Wall
3 - Point (lb)	17' 9" (Front)	N/A	2933	-	4717	Linked from: RB3: Cantilever Beam, Support 1

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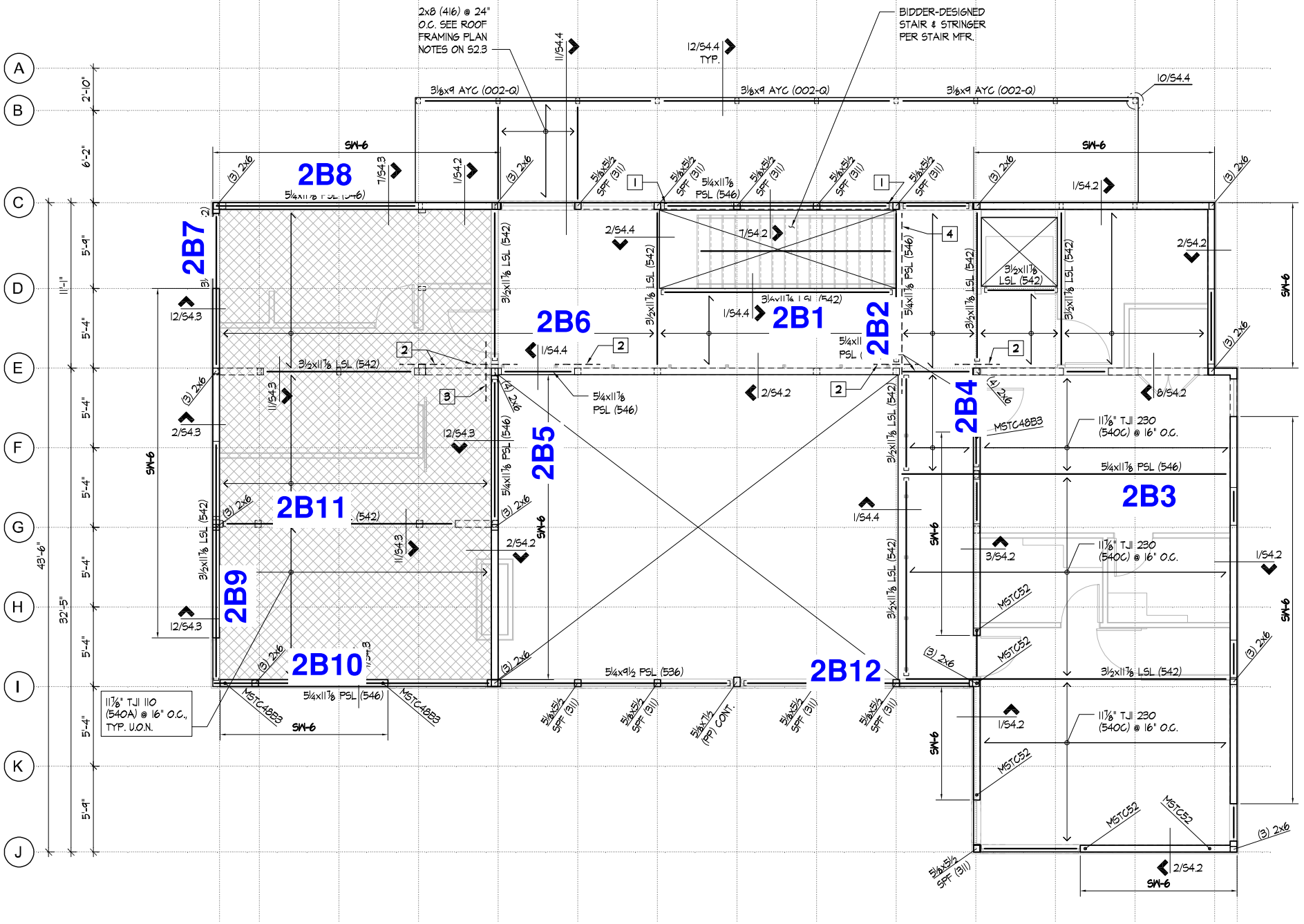
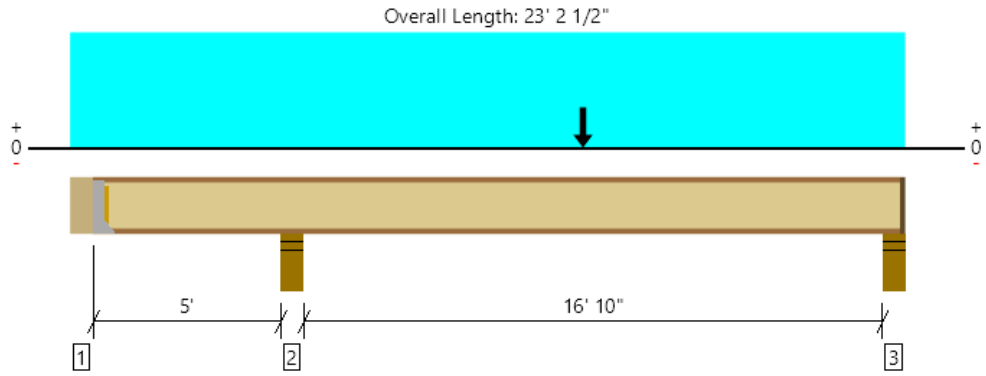


SECOND FLOOR FRAMING PLAN

SCALE: 1/4" = 1'-0"

Second Floor, Cantilever Joist
1 piece(s) 11 7/8" TJI® 230 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1398 @ 5' 8 1/4"	2790 (5.25")	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	734 @ 5' 11"	1821	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-2273 @ 5' 8 1/4"	4215	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.170 @ 15' 1 5/16"	0.429	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.253 @ 15' 7/8"	0.857	Passed (L/813)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	46	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -353 lbs uplift at support located at 5 1/2". Strapping or other restraint may be required.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1x4 Flat strapping.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 11 7/8" HF beam	5.50"	Hanger[1]	1.75" / - [2]	-90	156/-263	66/-353	See note [1]
2 - Stud wall - SPF	5.50"	5.50"	3.50"	416	982	1398	None
3 - Stud wall - HF	5.50"	4.25"	1.75"	152	390	542	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 2" o/c	
Bottom Edge (Lu)	5' 8" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	U3516/20	2.00"	N/A	16-10dx1.5	6-10dx1.5	Web Stiffeners

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 23' 2 1/2"	16"	12.0	40.0	Default Load
2 - Point (PLF)	14'	16"	80.0	-	Partition

ForteWEB Software Operator	Job Notes
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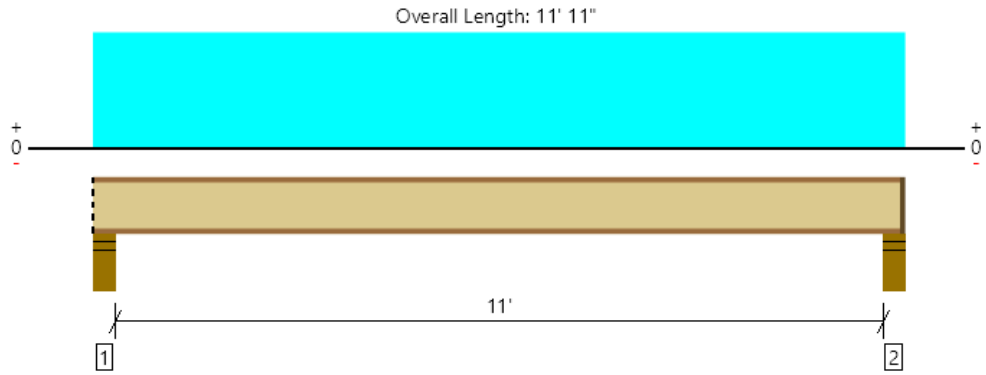
Second Floor, 11'-0" Joist
1 piece(s) 11 7/8" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	413 @ 4 1/2"	1375 (3.50")	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	381 @ 5 1/2"	1560	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1081 @ 5' 11 1/2"	3160	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.070 @ 5' 11 1/2"	0.279	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.092 @ 5' 11 1/2"	0.558	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	59	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1x4 Flat strapping.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	1.75"	95	318	413	Blocking
2 - Stud wall - HF	5.50"	4.25"	1.75"	95	318	413	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 6" o/c	
Bottom Edge (Lu)	11' 10" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 11' 11"	16"	12.0	40.0	Default Load

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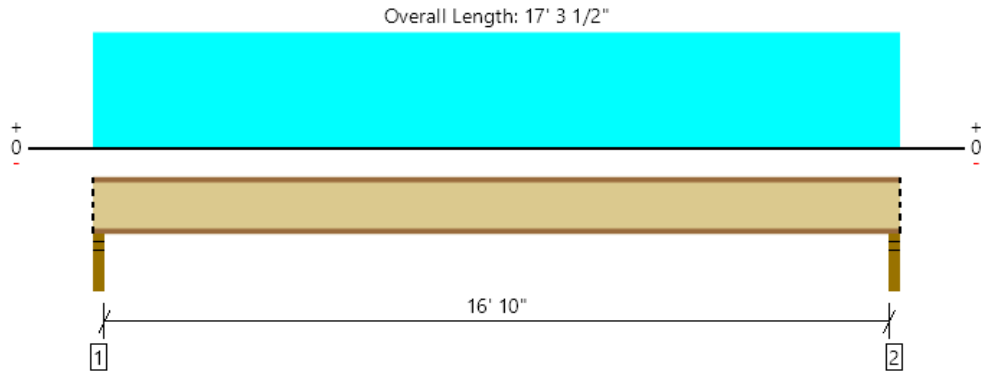
Weyerhaeuser

Second Floor, 16'-10" Joist
1 piece(s) 11 7/8" TJI® 230 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	599 @ 1 3/4"	1305 (2.75")	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	584 @ 2 3/4"	1655	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2505 @ 8' 7 3/4"	4215	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.273 @ 8' 7 3/4"	0.425	Passed (L/748)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.354 @ 8' 7 3/4"	0.850	Passed (L/576)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	45	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1x4 Flat strapping.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	2.75"	2.75"	1.75"	138	461	599	Blocking
2 - Stud wall - HF	2.75"	2.75"	1.75"	138	461	599	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 4" o/c	
Bottom Edge (Lu)	17' 4" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 17' 3 1/2"	16"	12.0	40.0	Default Load

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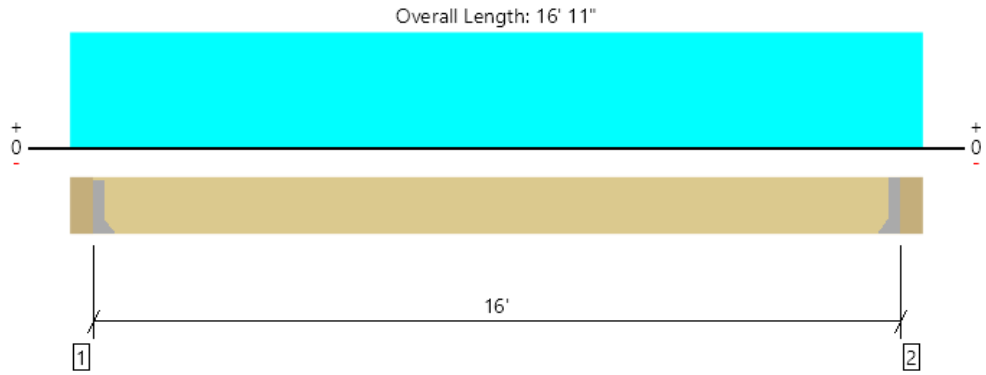
Second Floor, 2B1: Landing Grid D
1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1752 @ 5 1/2"	4725 (1.50")	Passed (37%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1535 @ 1' 5 3/8"	8590	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	7008 @ 8' 5 1/2"	15953	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.247 @ 8' 5 1/2"	0.400	Passed (L/776)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.452 @ 8' 5 1/2"	0.800	Passed (L/425)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 11 7/8" HF beam	5.50"	Hanger[1]	1.50"	831	1015	1846	See note [1]
2 - Hanger on 11 7/8" HF beam	5.50"	Hanger[1]	1.50"	831	1015	1846	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' o/c	
Bottom Edge (Lu)	16' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS414	2.00"	N/A	10-16d	6-16d	
2 - Face Mount Hanger	LUS414	2.00"	N/A	10-16d	6-16d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	5 1/2" to 16' 5 1/2"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 16' 11" (Front)	3'	12.0	40.0	Default Load
2 - Uniform (PLF)	0 to 16' 11" (Front)	N/A	50.0	-	Railing

Weyerhaeuser Notes

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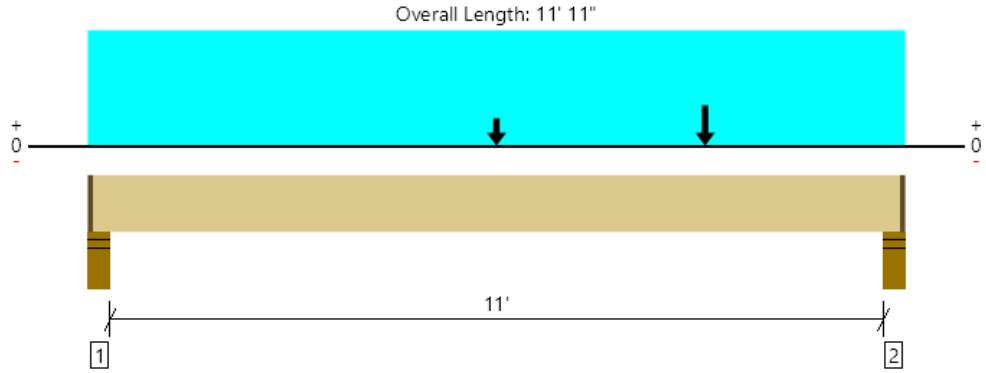
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

Second Floor, 2B2: Stairway Grid 10

1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3435 @ 11' 7"	9257 (4.25")	Passed (37%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3365 @ 10' 8 1/2"	8149	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	9783 @ 5' 11 1/2"	13838	Passed (71%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.194 @ 6' 2 7/16"	0.281	Passed (L/696)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.373 @ 6' 2 13/16"	0.563	Passed (L/361)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 11' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	5.50"	4.25"	1.50"	897	1040	1937	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.58"	1708	1732	3440	1 1/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 9" o/c	
Bottom Edge (Lu)	11' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 11' 9 3/4"	N/A	11.2	--	
1 - Uniform (PSF)	0 to 11' 11" (Front)	1'	12.0	40.0	Default Load
2 - Point (lb)	9' (Front)	N/A	1500	1280	Stairway
3 - Point (lb)	5' 11 1/2" (Front)	N/A	831	1015	Linked from: 2B1: Landing Beam, Support 1

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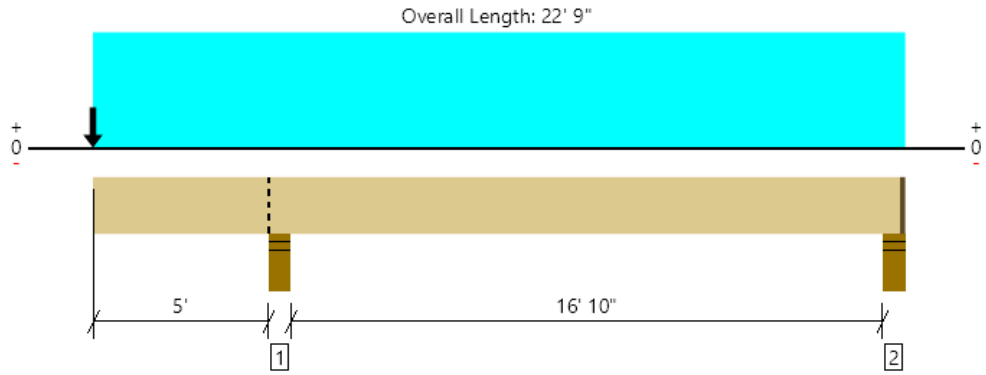
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Second Floor, 2B3: Cantilever To support Landing
1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3393 @ 5' 2 3/4"	11694 (5.50")	Passed (29%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2087 @ 4' 1/8"	12053	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-10390 @ 5' 2 3/4"	29854	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.250 @ 0	0.261	Passed (2L/502)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.413 @ 0	0.523	Passed (2L/304)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -321 lbs uplift at support located at 22' 5". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	1.60"	1504	1889	3393	Blocking
2 - Stud wall - HF	5.50"	4.25"	1.50"	11	357/-332	368/-321	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	22' 8" o/c	
Bottom Edge (Lu)	22' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 22' 7 3/4"	N/A	19.5	--	
1 - Uniform (PSF)	0 to 22' 9" (Front)	1'	12.0	40.0	Default Load
2 - Point (lb)	0 (Front)	N/A	800	1000	Beams

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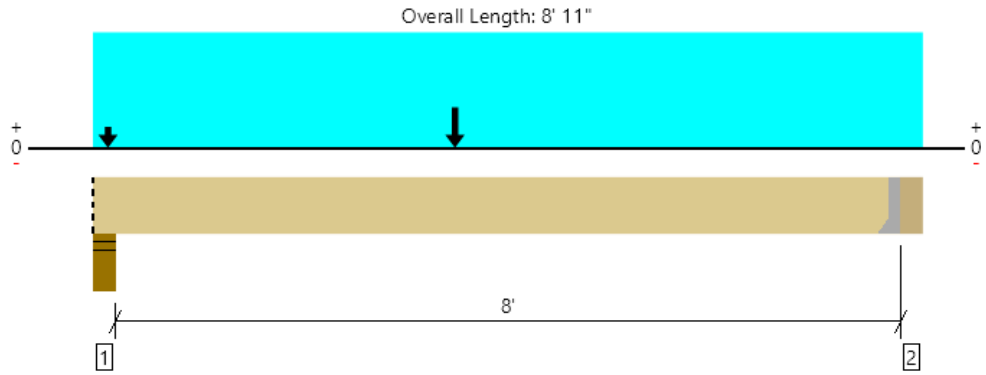
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

Second Floor, 2B4: Kitchen Grid 11
1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5485 @ 8' 5 1/2"	5485 (1.67")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3349 @ 7' 5 5/8"	13861	Passed (24%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	13620 @ 4'	47766	Passed (29%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.081 @ 4' 4 3/8"	0.203	Passed (L/999+)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.116 @ 4' 4 1/2"	0.406	Passed (L/838)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -360 lbs uplift at support located at 4". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Stud wall - SPF	5.50"	5.50"	3.03"	2255	2594	1714	703	2447/-2447	6771/-360	Blocking
2 - Hanger on 11 7/8" LSL beam	5.50"	Hanger[1]	1.67"	2104	1989	1763	579	2013/-2013	5975/-146	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

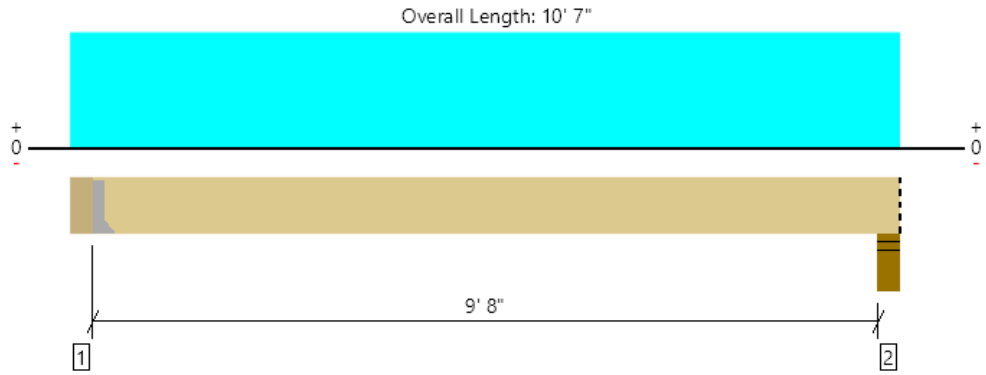
Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HHUS5.50/10	3.00"	N/A	30-10d	10-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 8' 5 1/2"	N/A	19.5	--	--	--	--	
1 - Uniform (PSF)	0 to 8' 11" (Front)	11'	12.0	40.0	-	-	-	Default Load
2 - Point (lb)	2" (Front)	N/A	200	660	-	-	-	Grid E Beam
3 - Uniform (PSF)	0 to 8' 11" (Front)	9'	12.0	-	-	-	-	Wall
4 - Uniform (PSF)	0 to 8' 11" (Front)	13'	16.0	-	30.0	-	-	Roof
5 - Point (lb)	4' (Front)	N/A	-	-	-	1282	4460	SW Grid 11

Second Floor, 2B5: Kitchen Grid 5

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3804 @ 5 1/2"	4725 (1.50")	Passed (81%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3035 @ 1' 5 3/8"	9878	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	9312 @ 5' 4 1/4"	18346	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.133 @ 5' 4 1/4"	0.245	Passed (L/885)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.246 @ 5' 4 1/4"	0.490	Passed (L/478)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Hanger on 11 7/8" PSL beam	5.50"	Hanger[1]	1.50"	1905	214	2249	4154	See note [1]
2 - Stud wall - SPF	5.50"	5.50"	2.73"	1867	209	2196	4063	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 2" o/c	
Bottom Edge (Lu)	10' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HHUS48	3.00"	N/A	22-10d	8-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 10' 7"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 10' 7" (Front)	1'	12.0	40.0	-	Floor Load
2 - Uniform (PSF)	0 to 10' 7" (Front)	9'	12.0	-	-	Wall Load
3 - Uniform (PSF)	0 to 10' 7" (Front)	14'	16.0	-	30.0	Roof Load

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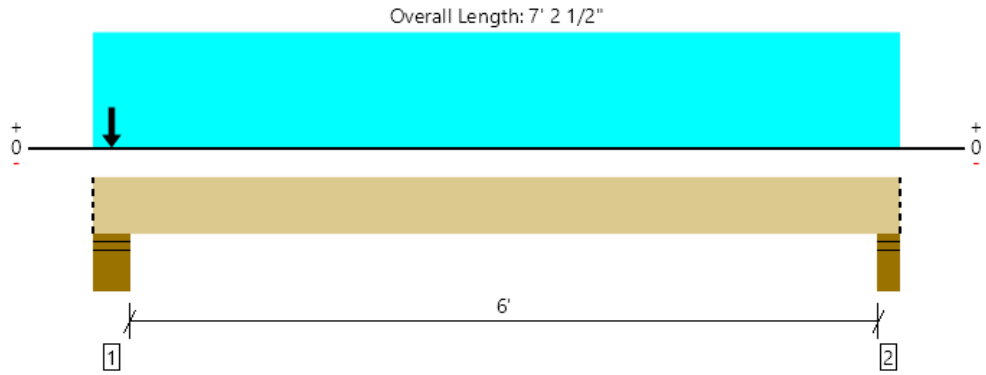
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

Second Floor, 2B6: Kitchen Grid E

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	19793 @ 7 1/2"	20081 (9.00")	Passed (99%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	666 @ 1' 8 7/8"	12053	Passed (6%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1619 @ 3' 9"	29854	Passed (5%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.007 @ 3' 9"	0.156	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.010 @ 3' 9"	0.313	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - SPF	9.00"	9.00"	8.87"	8675	1114	11118	19793	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	316	830	-	1146	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 3" o/c	
Bottom Edge (Lu)	7' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 2 1/2"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 7' 2 1/2" (Front)	6'	12.0	40.0	-	Floor Load
2 - Point (lb)	2" (Front)	N/A	6427	-	8869	Linked from: RB10: Clear Story Transfer, Support 2
3 - Point (lb)	2" (Front)	N/A	1905	214	2249	Linked from: 2B5: Kitchen Grid 5, Support 1

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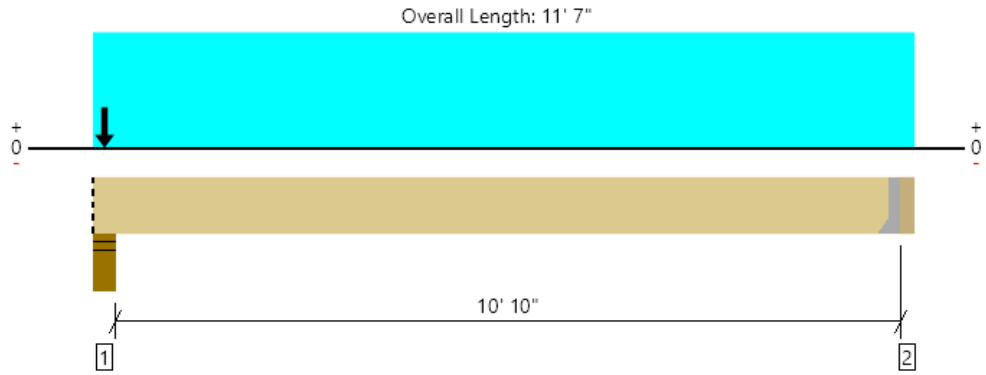
Weyerhaeuser

Second Floor, 2B7: Grid 1

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4450 @ 4"	7796 (5.50")	Passed (57%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	777 @ 10' 3 5/8"	8590	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2597 @ 5' 9 3/4"	15953	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.019 @ 5' 9 3/4"	0.274	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.083 @ 5' 9 3/4"	0.548	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - HF	5.50"	5.50"	3.14"	2064	233	2386	4450	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	764	231	-	995	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 4" o/c	
Bottom Edge (Lu)	11' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 3 1/2"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 11' 7" (Front)	1'	12.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 11' 7" (Front)	9'	12.0	-	-	Wall
3 - Point (lb)	2" (Front)	N/A	1291	-	2386	Linked from: RB4: Support Beam, Support 1

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ForteWEB Software Operator	Job Notes
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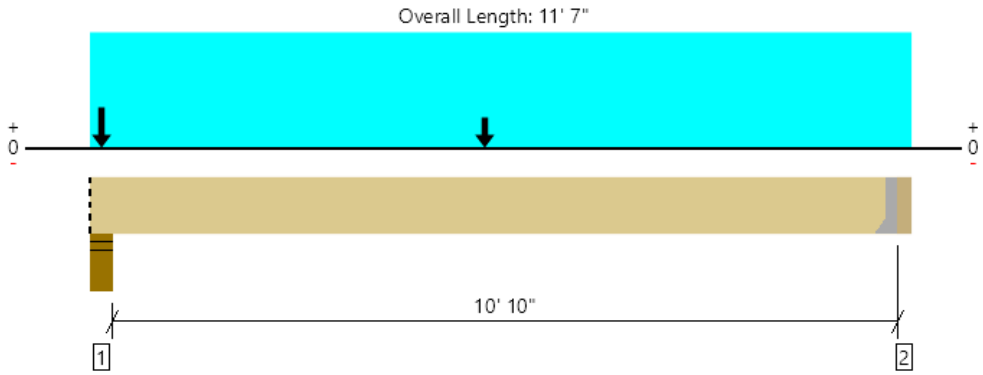
Weyerhaeuser

Second Floor, 2B7: Grid 1 + SW

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4650 @ 4"	7796 (5.50")	Passed (60%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1410 @ 1' 5 3/8"	13743	Passed (10%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	6422 @ 5' 8"	25525	Passed (25%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	-0.117 @ 5' 8"	0.274	Passed (L/999+)	--	0.6 D - 0.7 E (All Spans)
Total Load Defl. (in)	0.181 @ 5' 8"	0.548	Passed (L/727)	--	1.0 D + 0.7 E (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -329 lbs uplift at support located at 11' 3 1/2". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Stud wall - HF	5.50"	5.50"	3.28"	2064	233	2386	263	1186/-1186	4650	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	764	231	-	249	1124/-1124	1551/-329	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 4" o/c	
Bottom Edge (Lu)	11' 4" o/c	

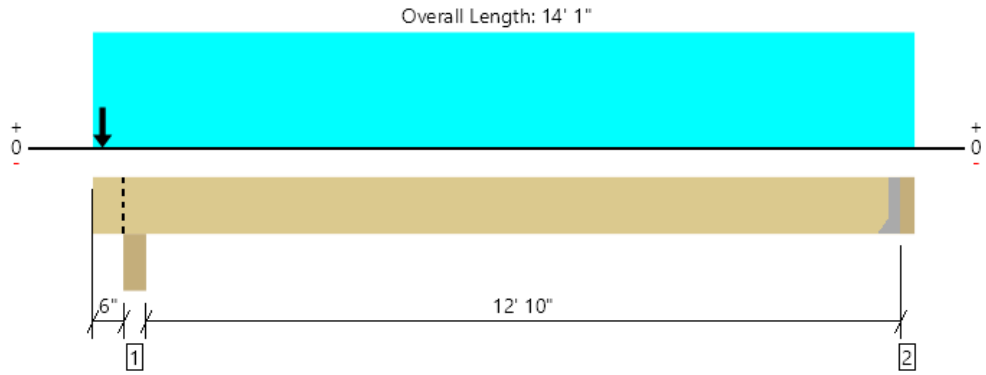
•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 11' 3 1/2"	N/A	13.0	--	--	--	--	
1 - Uniform (PSF)	0 to 11' 7" (Front)	1'	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 11' 7" (Front)	9'	12.0	-	-	-	-	Wall
3 - Point (lb)	5' 8" (Front)	N/A	-	-	-	512	2310	SW Grid 1
4 - Point (lb)	2" (Front)	N/A	1291	-	2386	-	-	Linked from: RB4: Support Beam, Support 1

Second Floor, 2B8: Grid C
1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	12562 @ 8 3/4"	18047 (5.50")	Passed (70%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2513 @ 1' 11 3/8"	12053	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	8338 @ 7' 7 9/16"	29854	Passed (28%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.106 @ 7' 3 1/8"	0.327	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.170 @ 7' 4 13/16"	0.653	Passed (L/922)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Column - DF	5.50"	5.50"	3.83"	5309	1988	4920	467	3946/-3946	12562	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	1192	1638	-203	-19	163/-163	2830	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 10" o/c	
Bottom Edge (Lu)	13' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HU612	2.50"	N/A	22-10d	8-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 13' 9 1/2"	N/A	19.5	--	--	--	--	
1 - Uniform (PSF)	0 to 14' 1" (Front)	6'	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 14' 1" (Front)	9'	12.0	-	-	-	-	Wall
3 - Point (lb)	2" (Front)	N/A	-	-	-	448	3783	SW Grid C
4 - Point (lb)	2" (Front)	N/A	2933	-	4717	-	-	Linked from: RB3: Cantilever Beam, Support 1
5 - Point (lb)	2" (Front)	N/A	764	231	-	-	-	Linked from: 2B7: Grid 1, Support 2

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

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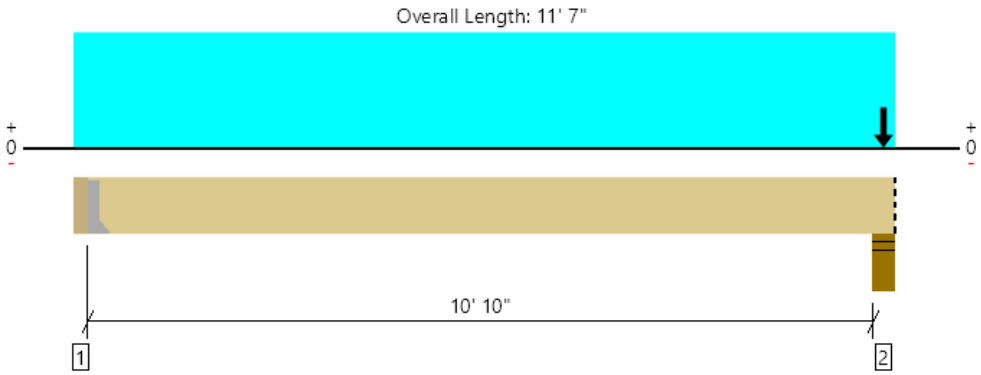
Second Floor, 2B9: Grid 1

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4450 @ 11' 3"	8181 (5.50")	Passed (54%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	777 @ 1' 3 3/8"	8590	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2597 @ 5' 9 1/4"	15953	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.019 @ 5' 9 1/4"	0.274	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.083 @ 5' 9 1/4"	0.548	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	764	231	-	995	See note [1]
2 - Stud wall - SPF	5.50"	5.50"	2.99"	2064	233	2386	4450	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 4" o/c	
Bottom Edge (Lu)	11' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 11' 7"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 11' 7" (Front)	1'	12.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 11' 7" (Front)	9'	12.0	-	-	Wall
3 - Point (lb)	11' 5" (Front)	N/A	1291	-	2386	Linked from: RB4: Support Beam, Support 1

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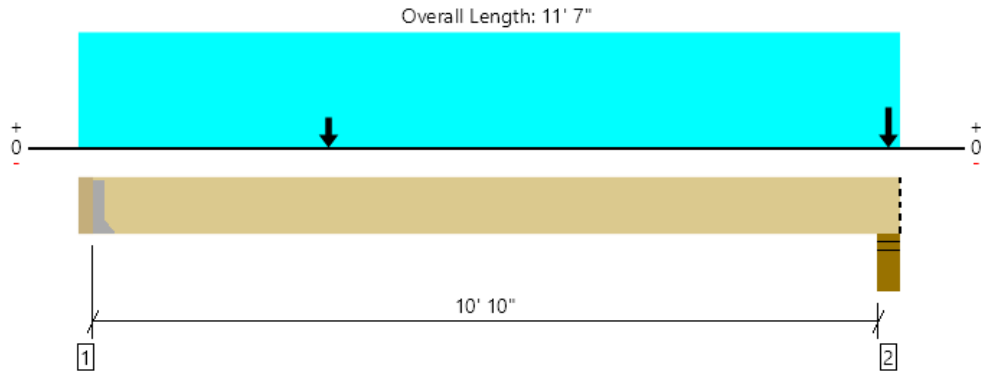
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

Second Floor, 2B9: Grid 1 + SW

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4450 @ 11' 3"	8181 (5.50")	Passed (54%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1739 @ 1' 3 3/8"	13743	Passed (13%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	5318 @ 3' 6"	25525	Passed (21%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	-0.090 @ 5' 2 5/8"	0.274	Passed (L/999+)	--	0.6 D - 0.7 E (All Spans)
Total Load Defl. (in)	0.153 @ 5' 5 1/2"	0.548	Passed (L/859)	--	1.0 D + 0.7 E (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -684 lbs uplift at support located at 3 1/2". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	764	231	-	362	1632/-1632	1906/-684	See note [1]
2 - Stud wall - SPF	5.50"	5.50"	2.99"	2064	233	2386	150	675/-675	4450	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 4" o/c	
Bottom Edge (Lu)	11' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	3 1/2" to 11' 7"	N/A	13.0	--	--	--	--	
1 - Uniform (PSF)	0 to 11' 7" (Front)	1'	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 11' 7" (Front)	9'	12.0	-	-	-	-	Wall
3 - Point (lb)	3' 6" (Front)	N/A	-	-	-	512	2307	SW Grid 1
4 - Point (lb)	11' 5" (Front)	N/A	1291	-	2386	-	-	Linked from: RB4: Support Beam, Support 1

ForteWEB Software Operator	Job Notes
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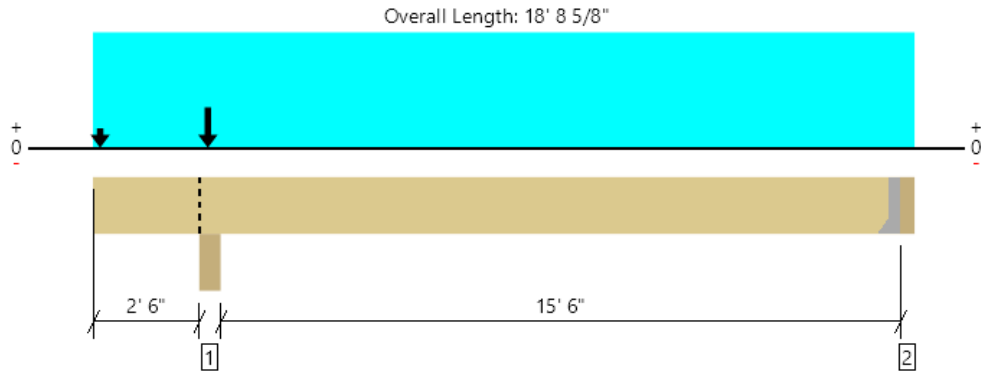
Second Floor, 2B10: Grid I

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	13833 @ 2' 8 9/16"	16816 (5.13")	Passed (82%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3188 @ 3' 11"	12053	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	12257 @ 10' 11 1/2"	29854	Passed (41%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.217 @ 10' 6 7/8"	0.393	Passed (L/870)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.353 @ 10' 8 1/2"	0.786	Passed (L/535)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Column - SPF	5.13"	5.13"	4.22"	7082	2862	6140	13833	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	1449	1956/-24	-	3405	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	18' 5" o/c	
Bottom Edge (Lu)	18' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HHUS5.50/10	3.00"	N/A	30-10d	10-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 5 1/8"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 18' 8 5/8" (Front)	6'	12.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 18' 8 5/8" (Front)	9'	12.0	-	-	Wall
3 - Point (lb)	2" (Front)	N/A	764	231	-	Linked from: 2B9: Grid 1, Support 1
4 - Point (lb)	2' 8" (Front)	N/A	4039	-	6140	Linked from: RB11: Grid I, Support 1

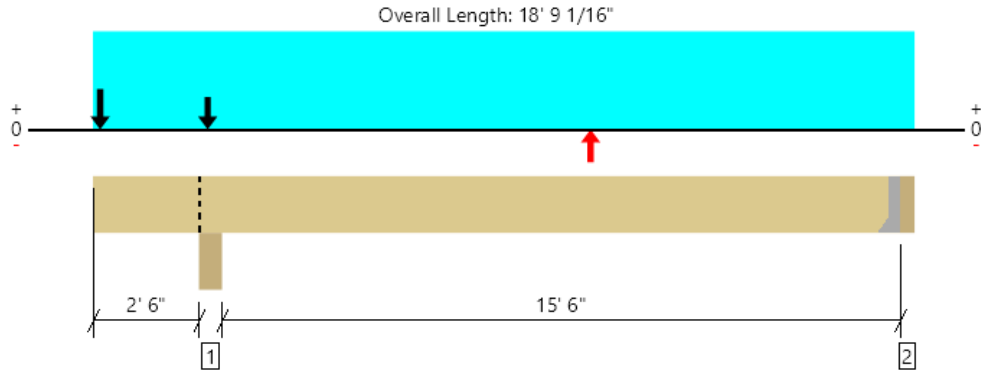
Second Floor, 2B10: Grid I + SW

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL

ok, strap provided to resist uplift

An excessive uplift of -2036 lbs at support located at 2' 8 3/4" failed this product.

An excessive uplift of -3411 lbs at support located at 18' 5 9/16" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	18636 @ 2' 8 3/4"	18211 (5.55")	Passed (102%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Shear (lbs)	7695 @ 1' 6 1/8"	19285	Passed (40%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	33314 @ 11' 6"	47766	Passed (70%)	1.60	1.0 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.546 @ 0	0.200	Failed (2L/120)	--	1.0 D + 0.7 E (All Spans)
Total Load Defl. (in)	0.543 @ 0	0.273	Failed (2L/120)	--	0.6 D + 0.7 E (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Upward deflection on left cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Upward deflection on left cantilever exceeds 0.4".

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Column - LSL	5.55"	5.55"	5.68"	7977	3137	6140	2314/-881	9746/-9746	18636/-2036	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.75"	1325	1958/-62	-	-1434	6009/-6009	5849/-3411	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	18' 6" o/c	
Bottom Edge (Lu)	18' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HHUS5.50/10	3.00"	N/A	30-16d	10-16d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 18' 5 9/16"	N/A	19.5	--	--	--	--	
1 - Uniform (PSF)	0 to 18' 9 1/16" (Front)	6'	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 18' 9 1/16" (Front)	9'	12.0	-	-	-	-	Wall
3 - Point (lb)	2" (Front)	N/A	-	-	-	1990	8380	SW Grid I
4 - Point (lb)	11' 6" (Front)	N/A	-	-	-	-1990	-8330	SW Grid I
5 - Point (lb)	2" (Front)	N/A	764	231	-	-	-	SW Grid I
6 - Point (lb)	2" (Front)	N/A	764	231	-	-	-	Linked from: 2B9: Grid 1, Support 1
7 - Point (lb)	2' 8" (Front)	N/A	4039	-	6140	-	-	Linked from: RB11: Grid I, Support 1

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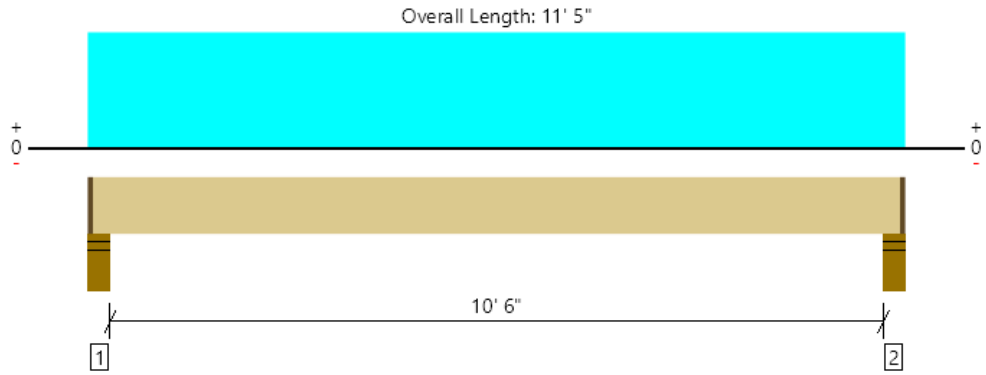
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Second Floor, 2B11: Grid G

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3278 @ 4"	6024 (4.25")	Passed (54%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2492 @ 1' 5 3/8"	8590	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	8450 @ 5' 8 1/2"	15953	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.197 @ 5' 8 1/2"	0.269	Passed (L/654)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.262 @ 5' 8 1/2"	0.538	Passed (L/492)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	4.25"	2.31"	826	2512	3338	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	4.25"	2.31"	826	2512	3338	1 1/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 3" o/c	
Bottom Edge (Lu)	11' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 11' 3 3/4"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 11' 5" (Front)	11'	12.0	40.0	Default Load

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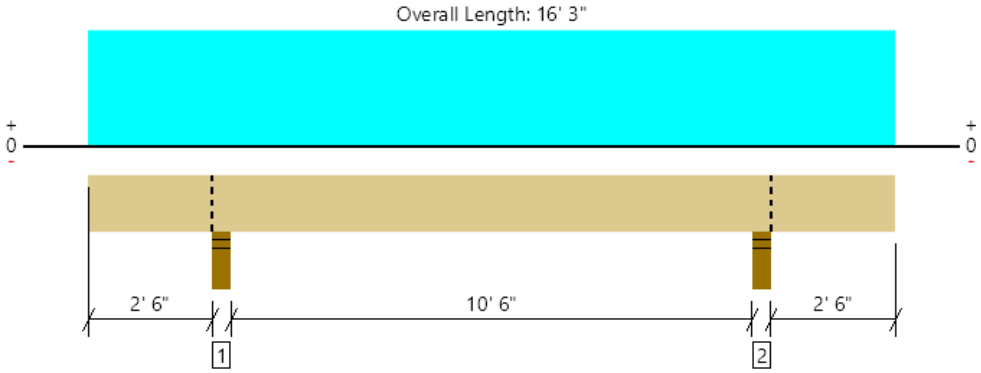
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

Second Floor, 2B11: Grid G - Cont

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4899 @ 2' 8 1/4"	6379 (4.50")	Passed (77%)	--	1.0 D + 1.0 L (Adj Spans)
Shear (lbs)	2638 @ 3' 10 3/8"	8590	Passed (31%)	1.00	1.0 D + 1.0 L (Adj Spans)
Moment (Ft-lbs)	8124 @ 8' 1 1/2"	15953	Passed (51%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.206 @ 8' 1 1/2"	0.272	Passed (L/633)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.256 @ 8' 1 1/2"	0.544	Passed (L/509)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	4.50"	4.50"	3.46"	1178	3721	4899	Blocking
2 - Stud wall - HF	4.50"	4.50"	3.46"	1178	3721	4899	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 3" o/c	
Bottom Edge (Lu)	16' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 16' 3"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 16' 3" (Front)	11'	12.0	40.0	Default Load

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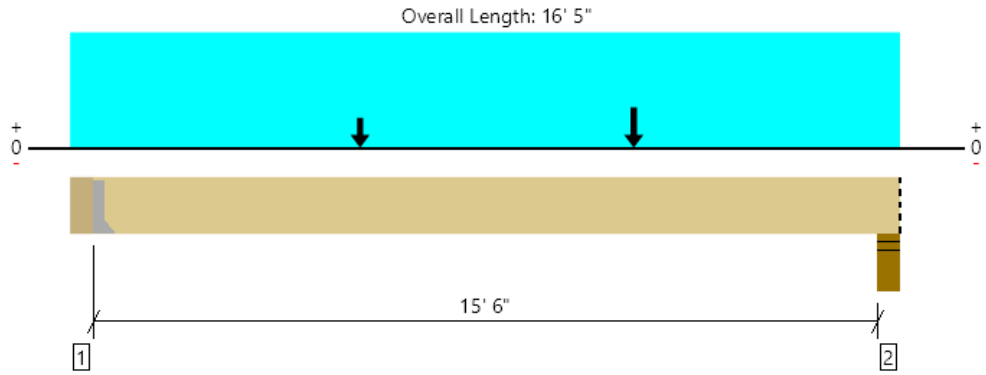
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Second Floor, 2B12: Slider Hdr Grid I

1 piece(s) 5 1/4" x 18" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5461 @ 5 1/2"	5461 (1.66")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	5816 @ 14' 5 1/2"	21011	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	29130 @ 11'	75322	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.144 @ 8' 4 9/16"	0.521	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.259 @ 8' 4 3/8"	0.781	Passed (L/725)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Hanger on 18" HF beam	5.50"	Hanger[1]	1.66"	2584	2906	5491	See note [1]
2 - Stud wall - HF	5.50"	5.50"	2.82"	2764	3236	5999	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' o/c	
Bottom Edge (Lu)	16' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HGUS5.50/14	4.00"	N/A	66-10d	22-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 16' 5"	N/A	29.5	--	
1 - Uniform (PSF)	0 to 16' 5" (Front)	8'	8.0	-	Glazing
2 - Point (lb)	5' 7" (Front)	N/A	1672	2619	Linked from: RB6: Clear Story, Support 1
3 - Point (lb)	11' (Front)	N/A	2154	3523	Linked from: RB7: Clear Story, Support 1

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

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Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

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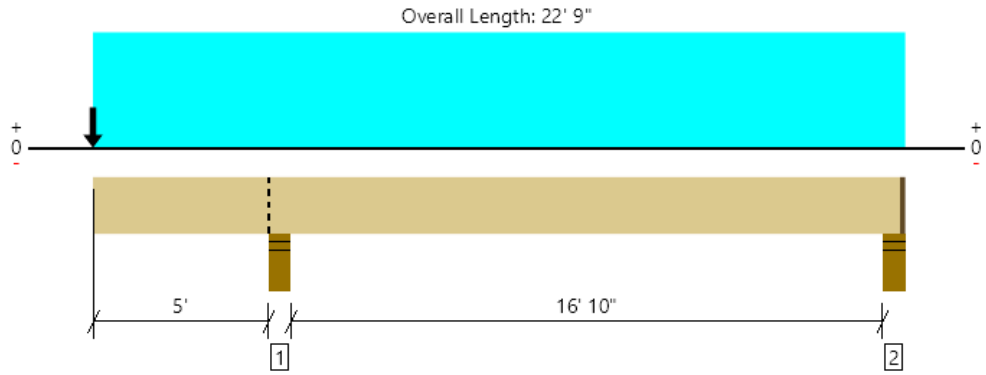
Second Floor, 2b13: Cantilever Beam Grid I

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2124 @ 5' 2 3/4"	7796 (5.50")	Passed (27%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1161 @ 4' 1/8"	8590	Passed (14%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-5595 @ 5' 2 3/4"	15953	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.320 @ 0	0.349	Passed (2L/392)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.451 @ 0	0.523	Passed (2L/278)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	1.50"	809	1315	2124	Blocking
2 - Stud wall - HF	5.50"	4.25"	1.50"	98	357/-198	456/-100	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	22' 8" o/c	
Bottom Edge (Lu)	22' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 22' 7 3/4"	N/A	13.0	--	
1 - Point (lb)	0 (Front)	N/A	340	560	Beams
2 - Uniform (PSF)	0 to 22' 9" (Front)	1'	12.0	40.0	

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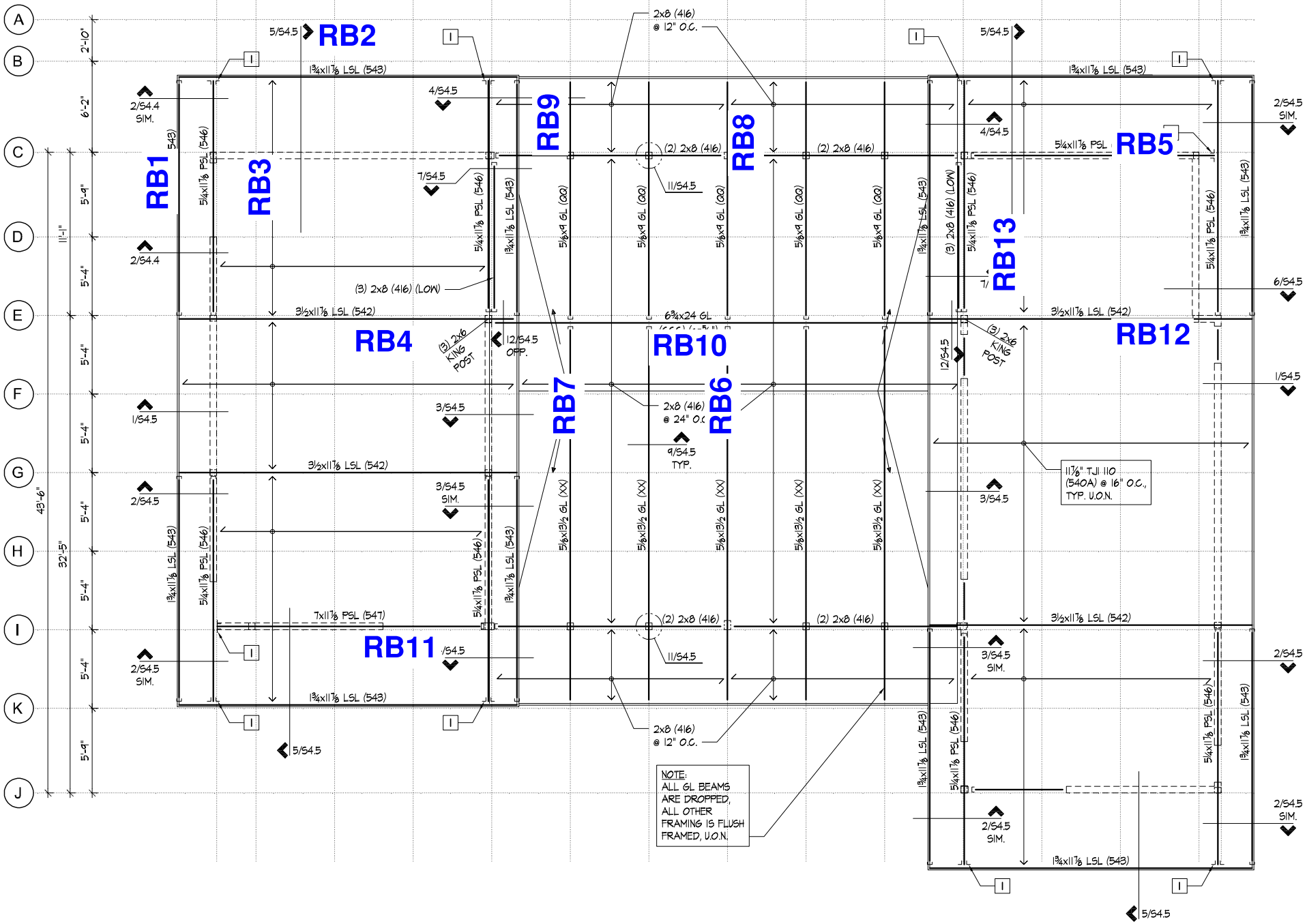
Weyerhaeuser



ROOF FRAMING PLAN

SCALE: 1/4" = 1'-0"

LEGEND:

KEY NOTES

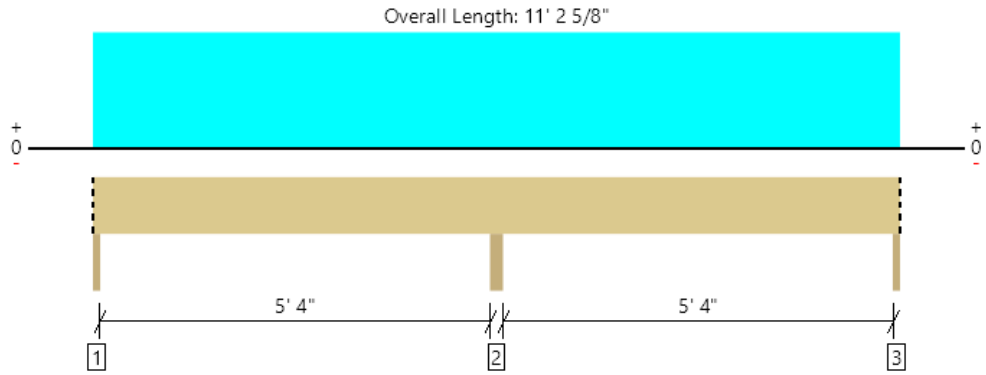
1 INVE

2 INVE

MEM
2x
(2) 2
(3) 2
11⅞" T.
3½x11⅞
5¼x11⅞
7x11⅞

Roof, Clear Story Roof

1 piece(s) 2 x 8 SPF No.1/No.2 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	638 @ 5' 7 5/16"	1992 (3.13")	Passed (32%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	251 @ 6' 4 1/8"	1126	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-354 @ 5' 7 5/16"	1521	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.011 @ 8' 7 7/8"	0.185	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.015 @ 8' 8 7/16"	0.277	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beam - HF	1.75"	1.75"	1.50"	69	139	208	Blocking
2 - Beam - SPF	3.13"	3.13"	1.50"	222	416	638	None
3 - Beam - HF	1.75"	1.75"	1.50"	69	139	208	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 3" o/c	
Bottom Edge (Lu)	11' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 11' 2 5/8"	24"	16.0	30.0	Default Load

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

ForteWEB Software Operator	Job Notes
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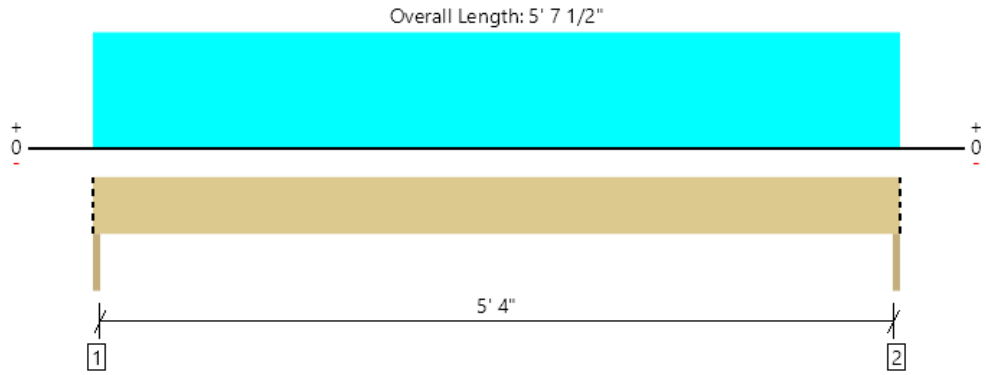
Weyerhaeuser

Roof, Clear Story Roof - Simple

1 piece(s) 2 x 6 SPF No.1/No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	173 @ 3/4"	1063 (1.75")	Passed (16%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	135 @ 7 1/4"	854	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	232 @ 2' 9 3/4"	948	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.028 @ 2' 9 3/4"	0.183	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.043 @ 2' 9 3/4"	0.275	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beam - HF	1.75"	1.75"	1.50"	60	113	173	Blocking
2 - Beam - HF	1.75"	1.75"	1.50"	60	113	173	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 8" o/c	
Bottom Edge (Lu)	5' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 5' 7 1/2"	16"	16.0	30.0	Default Load

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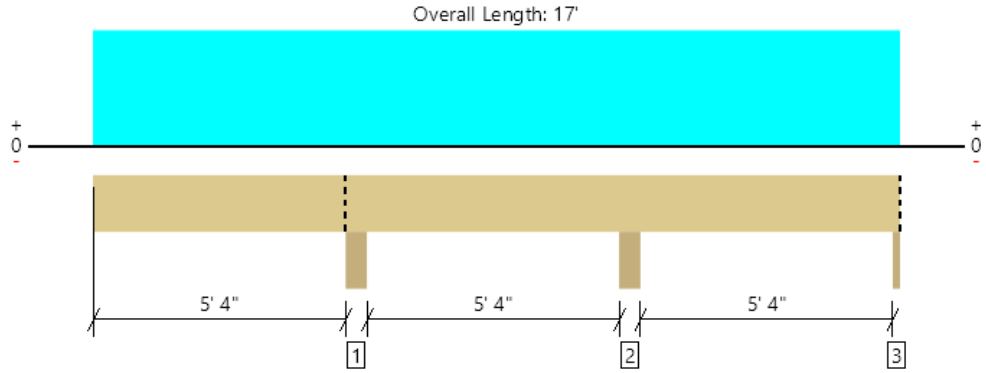
Weyerhaeuser

Roof, Clear Story Roof - Cantilever

1 piece(s) 2 x 8 SPF No.1/No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	686 @ 5' 6 9/16"	3113 (5.13")	Passed (22%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	295 @ 6' 4 3/8"	1126	Passed (26%)	1.15	1.0 D + 1.0 S (Adj Spans)
Moment (Ft-lbs)	-944 @ 5' 6 9/16"	1521	Passed (62%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.265 @ 0	0.370	Passed (2L/502)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.397 @ 0	0.555	Passed (2L/336)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beam - HF	5.13"	5.13"	1.50"	236	450	686	Blocking
2 - Beam - HF	5.13"	5.13"	1.50"	66	204	270	None
3 - Beam - HF	1.75"	1.75"	1.50"	61	121	182	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	Continuous	

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 17'	16"	16.0	30.0	Default Load

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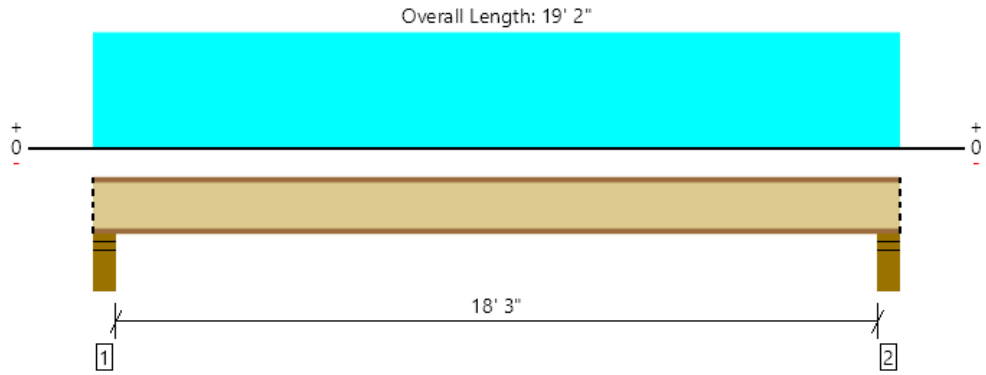
Roof, Typical Roof Joist

1 piece(s) 11 7/8" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	588 @ 4 1/2"	1581 (3.50")	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	560 @ 5 1/2"	1794	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2600 @ 9' 7"	3634	Passed (72%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.418 @ 9' 7"	0.614	Passed (L/528)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.641 @ 9' 7"	0.921	Passed (L/345)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	5.50"	5.50"	1.75"	204	383	588	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	204	383	588	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 6" o/c	
Bottom Edge (Lu)	19' 2" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 19' 2"	16"	16.0	30.0	Default Load

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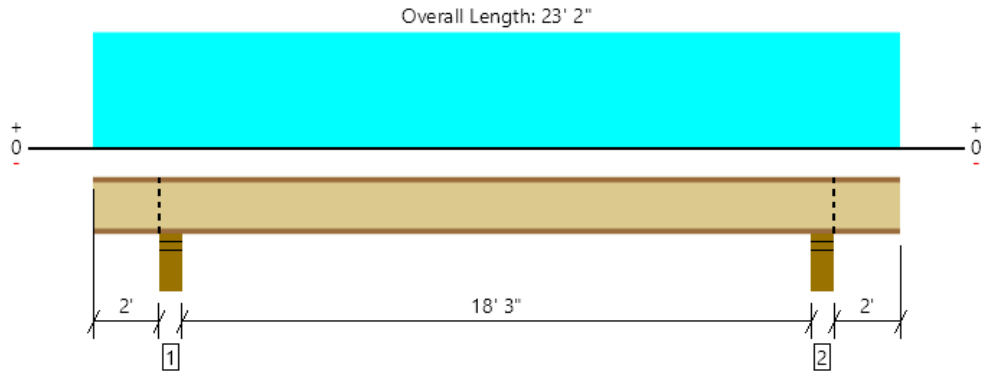
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, Typical Roof Joist - Cantilever Ends

1 piece(s) 11 7/8" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	713 @ 2' 2 3/4"	2703 (5.25")	Passed (26%)	1.15	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	540 @ 2' 5 1/2"	1794	Passed (30%)	1.15	1.0 D + 1.0 S (Adj Spans)
Moment (Ft-lbs)	2581 @ 11' 7"	3634	Passed (71%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.430 @ 11' 7"	0.624	Passed (L/522)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.652 @ 11' 7"	0.935	Passed (L/344)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Upward deflection on left and right cantilevers exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	5.50"	5.50"	3.50"	247	466	713	Blocking
2 - Stud wall - HF	5.50"	5.50"	3.50"	247	466	713	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 6" o/c	
Bottom Edge (Lu)	7' 4" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 23' 2"	16"	16.0	30.0	Default Load

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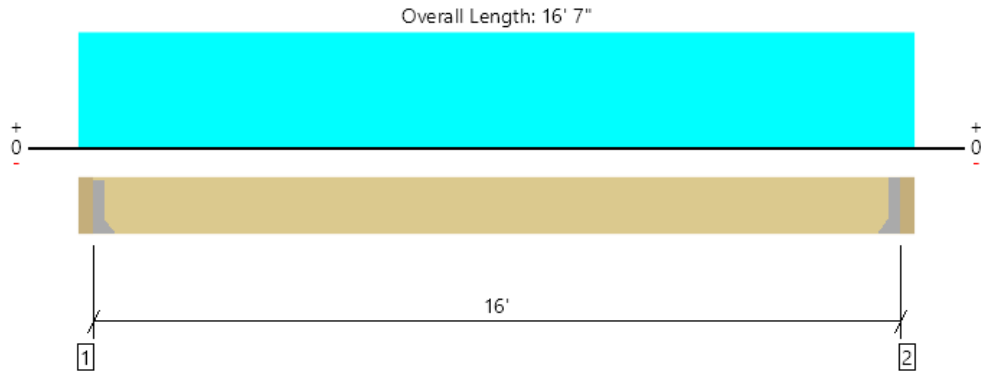
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

Roof, RB1: Sub-Facia

1 piece(s) 1 3/4" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	604 @ 3 1/2"	2363 (1.50")	Passed (26%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	529 @ 1' 3 3/8"	4939	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2416 @ 8' 3 1/2"	9173	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.186 @ 8' 3 1/2"	0.533	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.311 @ 8' 3 1/2"	0.800	Passed (L/617)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	251	373	624	See note [1]
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	251	373	624	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	15' 5" o/c	
Bottom Edge (Lu)	16' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	
2 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 16' 3 1/2"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 16' 7" (Front)	1' 6"	16.0	30.0	Default Load

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

ForteWEB Software Operator	Job Notes
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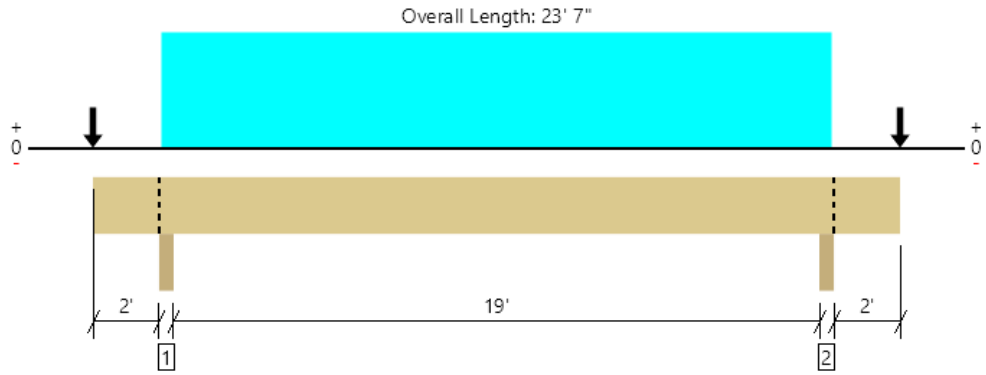
Weyerhaeuser

Roof, RB2: Sub-Facia Cantilever
1 piece(s) 1 3/4" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1398 @ 2' 1 3/4"	5513 (3.50")	Passed (25%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	663 @ 3' 3 3/8"	4939	Passed (13%)	1.15	1.0 D + 1.0 S (Adj Spans)
Moment (Ft-lbs)	2558 @ 11' 9 1/2"	9173	Passed (28%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.300 @ 11' 9 1/2"	0.643	Passed (L/772)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.444 @ 11' 9 1/2"	0.965	Passed (L/521)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beam - LSL	3.50"	3.50"	1.50"	562	836	1398	Blocking
2 - Beam - LSL	3.50"	3.50"	1.50"	562	836	1398	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 6" o/c	
Bottom Edge (Lu)	23' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 23' 7"	N/A	6.5	--	
1 - Uniform (PSF)	2' to 21' 7" (Front)	1' 6"	16.0	30.0	Default Load
2 - Point (lb)	0 (Front)	N/A	250	375	Sub-Fascia
3 - Point (lb)	23' 7" (Front)	N/A	250	375	Sub-Fascia

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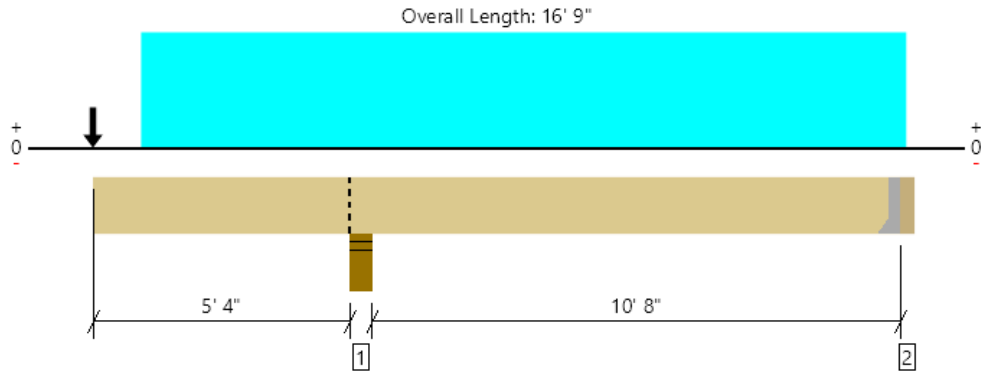
Weyerhaeuser

Roof, RB3: Cantilever Beam
1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7650 @ 5' 6 3/4"	12272 (5.50")	Passed (62%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3328 @ 6' 9 3/8"	13861	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-13105 @ 5' 6 3/4"	34332	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.209 @ 0	0.371	Passed (2L/638)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.320 @ 0	0.556	Passed (2L/418)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	3.43"	2933	4717	7650	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	567	1392	1959	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 6" o/c	
Bottom Edge (Lu)	16' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	U610	2.00"	N/A	14-10d	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 5 1/2"	N/A	19.5	--	
1 - Uniform (PSF)	1' to 16' 7" (Front)	10' 6"	16.0	30.0	Default Load
2 - Point (lb)	0 (Front)	N/A	562	836	Linked from: RB2: Sub-Facia Cantilever, Support 2

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ForteWEB Software Operator	Job Notes
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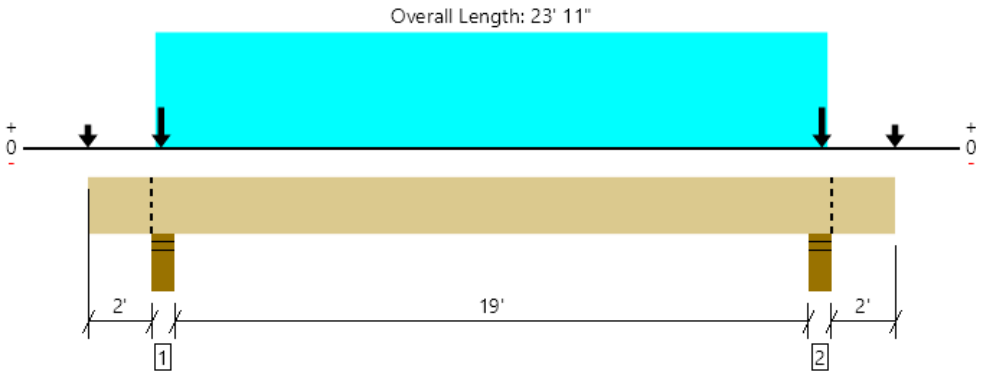
Weyerhaeuser

Roof, RB4: Support Beam

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3677 @ 2' 2 3/4"	8181 (5.50")	Passed (45%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	915 @ 3' 5 3/8"	9878	Passed (9%)	1.15	1.0 D + 1.0 S (Adj Spans)
Moment (Ft-lbs)	3960 @ 11' 11 1/2"	18346	Passed (22%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.221 @ 11' 11 1/2"	0.649	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.356 @ 11' 11 1/2"	0.973	Passed (L/656)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	2.47"	1291	2386	3677	Blocking
2 - Stud wall - SPF	5.50"	5.50"	2.47"	1291	2386	3677	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	23' 11" o/c	
Bottom Edge (Lu)	23' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 23' 11"	N/A	13.0	--	
1 - Uniform (PSF)	2' to 21' 11" (Front)	2'	16.0	30.0	Default Load
2 - Point (lb)	0 (Front)	N/A	250	375	Sub-Fascia
3 - Point (lb)	23' 11" (Front)	N/A	250	375	Sub-Fascia
4 - Point (lb)	2' 2" (Front)	N/A	567	1392	Linked from: RB3: Cantilever Beam, Support 2
5 - Point (lb)	21' 9" (Front)	N/A	567	1392	Linked from: RB3: Cantilever Beam, Support 2

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ForteWEB Software Operator	Job Notes
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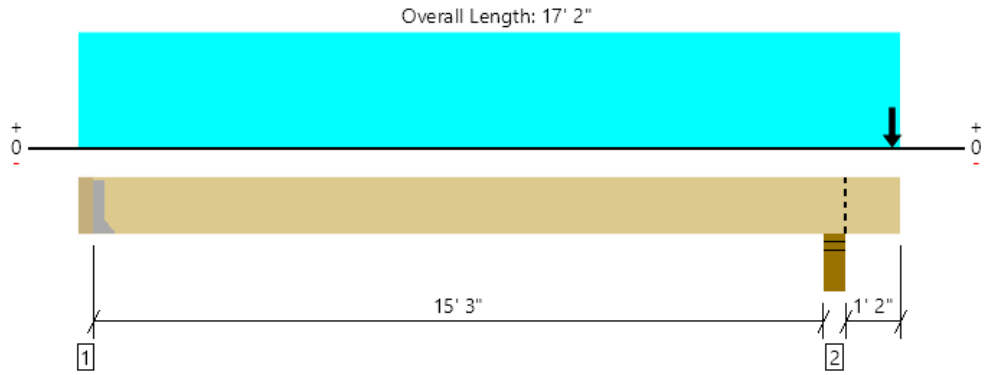
Weyerhaeuser

Roof, RB5: Cantilever Support Beam
1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9283 @ 15' 9 1/4"	18047 (5.50")	Passed (51%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	7670 @ 16' 11 7/8"	13861	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-9512 @ 15' 9 1/4"	34332	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.052 @ 17' 2"	0.200	Passed (2L/646)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.077 @ 17' 2"	0.200	Passed (2L/436)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (0.2").
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	172	293/-129	464	See note [1]
2 - Stud wall - LSL	5.50"	5.50"	2.83"	3639	5643	9283	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 11" o/c	
Bottom Edge (Lu)	16' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	U610	2.00"	N/A	14-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 17' 2"	N/A	19.5	--	
1 - Uniform (PSF)	0 to 17' 2" (Front)	2'	16.0	30.0	Default Load
2 - Point (lb)	17' (Front)	N/A	2933	4717	Linked from: RB3: Cantilever Beam, Support 1

Weyerhaeuser Notes

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

ForteWEB Software Operator	Job Notes
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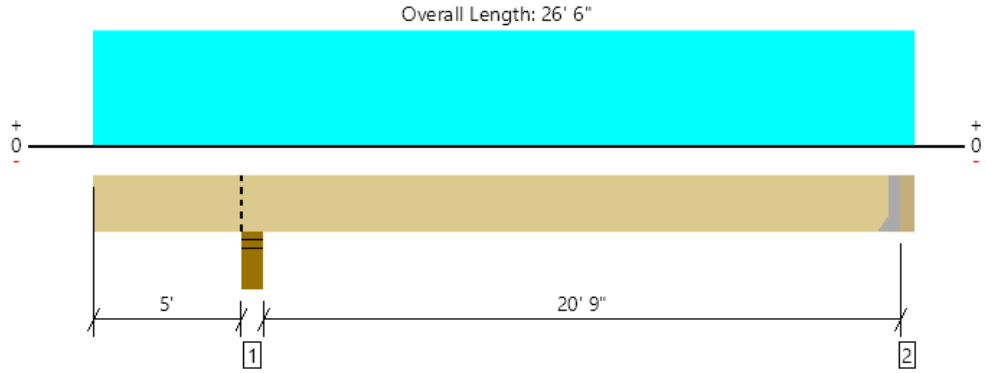
Weyerhaeuser

Roof, RB6: Clear Story

1 piece(s) 5 1/8" x 13 1/2" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2631 @ 26' 2 1/2"	4997 (1.50")	Passed (53%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	2566 @ 6' 7"	14057	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	13204 @ 16' 2 1/16"	35545	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Neg Moment (Ft-lbs)	-3584 @ 5' 2 3/4"	35805	Passed (10%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.341 @ 15' 10"	0.699	Passed (L/738)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.542 @ 15' 10 9/16"	1.049	Passed (L/465)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 0.99 that was calculated using length L = 20' 7/8".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 6' 6 3/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	1.97"	1672	2619	4292	Blocking
2 - Hanger on 13 1/2" GLB beam	3.50"	Hanger[1]	1.50"	1030	1673	2703	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	26' 3" o/c	
Bottom Edge (Lu)	26' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

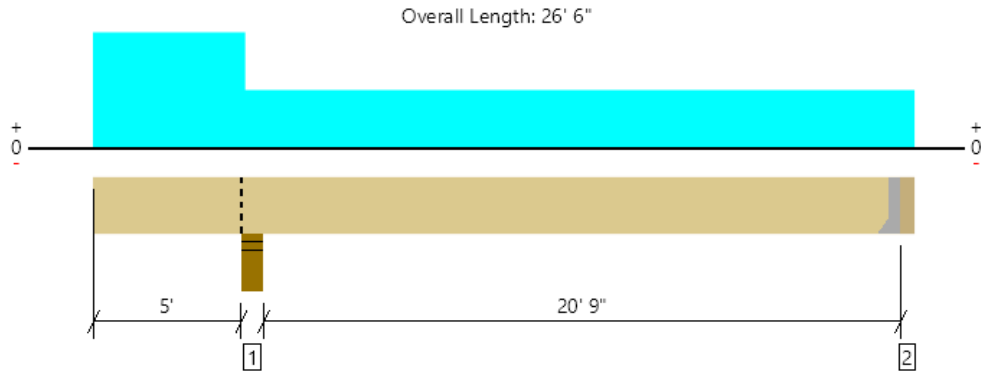
Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HU5.125/12	2.50"	N/A	22-10d	8-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 26' 2 1/2"	N/A	16.8	--	
1 - Uniform (PSF)	0 to 26' 6" (Front)	5' 4"	16.0	30.0	Default Load

Roof, RB7: Clear Story

1 piece(s) 5 1/8" x 13 1/2" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2524 @ 26' 2 1/2"	4997 (1.50")	Passed (51%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	2725 @ 6' 7"	14057	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	12147 @ 16' 7"	35694	Passed (34%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-6932 @ 5' 2 3/4"	35805	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.314 @ 15' 11 9/16"	0.699	Passed (L/802)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.485 @ 16' 11/16"	1.049	Passed (L/519)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 19' 3 1/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 7' 9".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	2.61"	2154	3523	5678	Blocking
2 - Hanger on 13 1/2" GLB beam	3.50"	Hanger[1]	1.50"	974	1621	2595	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	26' 3" o/c	
Bottom Edge (Lu)	26' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HU5.125/12	2.50"	N/A	22-10dx1.5	8-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 26' 2 1/2"	N/A	16.8	--	
1 - Uniform (PSF)	5' to 26' 6" (Front)	5' 4"	16.0	30.0	Default Load
2 - Uniform (PSF)	0 to 5' (Front)	10' 8"	16.0	30.0	Default Load

ForteWEB Software Operator	Job Notes
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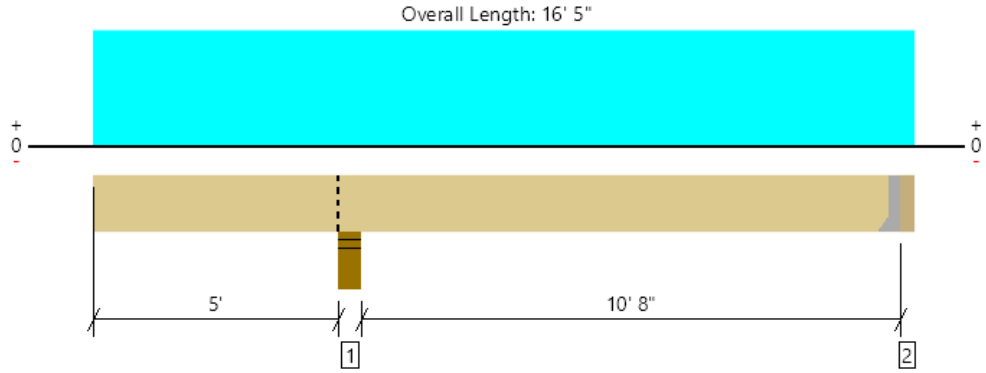
Roof, RB8: Clear Story Short

1 piece(s) 5 1/8" x 9" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3061 @ 5' 2 3/4"	11980 (5.50")	Passed (26%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1468 @ 6' 2 1/2"	9371	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	2696 @ 11' 6 1/2"	15913	Passed (17%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-3507 @ 5' 2 3/4"	15913	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.105 @ 0	0.349	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.126 @ 0	0.523	Passed (2L/996)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 2".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 7' 8 7/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	1152	1909	3061	Blocking
2 - Hanger on 9" GLB beam	3.50"	Hanger[1]	1.50"	430	818	1248	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 2" o/c	
Bottom Edge (Lu)	16' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

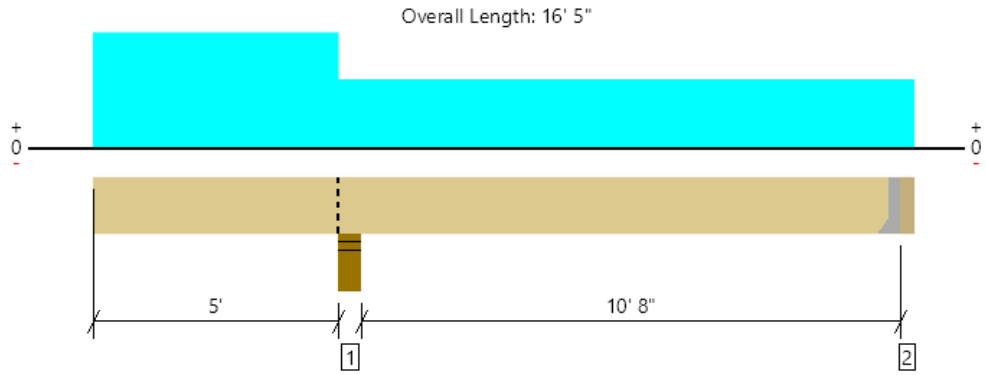
Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HU38-2	2.50"	N/A	14-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 1 1/2"	N/A	11.2	--	
1 - Uniform (PSF)	0 to 16' 5" (Front)	5' 4"	16.0	30.0	Default Load

Roof, RB9: Clear Story Short

1 piece(s) 5 1/8" x 9" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4116 @ 5' 2 3/4"	11980 (5.50")	Passed (34%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1807 @ 4' 3"	9371	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	2083 @ 12' 1 1/8"	15913	Passed (13%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-5809 @ 5' 2 3/4"	15913	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.224 @ 0	0.349	Passed (2L/560)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.309 @ 0	0.523	Passed (2L/406)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 8' 11/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 4 5/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	1.89"	1519	2597	4116	Blocking
2 - Hanger on 9" GLB beam	3.50"	Hanger[1]	1.50"	356	749	1105	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 2" o/c	
Bottom Edge (Lu)	16' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HU38-2	2.50"	N/A	10-10dx1.5	4-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 1 1/2"	N/A	11.2	--	
1 - Uniform (PSF)	5' to 16' 5" (Front)	5' 4"	16.0	30.0	Default Load
2 - Uniform (PSF)	0 to 5' (Front)	9'	16.0	30.0	Default Load

ForteWEB Software Operator	Job Notes
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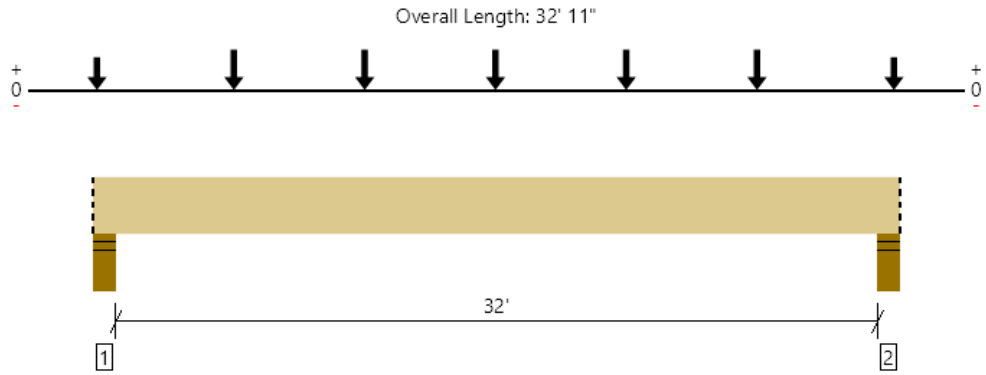
Roof, RB10: Clear Story Transfer
1 piece(s) 6 3/4" x 24" 24F-V8 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	15353 @ 4"	15778 (5.50")	Passed (97%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	11580 @ 2' 5 1/2"	32913	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	112093 @ 16' 5"	129601	Passed (86%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.826 @ 16' 5 7/16"	1.075	Passed (L/468)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.467 @ 16' 5 1/2"	1.612	Passed (L/264)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 0.87 that was calculated using length L = 32' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	5.35"	6451	8903	15353	Blocking
2 - Stud wall - SPF	5.50"	5.50"	5.33"	6427	8869	15297	Blocking

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

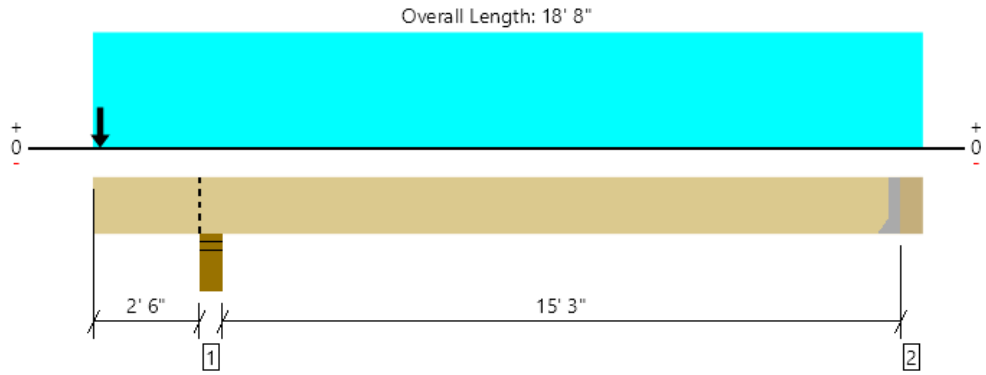
Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	31' 1" o/c	
Bottom Edge (Lu)	32' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 32' 11"	N/A	39.4	--	
1 - Point (lb)	5' 9" (Front)	N/A	1800	2600	GL Beams (Short & Long)
2 - Point (lb)	11' 1" (Front)	N/A	1800	2600	GL Beams (Short & Long)
3 - Point (lb)	16' 5" (Front)	N/A	1800	2600	GL Beams (Short & Long)
4 - Point (lb)	21' 9" (Front)	N/A	1800	2600	GL Beams (Short & Long)
5 - Point (lb)	27' 1" (Front)	N/A	1800	2600	GL Beams (Short & Long)
6 - Point (lb)	2" (Front)	N/A	1291	2386	Linked from: RB4: Support Beam, Support 1
7 - Point (lb)	32' 8" (Front)	N/A	1291	2386	Linked from: RB4: Support Beam, Support 2

Roof, RB11: Grid I

1 piece(s) 7" x 11 7/8" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	10180 @ 2' 8 3/4"	16363 (5.50")	Passed (62%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	7828 @ 1' 6 1/8"	18481	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-20042 @ 2' 8 3/4"	45776	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.168 @ 0	0.200	Passed (2L/388)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.261 @ 0	0.273	Passed (2L/252)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -572 lbs uplift at support located at 18' 2 1/2". Strapping or other restraint may be required.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	3.42"	4039	6140	10180	Blocking
2 - Hanger on 11 7/8" LSL beam	5.50"	Hanger[1]	1.50"	-36	94/-536	58/-572	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	18' 3" o/c	
Bottom Edge (Lu)	18' 3" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HU410-2	2.50"	N/A	14-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 2 1/2"	N/A	26.0	--	
1 - Uniform (PSF)	0 to 18' 8" (Front)	2'	16.0	30.0	Default Load
2 - Point (lb)	2" (Front)	N/A	2933	4717	Linked from: RB3: Cantilever Beam, Support 1

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

ForteWEB Software Operator	Job Notes
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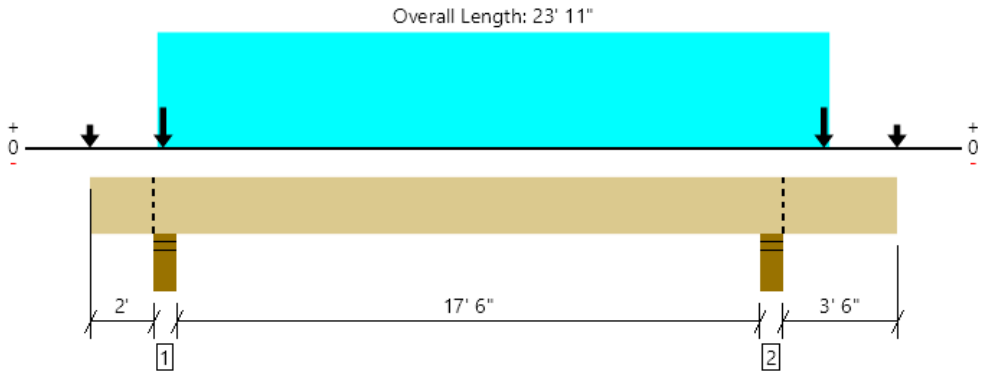
Weyerhaeuser

Roof, RB12 Grid E

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3991 @ 20' 2 1/4"	8181 (5.50")	Passed (49%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	2664 @ 21' 4 7/8"	9878	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-5620 @ 20' 2 1/4"	18346	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.187 @ 23' 11"	0.249	Passed (2L/478)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.232 @ 23' 11"	0.373	Passed (2L/386)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	2.32"	1181	2264	3445	Blocking
2 - Stud wall - SPF	5.50"	5.50"	2.68"	1401	2590	3991	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	23' 11" o/c	
Bottom Edge (Lu)	23' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 23' 11"	N/A	13.0	--	
1 - Uniform (PSF)	2' to 21' 11" (Front)	2'	16.0	30.0	Default Load
2 - Point (lb)	0 (Front)	N/A	250	375	Sub-Fascia
3 - Point (lb)	23' 11" (Front)	N/A	250	375	Sub-Fascia
4 - Point (lb)	2' 2" (Front)	N/A	567	1392	Linked from: RB3: Cantilever Beam, Support 2
5 - Point (lb)	21' 9" (Front)	N/A	567	1392	Linked from: RB3: Cantilever Beam, Support 2

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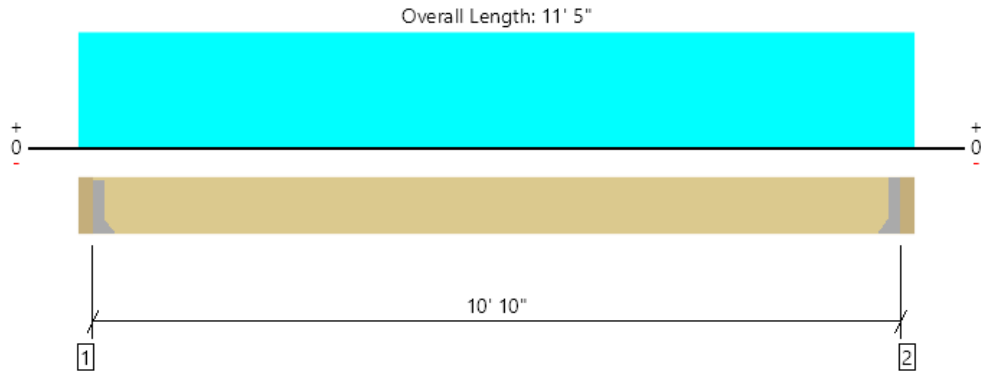
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

Roof, RB13: Grid 11 Low

3 piece(s) 2 x 8 SPF No.1/No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	839 @ 3 1/2"	2869 (1.50")	Passed (29%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	746 @ 10 3/4"	3377	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2273 @ 5' 8 1/2"	3967	Passed (57%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.124 @ 5' 8 1/2"	0.361	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.240 @ 5' 8 1/2"	0.542	Passed (L/542)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Hanger on 7 1/4" LSL beam	3.50"	Hanger[1]	1.50"	425	457	882	See note [1]
2 - Hanger on 7 1/4" LSL beam	3.50"	Hanger[1]	1.50"	425	457	882	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 10" o/c	
Bottom Edge (Lu)	10' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS28-3	2.00"	N/A	6-10dx1.5	4-10d	
2 - Face Mount Hanger	LUS28-3	2.00"	N/A	6-10dx1.5	4-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 11' 1 1/2"	N/A	8.3	--	
1 - Uniform (PSF)	0 to 11' 5" (Front)	2' 8"	16.0	30.0	Default Load
2 - Uniform (PSF)	0 to 11' 5" (Front)	2'	12.0	-	Wall Load

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

ForteWEB Software Operator	Job Notes
Travis Michaud QCE (206) 957-3917 tmichaud@quantumce.com	

Weyerhaeuser

Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Grid 8 Column

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	18 ft		
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: DF		
Wood Grade	2.0 L1, >= 4 Laminations		
Fb +	2,400.0 psi	Fv	230.0 psi
Fb -	2,200.0 psi	Ft	1,650.0 psi
Fc - Prll	2,400.0 psi	Density	pcf
Fc - Perp	650.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	2,000.0	2,000.0	2,000.0 ksi
Minimum	1,060.0	1,060.0	

Wood Section Name	**5.125x7.5**		
Wood Grading/Manuf.	Western		
Wood Member Type	GLB		
Exact Width	**5.125** in	Allow Stress Modification Factors	
Exact Depth	**7.50** in	Cf or Cv for Bending	1.0
Area	38.438 in^2	Cf or Cv for Compression	1.0
Ix	180.176 in^4	Cf or Cv for Tension	1.0
Iy	84.132 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 9 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 18 ft, K = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Roof Beam: Axial Load at 18.0 ft, D = 1.620, S = 3.240 k
Transfer Beam: Axial Load at 9.50 ft, Xecc = 2.563 in, D = 2.0, S = 3.240 k
BENDING LOADS . . .
Lat. Point Load at 9.0 ft creating Mx-x, W = 4.30 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9376** : 1
Load Combination +D+0.60W
Governing NDS Forumla np + Mxx + Myy, NDS Eq. 3.9-
Location of max.above base 9.060 ft
At maximum location values are . . .
Applied Axial 3.620 k
Applied Mx 11.532 k-ft
Applied My -0.2150 k-ft
Fc : Allowable 1,014.10 psi

PASS Maximum Shear Stress Ratio = **0.1368** : 1
Load Combination +D+0.60W
Location of max.above base 8.940 ft
Applied Design Shear 50.341 psi
Allowable Shear 368.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	2.150 k	Bottom along Y-Y	2.150 k
Top along X-X	0.06216 k	Bottom along X-X	0.06216 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 1.063 in at 9.060 ft above base
for load combination : +0.420W
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.450	0.09698	PASS	0.0 ft	0.004473	PASS	18.0 ft
+D+S	1.150	0.360	0.2642	PASS	0.0 ft	0.009172	PASS	18.0 ft
+D+0.750S	1.150	0.360	0.2218	PASS	0.0 ft	0.007754	PASS	18.0 ft
+D+0.60W	1.600	0.264	0.9376	PASS	9.060 ft	0.1368	PASS	8.940 ft
+D+0.450W	1.600	0.264	0.7107	PASS	9.060 ft	0.1026	PASS	8.940 ft
+D+0.750S+0.450W	1.600	0.264	0.8829	PASS	9.060 ft	0.1026	PASS	8.940 ft
+0.60D+0.60W	1.600	0.264	0.8887	PASS	9.060 ft	0.1368	PASS	8.940 ft
+0.60D	1.600	0.264	0.05572	PASS	0.0 ft	0.001510	PASS	18.0 ft

Wood Column

DESCRIPTION: Grid 8 Column

Maximum Reactions

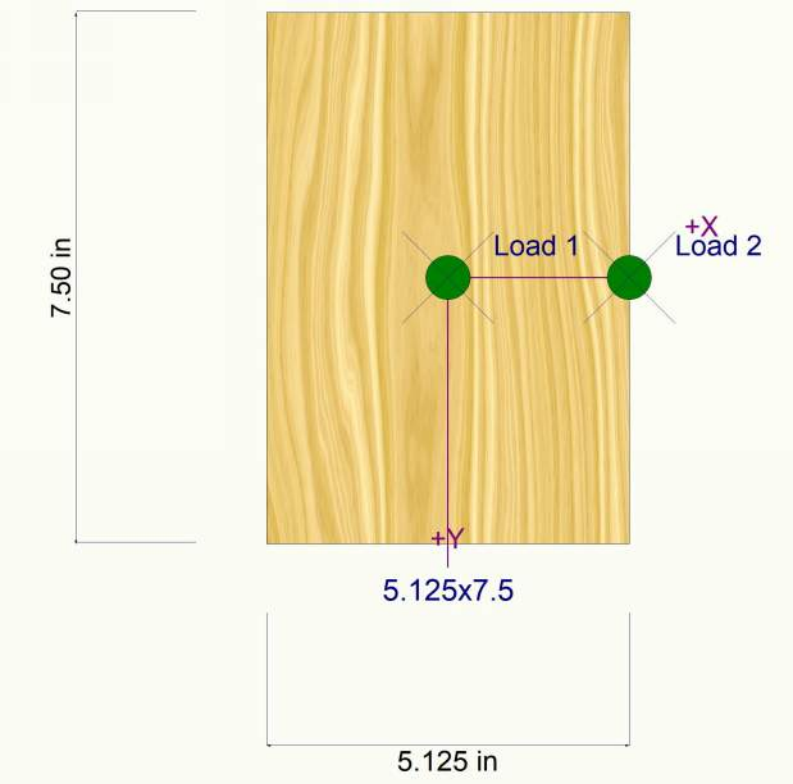
Note: Only non-zero reactions are listed.

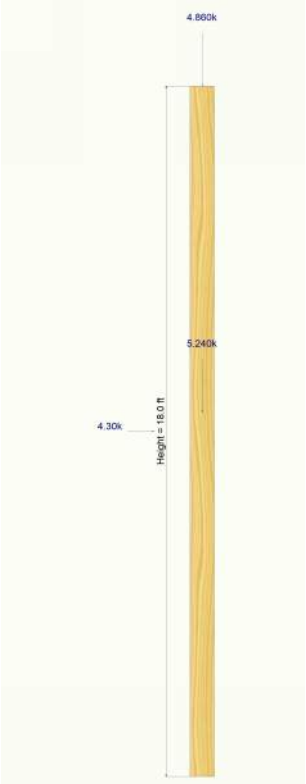
Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only	-0.024	0.024			3.620				
+D+S	-0.062	0.062			10.100				
+D+0.750S	-0.053	0.053			8.480				
+D+0.60W	-0.024	0.024	1.290	1.290	3.620				
+D+0.450W	-0.024	0.024	0.968	0.968	3.620				
+D+0.750S+0.450W	-0.053	0.053	0.968	0.968	8.480				
+0.60D+0.60W	-0.014	0.014	1.290	1.290	2.172				
+0.60D	-0.014	0.014			2.172				
S Only	-0.038	0.038			6.480				
W Only			2.150	2.150					

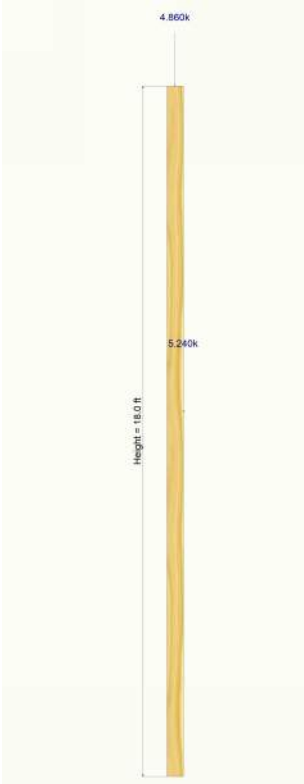
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+0.420W	0.0000 in	0.000 ft	1.0628 in	9.060 ft

Sketches







Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Grid 7 Column 18'

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 17.833 ft
(Used for non-slender calculations)

Wood Species : GluLam Column, Species: DF
Wood Grade : 2.0 L1, >= 4 Laminations

Fb +	2400 psi	Fv	230 psi
Fb -	2200 psi	Ft	1650 psi
Fc - Prll	2400 psi	Density	0 pcf
Fc - Perp	650 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	2000	2000	2000 ksi
Minimum	1060	1060	

Wood Section Name : **5.125x6**
Wood Grading/Manuf. : Western
Wood Member Type : GLB

Exact Width	**5.125**	in
Exact Depth	**6.0**	in
Area	30.750	in^2
Ix	92.250	in^4
Iy	67.306	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 9.5 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 17.833 ft, K =

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Roof Beam: Axial Load at 17.833 ft, D = 2.0, S = 3.50 k
BENDING LOADS . . .
Wind: Lat. Uniform Load creating Mx-x, W = 0.160 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4804** : 1
Load Combination +D+0.60W
Governing NDS Forumla 1Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 8.857 ft
At maximum location values are . . .
Applied Axial 2.0 k
Applied Mx 3.816 k-ft
Applied My 0.0 k-ft
Fc : Allowable 670.77 psi

PASS Maximum Shear Stress Ratio = **0.1135** : 1
Load Combination +D+0.60W
Location of max.above base 0.0 ft
Applied Design Shear 41.755 psi
Allowable Shear 368.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	1.427 k	Bottom along Y-Y	1.427 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.8378 in at 8.976 ft above base
for load combination : +0.420W
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.304	0.09910	PASS	0.0 ft	0.0	PASS	17.833 ft
+D+S	1.150	0.241	0.2694	PASS	0.0 ft	0.0	PASS	17.833 ft
+D+0.750S	1.150	0.241	0.2265	PASS	0.0 ft	0.0	PASS	17.833 ft
+D+0.60W	1.600	0.175	0.4804	PASS	8.857 ft	0.1135	PASS	0.0 ft
+D+0.450W	1.600	0.175	0.3626	PASS	8.976 ft	0.08510	PASS	0.0 ft
+D+0.750S+0.450W	1.600	0.175	0.4599	PASS	8.976 ft	0.08510	PASS	0.0 ft
+0.60D+0.60W	1.600	0.175	0.4554	PASS	8.857 ft	0.1135	PASS	0.0 ft
+0.60D	1.600	0.175	0.05818	PASS	0.0 ft	0.0	PASS	17.833 ft

Wood Column

DESCRIPTION: Grid 7 Column 18'

Maximum Reactions

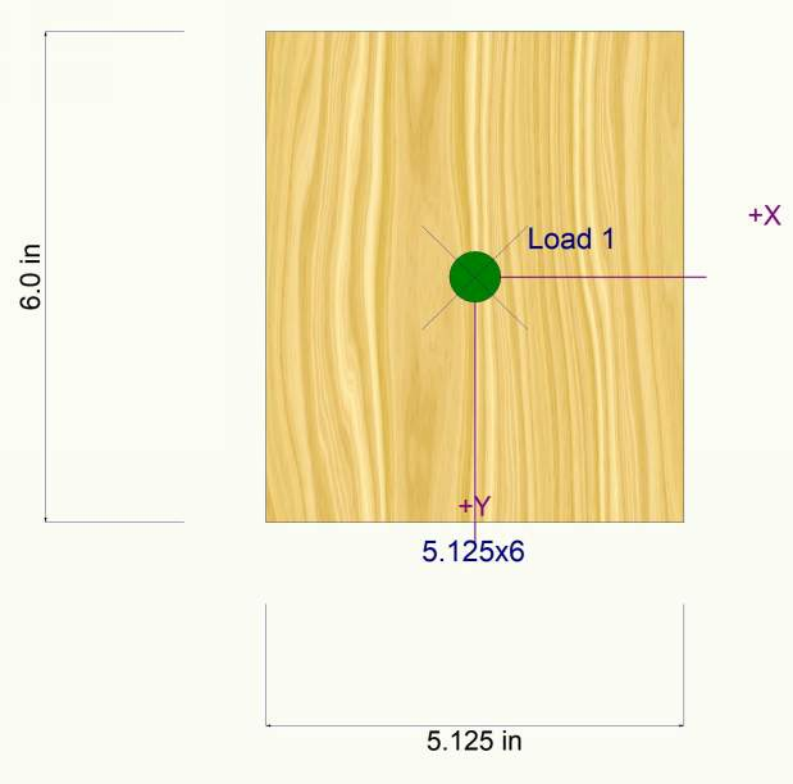
Note: Only non-zero reactions are listed.

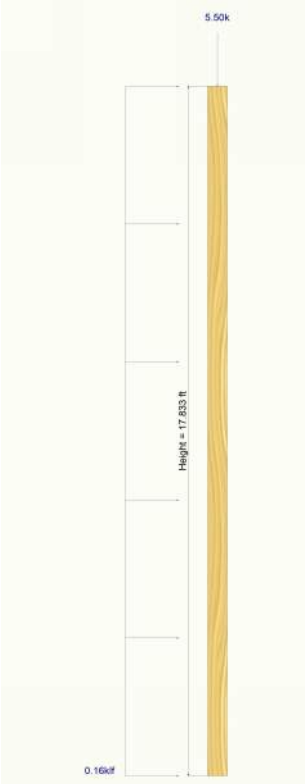
Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					2.000				
+D+S					5.500				
+D+0.750S					4.625				
+D+0.60W			0.856	0.856	2.000				
+D+0.450W			0.642	0.642	2.000				
+D+0.750S+0.450W			0.642	0.642	4.625				
+0.60D+0.60W			0.856	0.856	1.200				
+0.60D					1.200				
S Only					3.500				
W Only			1.427	1.427					

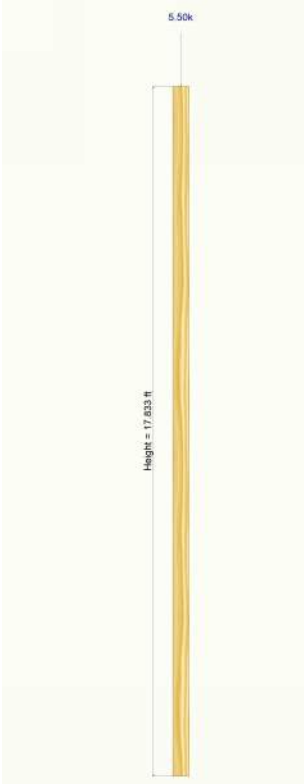
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+0.420W	0.0000 in	0.000 ft	0.8378 in	8.976 ft

Sketches







Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Grid 7 Column 9'

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design	Wood Section Name	**3.125x6**
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Western
Overall Column Height	9 ft	Wood Member Type	GLB
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: DF	Exact Width	**3.125** in
Wood Grade	2.0 L1, >= 4 Laminations	Exact Depth	**6.0** in
Fb +	2400 psi	Fv	230 psi
Fb -	2200 psi	Ft	1650 psi
Fc - Prll	2400 psi	Density	0 pcf
Fc - Perp	650 psi		

Area	18.750 in^2	Cf or Cv for Bending	1.0
Ix	56.250 in^4	Cf or Cv for Compression	1.0
Iy	15.259 in^4	Cf or Cv for Tension	1.0
		Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	2000	2000	2000 ksi
Minimum	1060	1060	

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 9 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 9 ft, K = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Roof Beam: Axial Load at 9.0 ft, D = 2.0, S = 3.50 k
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.160 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4159** : 1

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	9.0 ft
At maximum location values are . . .	
Applied Axial	5.50 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	705.30 psi

PASS Maximum Shear Stress Ratio = **0.09391** : 1

Load Combination	+D+0.60W
Location of max.above base	9.0 ft
Applied Design Shear	34.560 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.720 k	Bottom along Y-Y	0.720 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.08913 in at 4.530 ft above base
for load combination : +0.420W
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.322	0.1532	PASS	9.0 ft	0.0	PASS	9.0 ft
+D+S	1.150	0.256	0.4159	PASS	9.0 ft	0.0	PASS	9.0 ft
+D+0.750S	1.150	0.256	0.3497	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.60W	1.600	0.186	0.2109	PASS	4.470 ft	0.09391	PASS	9.0 ft
+D+0.450W	1.600	0.186	0.1638	PASS	4.470 ft	0.07044	PASS	9.0 ft
+D+0.750S+0.450W	1.600	0.186	0.3478	PASS	4.470 ft	0.07044	PASS	9.0 ft
+0.60D+0.60W	1.600	0.186	0.1935	PASS	4.470 ft	0.09391	PASS	9.0 ft
+0.60D	1.600	0.186	0.08973	PASS	9.0 ft	0.0	PASS	9.0 ft

Wood Column

DESCRIPTION: Grid 7 Column 9'

Maximum Reactions

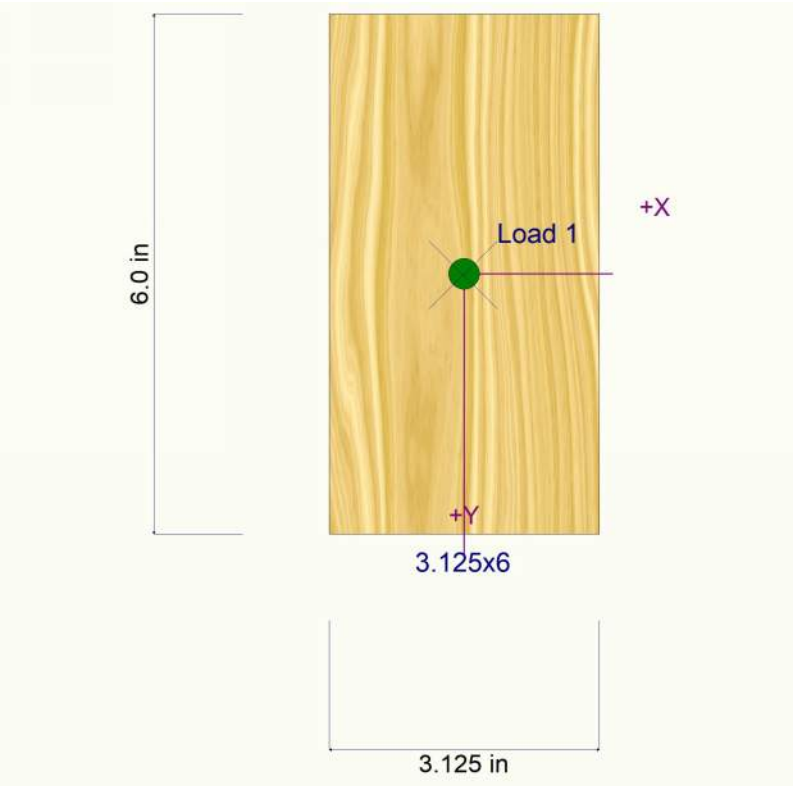
Note: Only non-zero reactions are listed.

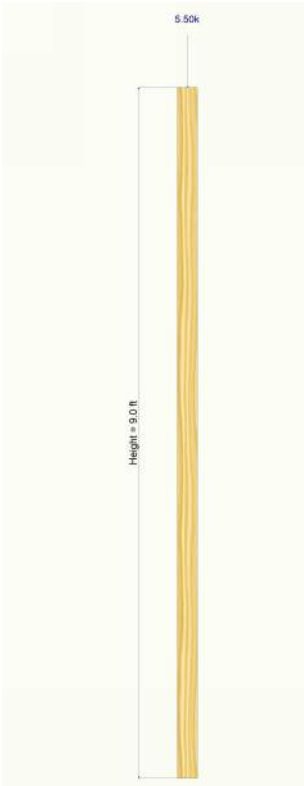
Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					2.000				
+D+S					5.500				
+D+0.750S					4.625				
+D+0.60W			0.432	0.432	2.000				
+D+0.450W			0.324	0.324	2.000				
+D+0.750S+0.450W			0.324	0.324	4.625				
+0.60D+0.60W			0.432	0.432	1.200				
+0.60D					1.200				
S Only					3.500				
W Only			0.720	0.720					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+0.420W	0.0000	in	0.000	ft	0.0891	in	4.530	ft

Sketches





Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Grid 7 Column 10' (Shorter Roof Beams)

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	18 ft		
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: DF		
Wood Grade	2.0 L1, >= 4 Laminations		
Fb +	2400 psi	Fv	230 psi
Fb -	2200 psi	Ft	1650 psi
Fc - Prll	2400 psi	Density	0 pcf
Fc - Perp	650 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	2000	2000	2000 ksi
Minimum	1060	1060	

Wood Section Name	**3.125x7.5**		
Wood Grading/Manuf.	Western		
Wood Member Type	GLB		
Exact Width	**3.125** in	Allow Stress Modification Factors	
Exact Depth	**7.50** in	Cf or Cv for Bending	1.0
Area	23.438 in^2	Cf or Cv for Compression	1.0
Ix	109.863 in^4	Cf or Cv for Tension	1.0
Iy	19.073 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 18 ft, K = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Roof Beam: Axial Load at 18.0 ft, D = 1.20, S = 1.90 k
BENDING LOADS . . .
Wind: Lat. Uniform Load creating Mx-x, W = 0.160 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4781** : 1

Load Combination	+D+0.60W
Governing NDS Forumla	1Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	9.060 ft
At maximum location values are . . .	
Applied Axial	1.20 k
Applied Mx	3.888 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,014.10 psi

PASS Maximum Shear Stress Ratio = **0.1503** : 1

Load Combination	+D+0.60W
Location of max.above base	18.0 ft
Applied Design Shear	55.296 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	1.440 k	Bottom along Y-Y	1.440 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.7302 in	at	9.060 ft	above base	
for load combination :	+0.420W				
Along X-X	0.0 in	at	0.0 ft	above base	
for load combination :	n/a				

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.450	0.05272	PASS	0.0 ft	0.0	PASS	18.0 ft
+D+S	1.150	0.360	0.1330	PASS	0.0 ft	0.0	PASS	18.0 ft
+D+0.750S	1.150	0.360	0.1126	PASS	0.0 ft	0.0	PASS	18.0 ft
+D+0.60W	1.600	0.264	0.4781	PASS	9.060 ft	0.1503	PASS	18.0 ft
+D+0.450W	1.600	0.264	0.3592	PASS	8.940 ft	0.1127	PASS	18.0 ft
+D+0.750S+0.450W	1.600	0.264	0.3920	PASS	8.940 ft	0.1127	PASS	18.0 ft
+0.60D+0.60W	1.600	0.264	0.4669	PASS	9.060 ft	0.1503	PASS	18.0 ft
+0.60D	1.600	0.264	0.03029	PASS	0.0 ft	0.0	PASS	18.0 ft

Wood Column

DESCRIPTION: Grid 7 Column 10' (Shorter Roof Beams)

Maximum Reactions

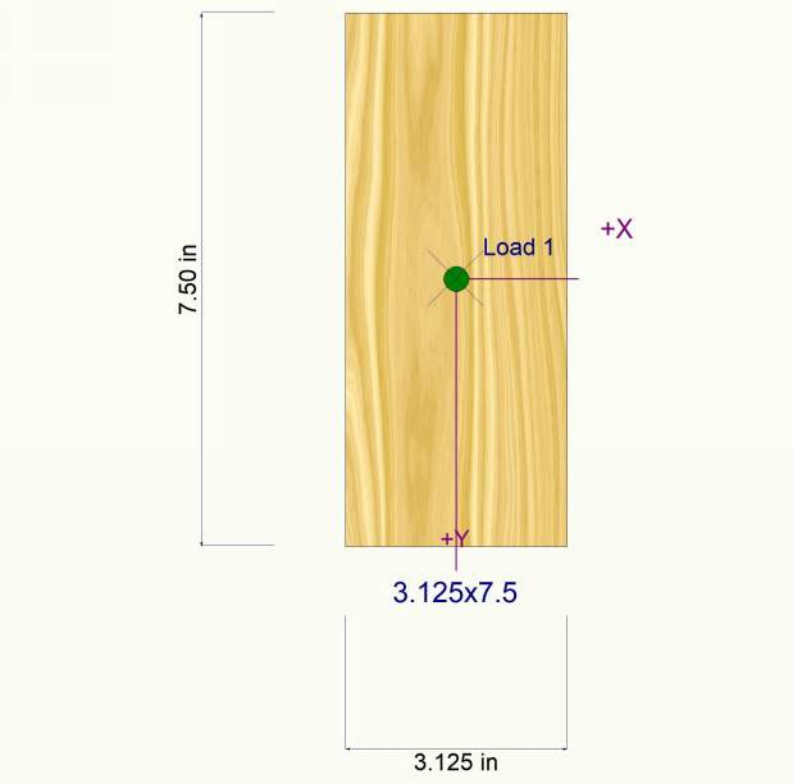
Note: Only non-zero reactions are listed.

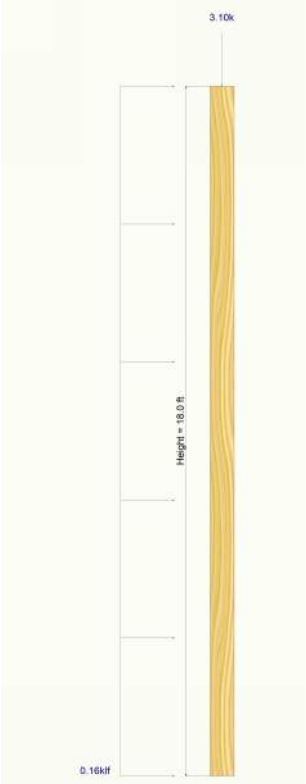
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						1.200					
+D+S						3.100					
+D+0.750S						2.625					
+D+0.60W				0.864	0.864	1.200					
+D+0.450W				0.648	0.648	1.200					
+D+0.750S+0.450W				0.648	0.648	2.625					
+0.60D+0.60W				0.864	0.864	0.720					
+0.60D						0.720					
S Only						1.900					
W Only				1.440	1.440						

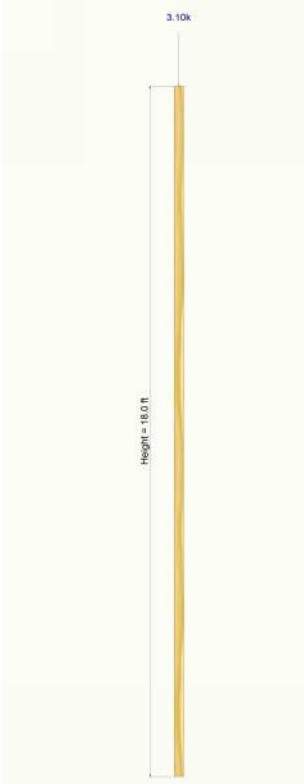
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+0.420W	0.0000	in	0.000	ft	0.7302	in	9.060	ft

Sketches







Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Grid 7 Column 18' (Shorter Roof Beams)

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 18 ft
(Used for non-slender calculations)

Wood Species : Spruce - Pine - Fir
Wood Grade : No. 1/No. 2

Fb +	875 psi	Fv	135 psi
Fb -	875 psi	Ft	450 psi
Fc - Prll	1150 psi	Density	26.22 pcf
Fc - Perp	425 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1400	1400	1400 ksi
Minimum	510	510	

Wood Section Name : **5.125x5.5**
Wood Grading/Manuf. : Western
Wood Member Type : GLB

Exact Width	**5.125**	in
Exact Depth	**5.5**	in
Area	28.188	in^2
Ix	71.056	in^4
Iy	61.697	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 18 ft, K = 1.0

Applied Loads

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

Column self weight included : 92.386 lbs * Dead Load Factor
AXIAL LOADS . . .
Roof Beam: Axial Load at 18.0 ft, D = 1.20, S = 1.90 k
BENDING LOADS . . .
Wind: Lat. Uniform Load creating Mx-x, W = 0.160 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

FAIL Max. Axial+Bending Stress Ratio = **1.629** : 1
Load Combination : +D+0.750S+0.450W
Governing NDS Forumla : 1Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base : 8.940 ft
At maximum location values are . . .
Applied Axial : 2.717 k
Applied Mx : 2.916 k-ft
Applied My : 0.0 k-ft
Fc : Allowable : 267.265 psi

PASS Maximum Shear Stress Ratio = **0.2129** : 1
Load Combination : +D+0.60W
Location of max.above base : 0.0 ft
Applied Design Shear : 45.978 psi
Allowable Shear : 216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	1.440 k	Bottom along Y-Y	1.440 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y : 1.613 in at 9.060 ft above base
for load combination : +0.420W
Along X-X : 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.254	0.1744	PASS	0.0 ft	0.0	PASS	18.0 ft
+D+S	1.150	0.200	0.4271	PASS	0.0 ft	0.0	PASS	18.0 ft
+D+0.750S	1.150	0.200	0.3636	PASS	0.0 ft	0.0	PASS	18.0 ft
+D+0.60W	1.600	0.145	1.581	FAIL !	8.940 ft	0.2129	PASS	0.0 ft
+D+0.450W	1.600	0.145	1.193	FAIL !	8.940 ft	0.1596	PASS	18.0 ft
+D+0.750S+0.450W	1.600	0.145	1.629	FAIL !	8.940 ft	0.1596	PASS	18.0 ft
+0.60D+0.60W	1.600	0.145	1.446	FAIL !	8.940 ft	0.2129	PASS	0.0 ft
+0.60D	1.600	0.145	0.1029	PASS	0.0 ft	0.0	PASS	18.0 ft

Wood Column

DESCRIPTION: Grid 7 Column 18' (Shorter Roof Beams)

Maximum Reactions

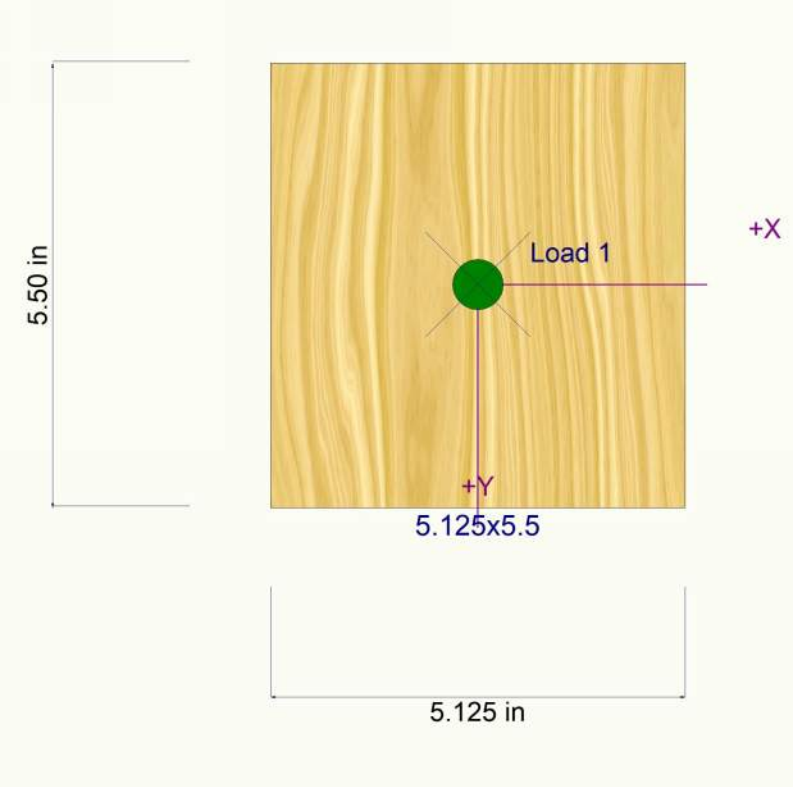
Note: Only non-zero reactions are listed.

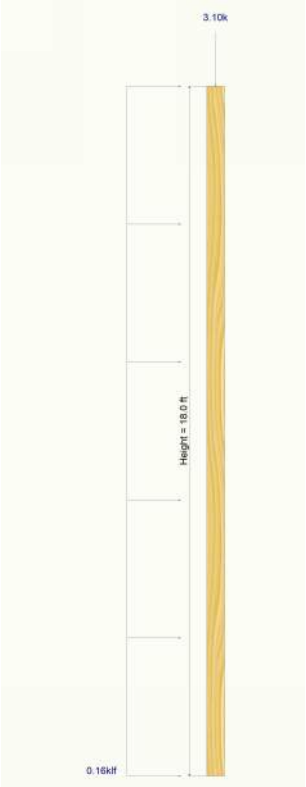
Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					1.292				
+D+S					3.192				
+D+0.750S					2.717				
+D+0.60W			0.864	0.864	1.292				
+D+0.450W			0.648	0.648	1.292				
+D+0.750S+0.450W			0.648	0.648	2.717				
+0.60D+0.60W			0.864	0.864	0.775				
+0.60D					0.775				
S Only					1.900				
W Only			1.440	1.440					

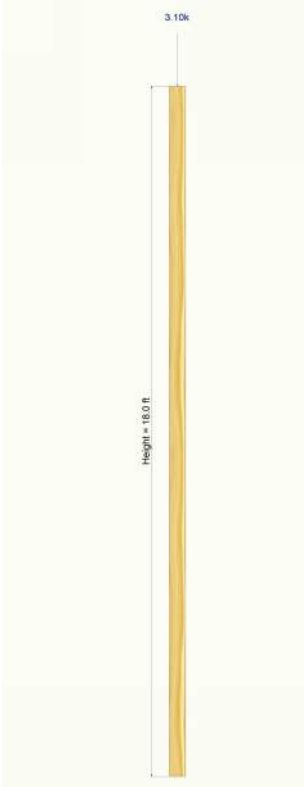
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+0.420W	0.0000	in	0.000	ft	1.6128	in	9.060	ft

Sketches







Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: 2B10 Post

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 8 ft
(Used for non-slender calculations)
Wood Species : Spruce - Pine - Fir
Wood Grade : No. 1/No. 2

Fb +	875 psi	Fv	135 psi
Fb -	875 psi	Ft	450 psi
Fc - Prll	1150 psi	Density	26.22 pcf
Fc - Perp	425 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1400	1400	1400 ksi
Minimum	510	510	

Wood Section Name : **5-2x6**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**7.50**	in
Exact Depth	**5.50**	in
Area	41.250	in^2
Ix	103.984	in^4
Iy	193.359	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compression	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 8 ft, K = 1.0

Applied Loads

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

Column self weight included : 60.088 lbs * Dead Load Factor
AXIAL LOADS . . .
RB10: Axial Load at 8.0 ft, D = 6.50, S = 8.90 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3837** : 1

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	15.460 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	976.78 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+0.60D
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.752	0.1857	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+S	1.150	0.671	0.3837	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750S	1.150	0.671	0.3285	PASS	0.0 ft	0.0	PASS	8.0 ft
+0.60D	1.600	0.547	0.08612	PASS	0.0 ft	0.0	PASS	8.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					6.560				
+D+S					15.460				
+D+0.750S					13.235				

Wood Column

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

DESCRIPTION: 2B10 Post

Maximum Reactions

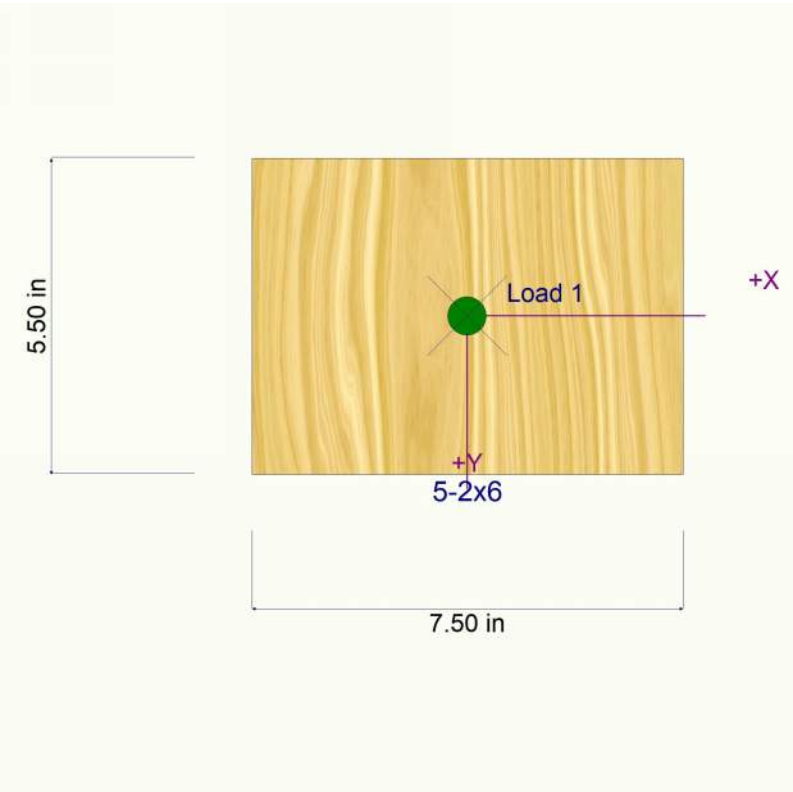
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+0.60D						3.936					
S Only						8.900					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+S	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.750S	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+0.60D	0.0000	in	0.000	ft	0.0000	in	0.000	ft
S Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft

Sketches



Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: 2B8 Post At Grid I

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	8 ft		
(Used for non-slender calculations)			
Wood Species	Spruce - Pine - Fir		
Wood Grade	No. 1/No. 2		
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Wood Section Name	**3.125x5.5**		
Wood Grading/Manuf.	Southern Pine		
Wood Member Type	GLB		
Exact Width	**3.125** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.0
Area	17.188 in^2	Cf or Cv for Compression	1.0
Ix	43.327 in^4	Cf or Cv for Tension	1.0
Iy	13.987 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 3 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 8 ft, K = 1.0

Applied Loads

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

Column self weight included : 25.037 lbs * Dead Load Factor
AXIAL LOADS . . .
1B8: Axial Load at 8.0 ft, L = 10.0 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6180** : 1

Load Combination	+D+L
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	10.025 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	943.86 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+0.60D
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.850	0.001657	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+L	1.000	0.821	0.6180	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L	1.250	0.743	0.4101	PASS	0.0 ft	0.0	PASS	8.0 ft
+0.60D	1.600	0.636	0.000746	PASS	0.0 ft	0.0	PASS	8.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction k @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					0.025				
+D+L					10.025				
+D+0.750L					7.525				

Wood Column

DESCRIPTION: 2B8 Post At Grid I

Maximum Reactions

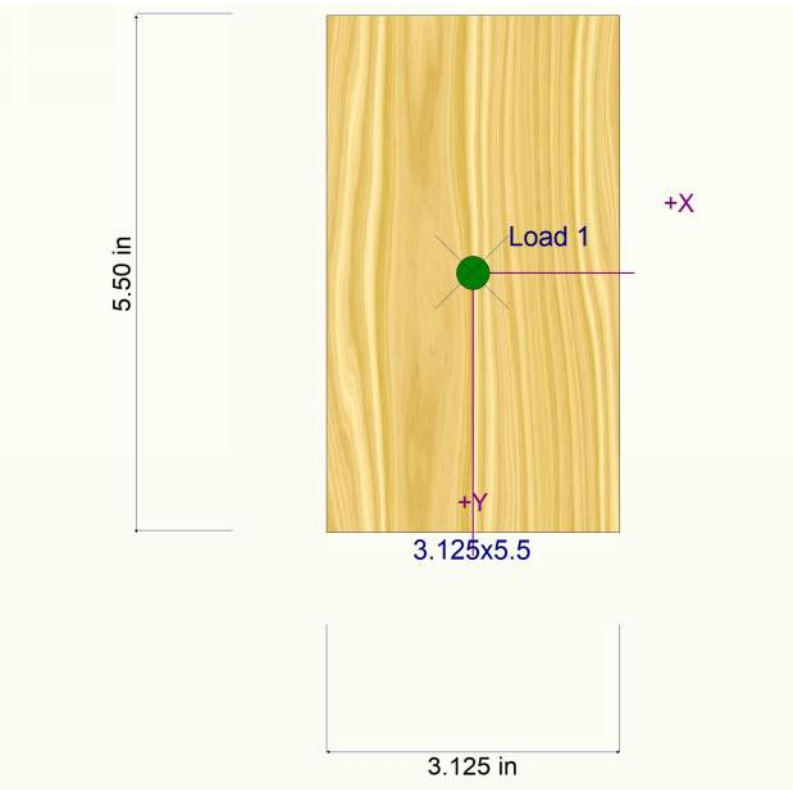
Note: Only non-zero reactions are listed.

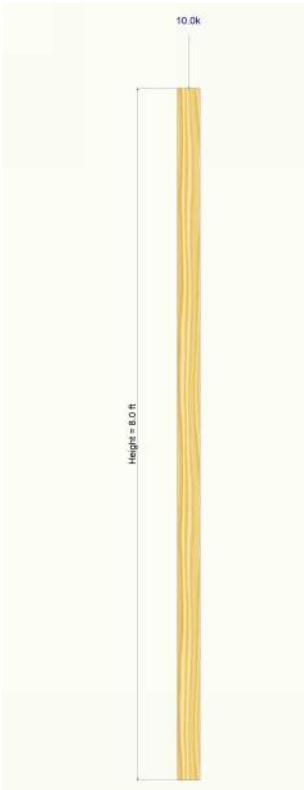
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+0.60D						0.015					
L Only						10.000					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+L	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.750L	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+0.60D	0.0000	in	0.000	ft	0.0000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft

Sketches





Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: 1B8 Post

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	8 ft		
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: DF		
Wood Grade	2.0 L1, >= 4 Laminations		
Fb +	2400 psi	Fv	230 psi
Fb -	2200 psi	Ft	1650 psi
Fc - Prll	2400 psi	Density	0 pcf
Fc - Perp	650 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	2000	2000	2000 ksi
Minimum	1060	1060	

Wood Section Name	**5.125x6**		
Wood Grading/Manuf.	Western		
Wood Member Type	GLB		
Exact Width	**5.125** in	Allow Stress Modification Factors	
Exact Depth	**6.0** in	Cf or Cv for Bending	1.0
Area	30.750 in^2	Cf or Cv for Compression	1.0
Ix	92.250 in^4	Cf or Cv for Tension	1.0
Iy	67.306 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 8 ft, K = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
1B8: Axial Load at 8.0 ft, D = 7.90, L = 10.30, S = 4.50 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3193** : 1
Load Combination +D+L
Governing NDS Forumla Comp Only, fc/Fc'
Location of max.above base 0.0 ft
At maximum location values are . . .
Applied Axial 18.20 k
Applied Mx 0.0 k-ft
Applied My 0.0 k-ft
Fc : Allowable 1,853.90 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination +0.60D
Location of max.above base 8.0 ft
Applied Design Shear 0.0 psi
Allowable Shear 368.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.808	0.1471	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+L	1.000	0.772	0.3193	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+S	1.150	0.718	0.2036	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L	1.250	0.682	0.2485	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L+0.750S	1.150	0.718	0.3120	PASS	0.0 ft	0.0	PASS	8.0 ft
+0.60D	1.600	0.571	0.07033	PASS	0.0 ft	0.0	PASS	8.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					7.900				

Wood Column

DESCRIPTION: 1B8 Post

Maximum Reactions

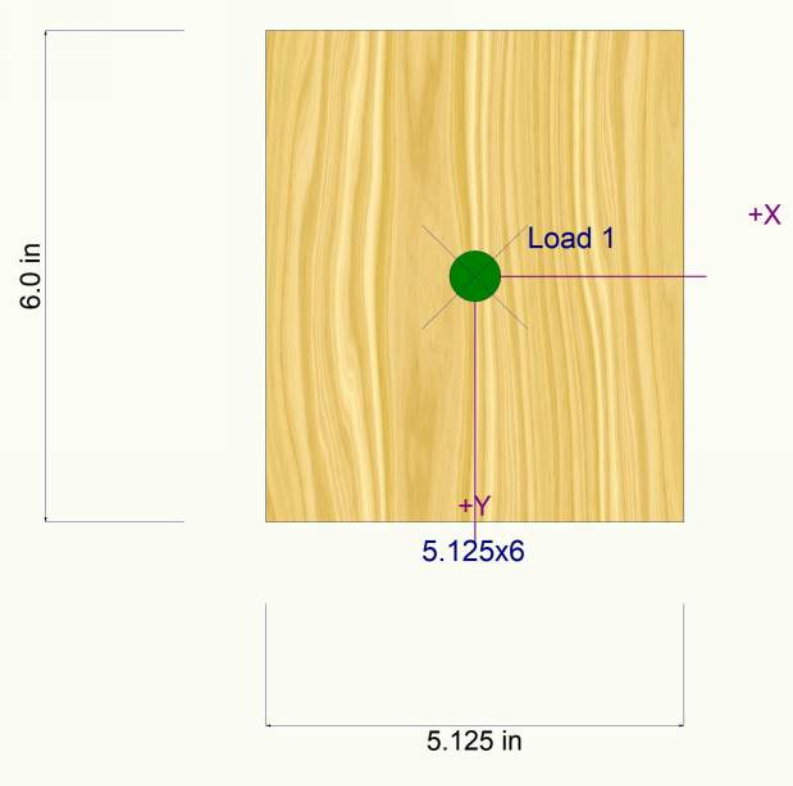
Note: Only non-zero reactions are listed.

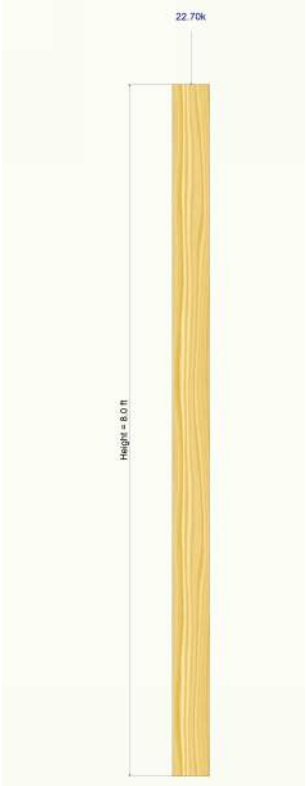
Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
+D+L					18.200				
+D+S					12.400				
+D+0.750L					15.625				
+D+0.750L+0.750S					19.000				
+0.60D					4.740				
L Only					10.300				
S Only					4.500				

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+L	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.0000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft

Sketches





Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: 1B9 Post

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	8 ft		
(Used for non-slender calculations)			
Wood Species	Spruce - Pine - Fir		
Wood Grade	No. 1/No. 2		
Fb +	875 psi	Fv	135 psi
Fb -	875 psi	Ft	450 psi
Fc - Prll	1150 psi	Density	26.22 pcf
Fc - Perp	425 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1400	1400	1400 ksi
Minimum	510	510	

Wood Section Name	**3-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**4.50** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	24.750 in^2	Cf or Cv for Compression	1.10
Ix	62.391 in^4	Cf or Cv for Tension	1.30
Iy	41.766 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 8 ft, K = 1.0

Applied Loads

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

Column self weight included : 36.053 lbs * Dead Load Factor
AXIAL LOADS . . .
1B9: Axial Load at 8.0 ft, D = 6.30, L = 6.30, S = 3.90, W = 0.50, E = 1.40 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7466** : 1

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	13.986 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	756.93 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+0.60D+0.70E
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.614	0.3663	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+L	1.000	0.574	0.7035	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+S	1.150	0.520	0.5464	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L	1.250	0.489	0.5780	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L+0.750S	1.150	0.520	0.7466	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.60W	1.600	0.401	0.3301	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L+0.450W	1.600	0.401	0.5614	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L+0.750S+0.450W	1.600	0.401	0.7069	PASS	0.0 ft	0.0	PASS	8.0 ft
+0.60D+0.60W	1.600	0.401	0.2040	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.70E	1.600	0.401	0.3639	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L+0.750S+0.5250E	1.600	0.401	0.7323	PASS	0.0 ft	0.0	PASS	8.0 ft
+0.60D+0.70E	1.600	0.401	0.2379	PASS	0.0 ft	0.0	PASS	8.0 ft

Wood Column

DESCRIPTION: 1B9 Post

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments @ Base	My - End Moments @ Top	k-ft	Mx - End Moments @ Base	Mx - End Moments @ Top
D Only						6.336					
+D+L						12.636					
+D+S						10.236					
+D+0.750L						11.061					
+D+0.750L+0.750S						13.986					
+D+0.60W						6.636					
+D+0.750L+0.450W						11.286					
+D+0.750L+0.750S+0.450W						14.211					
+0.60D+0.60W						4.102					
+D+0.70E						7.316					
+D+0.750L+0.750S+0.5250E						14.721					
+0.60D+0.70E						4.782					
L Only						6.300					
S Only						3.900					
W Only						0.500					
E Only						1.400					

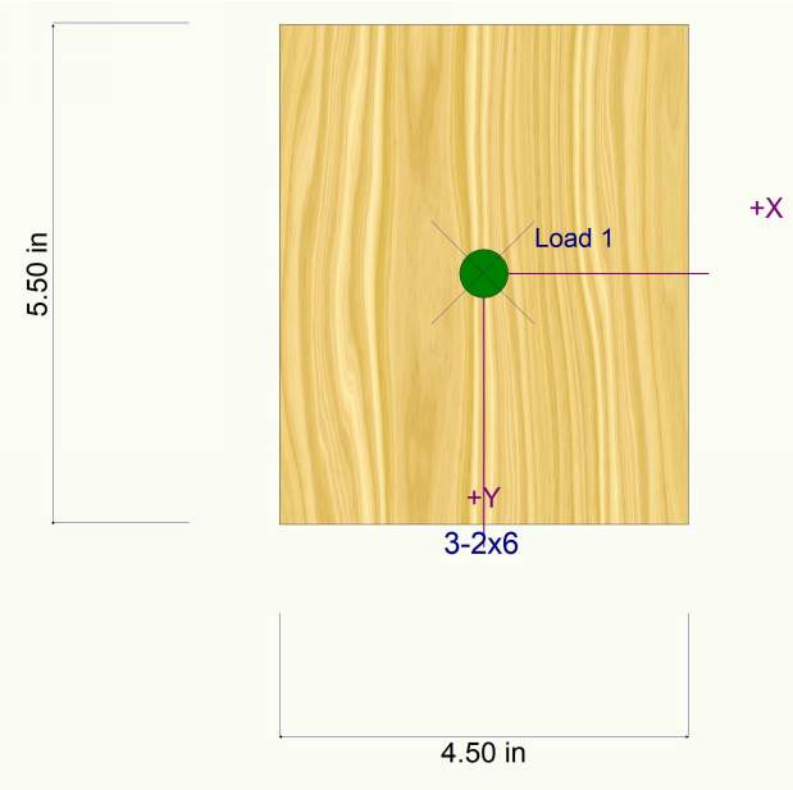
Maximum Deflections for Load Combinations

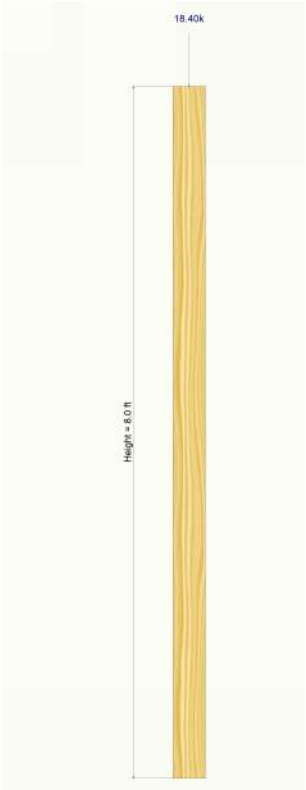
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+L	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.450W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.450W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.70E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S+0.5250E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft

Wood Column

DESCRIPTION: 1B9 Post

Sketches





Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: 1B5 Col

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	7.75 ft		
(Used for non-slender calculations)			
Wood Species	DF/DF		
Wood Grade	24F - E4		
Fb +	2400 psi	Fv	265 psi
Fb -	1450 psi	Ft	1100 psi
Fc - Prll	1700 psi	Density	31.21 pcf
Fc - Perp	650 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1800	1700	1800 ksi
Minimum	950	900	

Wood Section Name	**3.125x6**		
Wood Grading/Manuf.	Western		
Wood Member Type	GLB		
Exact Width	**3.125** in	Allow Stress Modification Factors	
Exact Depth	**6.0** in	Cf or Cv for Bending	1.0
Area	18.750 in^2	Cf or Cv for Compression	1.0
Ix	56.250 in^4	Cf or Cv for Tension	1.0
Iy	15.259 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 7.75 ft, K = 1.
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 7.75 ft, K = 1.

Applied Loads

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

Column self weight included : 31.494 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 7.750 ft, D = 2.40, L = 7.40 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6486** : 1

Load Combination	+D+L
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	9.831 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	808.42 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+0.60D
Location of max.above base	7.750 ft
Applied Design Shear	0.0 psi
Allowable Shear	424.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.520	0.1630	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+L	1.000	0.476	0.6486	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+0.750L	1.250	0.390	0.5137	PASS	0.0 ft	0.0	PASS	7.750 ft
+0.60D	1.600	0.310	0.09221	PASS	0.0 ft	0.0	PASS	7.750 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					2.431				
+D+L					9.831				
+D+0.750L					7.981				

Wood Column

DESCRIPTION: 1B5 Col

Maximum Reactions

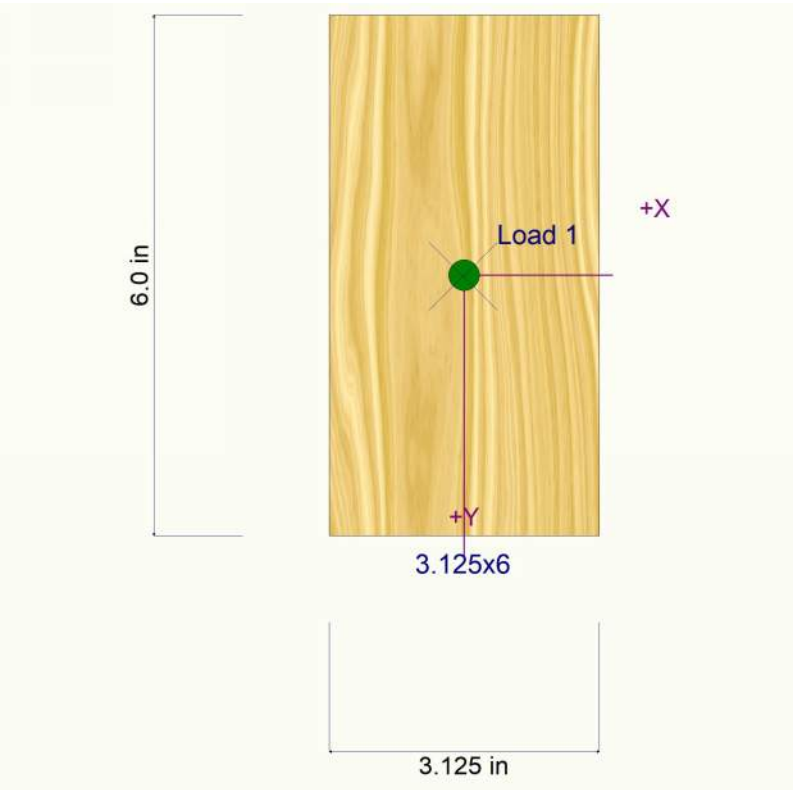
Note: Only non-zero reactions are listed.

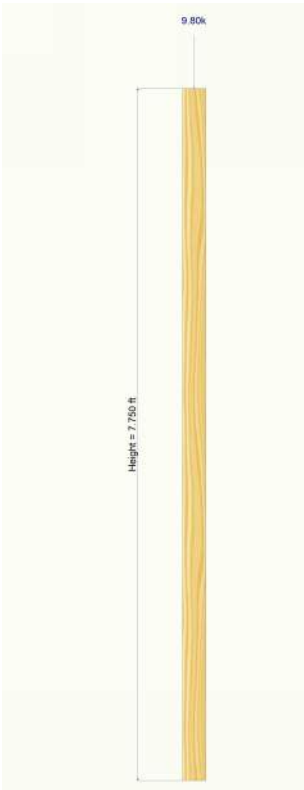
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+0.60D						1.459					
L Only						7.400					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+L	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.750L	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+0.60D	0.0000	in	0.000	ft	0.0000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft

Sketches





Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: 2B5 Post

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	9.5 ft		
(Used for non-slender calculations)			
Wood Species	Spruce - Pine - Fir		
Wood Grade	No. 1/No. 2		
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Wood Section Name	**6-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**9.0** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	49.50 in^2	Cf or Cv for Compression	1.10
Ix	124.781 in^4	Cf or Cv for Tension	1.30
Iy	334.125 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 9.5 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 9.5 ft, K = 1.0

Applied Loads

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

Column self weight included : 85.625 lbs * Dead Load Factor
AXIAL LOADS . . .
2B5: Axial Load at 9.50 ft, D = 8.90, L = 1.10, S = 11.10 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5144** : 1
Load Combination +D+S
Governing NDS Forumla Comp Only, fc/Fc'
Location of max.above base 0.0 ft
At maximum location values are . . .
Applied Axial 20.086 k
Applied Mx 0.0 k-ft
Applied My 0.0 k-ft
Fc : Allowable 788.87 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination +0.60D
Location of max.above base 9.50 ft
Applied Design Shear 0.0 psi
Allowable Shear 216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.635	0.2509	PASS	0.0 ft	0.0	PASS	9.50 ft
+D+L	1.000	0.596	0.2704	PASS	0.0 ft	0.0	PASS	9.50 ft
+D+S	1.150	0.542	0.5144	PASS	0.0 ft	0.0	PASS	9.50 ft
+D+0.750L	1.250	0.511	0.2455	PASS	0.0 ft	0.0	PASS	9.50 ft
+D+0.750L+0.750S	1.150	0.542	0.4644	PASS	0.0 ft	0.0	PASS	9.50 ft
+0.60D	1.600	0.421	0.1278	PASS	0.0 ft	0.0	PASS	9.50 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					8.986				

Wood Column

DESCRIPTION: 2B5 Post

Maximum Reactions

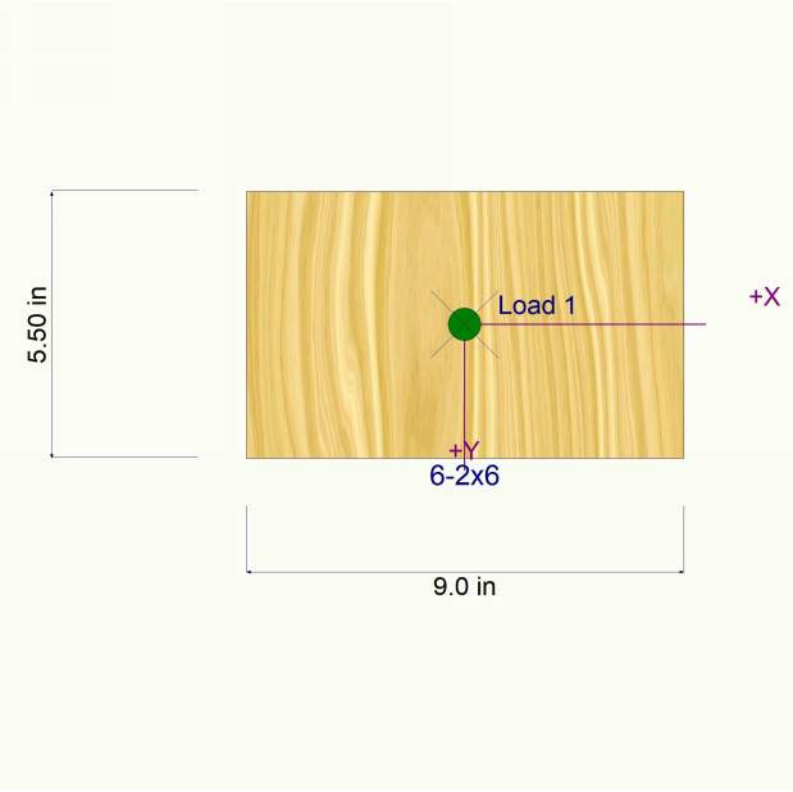
Note: Only non-zero reactions are listed.

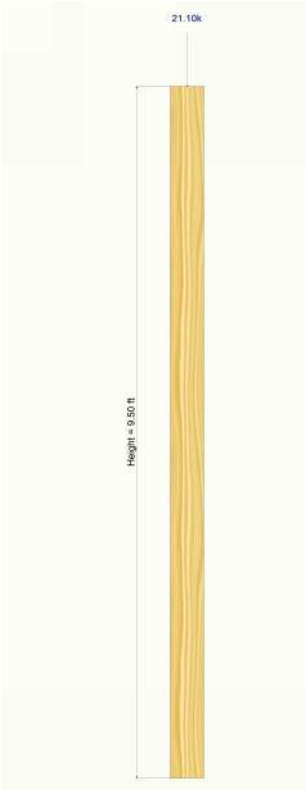
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+L						10.086					
+D+S						20.086					
+D+0.750L						9.811					
+D+0.750L+0.750S						18.136					
+0.60D						5.391					
L Only						1.100					
S Only						11.100					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+L	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+S	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.750L	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.750L+0.750S	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+0.60D	0.0000	in	0.000	ft	0.0000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
S Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft

Sketches





Wood Column

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Steel Beam Post

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	8 ft		
(Used for non-slender calculations)			
Wood Species	Spruce - Pine - Fir		
Wood Grade	No. 1/No. 2		
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Wood Section Name	**5-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**7.50** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	41.250 in^2	Cf or Cv for Compression	1.10
Ix	103.984 in^4	Cf or Cv for Tension	1.30
Iy	193.359 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 8 ft, K = 1.0

Applied Loads

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

Column self weight included : 60.088 lbs * Dead Load Factor
AXIAL LOADS . . .
Steel Beam: Axial Load at 8.0 ft, D = 9.050, L = 13.20, S = 4.80 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5944** : 1
Load Combination +D+L
Governing NDS Forumla Comp Only, fc/Fc'
Location of max.above base 0.0 ft
At maximum location values are . . .
Applied Axial 22.310 k
Applied Mx 0.0 k-ft
Applied My 0.0 k-ft
Fc : Allowable 909.85 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination +0.60D
Location of max.above base 8.0 ft
Applied Design Shear 0.0 psi
Allowable Shear 216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.752	0.2579	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+L	1.000	0.719	0.5944	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+S	1.150	0.671	0.3452	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L	1.250	0.641	0.4546	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L+0.750S	1.150	0.671	0.5612	PASS	0.0 ft	0.0	PASS	8.0 ft
+0.60D	1.600	0.547	0.1196	PASS	0.0 ft	0.0	PASS	8.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					9.110				

Wood Column

DESCRIPTION: Steel Beam Post

Maximum Reactions

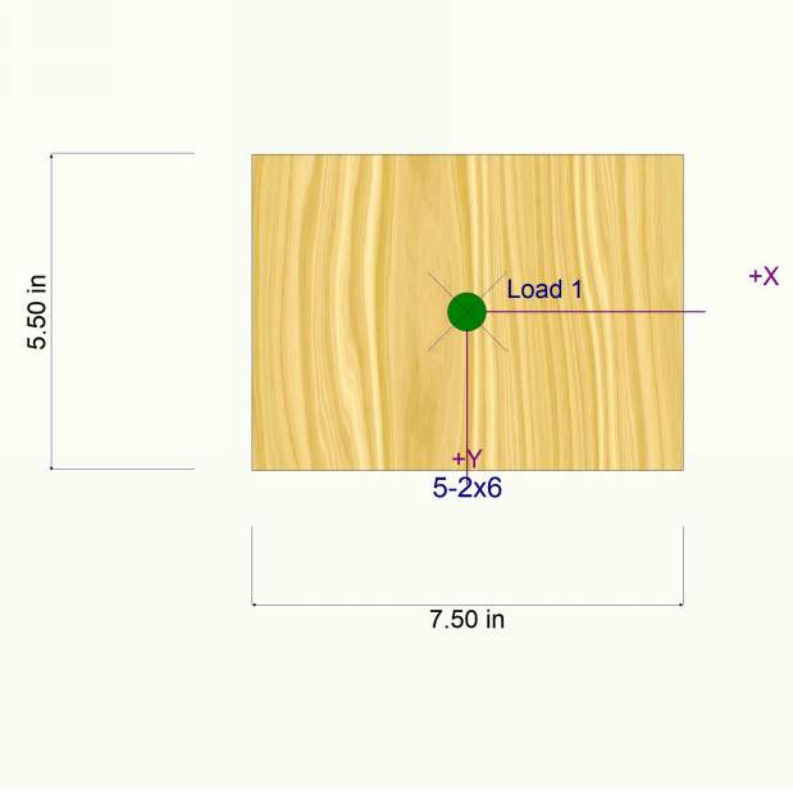
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+L						22.310					
+D+S						13.910					
+D+0.750L						19.010					
+D+0.750L+0.750S						22.610					
+0.60D						5.466					
L Only						13.200					
S Only						4.800					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+L	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+S	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.750L	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.750L+0.750S	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+0.60D	0.0000	in	0.000	ft	0.0000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
S Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft

Sketches



Wood Beam

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Slider Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

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

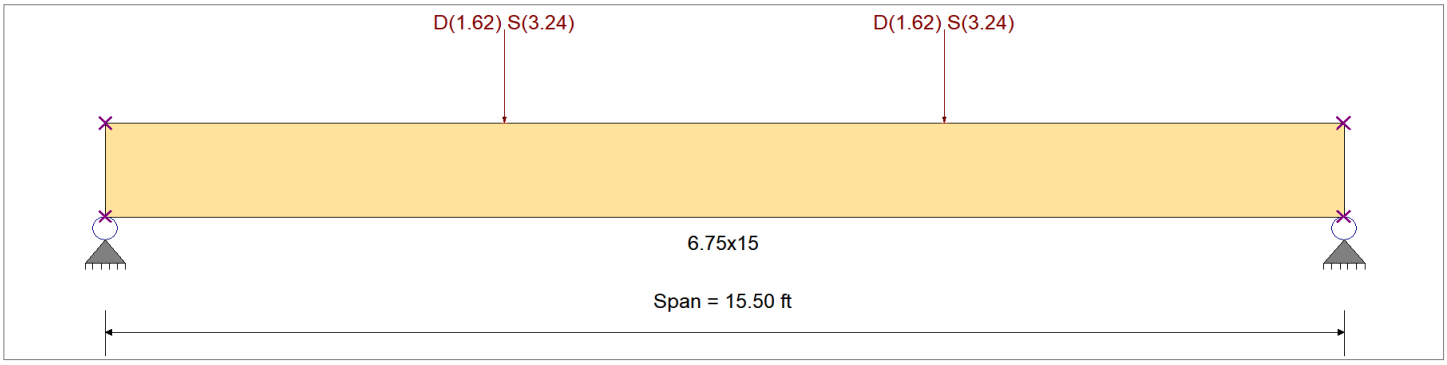
Wood Species : DF/DF
Wood Grade : 24F - V8

Beam Bracing : Completely Unbraced

Fb +	2400 psi
Fb -	2400 psi
Fc - Prll	1650 psi
Fc - Perp	650 psi
Fv	265 psi
Ft	1100 psi

E : Modulus of Elasticity

Ebend- xx	1800 ksi
Eminbend - xx	950 ksi
Ebend- yy	1600 ksi
Eminbend - yy	850 ksi
Density	31.21 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Point Load : D = 1.620, S = 3.240 k @ 5.0 ft, (Roof Beam)
Point Load : D = 1.620, S = 3.240 k @ 10.50 ft, (Roof Beam)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.437 : 1	Maximum Shear Stress Ratio	=	0.243 : 1
Section used for this span		6.75x15	Section used for this span		6.75x15
	=	1,183.24 psi		=	74.11 psi
	=	2,706.74 psi		=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.750 ft	Location of maximum on span	=	14.255 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.213 in	Ratio =	872 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.328 in	Ratio =	567 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.196	0.109	0.90	0.981	1.00	1.00	1.00	1.00	0.99	8.76	415.24	2118.31	1.76	26.11	238.50
+D+S					0.981	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.437	0.243	1.15	0.981	1.00	1.00	1.00	1.00	0.98	24.96	1,183.24	2706.74	5.00	74.11	304.75
+D+0.750S					0.981	1.00	1.00	1.00	1.00	0.98			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.366	0.204	1.15	0.981	1.00	1.00	1.00	1.00	0.98	20.91	991.24	2706.74	4.19	62.11	304.75
+0.60D					0.981	1.00	1.00	1.00	1.00	0.98			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.067	0.037	1.60	0.981	1.00	1.00	1.00	1.00	0.97	5.26	249.15	3728.21	1.06	15.67	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3280	7.807		0.0000	0.000

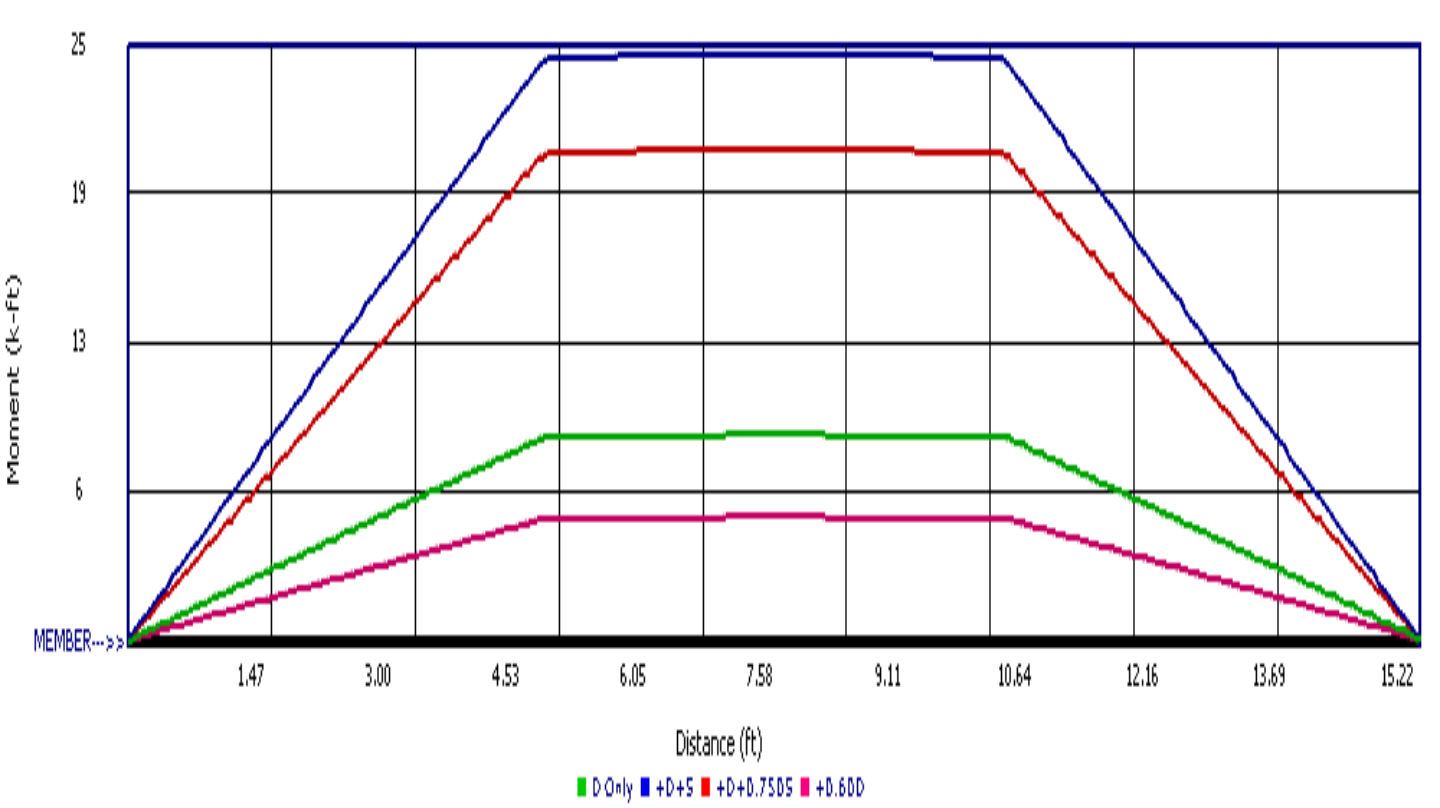
Wood Beam

DESCRIPTION: Slider Beam

Vertical Reactions

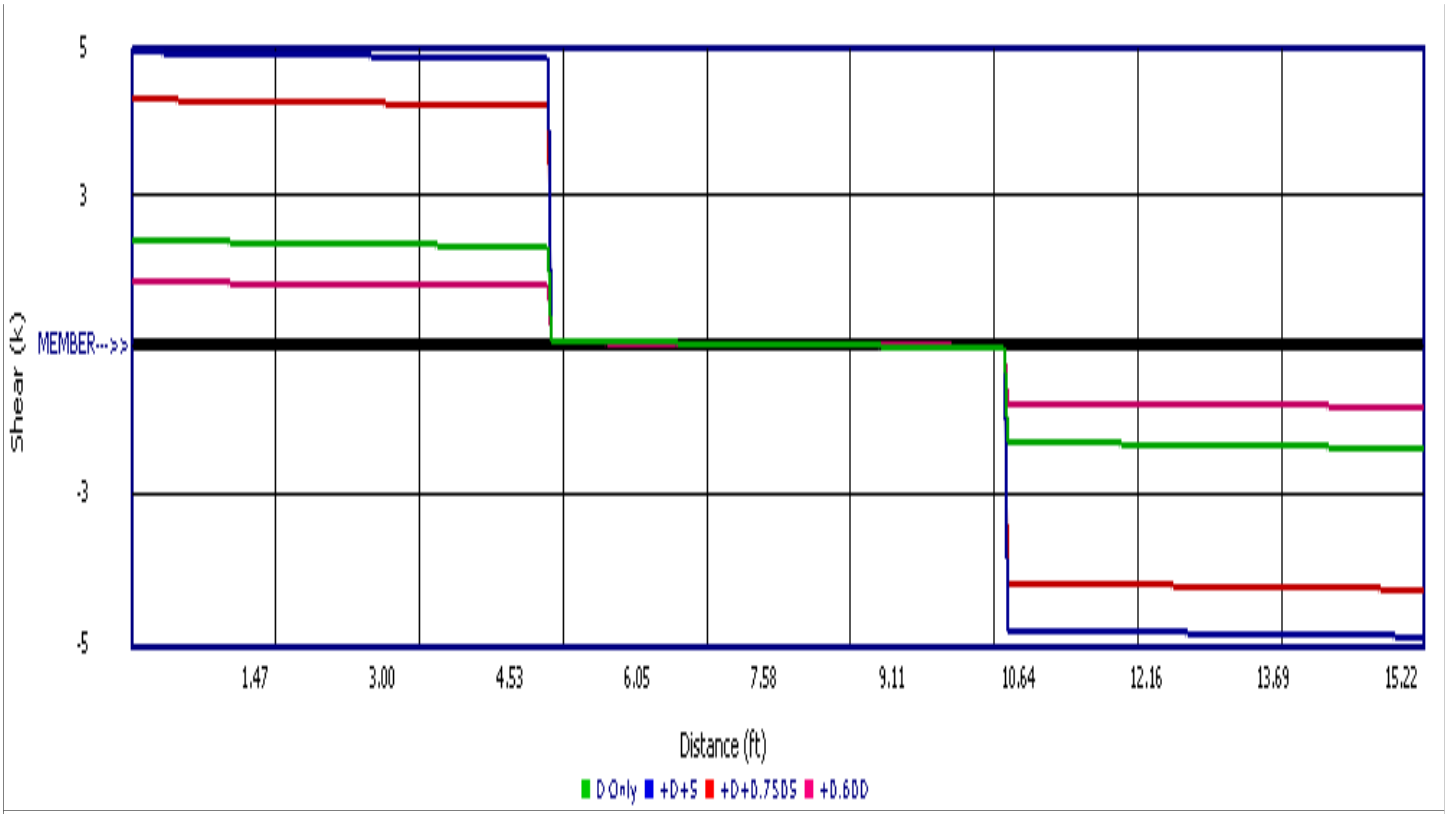
Support notation : Far left is #1 Values in KIPS

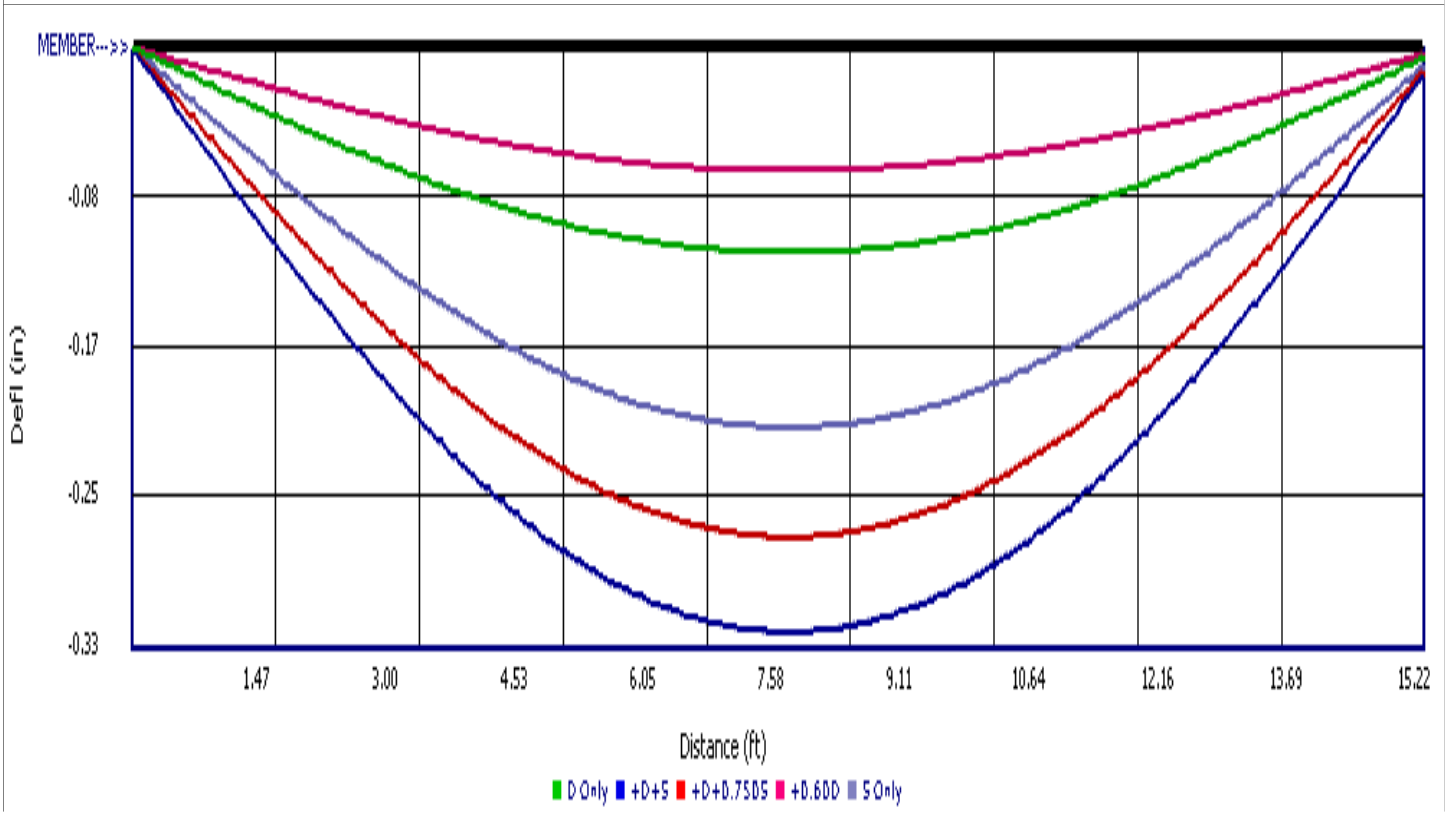
Load Combination	Support 1	Support 2
Overall MAXimum	5.030	5.030
Overall MINimum	3.240	3.240
D Only	1.790	1.790
+D+S	5.030	5.030
+D+0.750S	4.220	4.220
+0.60D	1.074	1.074
S Only	3.240	3.240



Wood Beam

DESCRIPTION: Slider Beam





Wood Beam

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Slider Beam Wind

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

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

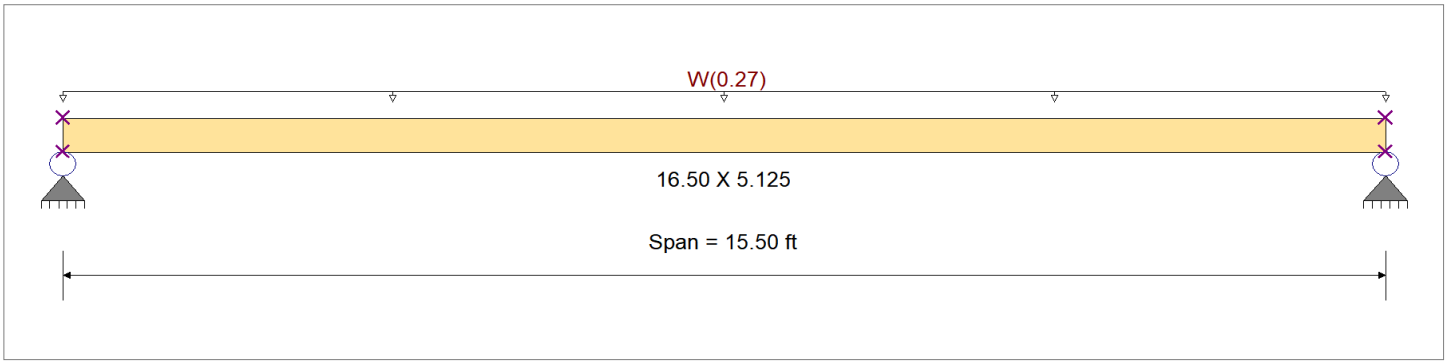
Wood Species : DF/DF
Wood Grade : 24F - V8

Beam Bracing : Completely Unbraced

Fb +	2400 psi
Fb -	2400 psi
Fc - Prll	1650 psi
Fc - Perp	650 psi
Fv	265 psi
Ft	1100 psi

E : Modulus of Elasticity

Ebend- xx	1800 ksi
Eminbend - xx	950 ksi
Ebend- yy	1600 ksi
Eminbend - yy	850 ksi
Density	31.21 pcf



Applied Loads

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

Uniform Load : W = 0.030 ksf, Tributary Width = 9.0 ft, (Wind)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.211 : 1	Maximum Shear Stress Ratio	=	0.050 : 1
Section used for this span		16.50 X 5.125	Section used for this span		16.50 X 5.125
	=	808.26 psi		=	21.13 psi
	=	3,834.33 psi		=	424.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	7.750 ft	Location of maximum on span	=	15.104 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.445 in	Ratio =	418 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.635 in	Ratio =	292 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
													0.00	0.00	0.00	0.00
Length = 15.50 ft	1			0.90	0.999	1.00	1.00	1.00	1.00	1.00			2156.81	0.00	0.00	238.50
+0.60W					0.999	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.211	0.050	1.60	0.999	1.00	1.00	1.00	1.00	1.00	4.87	808.26	3834.33	1.19	21.13	424.00
+0.450W					0.999	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.158	0.037	1.60	0.999	1.00	1.00	1.00	1.00	1.00	3.65	606.19	3834.33	0.89	15.85	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+0.60W	1	0.6352	7.807		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.093	2.093

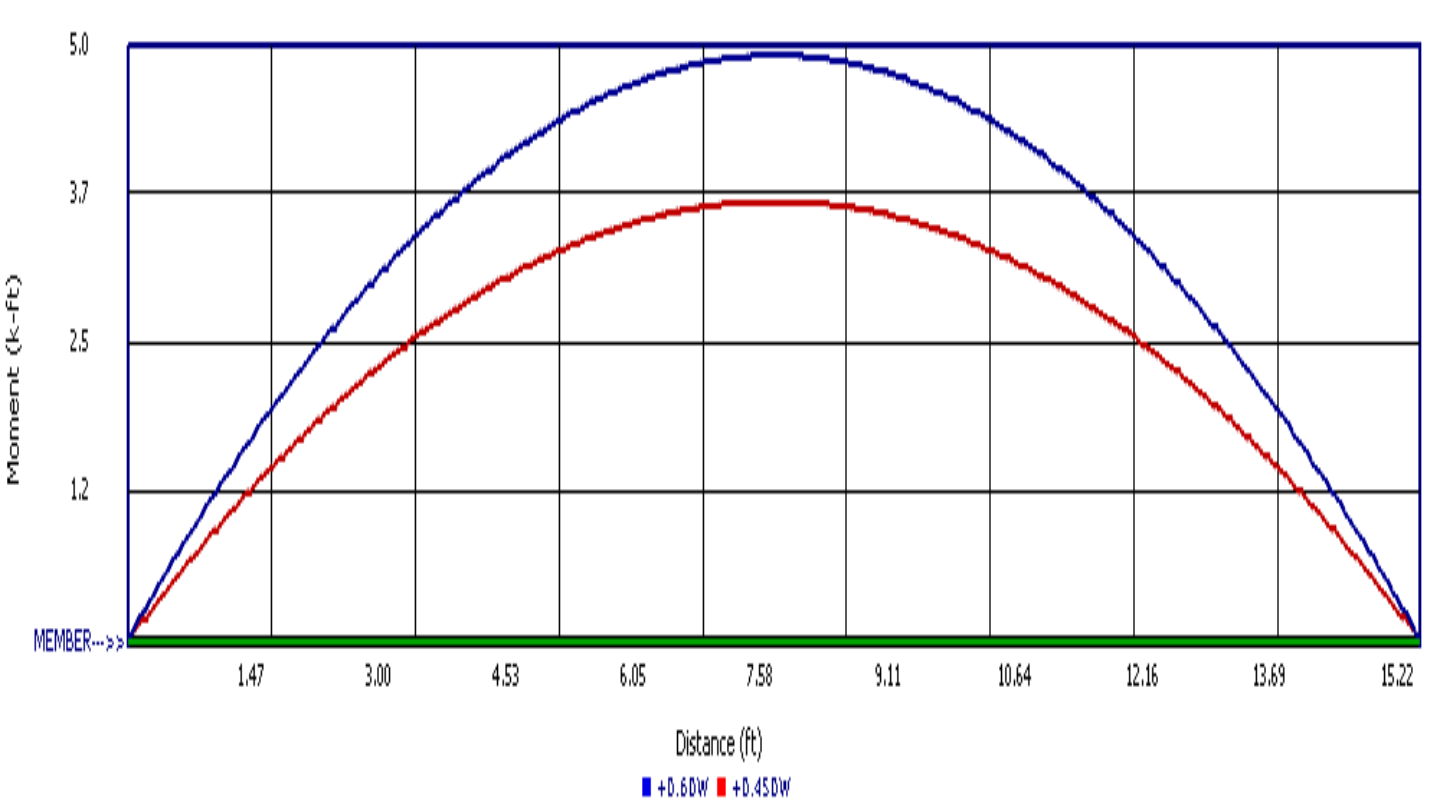
Wood Beam

DESCRIPTION: Slider Beam Wind

Vertical Reactions

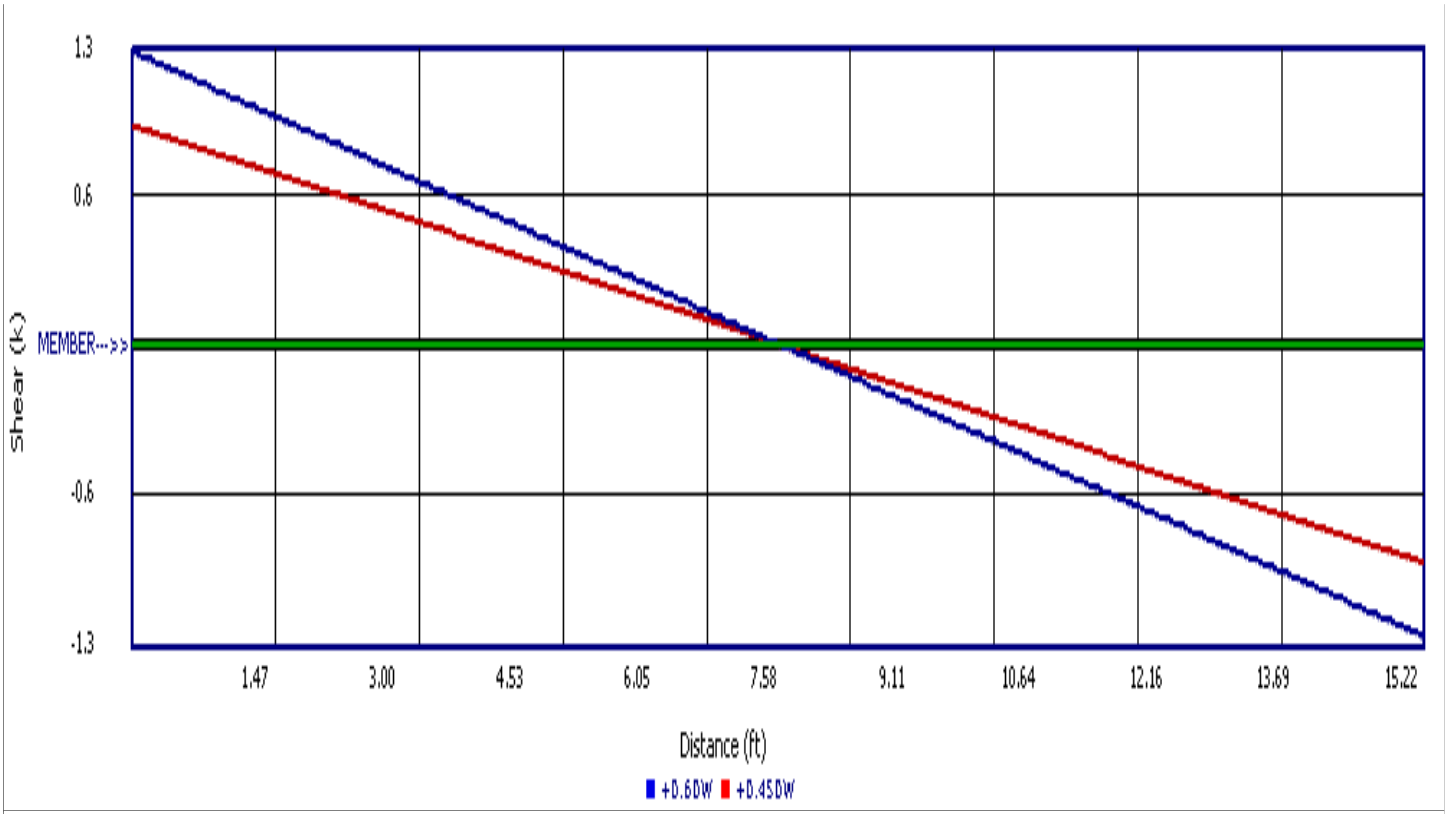
Support notation : Far left is #1 Values in KIPS

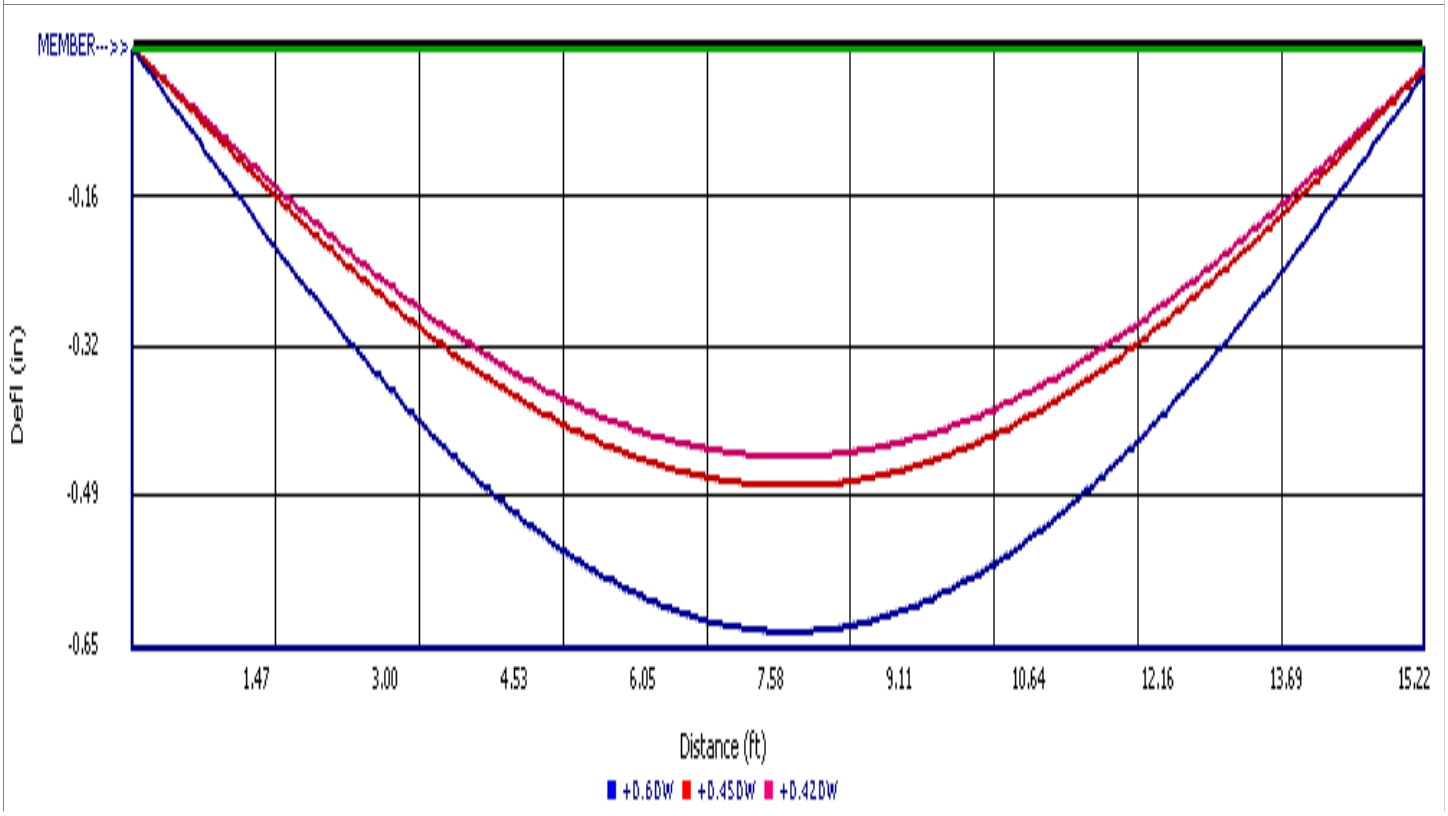
Load Combination	Support 1	Support 2
Overall MINimum	2.093	2.093
+0.60W	1.256	1.256
+0.450W	0.942	0.942
W Only	2.093	2.093



Wood Beam

DESCRIPTION: Slider Beam Wind





Wood Beam

Lic. # : KW-06005835 QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Out of Plane Grid C

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

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

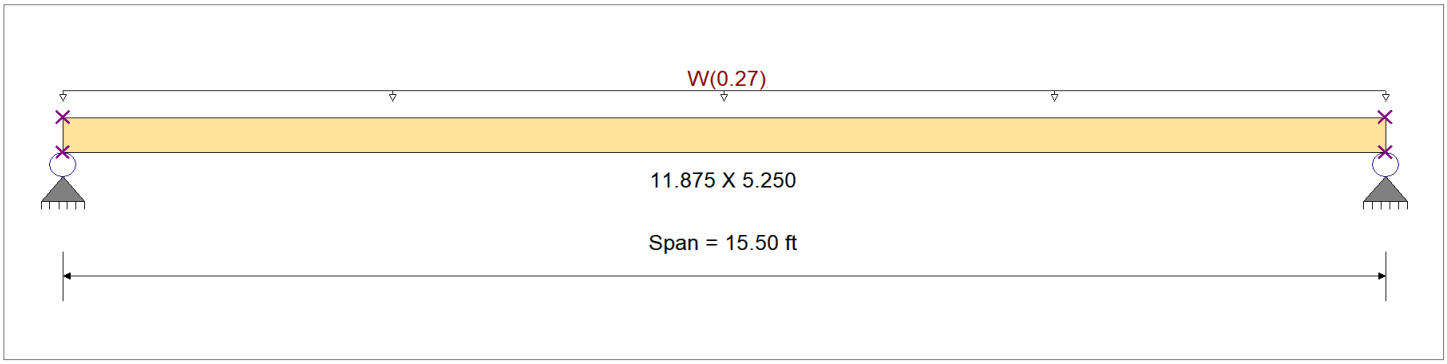
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

Beam Bracing : Completely Unbraced

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	625.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	45.070 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : W = 0.030 ksf, Tributary Width = 9.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.258 : 1	Maximum Shear Stress Ratio	=	0.069 : 1
Section used for this span		11.875 X 5.250	Section used for this span		11.875 X 5.250
	=	1,199.11 psi		=	32.12 psi
	=	4,640.00 psi		=	464.00 psi
Load Combination		+D+0.60W	Load Combination		+D+0.60W
Location of maximum on span	=	7.750 ft	Location of maximum on span	=	15.104 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.517 in	Ratio =	359 >=240
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240
Max Downward Total Deflection	0.000 in	Ratio =	0 <240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.049	0.013	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.59	128.91	2610.00	0.14	3.45	261.00
+D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.258	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.45	1,199.11	4640.00	1.33	32.12	464.00
+D+0.450W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.201	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.23	931.56	4640.00	1.04	24.95	464.00
+0.60D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.247	0.066	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.22	1,147.55	4640.00	1.28	30.74	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.017	0.004	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.35	77.34	4640.00	0.09	2.07	464.00

Wood Beam

DESCRIPTION: Out of Plane Grid C

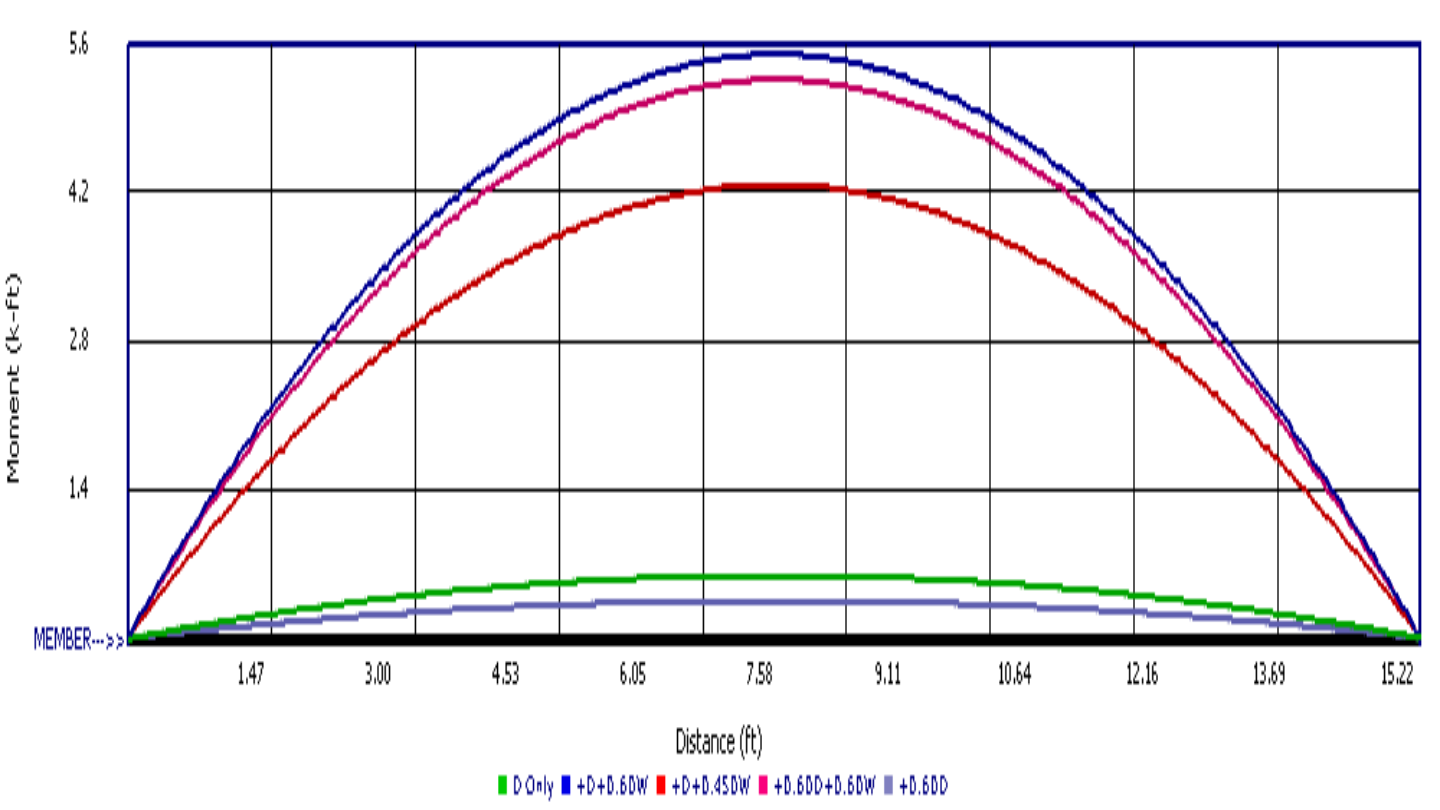
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+0.420W	1	0.5172	7.807		0.0000	0.000

Vertical Reactions

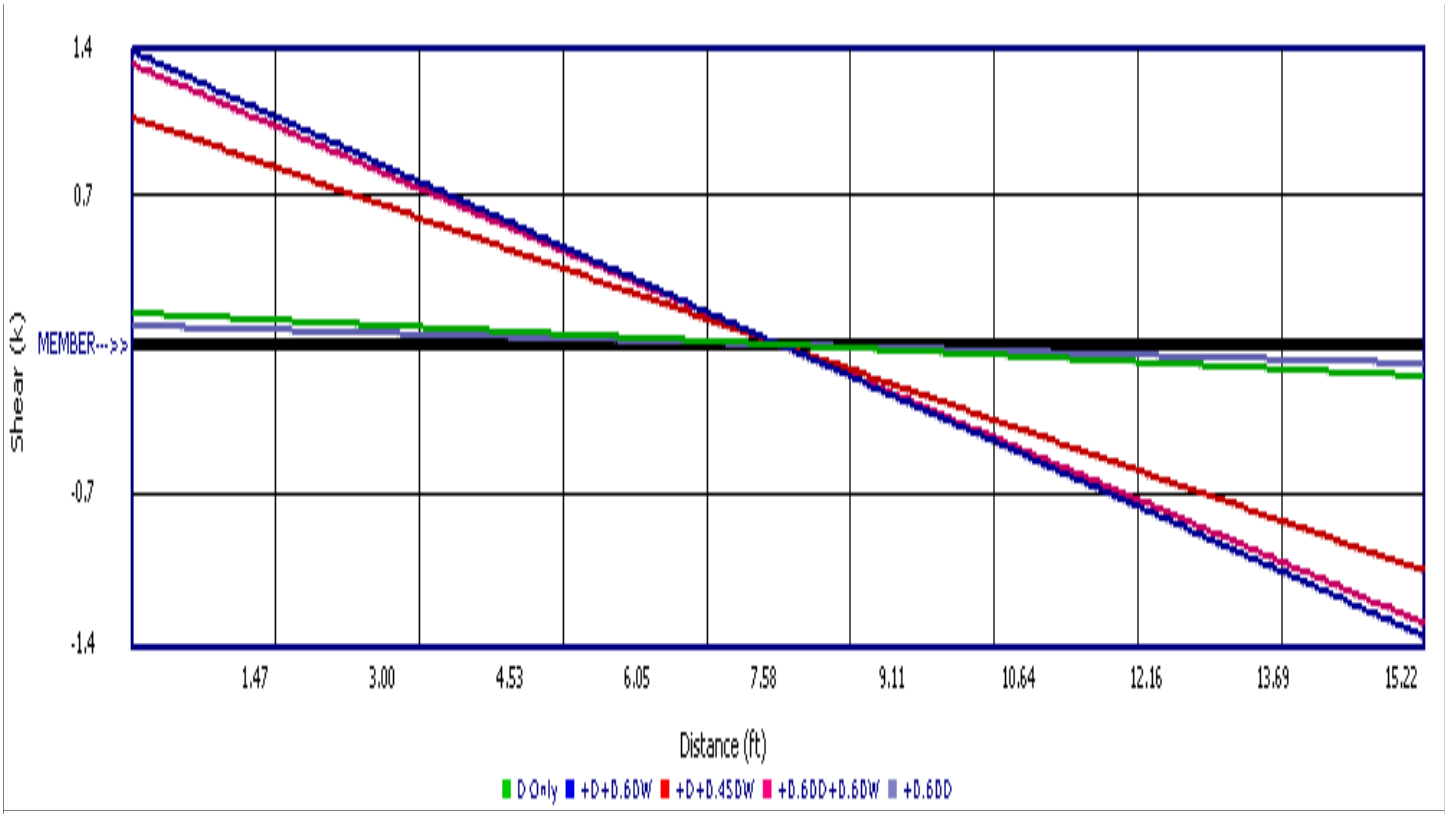
Support notation : Far left is #1 Values in KIPS

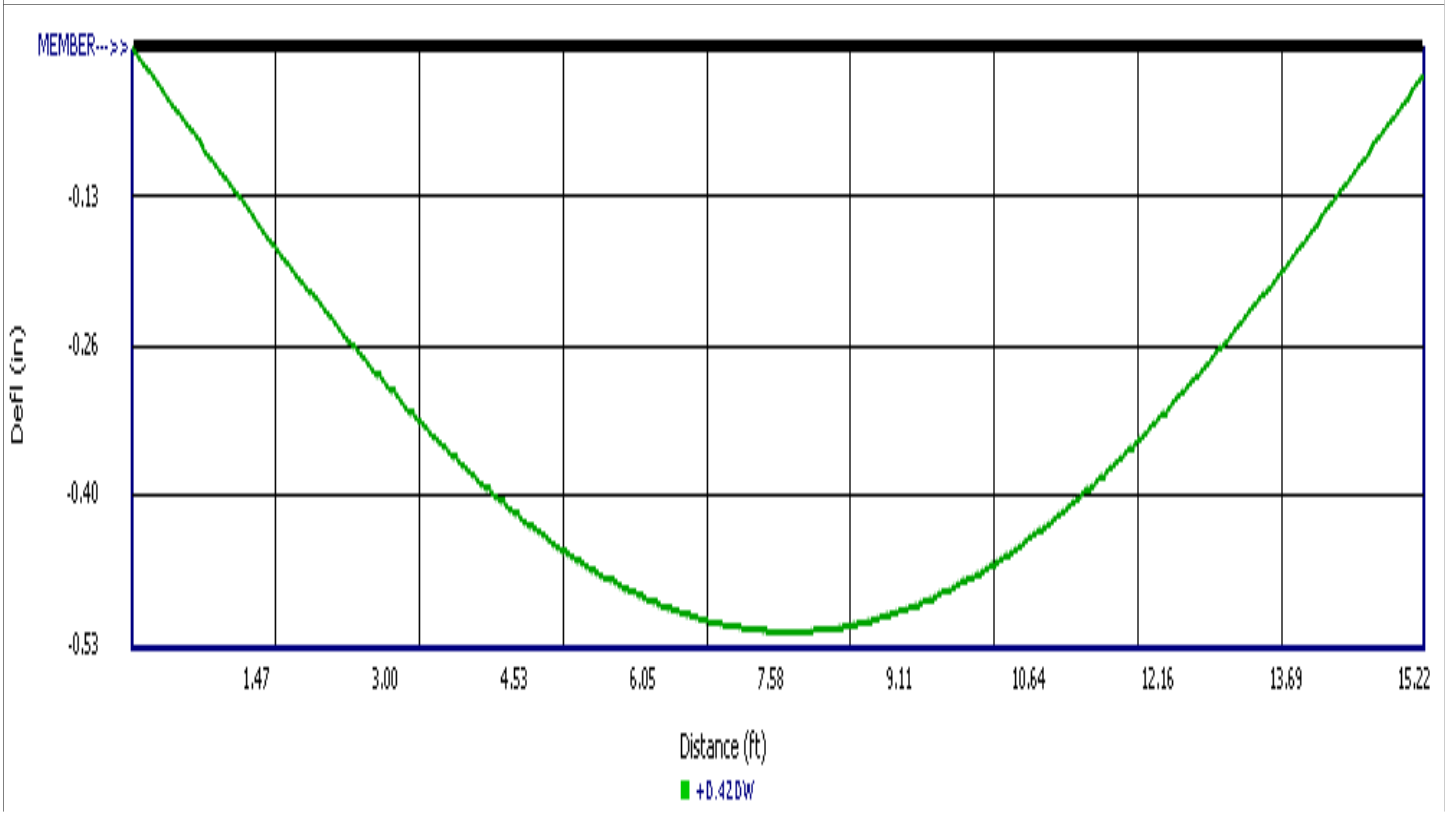
Load Combination	Support 1	Support 2
Overall MAXimum	2.093	2.093
Overall MINimum	2.093	2.093
D Only	0.151	0.151
+D+0.60W	1.407	1.407
+D+0.450W	1.093	1.093
+0.60D+0.60W	1.346	1.346
+0.60D	0.091	0.091
W Only	2.093	2.093



Wood Beam

DESCRIPTION: Out of Plane Grid C





Wood Beam

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Out of Plane Grid I

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

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

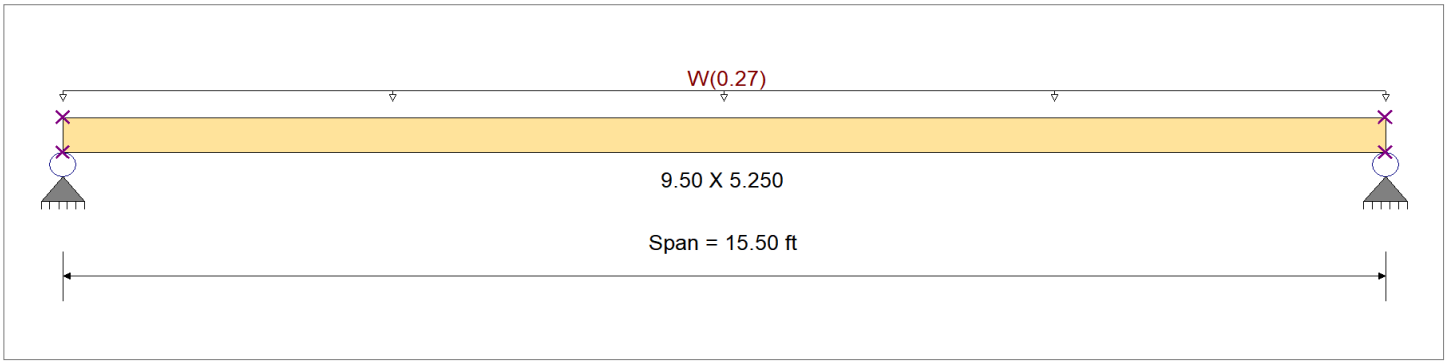
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

Beam Bracing : Completely Unbraced

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	625.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	45.070 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : W = 0.030 ksf, Tributary Width = 9.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.316 : 1	Maximum Shear Stress Ratio	=	0.085 : 1
Section used for this span		9.50 X 5.250	Section used for this span		9.50 X 5.250
	=	1,466.67 psi		=	39.28 psi
	=	4,640.00 psi		=	464.00 psi
Load Combination		+D+0.60W	Load Combination		+D+0.60W
Location of maximum on span	=	7.750 ft	Location of maximum on span	=	15.104 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.647 in	Ratio =	287 >=240
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240
Max Downward Total Deflection	0.000 in	Ratio =	0 <240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.049	0.013	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.47	128.91	2610.00	0.11	3.45	261.00
+D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.316	0.085	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.33	1,466.67	4640.00	1.31	39.28	464.00
+D+0.450W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.244	0.065	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.12	1,132.23	4640.00	1.01	30.33	464.00
+0.60D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.305	0.082	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.15	1,415.10	4640.00	1.26	37.90	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.50 ft	1	0.017	0.004	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.28	77.34	4640.00	0.07	2.07	464.00

Wood Beam

DESCRIPTION: Out of Plane Grid I

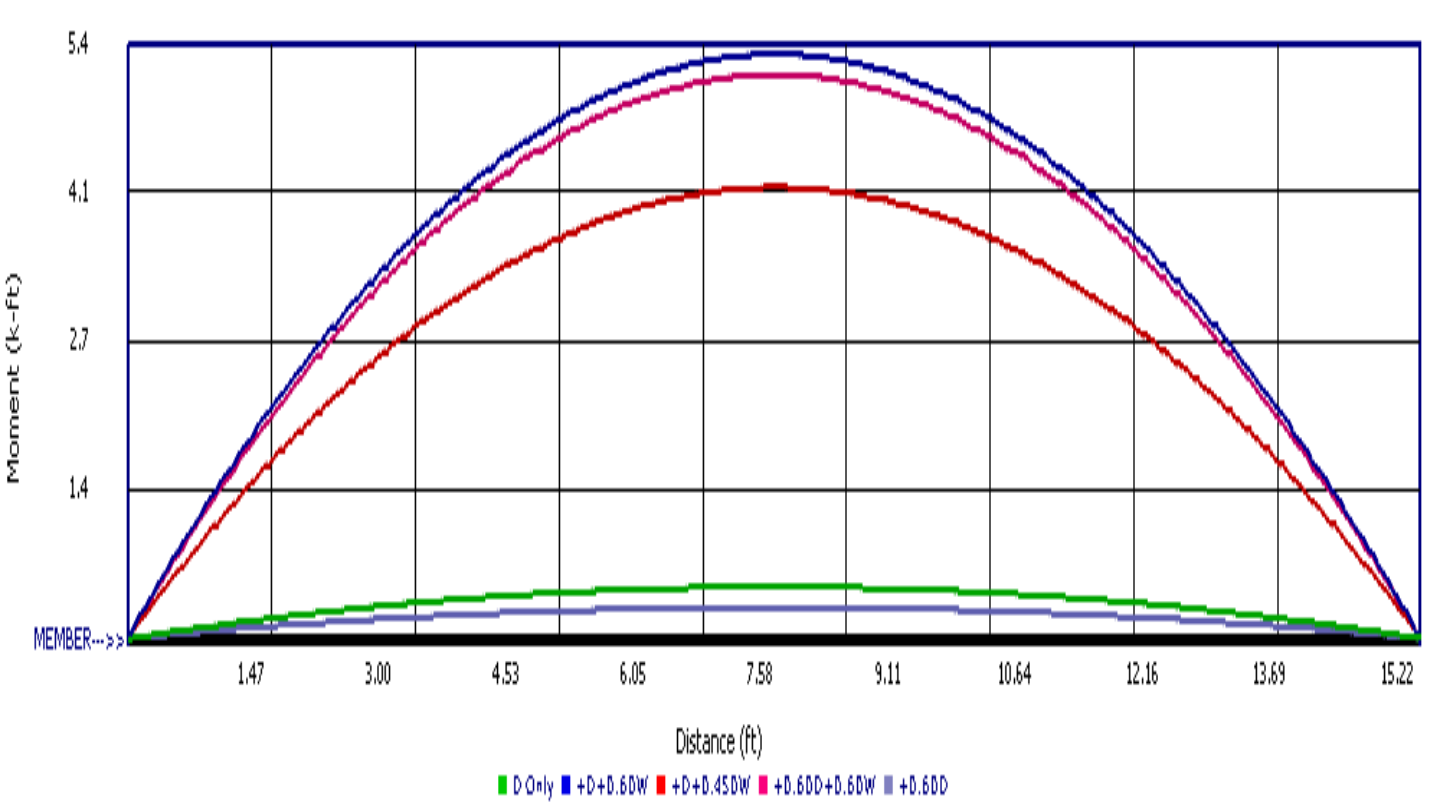
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+0.420W	1	0.6465	7.807		0.0000	0.000

Vertical Reactions

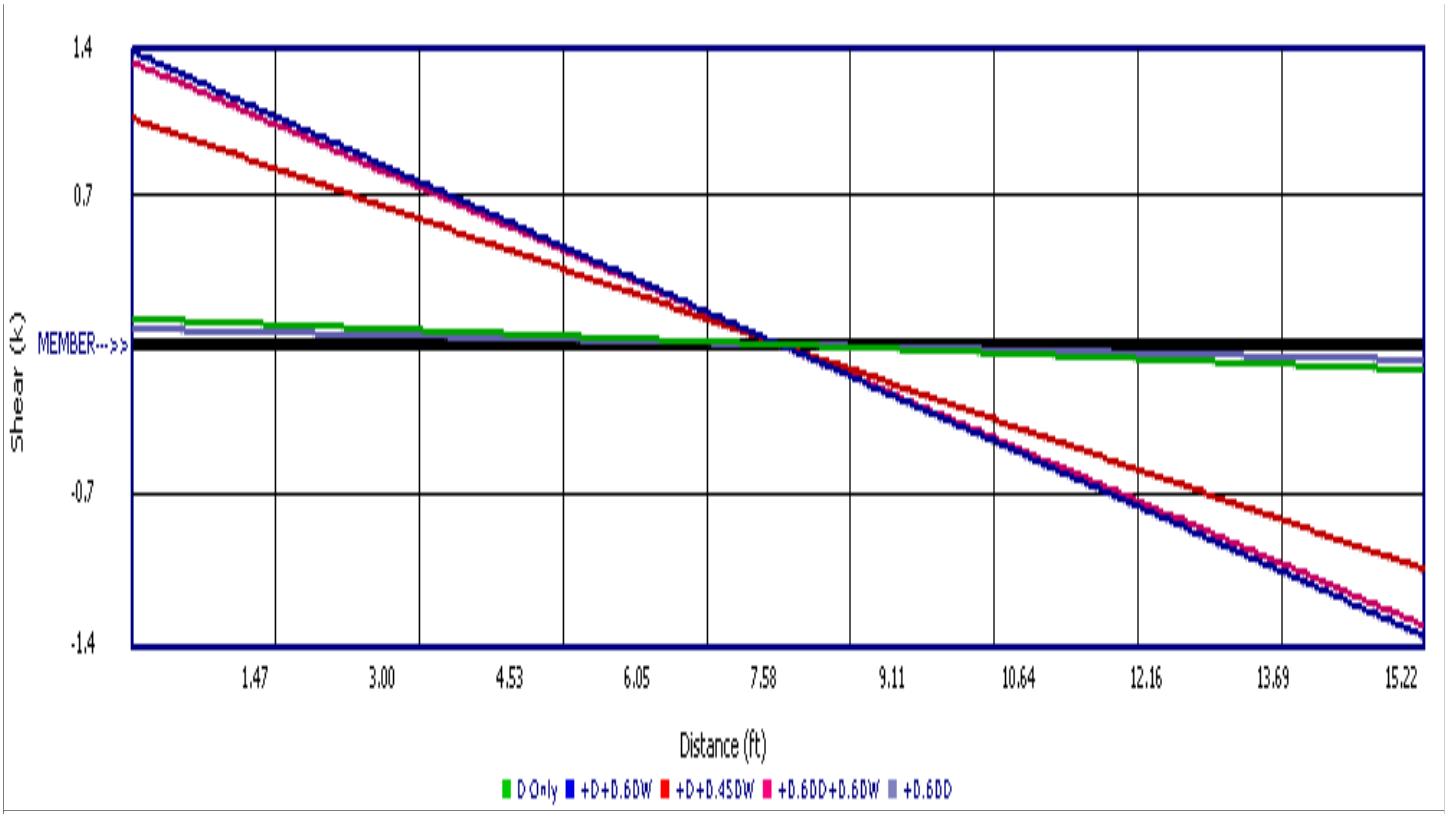
Support notation : Far left is #1 Values in KIPS

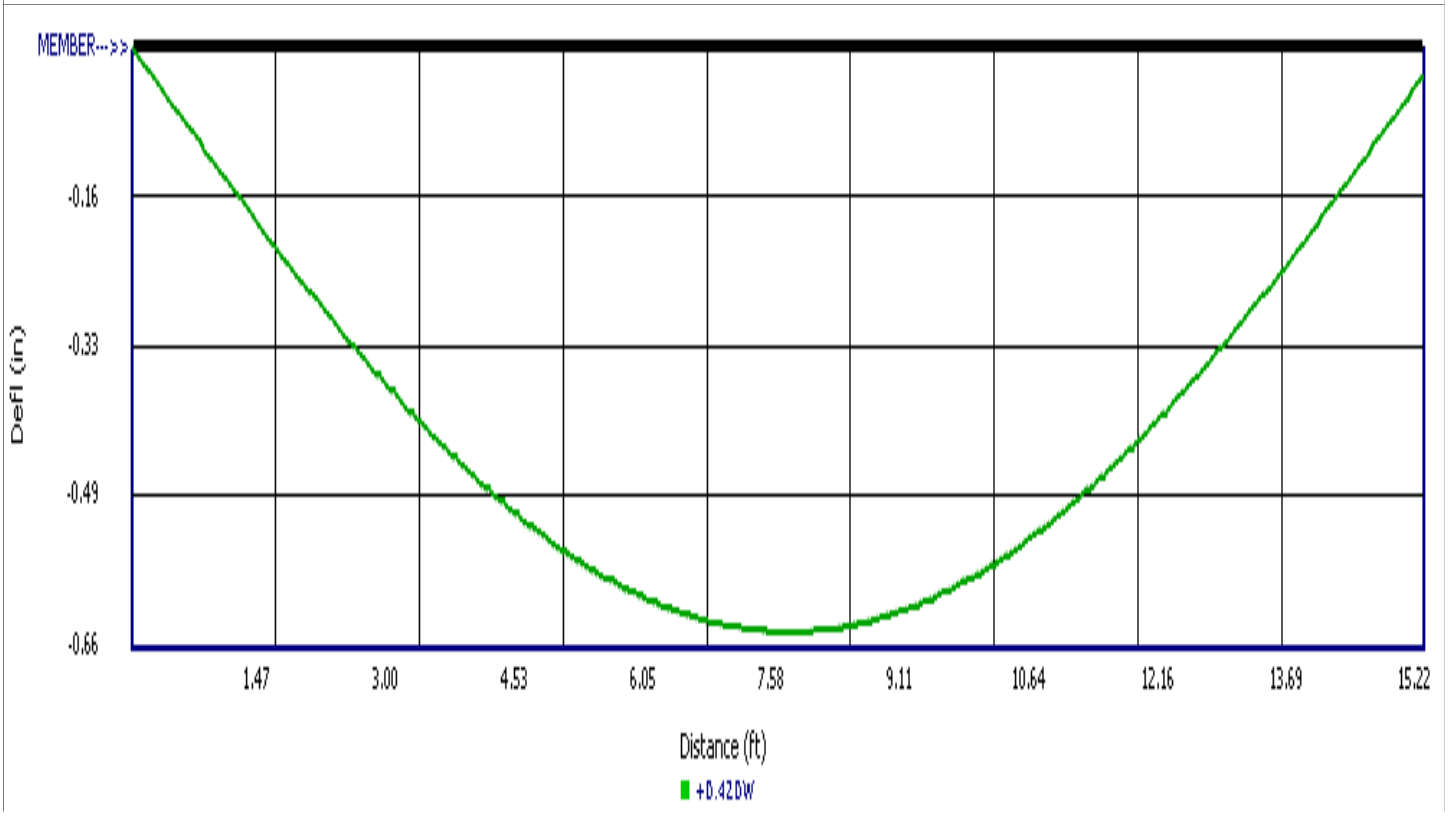
Load Combination	Support 1	Support 2
Overall MAXimum	2.093	2.093
Overall MINimum	2.093	2.093
D Only	0.121	0.121
+D+0.60W	1.376	1.376
+D+0.450W	1.063	1.063
+0.60D+0.60W	1.328	1.328
+0.60D	0.073	0.073
W Only	2.093	2.093



Wood Beam

DESCRIPTION: Out of Plane Grid I





Steel Beam

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

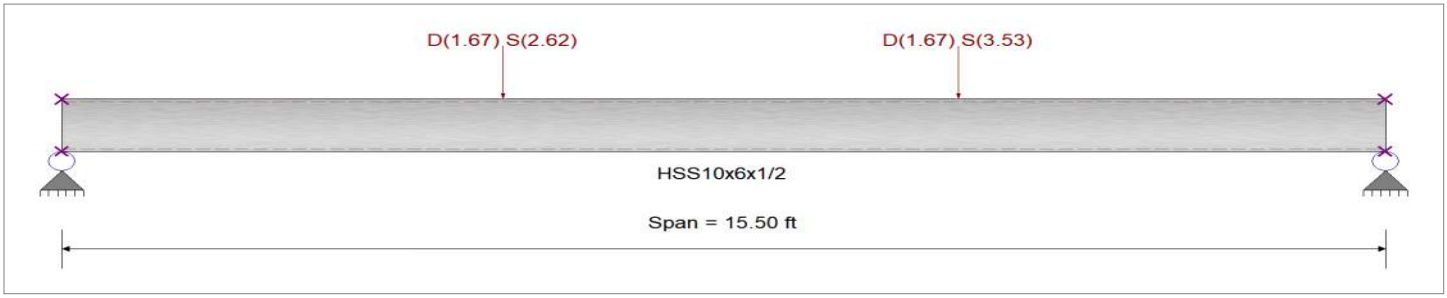
DESCRIPTION: 2B12: Slider Beam

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Completely Unbraced	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 calculated and added to loading
Load(s) for Span Number 1
Point Load : D = 1.670, S = 2.620 k @ 5.170 ft, (Roof Beam)

Point Load : D = 1.670, S = 3.530 k @ 10.50 ft, (Roof Beam)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.243 : 1	Maximum Shear Stress Ratio =	0.037 : 1
Section used for this span	HSS10x6x1/2	Section used for this span	HSS10x6x1/2
Ma : Applied	26.046 k-ft	Va : Applied	5.331 k
Mn / Omega : Allowable	107.285 k-ft	Vn/Omega : Allowable	143.760 k
Load Combination	+D+S	Load Combination	+D+S
Location of maximum on span	10.496 ft	Location of maximum on span	15.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.140 in	Ratio =	1,323 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.230 in	Ratio =	809 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 15.46 ft	1	0.093	0.014	9.96		9.96	179.17	107.29	1.13	1.00	2.06	240.08	143.76
Dsgn. L = 0.04 ft	1	0.001	0.014	0.09		0.09	179.17	107.29	1.00	1.00	2.07	240.08	143.76
+D+S													
Dsgn. L = 15.46 ft	1	0.243	0.037	26.05		26.05	179.17	107.29	1.14	1.00	5.33	240.08	143.76
Dsgn. L = 0.04 ft	1	0.002	0.037	0.24		0.24	179.17	107.29	1.00	1.00	5.33	240.08	143.76
+D+0.750S													
Dsgn. L = 15.46 ft	1	0.205	0.031	21.96		21.96	179.17	107.29	1.14	1.00	4.51	240.08	143.76
Dsgn. L = 0.04 ft	1	0.002	0.031	0.20		0.20	179.17	107.29	1.00	1.00	4.51	240.08	143.76
+0.60D													
Dsgn. L = 15.46 ft	1	0.056	0.009	5.98		5.98	179.17	107.29	1.13	1.00	1.24	240.08	143.76
Dsgn. L = 0.04 ft	1	0.001	0.009	0.05		0.05	179.17	107.29	1.00	1.00	1.24	240.08	143.76

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2298	7.839		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.914	5.331

Steel Beam

DESCRIPTION: 2B12: Slider Beam

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MINimum	1.218	1.240
D Only	2.029	2.066
+D+S	4.914	5.331
+D+0.750S	4.193	4.515
+0.60D	1.218	1.240
S Only	2.885	3.265

Steel Beam

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

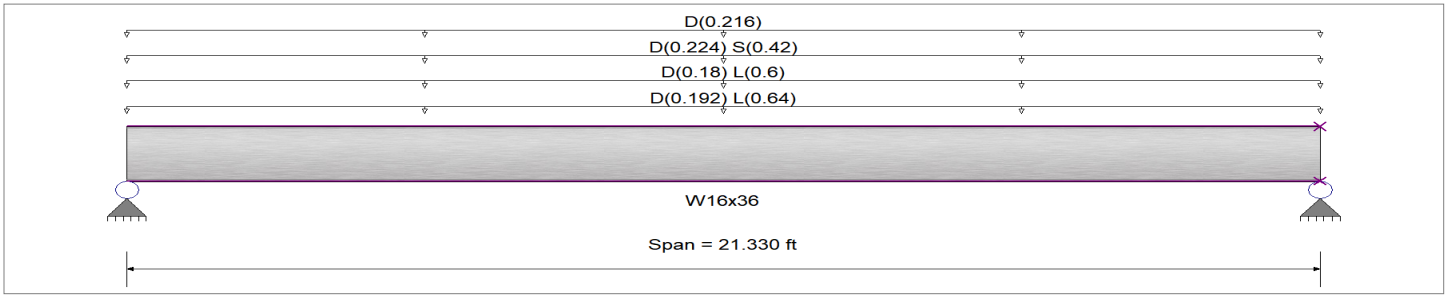
DESCRIPTION: Steel Beam Grid 11 (Gravity)

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
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 calculated and added to loading

Uniform Load : D = 0.0120, L = 0.040 ksf, Tributary Width = 16.0 ft, (Floor Load)

Uniform Load : D = 0.0120, L = 0.040 ksf, Tributary Width = 15.0 ft, (Second Floor)

Uniform Load : D = 0.0160, S = 0.030 ksf, Tributary Width = 14.0 ft, (Roof Load)

Uniform Load : D = 0.0120 ksf, Tributary Width = 18.0 ft, (Wall Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.745 : 1	Maximum Shear Stress Ratio =	0.238 : 1
Section used for this span	W16x36	Section used for this span	W16x36
Ma : Applied	119.036 k-ft	Va : Applied	22.323 k
Mn / Omega : Allowable	159.681 k-ft	Vn/Omega : Allowable	93.810 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
Location of maximum on span	10.665 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	0.446 in	Ratio =	573 >=480.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480.0
Max Downward Total Deflection	0.754 in	Ratio =	340 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 21.33 ft	1	0.302	0.096	48.23		48.23	266.67	159.68	1.00	1.00	9.04	140.72	93.81
+D+L													
Dsgn. L = 21.33 ft	1	0.744	0.237	118.75		118.75	266.67	159.68	1.00	1.00	22.27	140.72	93.81
+D+S													
Dsgn. L = 21.33 ft	1	0.452	0.144	72.12		72.12	266.67	159.68	1.00	1.00	13.52	140.72	93.81
+D+0.750L													
Dsgn. L = 21.33 ft	1	0.633	0.202	101.12		101.12	266.67	159.68	1.00	1.00	18.96	140.72	93.81
+D+0.750L+0.750S													
Dsgn. L = 21.33 ft	1	0.745	0.238	119.04		119.04	266.67	159.68	1.00	1.00	22.32	140.72	93.81
+0.60D													
Dsgn. L = 21.33 ft	1	0.181	0.058	28.94		28.94	266.67	159.68	1.00	1.00	5.43	140.72	93.81

Steel Beam

Lic. # : KW-06005835
QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Steel Beam Grid 11 (Gravity)

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.7538	10.726		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	22.323	22.323
Overall MINimum	4.479	4.479
D Only	9.045	9.045
+D+L	22.269	22.269
+D+S	13.524	13.524
+D+0.750L	18.963	18.963
+D+0.750L+0.750S	22.323	22.323
+0.60D	5.427	5.427
L Only	13.225	13.225
S Only	4.479	4.479

Steel Beam

Lic. # : KW-06005835 — QUANTUM CONSULTING ENGINEERS

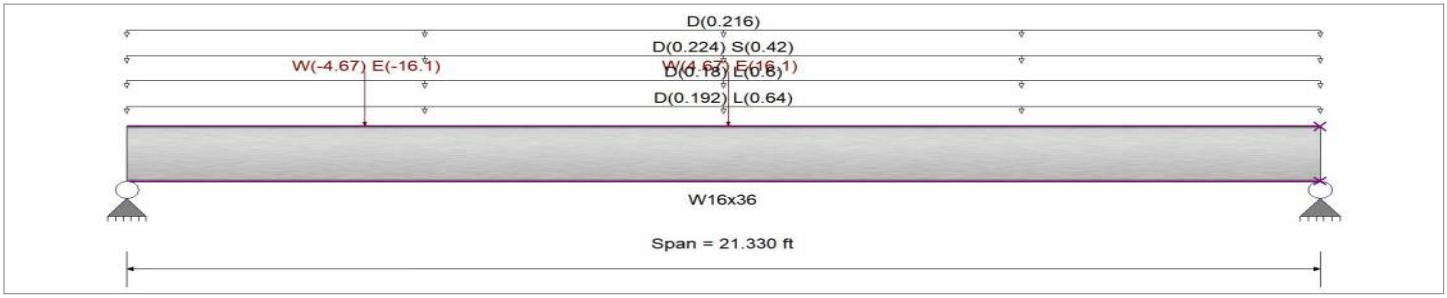
DESCRIPTION: Steel Beam Grid 11 (Lateral)

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
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 calculated and added to loading

Uniform Load : D = 0.0120, L = 0.040 ksf, Tributary Width = 16.0 ft, (Floor Load)

Uniform Load : D = 0.0120, L = 0.040 ksf, Tributary Width = 15.0 ft, (Second Floor)

Uniform Load : D = 0.0160, S = 0.030 ksf, Tributary Width = 14.0 ft, (Roof Load)

Uniform Load : D = 0.0120 ksf, Tributary Width = 18.0 ft, (Wall Load)

Point Load : W = -4.670, E = -16.10 k @ 4.250 ft, (SW-3)

Point Load : W = 4.670, E = 16.10 k @ 10.750 ft, (SW-3)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.915 : 1	Maximum Shear Stress Ratio =	0.265 : 1
Section used for this span	W16x36	Section used for this span	W16x36
Ma : Applied	146.177 k-ft	Va : Applied	24.899 k
Mn / Omega : Allowable	159.681 k-ft	Vn/Omega : Allowable	93.810 k
Load Combination	+D+0.750L+0.750S+0.5250E	Load Combination	+D+0.750L+0.750S+0.5250E
Location of maximum on span	10.787 ft	Location of maximum on span	21.330 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.446 in	Ratio =	573 >=480.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480.0
Max Downward Total Deflection	0.853 in	Ratio =	300 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 21.33 ft	1	0.302	0.096	48.23		48.23	266.67	159.68	1.00	1.00	9.04	140.72	93.81
+D+L													
Dsgn. L = 21.33 ft	1	0.744	0.237	118.75		118.75	266.67	159.68	1.00	1.00	22.27	140.72	93.81
+D+S													
Dsgn. L = 21.33 ft	1	0.452	0.144	72.12		72.12	266.67	159.68	1.00	1.00	13.52	140.72	93.81
+D+0.750L													
Dsgn. L = 21.33 ft	1	0.633	0.202	101.12		101.12	266.67	159.68	1.00	1.00	18.96	140.72	93.81
+D+0.750L+0.750S													
Dsgn. L = 21.33 ft	1	0.745	0.238	119.04		119.04	266.67	159.68	1.00	1.00	22.32	140.72	93.81

Steel Beam

DESCRIPTION: Steel Beam Grid 11 (Lateral)

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.60W													
Dsgn. L = 21.33 ft	1	0.358	0.106	57.23		57.23	266.67	159.68	1.00	1.00	9.90	140.72	93.81
+D+0.750L+0.450W													
Dsgn. L = 21.33 ft	1	0.675	0.209	107.86		107.86	266.67	159.68	1.00	1.00	19.60	140.72	93.81
+D+0.750L+0.750S+0.450W													
Dsgn. L = 21.33 ft	1	0.788	0.245	125.77		125.77	266.67	159.68	1.00	1.00	22.96	140.72	93.81
+0.60D+0.60W													
Dsgn. L = 21.33 ft	1	0.238	0.067	37.94		37.94	266.67	159.68	1.00	1.00	6.28	140.72	93.81
+D+0.70E													
Dsgn. L = 21.33 ft	1	0.529	0.141	84.43		84.43	266.67	159.68	1.00	1.00	13.26	140.72	93.81
+D+0.750L+0.750S+0.5250E													
Dsgn. L = 21.33 ft	1	0.915	0.265	146.18		146.18	266.67	159.68	1.00	1.00	24.90	140.72	93.81
+0.60D+0.70E													
Dsgn. L = 21.33 ft	1	0.408	0.118	65.14		65.14	266.67	159.68	1.00	1.00	11.09	140.72	93.81

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E	1	0.8530	10.909		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	22.323	24.898
Overall MINimum	-1.423	1.423
D Only	9.045	9.045
+D+L	22.269	22.269
+D+S	13.524	13.524
+D+0.750L	18.963	18.963
+D+0.750L+0.750S	22.323	22.323
+D+0.60W	8.191	9.899
+D+0.750L+0.450W	18.323	19.604
+D+0.750L+0.750S+0.450W	21.682	22.963
+0.60D+0.60W	4.573	6.281
+D+0.70E	5.610	12.479
+D+0.750L+0.750S+0.5250E	19.747	24.898
+0.60D+0.70E	1.993	8.861
L Only	13.225	13.225
S Only	4.479	4.479
W Only	-1.423	1.423
E Only	-4.906	4.906

Steel Beam

Lic. # : KW-06005835 QUANTUM CONSULTING ENGINEERS

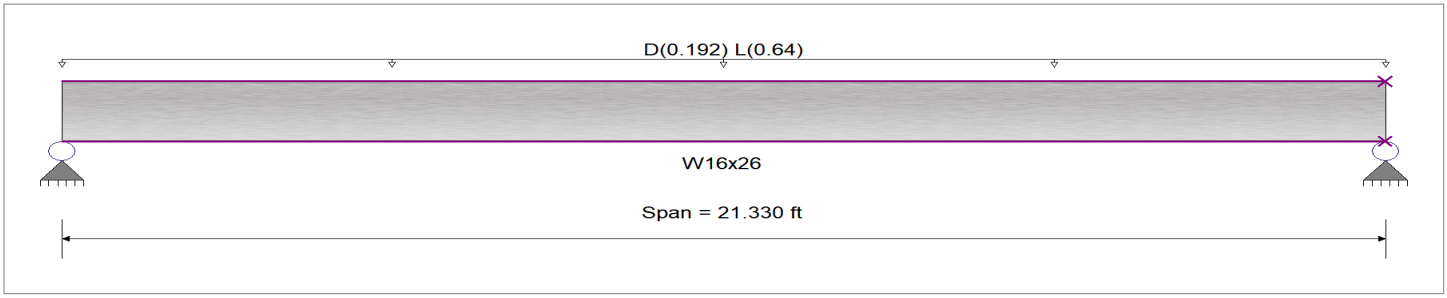
DESCRIPTION: Steel Beam Grid 8

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
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 calculated and added to loading
Uniform Load : D = 0.0120, L = 0.040 ksf, Tributary Width = 16.0 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.443 : 1	Maximum Shear Stress Ratio =	0.130 : 1
Section used for this span	W16x26	Section used for this span	W16x26
Ma : Applied	48.804 k-ft	Va : Applied	9.152 k
Mn / Omega : Allowable	110.279 k-ft	Vn/Omega : Allowable	70.509 k
Load Combination	+D+L	Load Combination	+D+L
Location of maximum on span	10.665 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	0.343 in	Ratio =	746 >=480.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <480.0
Max Downward Total Deflection	0.460 in	Ratio =	556 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 21.33 ft	1	0.112	0.033	12.41		12.41	184.17	110.28	1.00	1.00	2.33	117.75	70.51
+D+L													
Dsgn. L = 21.33 ft	1	0.443	0.130	48.80		48.80	184.17	110.28	1.00	1.00	9.15	117.75	70.51
+D+0.750L													
Dsgn. L = 21.33 ft	1	0.360	0.106	39.70		39.70	184.17	110.28	1.00	1.00	7.45	117.75	70.51
+0.60D													
Dsgn. L = 21.33 ft	1	0.067	0.020	7.44		7.44	184.17	110.28	1.00	1.00	1.40	117.75	70.51

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.4600	10.726		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.152	9.152
Overall MINimum	1.396	1.396
D Only	2.326	2.326
+D+L	9.152	9.152
+D+0.750L	7.446	7.446
+0.60D	1.396	1.396
L Only	6.826	6.826

Steel Base Plate

DESCRIPTION: HSS4x4 Base Plate

Code References

Calculations per AISC Design Guide # 1, IBC 2018, CBC 2019, ASCE 7-16, AISC 360-16
Load Combination Set : ASCE 7-16

General Information

Material Properties

AISC Design Method	Load Resistance Factor Design		Φ c : LRFD Resistance Factor	0.65
Steel Plate Fy	=	36 ksi		
Concrete Support f'c	=	3 ksi		
Assumed Bearing Area :	Full Bearing		Nominal Bearing Fp per J8	4.590 ksi

Column & Plate

Column Properties

Steel Section : HSS4x4x5/16

Depth	4 in	Area	4.1 in^2
Width	4 in	Ixx	9.14 in^4
Flange Thickness	0.291 in	Iyy	9.14 in^4
Web Thickness	0 in		

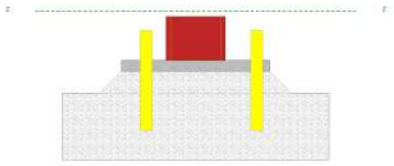
Plate Dimensions

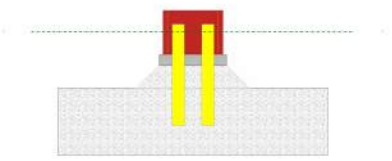
N : Length	10.0 in
B : Width	4.50 in
Thickness	0.750 in

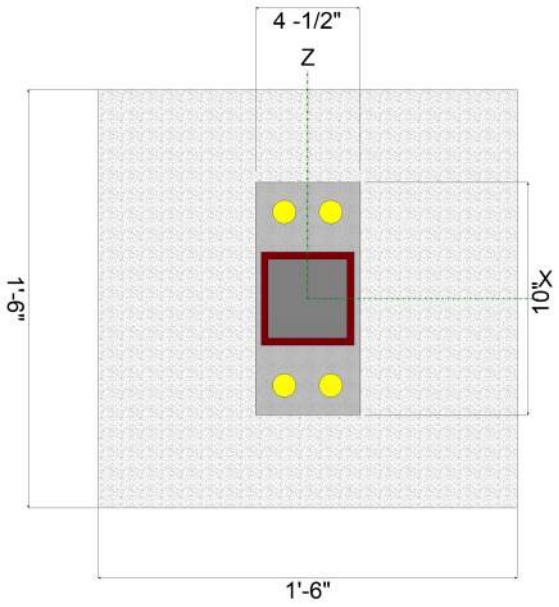
Column assumed welded to base plate.

Support Dimensions

Width along "X"	18.0 in
Length along "Z'	18.0 in





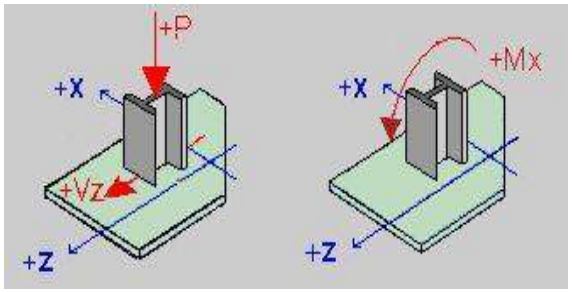


Applied Loads

	P-Y	V-Z	M-X
D : Dead Load	20.0 k	k	k-ft
L : Live	20.0 k	k	k-ft
Lr : Roof Live	k	k	k-ft
S : Snow	k	k	k-ft
W : Wind	k	k	k-ft
E : Earthquake	k	k	k-ft
H : Lateral Earth	k	k	k-ft

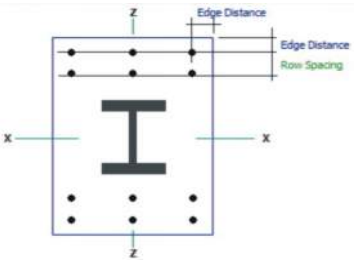
" P " = Gravity load, "+" sign is downward.

"+" Moments create higher soil pressure at +Z edge.
"+" Shears push plate towards +Z edge.



Anchor Bolts

Anchor Bolt or Rod Description	1 1/2"	
Max of Tension or Pullout Capacity.....		k
Shear Capacity.....		k
Edge distance : bolt to plate.....	1.25	in
Number of Bolts in each Row.....	2	
Number of Bolt Rows.....	1	



Steel Base Plate

DESCRIPTION: HSS4x4 Base Plate

GOVERNING DESIGN LOAD CASE SUMMARY

Plate Design Summary

Design Method	Load Resistance Factor Design
Governing Load Combination	+1.20D+1.60L
Governing Load Case Type	Axial Load Only
Governing STRESS RATIO	0.8749
Design Plate Size	10" x 4 -1/2" x 0 -3/4"

Pu : Axial	0.000	k
Mu : Moment	0.000	k-ft

Mu : Max. Moment	5.980	k-in
fb : Max. Bending Stress	28.348	ksi
Fb : Allowable : Fy * Phi	32.400	ksi
Bending Stress Ratio	0.875	
Bending Stress OK		
fu : Max. Plate Bearing Stress	1.244	ksi
Fp : Allowable :	2.984	ksi
Bearing Stress Ratio	0.417	
Bearing Stress OK		

Load Comb. : +1.40D

Axial Load Only, No Moment

Loading

Pu : Axial	28.000	k
Design Plate Height	10.000	in
Design Plate Width	4.500	in
Will be different from entry if partial bearing used.		
A1 : Plate Area	45.000	in^2
A2: Support Area	145.800	in^2
sqrt(A2/A1)	1.800	

Distance for Moment Calculation

" m "	3.100	in
" n "	0.350	in
X	0.000	in^2
Lambda	0.000	
n'	0.000	in
n' * Lambda	0.000	in
L = max(m, n, n")	3.100	in

Bearing Stresses

Fp : Allowable	2.984	ksi
fu : Max. Bearing Pressure	0.622	ksi
Stress Ratio	0.209	

Plate Bending Stresses

Mmax = Fu * L^2 / 2	2.990	k-in
fb : Actual	14.174	ksi
Fb : Allowable	32.400	ksi
Stress Ratio	0.437	

Load Comb. : +1.20D+1.60L

Axial Load Only, No Moment

Loading

Pu : Axial	56.000	k
Design Plate Height	10.000	in
Design Plate Width	4.500	in
Will be different from entry if partial bearing used.		
A1 : Plate Area	45.000	in^2
A2: Support Area	145.800	in^2
sqrt(A2/A1)	1.800	

Distance for Moment Calculation

" m "	3.100	in
" n "	0.350	in
X	0.000	in^2
Lambda	0.000	
n'	0.000	in
n' * Lambda	0.000	in
L = max(m, n, n")	3.100	in

Bearing Stresses

Fp : Allowable	2.984	ksi
fu : Max. Bearing Pressure	1.244	ksi
Stress Ratio	0.417	

Plate Bending Stresses

Mmax = Fu * L^2 / 2	5.980	k-in
fb : Actual	28.348	ksi
Fb : Allowable	32.400	ksi
Stress Ratio	0.875	

Steel Base Plate

DESCRIPTION: HSS4x4 Base Plate

Load Comb. : +1.20D+L

Axial Load Only, No Moment

Loading

Pu : Axial	44.000	k
Design Plate Height	10.000	in
Design Plate Width	4.500	in
Will be different from entry if partial bearing used.		
A1 : Plate Area	45.000	in^2
A2: Support Area	145.800	in^2
sqrt(A2/A1)	1.800	

Distance for Moment Calculation

" m "	3.100	in
" n "	0.350	in
X	0.000	in^2
Lambda	0.000	
n'	0.000	in
n' * Lambda	0.000	in
L = max(m, n, n")	3.100	in

Bearing Stresses

Fp : Allowable	2.984	ksi
fu : Max. Bearing Pressure	0.978	ksi
Stress Ratio	0.328	

Plate Bending Stresses

Mmax = Fu * L^2 / 2	4.698	k-in
fb : Actual	22.273	ksi
Fb : Allowable	32.400	ksi
Stress Ratio	0.687	

Load Comb. : +1.20D

Axial Load Only, No Moment

Loading

Pu : Axial	24.000	k
Design Plate Height	10.000	in
Design Plate Width	4.500	in
Will be different from entry if partial bearing used.		
A1 : Plate Area	45.000	in^2
A2: Support Area	145.800	in^2
sqrt(A2/A1)	1.800	

Distance for Moment Calculation

" m "	3.100	in
" n "	0.350	in
X	0.000	in^2
Lambda	0.000	
n'	0.000	in
n' * Lambda	0.000	in
L = max(m, n, n")	3.100	in

Bearing Stresses

Fp : Allowable	2.984	ksi
fu : Max. Bearing Pressure	0.533	ksi
Stress Ratio	0.179	

Plate Bending Stresses

Mmax = Fu * L^2 / 2	2.563	k-in
fb : Actual	12.149	ksi
Fb : Allowable	32.400	ksi
Stress Ratio	0.375	

Load Comb. : +0.90D

Axial Load Only, No Moment

Loading

Pu : Axial	18.000	k
Design Plate Height	10.000	in
Design Plate Width	4.500	in
Will be different from entry if partial bearing used.		
A1 : Plate Area	45.000	in^2
A2: Support Area	145.800	in^2
sqrt(A2/A1)	1.800	

Distance for Moment Calculation

" m "	3.100	in
" n "	0.350	in
X	0.000	in^2
Lambda	0.000	
n'	0.000	in
n' * Lambda	0.000	in
L = max(m, n, n")	3.100	in

Bearing Stresses

Fp : Allowable	2.984	ksi
fu : Max. Bearing Pressure	0.400	ksi
Stress Ratio	0.134	

Plate Bending Stresses

Mmax = Fu * L^2 / 2	1.922	k-in
fb : Actual	9.112	ksi
Fb : Allowable	32.400	ksi
Stress Ratio	0.281	

Railing Design Per IBC 2018

Design Railing Anchorage

1.) Railng

Railing is a glass panel pin system type railing by Viewrail the bolts onto the face of perimeter framing.
Railing anchorage to framing and design are by mfr, see ICC-ES Evaluation Report ESR-4799

2.) Wood Framing Attachment

Design Load:	200 lb
Joist Size:	2x8
Moment Arm:	5.75"
Tension:	1252 lb
Compression:	1252 lb

DTT2Z Connector Capacity is 1800 lb > 1252 lb OK

Attach directly to perpendicular joists, see blocking calc below
for parallel joists.Use blocking to transfer overturning force to joists.

Quantum Consulting Engineers LLC
1511 Third Avenue, Suite 323
Seattle, WA 98101

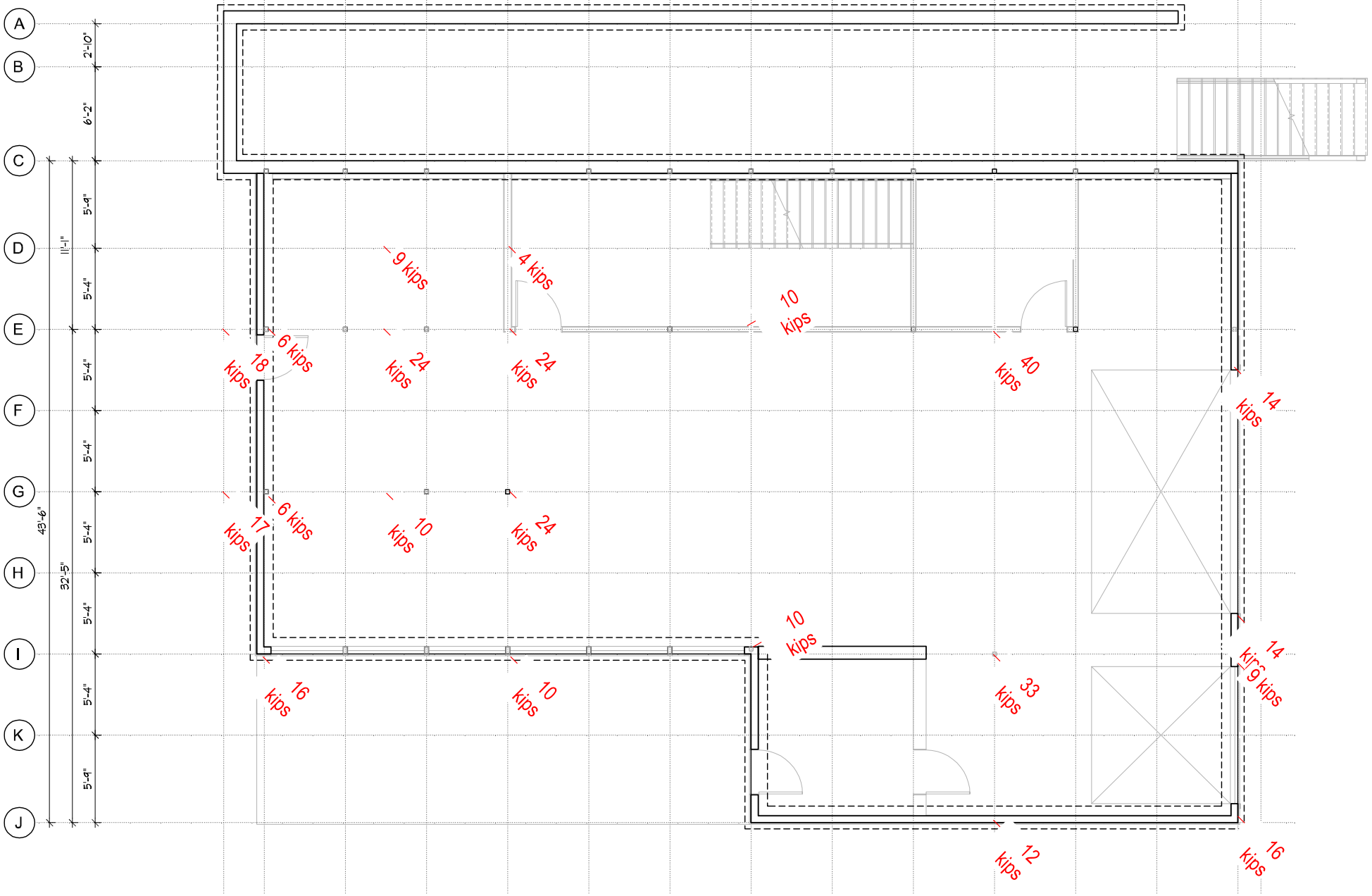
Project:	42252 - Intrachat	Job No:	22252.01
Client:	Lindal Cedar Homes	Date:	07/29/22
Designer:	TVM	Sheet:	

QUANTUM | CONSULTING ENGINEERS

42252 INTRACHAT RESIDENCE
7929 EAST MERCER WAY
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 22252.01

FOUNDATION DESIGN



Foundation Load Map

FOUNDATION / BASEMENT PLAN

SCALE: 1/4" = 1'-0"

Pipe Pile Loading

4"Ø Pipe Piles (10 ton capacity)

Grid 14

		Load Type				
Level	***Trib Width***	***Dead***		***Live***		***Snow***	
Roof	14 ft	16 psf	224 plf			30 psf	420 plf
2nd Flr	10 ft	12 psf	120 plf	40 psf	400 plf		
1st Flr	10 ft	12 psf	120 plf	40 psf	400 plf		
Walls	18 ft	12 psf	216 plf				
Grade BM.+1' Stem			400 plf				
Total			1080 plf		800 plf		420 plf

Load Case:

DL+LL = **1880 lb**

DL+0.75(LL+SL) = **1995 lb** *Controls*

Max Pile Spacing = **10.0 ft**

Grid C

		Load Type				
Level	***Trib Width***	***Dead***		***Live***		***Snow***	
Roof	12 ft	16 psf	192 plf			30 psf	360 plf
2nd Flr	6 ft	12 psf	72 plf	40 psf	240 plf		
1st Flr	6 ft	12 psf	72 plf	40 psf	240 plf		
Walls	18 ft	12 psf	216 plf				
Grade BM			300 plf				
Stem Wall			900 plf				
Total			1752 plf		480 plf		360 plf

Load Case:

DL+LL = **2232 lb**

DL+0.75(LL+SL) = **2382 lb** *Controls*

Max Pile Spacing = **8.4 ft**

Pipe Pile Loading

4"Ø Pipe Piles (10 ton capacity)

Grid E

		Load Type				
Level	***Trib Width***	***Dead***		***Live***		***Snow***
2nd Flr	5 ft	12 psf	60 plf	40 psf	200 plf	
1st Flr	5 ft	12 psf	60 plf	40 psf	200 plf	
Walls	18 ft	10 psf	180 plf			
Slab	10.7 ft	75 psf	800 plf	40 psf	427 plf	
Grade BM.+1' Stem			400 plf			
Total			1500 plf		827 plf	0 plf

Load Case:

DL+LL =	**2327 lb**	*Controls*
DL+0.75(LL+SL) =	**2120 lb**	
Max Pile Spacing =	**8.6 ft**	

Grid G

		Load Type				
Level	***Trib Width***	***Dead***		***Live***		***Snow***
Slab	11 ft	75 psf	800 plf	40 psf	427 plf	
Grade BM.+1' Stem			400 plf			
Total			1200 plf		427 plf	0 plf

Load Case:

DL+LL =	**1627 lb**	*Controls*
DL+0.75(LL+SL) =	**1520 lb**	
Max Pile Spacing =	**12.3 ft**	

Pipe Pile Loading

4"Ø Pipe Piles (10 ton capacity)

Grid I (5-8)

		Load Type				
Level	***Trib Width***	***Dead***		***Live***		***Snow***
Roof	17 ft	16 psf	272 plf			30 psf 510 plf
Walls	27 ft	12 psf	324 plf			
Slab	6 ft	75 psf	413 plf	40 psf	220 plf	
Grade BM.+1' Stem			400 plf			
Total			1409 plf		220 plf	510 plf

Load Case:

DL+LL = **1629 lb**

DL+0.75(LL+SL) = **1956 lb** *Controls*

Max Pile Spacing = **10.2 ft**

Grid I (1-5)

		Load Type				
Level	***Trib Width***	***Dead***		***Live***		***Snow***
Deck	6 ft	15 psf	90 plf	60 psf	360 plf	
Walls	8 ft	12 psf	96 plf			
Slab	6 ft	75 psf	413 plf	40 psf	220 plf	
Grade BM.+1' Stem			400 plf			
Total			999 plf		580 plf	0 plf

Load Case:

DL+LL = **1579 lb** *Controls*

DL+0.75(LL+SL) = **1434 lb**

Max Pile Spacing = **12.7 ft**

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

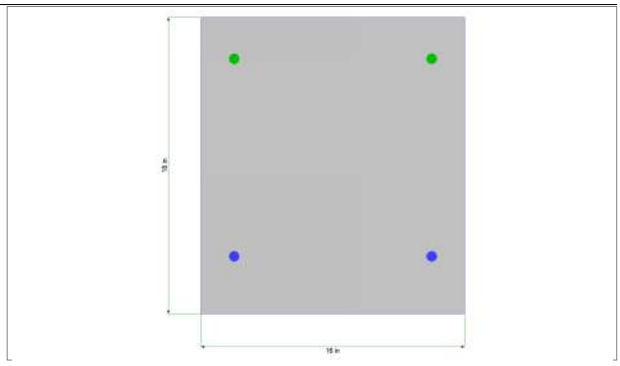
DESCRIPTION: Grade Beam Grid I/4-5

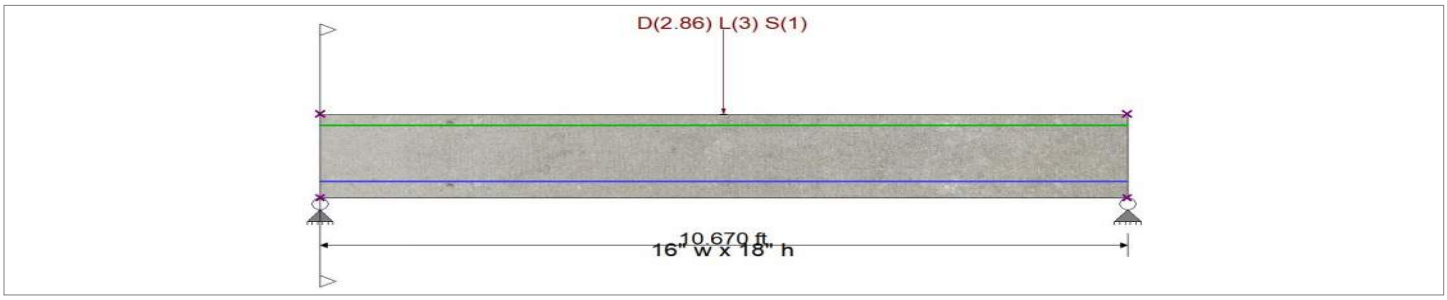
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	375.0 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	2,850.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2





Cross Section & Reinforcing Details

Rectangular Section, Width = 16.0 in, Height = 18.0 in
Span #1 Reinforcing....
2-#5 at 3.50 in from Bottom, from 0.0 to 10.670 ft in this span
2-#5 at 2.50 in from Top, from 0.0 to 10.670 ft in this span

Beam self weight calculated and added to loads
Point Load : D = 2.860, L = 3.0, S = 1.0 k @ 5.330 ft, (IB8 Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.698** : 1	Maximum Deflection			
Section used for this span		**Typical Section**	Max Downward Transient Deflection	0.006 in	Ratio =	21637 >=360
Mu : Applied		28.224 k-ft	Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Mn * Phi : Allowable		40.431 k-ft	Max Downward Total Deflection	0.015 in	Ratio =	8328 >=180
Location of maximum on span		5.325 ft	Max Upward Total Deflection	0.000 in	Ratio =	0 <180.0
Span # where maximum occurs		Span # 1				

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	4.480	4.474
Overall MINimum	0.500	0.500
D Only	2.978	2.976
+D+L	4.480	4.474
+D+S	3.479	3.475
+D+0.750L	4.105	4.100
+D+0.750L+0.750S	4.480	4.474
+0.60D	1.787	1.785
L Only	1.501	1.499
S Only	0.500	0.500

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Concrete Beam

DESCRIPTION: Grade Beam Grid I/4-5

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	10.670	28.22	40.43	0.70
+1.40D					
Span # 1	1	10.670	16.45	40.43	0.41
+1.20D+1.60L					
Span # 1	1	10.670	26.89	40.43	0.67
+1.20D+1.60L+0.50S					
Span # 1	1	10.670	28.22	40.43	0.70
+1.20D+L					
Span # 1	1	10.670	22.09	40.43	0.55
+1.20D					
Span # 1	1	10.670	14.10	40.43	0.35
+1.20D+L+1.60S					
Span # 1	1	10.670	26.36	40.43	0.65
+1.20D+1.60S					
Span # 1	1	10.670	18.36	40.43	0.45
+1.20D+L+0.50S					
Span # 1	1	10.670	23.43	40.43	0.58
+0.90D					
Span # 1	1	10.670	10.57	40.43	0.26
+1.20D+L+0.20S					
Span # 1	1	10.670	22.63	40.43	0.56

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.750L+0.750S	1	0.0154	5.335		0.0000	0.000

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

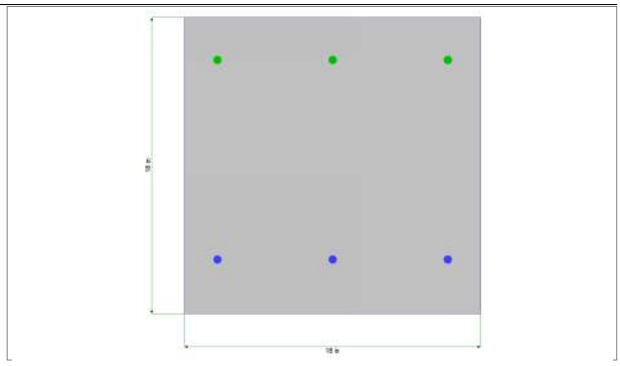
DESCRIPTION: Grade Beam Grid G (Continuous)

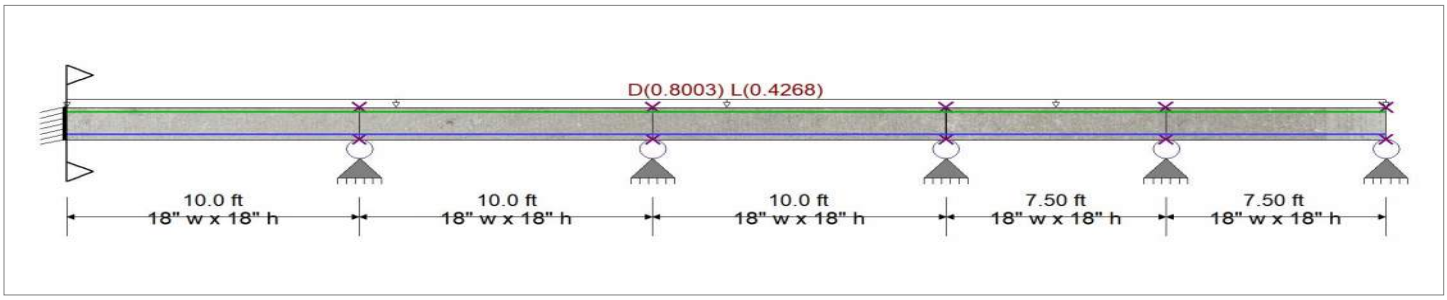
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.02 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2





Cross Section & Reinforcing Details

Rectangular Section, Width = 18.0 in, Height = 18.0 in

Span #1 Reinforcing....
3-#4 at 3.310 in from Bottom, from 0.0 to 10.0 ft in this span
3-#4 at 2.560 in from Top, from 0.0 to 10.0 ft in this span

Span #2 Reinforcing....
2-#5 at 3.310 in from Bottom, from 0.0 to 10.0 ft in this span
2-#5 at 2.560 in from Top, from 0.0 to 10.0 ft in this span

Span #3 Reinforcing....
2-#5 at 3.310 in from Bottom, from 0.0 to 10.0 ft in this span
2-#5 at 2.560 in from Top, from 0.0 to 10.0 ft in this span

Span #4 Reinforcing....
2-#5 at 3.310 in from Bottom, from 0.0 to 7.50 ft in this span
2-#5 at 2.560 in from Top, from 0.0 to 7.50 ft in this span

Span #5 Reinforcing....
2-#5 at 3.310 in from Bottom, from 0.0 to 7.50 ft in this span
2-#5 at 2.560 in from Top, from 0.0 to 7.50 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.0750, L = 0.040

Uniform Load on ALL spans : D = 0.0750, L = 0.040 ksf, Tributary Width = 10.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.412** : 1	Maximum Deflection		
Section used for this span		**Typical Section**	Max Downward Transient Deflection	0.002 in	Ratio = 64910 >=360
Mu : Applied		-19.098 k-ft	Max Upward Transient Deflection	-0.001 in	Ratio = 107912 >=360
Mn * Phi : Allowable		46.390 k-ft	Max Downward Total Deflection	0.004 in	Ratio = 28069 >=180
Location of maximum on span		0.000 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 <180.0
Span # where maximum occurs		Span # 1			

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6
Overall MAXimum	8.174	15.791	16.447	14.156	13.091	4.889
Overall MINimum	0.004	-0.017	0.060	0.081	-0.027	0.004
+D+H	5.657	11.168	11.604	9.750	9.103	3.411

Concrete Beam

DESCRIPTION: Grade Beam Grid G (Continuous)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6
+D+L+H, LL Comb Run (****L)	5.661	11.151	11.663	9.441	11.177	4.799
+D+L+H, LL Comb Run (***L*)	5.644	11.219	11.424	11.476	10.882	3.248
+D+L+H, LL Comb Run (***LL)	5.648	11.202	11.484	11.167	12.956	4.636
+D+L+H, LL Comb Run (**L**)	5.750	10.794	13.980	12.349	8.590	3.497
+D+L+H, LL Comb Run (**L*L)	5.755	10.777	14.040	12.040	10.665	4.885
+D+L+H, LL Comb Run (**LL*)	5.737	10.845	13.801	14.075	10.369	3.334
+D+L+H, LL Comb Run (**LLL)	5.742	10.828	13.861	13.766	12.444	4.722
+D+L+H, LL Comb Run (*L***)	5.295	13.682	14.011	9.347	9.238	3.389
+D+L+H, LL Comb Run (*L**L)	5.299	13.664	14.070	9.038	11.312	4.777
+D+L+H, LL Comb Run (*L*L*)	5.282	13.733	13.832	11.073	11.016	3.226
+D+L+H, LL Comb Run (*L*LL)	5.287	13.716	13.891	10.764	13.091	4.614
+D+L+H, LL Comb Run (*LL**)	5.389	13.307	16.387	11.946	8.725	3.474
+D+L+H, LL Comb Run (*LL*L)	5.393	13.290	16.447	11.637	10.800	4.862
+D+L+H, LL Comb Run (*LLL*)	5.376	13.359	16.208	13.672	10.504	3.311
+D+L+H, LL Comb Run (*LLLL)	5.380	13.341	16.268	13.363	12.579	4.699
+D+L+H, LL Comb Run (L****)	8.076	13.226	11.336	9.830	9.076	3.416
+D+L+H, LL Comb Run (L***L)	8.081	13.209	11.395	9.522	11.150	4.804
+D+L+H, LL Comb Run (L**L*)	8.064	13.278	11.156	11.557	10.855	3.253
+D+L+H, LL Comb Run (L**LL)	8.068	13.261	11.216	11.248	12.929	4.641
+D+L+H, LL Comb Run (L*L**)	8.170	12.852	13.712	12.429	8.563	3.501
+D+L+H, LL Comb Run (L*L*L)	8.174	12.835	13.772	12.121	10.638	4.889
+D+L+H, LL Comb Run (L*LL*)	8.157	12.903	13.533	14.156	10.342	3.338
+D+L+H, LL Comb Run (L*LLL)	8.161	12.886	13.593	13.847	12.417	4.726
+D+L+H, LL Comb Run (LL***)	7.715	15.740	13.743	9.427	9.211	3.393
+D+L+H, LL Comb Run (LL**L)	7.719	15.723	13.802	9.119	11.285	4.781
+D+L+H, LL Comb Run (LL*L*)	7.702	15.791	13.564	11.153	10.989	3.230
+D+L+H, LL Comb Run (LL*LL)	7.706	15.774	13.623	10.845	13.064	4.618
+D+L+H, LL Comb Run (LLL**)	7.808	15.365	16.119	12.026	8.698	3.479
+D+L+H, LL Comb Run (LLL*L)	7.813	15.348	16.179	11.718	10.773	4.867
+D+L+H, LL Comb Run (LLLL*)	7.796	15.417	15.940	13.752	10.477	3.316
+D+L+H, LL Comb Run (LLLLL)	7.800	15.400	16.000	13.444	12.552	4.704
+D+Lr+H, LL Comb Run (****L)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (***L*)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (***LL)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (**L**)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (**L*L)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (**LL*)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (**LLL)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (*L***)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (*L**L)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (*L*L*)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (*L*LL)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (*LL**)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (*LL*L)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (*LLL*)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (*LLLL)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (L****)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (L***L)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (L**L*)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (L**LL)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (L*L**)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (L*L*L)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (L*LL*)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (L*LLL)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (LL***)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (LL**L)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (LL*L*)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (LL*LL)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (LLL**)	5.657	11.168	11.604	9.750	9.103	3.411

DESCRIPTION: Grade Beam Grid G (Continuous)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6
+D+Lr+H, LL Comb Run (LLL*L)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (LLLL*)	5.657	11.168	11.604	9.750	9.103	3.411
+D+Lr+H, LL Comb Run (LLLLL)	5.657	11.168	11.604	9.750	9.103	3.411
+D+S+H	5.657	11.168	11.604	9.750	9.103	3.411
+D+0.750Lr+0.750L+H, LL Comb Run (	5.660	11.155	11.648	9.518	10.659	4.452
+D+0.750Lr+0.750L+H, LL Comb Run (	5.647	11.207	11.469	11.044	10.437	3.289
+D+0.750Lr+0.750L+H, LL Comb Run (	5.650	11.194	11.514	10.813	11.993	4.330
+D+0.750Lr+0.750L+H, LL Comb Run (	5.727	10.888	13.386	11.699	8.718	3.475
+D+0.750Lr+0.750L+H, LL Comb Run (	5.730	10.875	13.431	11.468	10.274	4.516
+D+0.750Lr+0.750L+H, LL Comb Run (	5.717	10.926	13.252	12.994	10.053	3.353
+D+0.750Lr+0.750L+H, LL Comb Run (	5.720	10.913	13.297	12.762	11.608	4.394
+D+0.750Lr+0.750L+H, LL Comb Run (	5.386	13.053	13.409	9.447	9.204	3.394
+D+0.750Lr+0.750L+H, LL Comb Run (	5.389	13.040	13.454	9.216	10.760	4.436
+D+0.750Lr+0.750L+H, LL Comb Run (	5.376	13.092	13.275	10.742	10.538	3.272
+D+0.750Lr+0.750L+H, LL Comb Run (	5.379	13.079	13.319	10.511	12.094	4.313
+D+0.750Lr+0.750L+H, LL Comb Run (	5.456	12.773	15.192	11.397	8.820	3.459
+D+0.750Lr+0.750L+H, LL Comb Run (	5.459	12.760	15.236	11.165	10.376	4.500
+D+0.750Lr+0.750L+H, LL Comb Run (	5.446	12.811	15.057	12.691	10.154	3.336
+D+0.750Lr+0.750L+H, LL Comb Run (	5.449	12.798	15.102	12.460	11.710	4.377
+D+0.750Lr+0.750L+H, LL Comb Run (	7.471	12.712	11.403	9.810	9.083	3.415
+D+0.750Lr+0.750L+H, LL Comb Run (	7.475	12.699	11.447	9.579	10.638	4.456
+D+0.750Lr+0.750L+H, LL Comb Run (	7.462	12.750	11.268	11.105	10.417	3.292
+D+0.750Lr+0.750L+H, LL Comb Run (	7.465	12.737	11.313	10.873	11.973	4.333
+D+0.750Lr+0.750L+H, LL Comb Run (	7.542	12.431	13.185	11.760	8.698	3.479
+D+0.750Lr+0.750L+H, LL Comb Run (	7.545	12.418	13.230	11.528	10.254	4.520
+D+0.750Lr+0.750L+H, LL Comb Run (	7.532	12.470	13.051	13.054	10.032	3.356
+D+0.750Lr+0.750L+H, LL Comb Run (	7.535	12.457	13.096	12.823	11.588	4.398
+D+0.750Lr+0.750L+H, LL Comb Run (	7.200	14.597	13.208	9.508	9.184	3.398
+D+0.750Lr+0.750L+H, LL Comb Run (	7.203	14.584	13.253	9.276	10.740	4.439
+D+0.750Lr+0.750L+H, LL Comb Run (	7.191	14.635	13.074	10.803	10.518	3.276
+D+0.750Lr+0.750L+H, LL Comb Run (	7.194	14.622	13.118	10.571	12.074	4.317
+D+0.750Lr+0.750L+H, LL Comb Run (	7.270	14.316	14.991	11.457	8.799	3.462
+D+0.750Lr+0.750L+H, LL Comb Run (	7.274	14.303	15.035	11.226	10.355	4.503
+D+0.750Lr+0.750L+H, LL Comb Run (	7.261	14.355	14.856	12.752	10.133	3.340
+D+0.750Lr+0.750L+H, LL Comb Run (	7.264	14.342	14.901	12.520	11.689	4.381
+D+0.750L+0.750S+H, LL Comb Run (*	5.660	11.155	11.648	9.518	10.659	4.452
+D+0.750L+0.750S+H, LL Comb Run (*	5.647	11.207	11.469	11.044	10.437	3.289
+D+0.750L+0.750S+H, LL Comb Run (*	5.650	11.194	11.514	10.813	11.993	4.330
+D+0.750L+0.750S+H, LL Comb Run (*	5.727	10.888	13.386	11.699	8.718	3.475
+D+0.750L+0.750S+H, LL Comb Run (*	5.730	10.875	13.431	11.468	10.274	4.516
+D+0.750L+0.750S+H, LL Comb Run (*	5.717	10.926	13.252	12.994	10.053	3.353
+D+0.750L+0.750S+H, LL Comb Run (*	5.720	10.913	13.297	12.762	11.608	4.394
+D+0.750L+0.750S+H, LL Comb Run (*	5.386	13.053	13.409	9.447	9.204	3.394
+D+0.750L+0.750S+H, LL Comb Run (*	5.389	13.040	13.454	9.216	10.760	4.436
+D+0.750L+0.750S+H, LL Comb Run (*	5.376	13.092	13.275	10.742	10.538	3.272
+D+0.750L+0.750S+H, LL Comb Run (*	5.379	13.079	13.319	10.511	12.094	4.313
+D+0.750L+0.750S+H, LL Comb Run (*	5.456	12.773	15.192	11.397	8.820	3.459
+D+0.750L+0.750S+H, LL Comb Run (*	5.459	12.760	15.236	11.165	10.376	4.500
+D+0.750L+0.750S+H, LL Comb Run (*	5.446	12.811	15.057	12.691	10.154	3.336
+D+0.750L+0.750S+H, LL Comb Run (*	5.449	12.798	15.102	12.460	11.710	4.377
+D+0.750L+0.750S+H, LL Comb Run (L	7.471	12.712	11.403	9.810	9.083	3.415
+D+0.750L+0.750S+H, LL Comb Run (L	7.475	12.699	11.447	9.579	10.638	4.456
+D+0.750L+0.750S+H, LL Comb Run (L	7.462	12.750	11.268	11.105	10.417	3.292
+D+0.750L+0.750S+H, LL Comb Run (L	7.465	12.737	11.313	10.873	11.973	4.333
+D+0.750L+0.750S+H, LL Comb Run (L	7.542	12.431	13.185	11.760	8.698	3.479
+D+0.750L+0.750S+H, LL Comb Run (L	7.545	12.418	13.230	11.528	10.254	4.520
+D+0.750L+0.750S+H, LL Comb Run (L	7.532	12.470	13.051	13.054	10.032	3.356
+D+0.750L+0.750S+H, LL Comb Run (L	7.535	12.457	13.096	12.823	11.588	4.398
+D+0.750L+0.750S+H, LL Comb Run (L	7.200	14.597	13.208	9.508	9.184	3.398

DESCRIPTION: Grade Beam Grid G (Continuous)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6
+D+0.750L+0.750S+H, LL Comb Run (L	7.203	14.584	13.253	9.276	10.740	4.439
+D+0.750L+0.750S+H, LL Comb Run (L	7.191	14.635	13.074	10.803	10.518	3.276
+D+0.750L+0.750S+H, LL Comb Run (L	7.194	14.622	13.118	10.571	12.074	4.317
+D+0.750L+0.750S+H, LL Comb Run (L	7.270	14.316	14.991	11.457	8.799	3.462
+D+0.750L+0.750S+H, LL Comb Run (L	7.274	14.303	15.035	11.226	10.355	4.503
+D+0.750L+0.750S+H, LL Comb Run (L	7.261	14.355	14.856	12.752	10.133	3.340
+D+0.750L+0.750S+H, LL Comb Run (L	7.264	14.342	14.901	12.520	11.689	4.381
+D+0.60W+H	5.657	11.168	11.604	9.750	9.103	3.411
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.660	11.155	11.648	9.518	10.659	4.452
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.647	11.207	11.469	11.044	10.437	3.289
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.650	11.194	11.514	10.813	11.993	4.330
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.727	10.888	13.386	11.699	8.718	3.475
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.730	10.875	13.431	11.468	10.274	4.516
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.717	10.926	13.252	12.994	10.053	3.353
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.720	10.913	13.297	12.762	11.608	4.394
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.386	13.053	13.409	9.447	9.204	3.394
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.389	13.040	13.454	9.216	10.760	4.436
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.376	13.092	13.275	10.742	10.538	3.272
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.379	13.079	13.319	10.511	12.094	4.313
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.456	12.773	15.192	11.397	8.820	3.459
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.459	12.760	15.236	11.165	10.376	4.500
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.446	12.811	15.057	12.691	10.154	3.336
+D+0.750Lr+0.750L+0.450W+H, LL Com	5.449	12.798	15.102	12.460	11.710	4.377
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.471	12.712	11.403	9.810	9.083	3.415
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.475	12.699	11.447	9.579	10.638	4.456
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.462	12.750	11.268	11.105	10.417	3.292
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.465	12.737	11.313	10.873	11.973	4.333
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.542	12.431	13.185	11.760	8.698	3.479
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.545	12.418	13.230	11.528	10.254	4.520
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.532	12.470	13.051	13.054	10.032	3.356
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.535	12.457	13.096	12.823	11.588	4.398
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.200	14.597	13.208	9.508	9.184	3.398
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.203	14.584	13.253	9.276	10.740	4.439
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.191	14.635	13.074	10.803	10.518	3.276
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.194	14.622	13.118	10.571	12.074	4.317
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.270	14.316	14.991	11.457	8.799	3.462
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.274	14.303	15.035	11.226	10.355	4.503
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.261	14.355	14.856	12.752	10.133	3.340
+D+0.750Lr+0.750L+0.450W+H, LL Com	7.264	14.342	14.901	12.520	11.689	4.381
+D+0.750L+0.750S+0.450W+H, LL Comb	5.660	11.155	11.648	9.518	10.659	4.452
+D+0.750L+0.750S+0.450W+H, LL Comb	5.647	11.207	11.469	11.044	10.437	3.289
+D+0.750L+0.750S+0.450W+H, LL Comb	5.650	11.194	11.514	10.813	11.993	4.330
+D+0.750L+0.750S+0.450W+H, LL Comb	5.727	10.888	13.386	11.699	8.718	3.475
+D+0.750L+0.750S+0.450W+H, LL Comb	5.730	10.875	13.431	11.468	10.274	4.516
+D+0.750L+0.750S+0.450W+H, LL Comb	5.717	10.926	13.252	12.994	10.053	3.353
+D+0.750L+0.750S+0.450W+H, LL Comb	5.720	10.913	13.297	12.762	11.608	4.394
+D+0.750L+0.750S+0.450W+H, LL Comb	5.386	13.053	13.409	9.447	9.204	3.394
+D+0.750L+0.750S+0.450W+H, LL Comb	5.389	13.040	13.454	9.216	10.760	4.436
+D+0.750L+0.750S+0.450W+H, LL Comb	5.376	13.092	13.275	10.742	10.538	3.272
+D+0.750L+0.750S+0.450W+H, LL Comb	5.379	13.079	13.319	10.511	12.094	4.313
+D+0.750L+0.750S+0.450W+H, LL Comb	5.456	12.773	15.192	11.397	8.820	3.459
+D+0.750L+0.750S+0.450W+H, LL Comb	5.459	12.760	15.236	11.165	10.376	4.500
+D+0.750L+0.750S+0.450W+H, LL Comb	5.446	12.811	15.057	12.691	10.154	3.336
+D+0.750L+0.750S+0.450W+H, LL Comb	5.449	12.798	15.102	12.460	11.710	4.377
+D+0.750L+0.750S+0.450W+H, LL Comb	7.471	12.712	11.403	9.810	9.083	3.415
+D+0.750L+0.750S+0.450W+H, LL Comb	7.475	12.699	11.447	9.579	10.638	4.456
+D+0.750L+0.750S+0.450W+H, LL Comb	7.462	12.750	11.268	11.105	10.417	3.292
+D+0.750L+0.750S+0.450W+H, LL Comb	7.465	12.737	11.313	10.873	11.973	4.333
+D+0.750L+0.750S+0.450W+H, LL Comb	7.542	12.431	13.185	11.760	8.698	3.479

DESCRIPTION: Grade Beam Grid G (Continuous)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6
+D+0.750L+0.750S+0.450W+H, LL Comb	7.545	12.418	13.230	11.528	10.254	4.520
+D+0.750L+0.750S+0.450W+H, LL Comb	7.532	12.470	13.051	13.054	10.032	3.356
+D+0.750L+0.750S+0.450W+H, LL Comb	7.535	12.457	13.096	12.823	11.588	4.398
+D+0.750L+0.750S+0.450W+H, LL Comb	7.200	14.597	13.208	9.508	9.184	3.398
+D+0.750L+0.750S+0.450W+H, LL Comb	7.203	14.584	13.253	9.276	10.740	4.439
+D+0.750L+0.750S+0.450W+H, LL Comb	7.191	14.635	13.074	10.803	10.518	3.276
+D+0.750L+0.750S+0.450W+H, LL Comb	7.194	14.622	13.118	10.571	12.074	4.317
+D+0.750L+0.750S+0.450W+H, LL Comb	7.270	14.316	14.991	11.457	8.799	3.462
+D+0.750L+0.750S+0.450W+H, LL Comb	7.274	14.303	15.035	11.226	10.355	4.503
+D+0.750L+0.750S+0.450W+H, LL Comb	7.261	14.355	14.856	12.752	10.133	3.340
+D+0.750L+0.750S+0.450W+H, LL Comb	7.264	14.342	14.901	12.520	11.689	4.381
+0.60D+0.60W+0.60H	3.394	6.701	6.962	5.850	5.462	2.047
+D+0.70E+0.60H	5.657	11.168	11.604	9.750	9.103	3.411
+D+0.750L+0.750S+0.5250E+H, LL Com	5.660	11.155	11.648	9.518	10.659	4.452
+D+0.750L+0.750S+0.5250E+H, LL Com	5.647	11.207	11.469	11.044	10.437	3.289
+D+0.750L+0.750S+0.5250E+H, LL Com	5.650	11.194	11.514	10.813	11.993	4.330
+D+0.750L+0.750S+0.5250E+H, LL Com	5.727	10.888	13.386	11.699	8.718	3.475
+D+0.750L+0.750S+0.5250E+H, LL Com	5.730	10.875	13.431	11.468	10.274	4.516
+D+0.750L+0.750S+0.5250E+H, LL Com	5.717	10.926	13.252	12.994	10.053	3.353
+D+0.750L+0.750S+0.5250E+H, LL Com	5.720	10.913	13.297	12.762	11.608	4.394
+D+0.750L+0.750S+0.5250E+H, LL Com	5.386	13.053	13.409	9.447	9.204	3.394
+D+0.750L+0.750S+0.5250E+H, LL Com	5.389	13.040	13.454	9.216	10.760	4.436
+D+0.750L+0.750S+0.5250E+H, LL Com	5.376	13.092	13.275	10.742	10.538	3.272
+D+0.750L+0.750S+0.5250E+H, LL Com	5.379	13.079	13.319	10.511	12.094	4.313
+D+0.750L+0.750S+0.5250E+H, LL Com	5.456	12.773	15.192	11.397	8.820	3.459
+D+0.750L+0.750S+0.5250E+H, LL Com	5.459	12.760	15.236	11.165	10.376	4.500
+D+0.750L+0.750S+0.5250E+H, LL Com	5.446	12.811	15.057	12.691	10.154	3.336
+D+0.750L+0.750S+0.5250E+H, LL Com	5.449	12.798	15.102	12.460	11.710	4.377
+D+0.750L+0.750S+0.5250E+H, LL Com	7.471	12.712	11.403	9.810	9.083	3.415
+D+0.750L+0.750S+0.5250E+H, LL Com	7.475	12.699	11.447	9.579	10.638	4.456
+D+0.750L+0.750S+0.5250E+H, LL Com	7.462	12.750	11.268	11.105	10.417	3.292
+D+0.750L+0.750S+0.5250E+H, LL Com	7.465	12.737	11.313	10.873	11.973	4.333
+D+0.750L+0.750S+0.5250E+H, LL Com	7.542	12.431	13.185	11.760	8.698	3.479
+D+0.750L+0.750S+0.5250E+H, LL Com	7.545	12.418	13.230	11.528	10.254	4.520
+D+0.750L+0.750S+0.5250E+H, LL Com	7.532	12.470	13.051	13.054	10.032	3.356
+D+0.750L+0.750S+0.5250E+H, LL Com	7.535	12.457	13.096	12.823	11.588	4.398
+D+0.750L+0.750S+0.5250E+H, LL Com	7.200	14.597	13.208	9.508	9.184	3.398
+D+0.750L+0.750S+0.5250E+H, LL Com	7.203	14.584	13.253	9.276	10.740	4.439
+D+0.750L+0.750S+0.5250E+H, LL Com	7.191	14.635	13.074	10.803	10.518	3.276
+D+0.750L+0.750S+0.5250E+H, LL Com	7.194	14.622	13.118	10.571	12.074	4.317
+D+0.750L+0.750S+0.5250E+H, LL Com	7.270	14.316	14.991	11.457	8.799	3.462
+D+0.750L+0.750S+0.5250E+H, LL Com	7.274	14.303	15.035	11.226	10.355	4.503
+D+0.750L+0.750S+0.5250E+H, LL Com	7.261	14.355	14.856	12.752	10.133	3.340
+D+0.750L+0.750S+0.5250E+H, LL Com	7.264	14.342	14.901	12.520	11.689	4.381
+0.60D+0.70E+H	3.394	6.701	6.962	5.850	5.462	2.047
D Only	5.657	11.168	11.604	9.750	9.103	3.411
L Only, LL Comb Run (****L)	0.004	-0.017	0.060	-0.309	2.075	1.388
L Only, LL Comb Run (***L*)	-0.013	0.051	-0.179	1.726	1.779	-0.163
L Only, LL Comb Run (***LL)	-0.009	0.034	-0.119	1.418	3.853	1.225
L Only, LL Comb Run (**L**)	0.094	-0.374	2.377	2.599	-0.512	0.085
L Only, LL Comb Run (**L*L)	0.098	-0.391	2.436	2.290	1.562	1.474
L Only, LL Comb Run (**LL*)	0.081	-0.323	2.198	4.325	1.266	-0.078
L Only, LL Comb Run (**LLL)	0.085	-0.340	2.257	4.016	3.341	1.310
L Only, LL Comb Run (*L***)	-0.362	2.513	2.407	-0.403	0.135	-0.022
L Only, LL Comb Run (*L**L)	-0.357	2.496	2.467	-0.712	2.209	1.366
L Only, LL Comb Run (*L*L*)	-0.374	2.564	2.228	1.323	1.914	-0.186
L Only, LL Comb Run (*L*LL)	-0.370	2.547	2.288	1.014	3.988	1.203
L Only, LL Comb Run (*LL**)	-0.268	2.139	4.784	2.196	-0.378	0.063
L Only, LL Comb Run (*LL*L)	-0.264	2.122	4.844	1.887	1.697	1.451

Concrete Beam

DESCRIPTION: Grade Beam Grid G (Continuous)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6
L Only, LL Comb Run (*LLL*)	-0.281	2.190	4.605	3.922	1.401	-0.100
L Only, LL Comb Run (*LLLL)	-0.277	2.173	4.664	3.613	3.476	1.288
L Only, LL Comb Run (L****)	2.420	2.058	-0.268	0.081	-0.027	0.004
L Only, LL Comb Run (L***L)	2.424	2.041	-0.208	-0.228	2.048	1.393
L Only, LL Comb Run (L**L*)	2.407	2.109	-0.447	1.807	1.752	-0.159
L Only, LL Comb Run (L**LL)	2.411	2.092	-0.387	1.498	3.826	1.230
L Only, LL Comb Run (L*L**)	2.513	1.684	2.109	2.680	-0.539	0.090
L Only, LL Comb Run (L*L*L)	2.518	1.667	2.168	2.371	1.535	1.478
L Only, LL Comb Run (L*LL*)	2.500	1.735	1.930	4.406	1.239	-0.073
L Only, LL Comb Run (L*LLL)	2.505	1.718	1.989	4.097	3.314	1.315
L Only, LL Comb Run (LL***)	2.058	4.571	2.139	-0.323	0.108	-0.018
L Only, LL Comb Run (LL**L)	2.062	4.554	2.199	-0.631	2.182	1.370
L Only, LL Comb Run (LL*L*)	2.045	4.623	1.960	1.404	1.887	-0.181
L Only, LL Comb Run (LL*LL)	2.050	4.606	2.020	1.095	3.961	1.207
L Only, LL Comb Run (LLL**)	2.152	4.197	4.516	2.276	-0.405	0.067
L Only, LL Comb Run (LLL*L)	2.156	4.180	4.576	1.968	1.670	1.456
L Only, LL Comb Run (LLLL*)	2.139	4.248	4.337	4.003	1.374	-0.096
L Only, LL Comb Run (LLLLL)	2.143	4.231	4.396	3.694	3.449	1.292
H Only						

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	0.00	15.44	10.82	10.82	19.10	0.73	22.51	Vu < PhiVc/2	lot Reqd 9.6.	22.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	1.36	15.44	8.04	8.04	6.24	1.00	22.82	Vu < PhiVc/2	lot Reqd 9.6.	22.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	2.73	14.69	5.27	5.27	2.83	1.00	21.76	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	4.09	14.69	2.49	2.49	8.12	0.38	21.06	Vu < PhiVc/2	lot Reqd 9.6.	21.1	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	5.45	14.69	-1.18	1.18	4.28	0.34	21.02	Vu < PhiVc/2	lot Reqd 9.6.	21.0	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	6.82	14.69	-3.81	3.81	4.72	0.99	21.75	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	8.18	15.44	-6.59	6.59	2.37	1.00	22.82	Vu < PhiVc/2	lot Reqd 9.6.	22.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	9.55	15.44	-9.36	9.36	13.24	0.91	22.72	Vu < PhiVc/2	lot Reqd 9.6.	22.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	10.91	15.44	8.66	8.66	8.99	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	12.27	14.69	5.89	5.89	0.93	1.00	21.80	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	13.64	14.69	3.11	3.11	7.06	0.54	21.27	Vu < PhiVc/2	lot Reqd 9.6.	21.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	15.00	14.69	-0.56	0.56	4.09	0.17	20.83	Vu < PhiVc/2	lot Reqd 9.6.	20.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	16.36	14.69	-3.30	3.30	6.30	0.64	21.38	Vu < PhiVc/2	lot Reqd 9.6.	21.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	17.73	15.44	-6.08	6.08	0.10	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	19.09	15.44	-8.85	8.85	10.28	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	20.45	15.44	10.05	10.05	14.39	0.90	22.74	Vu < PhiVc/2	lot Reqd 9.6.	22.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	21.82	15.44	7.27	7.27	2.58	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	23.18	14.69	4.50	4.50	5.44	1.00	21.80	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	24.55	14.69	1.72	1.72	9.69	0.22	20.89	Vu < PhiVc/2	lot Reqd 9.6.	20.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	25.91	14.69	-1.91	1.91	10.00	0.23	20.91	Vu < PhiVc/2	lot Reqd 9.6.	20.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	27.27	14.69	-4.68	4.68	5.50	1.00	21.80	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	28.64	15.44	-7.46	7.46	2.78	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	30.00	15.44	8.52	8.52	14.84	0.74	22.55	Vu < PhiVc/2	lot Reqd 9.6.	22.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	31.02	15.44	6.43	6.43	7.19	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	32.05	15.44	4.35	4.35	1.68	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	33.07	14.69	2.27	2.27	1.71	1.00	21.80	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	34.09	14.69	-1.13	1.13	3.57	0.39	21.09	Vu < PhiVc/2	lot Reqd 9.6.	21.1	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	35.11	14.69	-3.21	3.21	1.35	1.00	21.80	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	36.14	15.44	-5.29	5.29	2.99	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	37.16	15.44	-7.37	7.37	9.46	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	5	38.18	15.44	7.86	7.86	6.26	1.00	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	5	39.20	14.69	5.77	5.77	0.71	1.00	21.80	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	5	40.23	14.69	3.69	3.69	5.55	0.82	21.59	Vu < PhiVc/2	lot Reqd 9.6.	21.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	5	41.25	14.69	1.61	1.61	8.26	0.24	20.92	Vu < PhiVc/2	lot Reqd 9.6.	20.9	0.0	0.0

Concrete Beam

DESCRIPTION: Grade Beam Grid G (Continuous)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+1.20D+1.60L+0.50S+1.60H, LL Comb	5	42.27	14.69	-0.91	0.91	10.05	0.11	20.77	Vu < PhiVc/2	lot Reqd 9.6.	20.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	5	43.30	14.69	-2.99	2.99	8.05	0.45	21.17	Vu < PhiVc/2	lot Reqd 9.6.	21.2	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	5	44.32	14.69	-5.07	5.07	3.93	1.00	21.80	Vu < PhiVc/2	lot Reqd 9.6.	21.8	0.0	0.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	10.000	-19.10	46.39	0.41
Span # 2	2	10.000	-17.71	47.79	0.37
Span # 3	3	10.000	-19.17	47.79	0.40
Span # 4	4	7.500	-14.84	47.79	0.31
Span # 5	5	7.500	-12.09	47.79	0.25
+1.40D+1.60H					
Span # 1	1	10.000	-13.26	46.39	0.29
Span # 2	2	10.000	-12.92	47.79	0.27
Span # 3	3	10.000	-13.93	47.79	0.29
Span # 4	4	7.500	-10.21	47.79	0.21
Span # 5	5	7.500	-8.54	47.79	0.18
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (****L)					
Span # 1	1	10.000	-11.38	46.39	0.25
Span # 2	2	10.000	-11.03	47.79	0.23
Span # 3	3	10.000	-12.10	47.79	0.25
Span # 4	4	7.500	-8.98	47.79	0.19
Span # 5	5	7.500	9.80	42.91	0.23
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (***L*)					
Span # 1	1	10.000	-11.29	46.39	0.24
Span # 2	2	10.000	-11.21	47.79	0.23
Span # 3	3	10.000	-11.46	47.79	0.24
Span # 4	4	7.500	-10.52	47.79	0.22
Span # 5	5	7.500	-9.27	47.79	0.19
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (***LL)					
Span # 1	1	10.000	-11.32	46.39	0.24
Span # 2	2	10.000	-11.16	47.79	0.23
Span # 3	3	10.000	-11.62	47.79	0.24
Span # 4	4	7.500	-10.51	47.79	0.22
Span # 5	5	7.500	-11.82	47.79	0.25
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L**)					
Span # 1	1	10.000	-11.86	46.39	0.26
Span # 2	2	10.000	-13.81	47.79	0.29
Span # 3	3	10.000	-15.43	47.79	0.32
Span # 4	4	7.500	-12.85	47.79	0.27
Span # 5	5	7.500	6.62	42.91	0.15
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L*L)					
Span # 1	1	10.000	-11.88	46.39	0.26
Span # 2	2	10.000	-13.97	47.79	0.29
Span # 3	3	10.000	-15.59	47.79	0.33
Span # 4	4	7.500	-12.26	47.79	0.26
Span # 5	5	7.500	10.22	42.91	0.24
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (**LL*)					
Span # 1	1	10.000	-11.79	46.39	0.25
Span # 2	2	10.000	-13.35	47.79	0.28
Span # 3	3	10.000	-14.96	47.79	0.31
Span # 4	4	7.500	-14.62	47.79	0.31
Span # 5	5	7.500	-8.25	47.79	0.17
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (**LLL)					
Span # 1	1	10.000	-11.82	46.39	0.25
Span # 2	2	10.000	-13.50	47.79	0.28
Span # 3	3	10.000	-15.12	47.79	0.32
Span # 4	4	7.500	-14.03	47.79	0.29
Span # 5	5	7.500	-10.80	47.79	0.23
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L***)					
Span # 1	1	10.000	-13.30	46.39	0.29
Span # 2	2	10.000	-14.93	47.79	0.31
Span # 3	3	10.000	-15.52	47.79	0.32
Span # 4	4	7.500	-7.67	47.79	0.16
Span # 5	5	7.500	-7.59	47.79	0.16

Concrete Beam

DESCRIPTION: Grade Beam Grid G (Continuous)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L**L)					
Span # 1	1	10.000	-13.26	46.39	0.29
Span # 2	2	10.000	-14.88	47.79	0.31
Span # 3	3	10.000	-15.68	47.79	0.33
Span # 4	4	7.500	-9.22	47.79	0.19
Span # 5	5	7.500	9.69	42.91	0.23
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*L*)					
Span # 1	1	10.000	-13.43	46.39	0.29
Span # 2	2	10.000	-15.06	47.79	0.32
Span # 3	3	10.000	-15.04	47.79	0.31
Span # 4	4	7.500	-9.45	47.79	0.20
Span # 5	5	7.500	-9.54	47.79	0.20
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*LL)					
Span # 1	1	10.000	-13.39	46.39	0.29
Span # 2	2	10.000	-15.02	47.79	0.31
Span # 3	3	10.000	-15.20	47.79	0.32
Span # 4	4	7.500	-10.75	47.79	0.22
Span # 5	5	7.500	-12.09	47.79	0.25
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL**)					
Span # 1	1	10.000	-12.34	46.39	0.27
Span # 2	2	10.000	-16.63	47.79	0.35
Span # 3	3	10.000	-19.01	47.79	0.40
Span # 4	4	7.500	-11.77	47.79	0.25
Span # 5	5	7.500	6.51	42.91	0.15
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL*L)					
Span # 1	1	10.000	-12.29	46.39	0.27
Span # 2	2	10.000	-16.79	47.79	0.35
Span # 3	3	10.000	-19.17	47.79	0.40
Span # 4	4	7.500	-11.18	47.79	0.23
Span # 5	5	7.500	10.11	42.91	0.24
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LLL*)					
Span # 1	1	10.000	-12.47	46.39	0.27
Span # 2	2	10.000	-16.17	47.79	0.34
Span # 3	3	10.000	-18.53	47.79	0.39
Span # 4	4	7.500	-13.54	47.79	0.28
Span # 5	5	7.500	-8.52	47.79	0.18
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LLLL)					
Span # 1	1	10.000	-12.43	46.39	0.27
Span # 2	2	10.000	-16.32	47.79	0.34
Span # 3	3	10.000	-18.69	47.79	0.39
Span # 4	4	7.500	-12.95	47.79	0.27
Span # 5	5	7.500	-11.07	47.79	0.23
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L****)					
Span # 1	1	10.000	-18.58	46.39	0.40
Span # 2	2	10.000	-13.71	47.79	0.29
Span # 3	3	10.000	-11.23	47.79	0.23
Span # 4	4	7.500	-8.96	47.79	0.19
Span # 5	5	7.500	-7.26	47.79	0.15
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L***L)					
Span # 1	1	10.000	-18.60	46.39	0.40
Span # 2	2	10.000	-13.67	47.79	0.29
Span # 3	3	10.000	-11.39	47.79	0.24
Span # 4	4	7.500	-8.94	47.79	0.19
Span # 5	5	7.500	9.82	42.91	0.23
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**L*)					
Span # 1	1	10.000	-18.51	46.39	0.40
Span # 2	2	10.000	-13.85	47.79	0.29
Span # 3	3	10.000	-10.75	47.79	0.22
Span # 4	4	7.500	-10.74	47.79	0.22
Span # 5	5	7.500	-9.22	47.79	0.19
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**LL)					
Span # 1	1	10.000	-18.53	46.39	0.40
Span # 2	2	10.000	-13.81	47.79	0.29
Span # 3	3	10.000	-10.91	47.79	0.23
Span # 4	4	7.500	-10.46	47.79	0.22
Span # 5	5	7.500	-11.77	47.79	0.25
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L**)					
Span # 1	1	10.000	-19.08	46.39	0.41
Span # 2	2	10.000	-13.17	47.79	0.28

Concrete Beam

DESCRIPTION: Grade Beam Grid G (Continuous)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
Span # 3	3	10.000	-14.72	47.79	0.31
Span # 4	4	7.500	-13.06	47.79	0.27
Span # 5	5	7.500	6.64	42.91	0.15
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L*L)					
Span # 1	1	10.000	-19.10	46.39	0.41
Span # 2	2	10.000	-13.33	47.79	0.28
Span # 3	3	10.000	-14.88	47.79	0.31
Span # 4	4	7.500	-12.47	47.79	0.26
Span # 5	5	7.500	10.25	42.91	0.24
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*LL*)					
Span # 1	1	10.000	-19.01	46.39	0.41
Span # 2	2	10.000	-12.85	47.79	0.27
Span # 3	3	10.000	-14.24	47.79	0.30
Span # 4	4	7.500	-14.84	47.79	0.31
Span # 5	5	7.500	-8.20	47.79	0.17
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*LLL)					
Span # 1	1	10.000	-19.03	46.39	0.41
Span # 2	2	10.000	-12.86	47.79	0.27
Span # 3	3	10.000	-14.40	47.79	0.30
Span # 4	4	7.500	-14.25	47.79	0.30
Span # 5	5	7.500	-10.74	47.79	0.22
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL***)					
Span # 1	1	10.000	-16.65	46.39	0.36
Span # 2	2	10.000	-17.57	47.79	0.37
Span # 3	3	10.000	-14.80	47.79	0.31
Span # 4	4	7.500	-7.89	47.79	0.17
Span # 5	5	7.500	-7.53	47.79	0.16
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL**L)					
Span # 1	1	10.000	-16.67	46.39	0.36
Span # 2	2	10.000	-17.53	47.79	0.37
Span # 3	3	10.000	-14.96	47.79	0.31
Span # 4	4	7.500	-9.17	47.79	0.19
Span # 5	5	7.500	9.71	42.91	0.23
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*L*)					
Span # 1	1	10.000	-16.58	46.39	0.36
Span # 2	2	10.000	-17.71	47.79	0.37
Span # 3	3	10.000	-14.32	47.79	0.30
Span # 4	4	7.500	-9.66	47.79	0.20
Span # 5	5	7.500	-9.49	47.79	0.20
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*LL)					
Span # 1	1	10.000	-16.60	46.39	0.36
Span # 2	2	10.000	-17.66	47.79	0.37
Span # 3	3	10.000	-14.48	47.79	0.30
Span # 4	4	7.500	-10.70	47.79	0.22
Span # 5	5	7.500	-12.04	47.79	0.25
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL**)					
Span # 1	1	10.000	-17.15	46.39	0.37
Span # 2	2	10.000	-16.57	47.79	0.35
Span # 3	3	10.000	-18.29	47.79	0.38
Span # 4	4	7.500	-11.99	47.79	0.25
Span # 5	5	7.500	6.53	42.91	0.15
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL*L)					
Span # 1	1	10.000	-17.17	46.39	0.37
Span # 2	2	10.000	-16.53	47.79	0.35
Span # 3	3	10.000	-18.45	47.79	0.39
Span # 4	4	7.500	-11.39	47.79	0.24
Span # 5	5	7.500	10.13	42.91	0.24
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLLL*)					
Span # 1	1	10.000	-17.08	46.39	0.37
Span # 2	2	10.000	-16.71	47.79	0.35
Span # 3	3	10.000	-17.82	47.79	0.37
Span # 4	4	7.500	-13.76	47.79	0.29
Span # 5	5	7.500	-8.47	47.79	0.18
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLLLL)					
Span # 1	1	10.000	-17.10	46.39	0.37
Span # 2	2	10.000	-16.66	47.79	0.35
Span # 3	3	10.000	-17.98	47.79	0.38
Span # 4	4	7.500	-13.17	47.79	0.28
Span # 5	5	7.500	-11.01	47.79	0.23

Concrete Beam

DESCRIPTION: Grade Beam Grid G (Continuous)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
+1.20D+L+1.60S+1.60H, LL Comb Run (****L)					
Span # 1	1	10.000	-11.38	46.39	0.25
Span # 2	2	10.000	-11.04	47.79	0.23
Span # 3	3	10.000	-12.04	47.79	0.25
Span # 4	4	7.500	-8.38	47.79	0.18
Span # 5	5	7.500	8.45	42.91	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (***L*)					
Span # 1	1	10.000	-11.32	46.39	0.24
Span # 2	2	10.000	-11.16	47.79	0.23
Span # 3	3	10.000	-11.64	47.79	0.24
Span # 4	4	7.500	-9.86	47.79	0.21
Span # 5	5	7.500	-8.54	47.79	0.18
+1.20D+L+1.60S+1.60H, LL Comb Run (***LL)					
Span # 1	1	10.000	-11.33	46.39	0.24
Span # 2	2	10.000	-11.13	47.79	0.23
Span # 3	3	10.000	-11.74	47.79	0.25
Span # 4	4	7.500	-9.49	47.79	0.20
Span # 5	5	7.500	-10.13	47.79	0.21
+1.20D+L+1.60S+1.60H, LL Comb Run (**L**)					
Span # 1	1	10.000	-11.67	46.39	0.25
Span # 2	2	10.000	-12.54	47.79	0.26
Span # 3	3	10.000	-14.13	47.79	0.30
Span # 4	4	7.500	-11.31	47.79	0.24
Span # 5	5	7.500	6.46	42.91	0.15
+1.20D+L+1.60S+1.60H, LL Comb Run (**L*L)					
Span # 1	1	10.000	-11.69	46.39	0.25
Span # 2	2	10.000	-12.64	47.79	0.26
Span # 3	3	10.000	-14.22	47.79	0.30
Span # 4	4	7.500	-10.94	47.79	0.23
Span # 5	5	7.500	8.71	42.91	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (**LL*)					
Span # 1	1	10.000	-11.63	46.39	0.25
Span # 2	2	10.000	-12.25	47.79	0.26
Span # 3	3	10.000	-13.83	47.79	0.29
Span # 4	4	7.500	-12.42	47.79	0.26
Span # 5	5	7.500	-7.90	47.79	0.17
+1.20D+L+1.60S+1.60H, LL Comb Run (**LLL)					
Span # 1	1	10.000	-11.65	46.39	0.25
Span # 2	2	10.000	-12.35	47.79	0.26
Span # 3	3	10.000	-13.93	47.79	0.29
Span # 4	4	7.500	-12.05	47.79	0.25
Span # 5	5	7.500	-9.49	47.79	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (*L***)					
Span # 1	1	10.000	-11.91	46.39	0.26
Span # 2	2	10.000	-13.48	47.79	0.28
Span # 3	3	10.000	-14.18	47.79	0.30
Span # 4	4	7.500	-8.07	47.79	0.17
Span # 5	5	7.500	-7.49	47.79	0.16
+1.20D+L+1.60S+1.60H, LL Comb Run (*L**L)					
Span # 1	1	10.000	-11.88	46.39	0.26
Span # 2	2	10.000	-13.45	47.79	0.28
Span # 3	3	10.000	-14.28	47.79	0.30
Span # 4	4	7.500	-8.20	47.79	0.17
Span # 5	5	7.500	8.38	42.91	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (*L*L*)					
Span # 1	1	10.000	-11.99	46.39	0.26
Span # 2	2	10.000	-13.57	47.79	0.28
Span # 3	3	10.000	-13.88	47.79	0.29
Span # 4	4	7.500	-9.18	47.79	0.19
Span # 5	5	7.500	-8.71	47.79	0.18
+1.20D+L+1.60S+1.60H, LL Comb Run (*L*LL)					
Span # 1	1	10.000	-11.96	46.39	0.26
Span # 2	2	10.000	-13.54	47.79	0.28
Span # 3	3	10.000	-13.98	47.79	0.29
Span # 4	4	7.500	-9.16	47.79	0.19
Span # 5	5	7.500	-10.30	47.79	0.22
+1.20D+L+1.60S+1.60H, LL Comb Run (*LL**)					
Span # 1	1	10.000	-11.30	46.39	0.24
Span # 2	2	10.000	-14.30	47.79	0.30

Concrete Beam

DESCRIPTION: Grade Beam Grid G (Continuous)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
Span # 3	3	10.000	-16.36	47.79	0.34
Span # 4	4	7.500	-10.64	47.79	0.22
Span # 5	5	7.500	6.39	42.91	0.15
+1.20D+L+1.60S+1.60H, LL Comb Run (*LL*L)					
Span # 1	1	10.000	-11.28	46.39	0.24
Span # 2	2	10.000	-14.40	47.79	0.30
Span # 3	3	10.000	-16.46	47.79	0.34
Span # 4	4	7.500	-10.27	47.79	0.21
Span # 5	5	7.500	8.64	42.91	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (*LLL*)					
Span # 1	1	10.000	-11.39	46.39	0.25
Span # 2	2	10.000	-14.01	47.79	0.29
Span # 3	3	10.000	-16.06	47.79	0.34
Span # 4	4	7.500	-11.75	47.79	0.25
Span # 5	5	7.500	-8.07	47.79	0.17
+1.20D+L+1.60S+1.60H, LL Comb Run (*LLLL)					
Span # 1	1	10.000	-11.36	46.39	0.24
Span # 2	2	10.000	-14.11	47.79	0.30
Span # 3	3	10.000	-16.16	47.79	0.34
Span # 4	4	7.500	-11.38	47.79	0.24
Span # 5	5	7.500	-9.66	47.79	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (L****)					
Span # 1	1	10.000	-15.87	46.39	0.34
Span # 2	2	10.000	-12.72	47.79	0.27
Span # 3	3	10.000	-11.50	47.79	0.24
Span # 4	4	7.500	-8.88	47.79	0.19
Span # 5	5	7.500	-7.28	47.79	0.15
+1.20D+L+1.60S+1.60H, LL Comb Run (L***L)					
Span # 1	1	10.000	-15.88	46.39	0.34
Span # 2	2	10.000	-12.69	47.79	0.27
Span # 3	3	10.000	-11.60	47.79	0.24
Span # 4	4	7.500	-8.51	47.79	0.18
Span # 5	5	7.500	8.46	42.91	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (L**L*)					
Span # 1	1	10.000	-15.83	46.39	0.34
Span # 2	2	10.000	-12.81	47.79	0.27
Span # 3	3	10.000	-11.20	47.79	0.23
Span # 4	4	7.500	-9.99	47.79	0.21
Span # 5	5	7.500	-8.51	47.79	0.18
+1.20D+L+1.60S+1.60H, LL Comb Run (L**LL)					
Span # 1	1	10.000	-15.84	46.39	0.34
Span # 2	2	10.000	-12.78	47.79	0.27
Span # 3	3	10.000	-11.30	47.79	0.24
Span # 4	4	7.500	-9.62	47.79	0.20
Span # 5	5	7.500	-10.10	47.79	0.21
+1.20D+L+1.60S+1.60H, LL Comb Run (L*L**)					
Span # 1	1	10.000	-16.18	46.39	0.35
Span # 2	2	10.000	-12.14	47.79	0.25
Span # 3	3	10.000	-13.68	47.79	0.29
Span # 4	4	7.500	-11.45	47.79	0.24
Span # 5	5	7.500	6.47	42.91	0.15
+1.20D+L+1.60S+1.60H, LL Comb Run (L*L*L)					
Span # 1	1	10.000	-16.20	46.39	0.35
Span # 2	2	10.000	-12.24	47.79	0.26
Span # 3	3	10.000	-13.78	47.79	0.29
Span # 4	4	7.500	-11.08	47.79	0.23
Span # 5	5	7.500	8.72	42.91	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (L*LL*)					
Span # 1	1	10.000	-16.14	46.39	0.35
Span # 2	2	10.000	-12.19	47.79	0.25
Span # 3	3	10.000	-13.38	47.79	0.28
Span # 4	4	7.500	-12.56	47.79	0.26
Span # 5	5	7.500	-7.87	47.79	0.16
+1.20D+L+1.60S+1.60H, LL Comb Run (L*LLL)					
Span # 1	1	10.000	-16.15	46.39	0.35
Span # 2	2	10.000	-12.16	47.79	0.25
Span # 3	3	10.000	-13.48	47.79	0.28
Span # 4	4	7.500	-12.19	47.79	0.25
Span # 5	5	7.500	-9.46	47.79	0.20

Concrete Beam

DESCRIPTION: Grade Beam Grid G (Continuous)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
+1.20D+L+1.60S+1.60H, LL Comb Run (LL***)					
Span # 1	1	10.000	-14.67	46.39	0.32
Span # 2	2	10.000	-15.13	47.79	0.32
Span # 3	3	10.000	-13.73	47.79	0.29
Span # 4	4	7.500	-8.21	47.79	0.17
Span # 5	5	7.500	-7.45	47.79	0.16
+1.20D+L+1.60S+1.60H, LL Comb Run (LL**L)					
Span # 1	1	10.000	-14.68	46.39	0.32
Span # 2	2	10.000	-15.11	47.79	0.32
Span # 3	3	10.000	-13.83	47.79	0.29
Span # 4	4	7.500	-8.17	47.79	0.17
Span # 5	5	7.500	8.39	42.91	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (LL*L*)					
Span # 1	1	10.000	-14.62	46.39	0.32
Span # 2	2	10.000	-15.22	47.79	0.32
Span # 3	3	10.000	-13.43	47.79	0.28
Span # 4	4	7.500	-9.32	47.79	0.19
Span # 5	5	7.500	-8.68	47.79	0.18
+1.20D+L+1.60S+1.60H, LL Comb Run (LL*LL)					
Span # 1	1	10.000	-14.64	46.39	0.32
Span # 2	2	10.000	-15.19	47.79	0.32
Span # 3	3	10.000	-13.53	47.79	0.28
Span # 4	4	7.500	-9.13	47.79	0.19
Span # 5	5	7.500	-10.27	47.79	0.21
+1.20D+L+1.60S+1.60H, LL Comb Run (LLL**)					
Span # 1	1	10.000	-14.98	46.39	0.32
Span # 2	2	10.000	-14.51	47.79	0.30
Span # 3	3	10.000	-15.91	47.79	0.33
Span # 4	4	7.500	-10.77	47.79	0.23
Span # 5	5	7.500	6.40	42.91	0.15
+1.20D+L+1.60S+1.60H, LL Comb Run (LLL*L)					
Span # 1	1	10.000	-14.99	46.39	0.32
Span # 2	2	10.000	-14.48	47.79	0.30
Span # 3	3	10.000	-16.01	47.79	0.34
Span # 4	4	7.500	-10.40	47.79	0.22
Span # 5	5	7.500	8.65	42.91	0.20
+1.20D+L+1.60S+1.60H, LL Comb Run (LLLL*)					
Span # 1	1	10.000	-14.93	46.39	0.32
Span # 2	2	10.000	-14.60	47.79	0.31
Span # 3	3	10.000	-15.61	47.79	0.33
Span # 4	4	7.500	-11.88	47.79	0.25
Span # 5	5	7.500	-8.04	47.79	0.17
+1.20D+L+1.60S+1.60H, LL Comb Run (LLLLL)					
Span # 1	1	10.000	-14.95	46.39	0.32
Span # 2	2	10.000	-14.57	47.79	0.30
Span # 3	3	10.000	-15.71	47.79	0.33
Span # 4	4	7.500	-11.51	47.79	0.24
Span # 5	5	7.500	-9.63	47.79	0.20

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H, LL Comb Run (L*L*L)	1	0.0031	5.000		0.0000	0.000
+D+L+H, LL Comb Run (*L*L*)	2	0.0034	5.000		0.0000	0.000
+D+L+H, LL Comb Run (L*L*L)	3	0.0043	5.000	+D+L+H, LL Comb Run (L*L*L)	-0.0002	10.341
+D+L+H, LL Comb Run (L*L*L)	4	0.0003	7.841	+D+L+H, LL Comb Run (L*L*L)	-0.0008	3.068
+D+L+H, LL Comb Run (L*L*L)	5	0.0025	3.750		0.0000	3.068

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

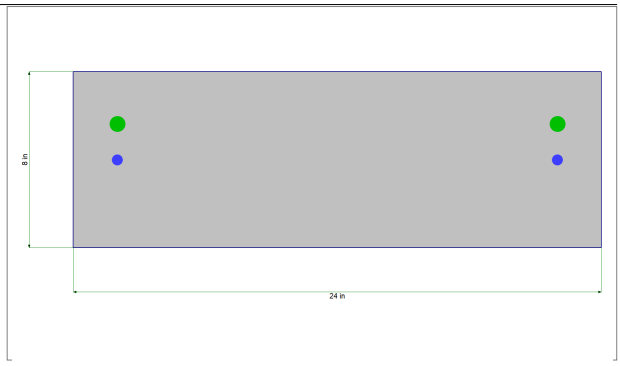
DESCRIPTION: Basement Wall Span Vertical

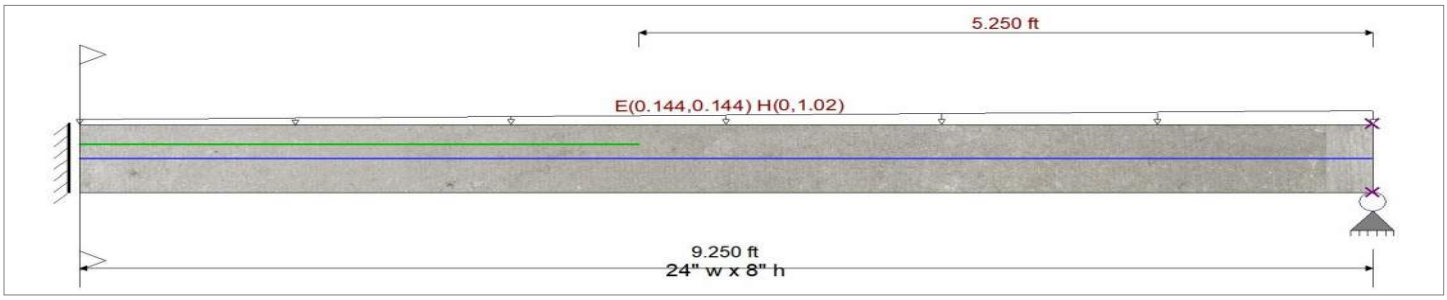
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2





Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 8.0 in
Span #1 Reinforcing....
2-#4 at 4.0 in from Bottom, from 0.0 to 9.250 ft in this span
2-#6 at 2.375 in from Top, from 0.0 to 4.0 ft in this span

Load for Span Number 1
Varying Uniform Load : E= 0.0720->0.0720, H= 0.0->0.510 ksf, Extent = 0.0 -->> 9.250 ft, Trib Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.987** : 1	Maximum Deflection			
Section used for this span		**Typical Section**	Max Downward Transient Deflection	0.003 in	Ratio =	35984 >=360
Mu : Applied		6.760 k-ft	Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Mn * Phi : Allowable		6.847 k-ft	Max Downward Total Deflection	0.014 in	Ratio =	7680 >=180
Location of maximum on span		6.150 ft	Max Upward Total Deflection	0.000 in	Ratio =	0 <180.0
Span # where maximum occurs		Span # 1				

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	2.706	2.944
Overall MINimum	0.832	0.500
H Only	2.123	2.595
+0.60H	1.274	1.557
+0.70E+0.60H	1.856	1.906
+0.5250E+H	2.560	2.857
+0.70E+H	2.706	2.944
E Only	0.832	0.500

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	0.00	5.63	4.23	4.23	9.69	0.20	11.03	Vu < PhiVc/2	lot Reqd 9.6.	11.0	0.0	0.0

Concrete Beam

DESCRIPTION: Basement Wall Span Vertical

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	0.10	5.63	4.21	4.21	9.26	0.21	11.05	Vu < PhiVc/2	lot Reqd 9.6.	11.0	0.0	0.0
+E+1.60H	1	0.20	5.63	4.20	4.20	8.83	0.22	11.07	Vu < PhiVc/2	lot Reqd 9.6.	11.1	0.0	0.0
+E+1.60H	1	0.30	5.63	4.18	4.18	8.41	0.23	11.10	Vu < PhiVc/2	lot Reqd 9.6.	11.1	0.0	0.0
+E+1.60H	1	0.40	5.63	4.16	4.16	7.99	0.24	11.12	Vu < PhiVc/2	lot Reqd 9.6.	11.1	0.0	0.0
+E+1.60H	1	0.51	5.63	4.13	4.13	7.57	0.26	11.15	Vu < PhiVc/2	lot Reqd 9.6.	11.2	0.0	0.0
+E+1.60H	1	0.61	5.63	4.11	4.11	7.15	0.27	11.18	Vu < PhiVc/2	lot Reqd 9.6.	11.2	0.0	0.0
+E+1.60H	1	0.71	5.63	4.08	4.08	6.74	0.28	11.22	Vu < PhiVc/2	lot Reqd 9.6.	11.2	0.0	0.0
+E+1.60H	1	0.81	5.63	4.05	4.05	6.33	0.30	11.26	Vu < PhiVc/2	lot Reqd 9.6.	11.3	0.0	0.0
+E+1.60H	1	0.91	5.63	4.03	4.03	5.92	0.32	11.30	Vu < PhiVc/2	lot Reqd 9.6.	11.3	0.0	0.0
+E+1.60H	1	1.01	5.63	3.99	3.99	5.51	0.34	11.35	Vu < PhiVc/2	lot Reqd 9.6.	11.4	0.0	0.0
+E+1.60H	1	1.11	5.63	3.96	3.96	5.11	0.36	11.41	Vu < PhiVc/2	lot Reqd 9.6.	11.4	0.0	0.0
+E+1.60H	1	1.21	5.63	3.92	3.92	4.71	0.39	11.47	Vu < PhiVc/2	lot Reqd 9.6.	11.5	0.0	0.0
+E+1.60H	1	1.31	5.63	3.89	3.89	4.32	0.42	11.55	Vu < PhiVc/2	lot Reqd 9.6.	11.5	0.0	0.0
+E+1.60H	1	1.42	5.63	3.85	3.85	3.93	0.46	11.64	Vu < PhiVc/2	lot Reqd 9.6.	11.6	0.0	0.0
+E+1.60H	1	1.52	5.63	3.81	3.81	3.54	0.50	11.75	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+E+1.60H	1	1.62	5.63	3.77	3.77	3.16	0.56	11.88	Vu < PhiVc/2	lot Reqd 9.6.	11.9	0.0	0.0
+E+1.60H	1	1.72	5.63	3.72	3.72	2.78	0.63	12.04	Vu < PhiVc/2	lot Reqd 9.6.	12.0	0.0	0.0
+E+1.60H	1	1.82	5.63	3.67	3.67	2.41	0.72	12.26	Vu < PhiVc/2	lot Reqd 9.6.	12.3	0.0	0.0
+E+1.60H	1	1.92	5.63	3.63	3.63	2.04	0.83	12.54	Vu < PhiVc/2	lot Reqd 9.6.	12.5	0.0	0.0
+E+1.60H	1	2.02	5.63	3.58	3.58	1.67	1.00	12.94	Vu < PhiVc/2	lot Reqd 9.6.	12.9	0.0	0.0
+E+1.60H	1	2.12	5.63	3.53	3.53	1.31	1.00	12.94	Vu < PhiVc/2	lot Reqd 9.6.	12.9	0.0	0.0
+E+1.60H	1	2.22	5.63	3.47	3.47	0.96	1.00	12.94	Vu < PhiVc/2	lot Reqd 9.6.	12.9	0.0	0.0
+E+1.60H	1	2.33	5.63	3.42	3.42	0.61	1.00	12.94	Vu < PhiVc/2	lot Reqd 9.6.	12.9	0.0	0.0
+E+1.60H	1	2.43	5.63	3.36	3.36	0.27	1.00	12.94	Vu < PhiVc/2	lot Reqd 9.6.	12.9	0.0	0.0
+E+1.60H	1	2.53	4.00	3.30	3.30	0.07	1.00	9.89	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0	0.0
+E+1.60H	1	2.63	4.00	3.24	3.24	0.40	1.00	9.89	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0	0.0
+E+1.60H	1	2.73	4.00	3.18	3.18	0.72	1.00	9.89	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0	0.0
+E+1.60H	1	2.83	4.00	3.11	3.11	1.04	1.00	9.89	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0	0.0
+E+1.60H	1	2.93	4.00	3.05	3.05	1.35	0.75	9.30	Vu < PhiVc/2	lot Reqd 9.6.	9.3	0.0	0.0
+E+1.60H	1	3.03	4.00	2.98	2.98	1.66	0.60	8.93	Vu < PhiVc/2	lot Reqd 9.6.	8.9	0.0	0.0
+E+1.60H	1	3.13	4.00	2.91	2.91	1.96	0.50	8.68	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0	0.0
+E+1.60H	1	3.23	4.00	2.84	2.84	2.25	0.42	8.50	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0	0.0
+E+1.60H	1	3.34	4.00	2.77	2.77	2.53	0.36	8.37	Vu < PhiVc/2	lot Reqd 9.6.	8.4	0.0	0.0
+E+1.60H	1	3.44	4.00	2.69	2.69	2.81	0.32	8.26	Vu < PhiVc/2	lot Reqd 9.6.	8.3	0.0	0.0
+E+1.60H	1	3.54	4.00	2.62	2.62	3.07	0.28	8.17	Vu < PhiVc/2	lot Reqd 9.6.	8.2	0.0	0.0
+E+1.60H	1	3.64	4.00	2.54	2.54	3.33	0.25	8.10	Vu < PhiVc/2	lot Reqd 9.6.	8.1	0.0	0.0
+E+1.60H	1	3.74	4.00	2.46	2.46	3.59	0.23	8.04	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	3.84	4.00	2.37	2.37	3.83	0.21	7.99	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	3.94	4.00	2.29	2.29	4.07	0.19	7.94	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	4.04	4.00	2.20	2.20	4.29	0.17	7.90	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	4.14	4.00	2.12	2.12	4.51	0.16	7.87	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	4.25	4.00	2.03	2.03	4.72	0.14	7.84	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.35	4.00	1.94	1.94	4.92	0.13	7.81	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.45	4.00	1.84	1.84	5.11	0.12	7.78	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.55	4.00	1.75	1.75	5.29	0.11	7.76	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.65	4.00	1.65	1.65	5.47	0.10	7.73	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.75	4.00	1.55	1.55	5.63	0.09	7.71	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.85	4.00	1.45	1.45	5.78	0.08	7.69	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.95	4.00	1.35	1.35	5.92	0.08	7.68	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	5.05	4.00	1.25	1.25	6.05	0.07	7.66	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	5.16	4.00	1.14	1.14	6.17	0.06	7.64	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.26	4.00	1.03	1.03	6.28	0.05	7.62	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.36	4.00	0.93	0.93	6.38	0.05	7.61	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.46	4.00	0.81	0.81	6.47	0.04	7.59	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Basement Wall Span Vertical

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	5.56	4.00	0.70	0.70	6.55	0.04	7.58	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.66	4.00	0.59	0.59	6.61	0.03	7.56	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.76	4.00	0.47	0.47	6.67	0.02	7.55	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+1.60H	1	5.86	4.00	0.36	0.36	5.84	0.02	7.54	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+1.60H	1	5.96	4.00	0.26	0.26	5.87	0.01	7.53	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+1.60H	1	6.07	4.00	0.15	0.15	5.89	0.01	7.51	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+1.60H	1	6.17	4.00	0.04	0.04	5.90	0.00	7.50	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.27	4.00	-0.14	0.14	6.75	0.01	7.51	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.37	4.00	-0.27	0.27	6.73	0.01	7.52	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.47	4.00	-0.40	0.40	6.70	0.02	7.54	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.57	4.00	-0.53	0.53	6.65	0.03	7.56	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.67	4.00	-0.66	0.66	6.59	0.03	7.57	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.77	4.00	-0.79	0.79	6.52	0.04	7.59	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.87	4.00	-0.93	0.93	6.43	0.05	7.61	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.98	4.00	-1.07	1.07	6.33	0.06	7.63	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	7.08	4.00	-1.21	1.21	6.22	0.06	7.65	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	7.18	4.00	-1.35	1.35	6.09	0.07	7.67	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	7.28	4.00	-1.49	1.49	5.94	0.08	7.69	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	7.38	4.00	-1.64	1.64	5.78	0.09	7.72	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	7.48	4.00	-1.79	1.79	5.61	0.11	7.75	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	7.58	4.00	-1.93	1.93	5.42	0.12	7.78	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	7.68	4.00	-2.08	2.08	5.22	0.13	7.81	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	7.78	4.00	-2.24	2.24	5.00	0.15	7.85	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	7.89	4.00	-2.39	2.39	4.77	0.17	7.89	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	7.99	4.00	-2.55	2.55	4.52	0.19	7.94	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	8.09	4.00	-2.71	2.71	4.25	0.21	8.00	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	8.19	4.00	-2.87	2.87	3.97	0.24	8.07	Vu < PhiVc/2	lot Reqd 9.6.	8.1	0.0	0.0
+E+1.60H	1	8.29	4.00	-3.03	3.03	3.67	0.27	8.15	Vu < PhiVc/2	lot Reqd 9.6.	8.2	0.0	0.0
+E+1.60H	1	8.39	4.00	-3.19	3.19	3.36	0.32	8.25	Vu < PhiVc/2	lot Reqd 9.6.	8.3	0.0	0.0
+E+1.60H	1	8.49	4.00	-3.36	3.36	3.03	0.37	8.38	Vu < PhiVc/2	lot Reqd 9.6.	8.4	0.0	0.0
+E+1.60H	1	8.59	4.00	-3.52	3.52	2.68	0.44	8.54	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0	0.0
+E+1.60H	1	8.69	4.00	-3.69	3.69	2.32	0.53	8.77	Vu < PhiVc/2	lot Reqd 9.6.	8.8	0.0	0.0
+E+1.60H	1	8.80	4.00	-3.86	3.86	1.93	0.67	9.09	Vu < PhiVc/2	lot Reqd 9.6.	9.1	0.0	0.0
+E+1.60H	1	8.90	4.00	-4.03	4.03	1.54	0.88	9.59	Vu < PhiVc/2	lot Reqd 9.6.	9.6	0.0	0.0
+E+1.60H	1	9.00	4.00	-4.21	4.21	1.12	1.00	9.89	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0	0.0
+E+1.60H	1	9.10	4.00	-4.38	4.38	0.68	1.00	9.89	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0	0.0
+E+1.60H	1	9.20	4.00	-4.56	4.56	0.23	1.00	9.89	Vu < PhiVc/2	lot Reqd 9.6.	9.9	0.0	0.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	9.250	6.76	6.85	0.99
+1.60H					
Span # 1	1	9.250	5.91	6.85	0.86
+E+1.60H					
Span # 1	1	9.250	6.76	6.85	0.99
+E+0.90H					
Span # 1	1	9.250	4.18	6.85	0.61

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+0.70E+H	1	0.0145	5.535		0.0000	0.000

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

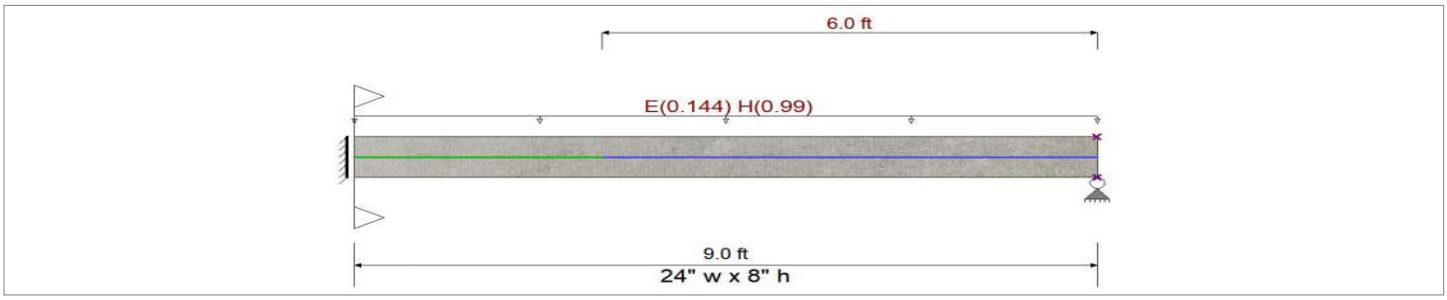
DESCRIPTION: Retaining Wall Span Horizonal

CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 8.0 in
Span #1 Reinforcing....
2-#5 at 4.0 in from Bottom, from 0.0 to 9.0 ft in this span
2-#5 at 4.0 in from Top, from 0.0 to 3.0 ft in this span

Load for Span Number 1
Uniform Load : E = 0.0720, H = 0.4950 ksf, Tributary Width = 2.0 ft, (Soil Load At Base)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.954** : 1	Maximum Deflection			
Section used for this span		**Typical Section**	Max Downward Transient Deflection	0.003 in	Ratio =	39067 >=360
Mu : Applied		9.842 k-ft	Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Mn * Phi : Allowable		10.312 k-ft	Max Downward Total Deflection	0.023 in	Ratio =	4789 >=180
Location of maximum on span		5.623 ft	Max Upward Total Deflection	0.000 in	Ratio =	0 <180.0
Span # where maximum occurs		Span # 1				

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	6.063	3.754
Overall MINimum	0.810	0.486
H Only	5.548	3.362
+0.60H	3.341	2.005
+0.70E+0.60H	3.908	2.345
+0.5250E+H	5.936	3.654
+0.70E+H	6.063	3.754
E Only	0.810	0.486

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	0.00	4.00	9.72	9.72	17.50	0.19	7.92	PhiVc < Vu	1.797	21.1	2.0	2.0
+E+1.60H	1	0.10	4.00	9.55	9.55	16.55	0.19	7.94	PhiVc < Vu	1.610	21.1	2.0	2.0

Concrete Beam

DESCRIPTION: Retaining Wall Span Horizonal

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	0.20	4.00	9.38	9.38	15.62	0.20	7.96	PhiVc < Vu	1.422	21.2	2.0	2.0
+E+1.60H	1	0.30	4.00	9.21	9.21	14.70	0.21	7.98	PhiVc < Vu	1.232	21.2	2.0	2.0
+E+1.60H	1	0.39	4.00	9.04	9.04	13.81	0.22	8.00	PhiVc < Vu	1.040	21.2	2.0	2.0
+E+1.60H	1	0.49	4.00	8.87	8.87	12.92	0.23	8.02	PhiVc < Vu	0.8454	21.2	2.0	2.0
+E+1.60H	1	0.59	4.00	8.70	8.70	12.06	0.24	8.05	PhiVc < Vu	0.6483	21.3	2.0	2.0
+E+1.60H	1	0.69	4.00	8.53	8.53	11.21	0.25	8.08	PhiVc < Vu	0.4478	21.3	2.0	2.0
+E+1.60H	1	0.79	4.00	8.36	8.36	10.38	0.27	8.12	PhiVc < Vu	0.2434	21.3	2.0	2.0
+E+1.60H	1	0.89	4.00	8.19	8.19	9.57	0.29	8.16	PhiVc < Vu	0.03408	21.4	2.0	2.0
+E+1.60H	1	0.98	4.00	8.02	8.02	8.77	0.30	8.20	PhiVc/2 < Vu <=	lt<=10", Not I	8.2	0.0	0.0
+E+1.60H	1	1.08	4.00	7.85	7.85	7.99	0.33	8.25	PhiVc/2 < Vu <=	lt<=10", Not I	8.3	0.0	0.0
+E+1.60H	1	1.18	4.00	7.68	7.68	7.23	0.35	8.32	PhiVc/2 < Vu <=	lt<=10", Not I	8.3	0.0	0.0
+E+1.60H	1	1.28	4.00	7.51	7.51	6.48	0.39	8.39	PhiVc/2 < Vu <=	lt<=10", Not I	8.4	0.0	0.0
+E+1.60H	1	1.38	4.00	7.34	7.34	5.75	0.43	8.48	PhiVc/2 < Vu <=	lt<=10", Not I	8.5	0.0	0.0
+E+1.60H	1	1.48	4.00	7.17	7.17	5.04	0.47	8.60	PhiVc/2 < Vu <=	lt<=10", Not I	8.6	0.0	0.0
+E+1.60H	1	1.57	4.00	7.00	7.00	4.34	0.54	8.74	PhiVc/2 < Vu <=	lt<=10", Not I	8.7	0.0	0.0
+E+1.60H	1	1.67	4.00	6.83	6.83	3.66	0.62	8.94	PhiVc/2 < Vu <=	lt<=10", Not I	8.9	0.0	0.0
+E+1.60H	1	1.77	4.00	6.66	6.66	3.00	0.74	9.22	PhiVc/2 < Vu <=	lt<=10", Not I	9.2	0.0	0.0
+E+1.60H	1	1.87	4.00	6.49	6.49	2.35	0.92	9.63	PhiVc/2 < Vu <=	lt<=10", Not I	9.6	0.0	0.0
+E+1.60H	1	1.97	4.00	6.32	6.32	1.72	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	2.07	4.00	6.15	6.15	1.10	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	2.16	4.00	5.98	5.98	0.51	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	2.26	4.00	5.81	5.81	0.07	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	2.36	4.00	5.64	5.64	0.63	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	2.46	4.00	5.47	5.47	1.18	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	2.56	4.00	5.30	5.30	1.71	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	2.66	4.00	5.13	5.13	2.22	0.77	9.28	PhiVc/2 < Vu <=	lt<=10", Not I	9.3	0.0	0.0
+E+1.60H	1	2.75	4.00	4.96	4.96	2.72	0.61	8.91	PhiVc/2 < Vu <=	lt<=10", Not I	8.9	0.0	0.0
+E+1.60H	1	2.85	4.00	4.79	4.79	3.20	0.50	8.65	PhiVc/2 < Vu <=	lt<=10", Not I	8.7	0.0	0.0
+E+1.60H	1	2.95	4.00	4.62	4.62	3.66	0.42	8.47	PhiVc/2 < Vu <=	lt<=10", Not I	8.5	0.0	0.0
+E+1.60H	1	3.05	4.00	4.45	4.45	4.11	0.36	8.33	PhiVc/2 < Vu <=	lt<=10", Not I	8.3	0.0	0.0
+E+1.60H	1	3.15	4.00	4.28	4.28	4.54	0.31	8.22	PhiVc/2 < Vu <=	lt<=10", Not I	8.2	0.0	0.0
+E+1.60H	1	3.25	4.00	4.11	4.11	4.95	0.28	8.14	PhiVc/2 < Vu <=	lt<=10", Not I	8.1	0.0	0.0
+E+1.60H	1	3.34	4.00	3.94	3.94	5.35	0.25	8.06	Vu < PhiVc/2	lot Reqd 9.6.	8.1	0.0	0.0
+E+1.60H	1	3.44	4.00	3.77	3.77	5.73	0.22	8.00	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	3.54	4.00	3.60	3.60	6.09	0.20	7.95	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	3.64	4.00	3.43	3.43	6.43	0.18	7.91	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	3.74	4.00	3.26	3.26	6.76	0.16	7.87	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	3.84	4.00	3.09	3.09	7.08	0.15	7.83	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	3.93	4.00	2.92	2.92	7.37	0.13	7.80	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.03	4.00	2.75	2.75	7.65	0.12	7.77	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.13	4.00	2.58	2.58	7.91	0.11	7.75	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.23	4.00	2.41	2.41	8.16	0.10	7.72	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.33	4.00	2.24	2.24	8.39	0.09	7.70	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.43	4.00	2.07	2.07	8.60	0.08	7.68	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.52	4.00	1.90	1.90	8.80	0.07	7.66	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.62	4.00	1.73	1.73	8.97	0.06	7.64	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	4.72	4.00	1.56	1.56	9.14	0.06	7.63	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	4.82	4.00	1.39	1.39	9.28	0.05	7.61	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	4.92	4.00	1.22	1.22	9.41	0.04	7.59	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.02	4.00	1.05	1.05	9.52	0.04	7.58	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.11	4.00	0.88	0.88	9.62	0.03	7.56	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.21	4.00	0.71	0.71	9.69	0.02	7.55	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	5.31	4.00	0.54	0.54	9.76	0.02	7.54	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	5.41	4.00	0.37	0.37	9.80	0.01	7.52	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Retaining Wall Span Horizonal

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	5.51	4.00	0.20	0.20	9.83	0.01	7.51	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	5.61	4.00	0.03	0.03	9.84	0.00	7.50	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	5.70	4.00	-0.14	0.14	9.84	0.00	7.50	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	5.80	4.00	-0.31	0.31	9.81	0.01	7.52	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	5.90	4.00	-0.48	0.48	9.78	0.02	7.53	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.00	4.00	-0.65	0.65	9.72	0.02	7.54	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.10	4.00	-0.82	0.82	9.65	0.03	7.56	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.20	4.00	-0.99	0.99	9.56	0.03	7.57	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.30	4.00	-1.16	1.16	9.45	0.04	7.59	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.39	4.00	-1.33	1.33	9.33	0.05	7.60	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.49	4.00	-1.50	1.50	9.19	0.05	7.62	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.59	4.00	-1.67	1.67	9.04	0.06	7.64	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.69	4.00	-1.84	1.84	8.86	0.07	7.65	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	6.79	4.00	-2.01	2.01	8.68	0.08	7.67	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	6.89	4.00	-2.18	2.18	8.47	0.09	7.69	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	6.98	4.00	-2.35	2.35	8.25	0.09	7.71	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	7.08	4.00	-2.52	2.52	8.01	0.10	7.74	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	7.18	4.00	-2.69	2.69	7.75	0.12	7.76	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	7.28	4.00	-2.86	2.86	7.48	0.13	7.79	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	7.38	4.00	-3.03	3.03	7.19	0.14	7.82	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	7.48	4.00	-3.20	3.20	6.88	0.15	7.85	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	7.57	4.00	-3.37	3.37	6.56	0.17	7.89	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	7.67	4.00	-3.54	3.54	6.22	0.19	7.93	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	7.77	4.00	-3.71	3.71	5.86	0.21	7.98	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	7.87	4.00	-3.88	3.88	5.49	0.24	8.04	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	7.97	4.00	-4.05	4.05	5.10	0.26	8.11	Vu < PhiVc/2	lot Reqd 9.6.	8.1	0.0	0.0
+E+1.60H	1	8.07	4.00	-4.22	4.22	4.70	0.30	8.19	PhiVc/2 < Vu <=	lt<=10", Not I	8.2	0.0	0.0
+E+1.60H	1	8.16	4.00	-4.39	4.39	4.27	0.34	8.29	PhiVc/2 < Vu <=	lt<=10", Not I	8.3	0.0	0.0
+E+1.60H	1	8.26	4.00	-4.56	4.56	3.83	0.40	8.41	PhiVc/2 < Vu <=	lt<=10", Not I	8.4	0.0	0.0
+E+1.60H	1	8.36	4.00	-4.73	4.73	3.38	0.47	8.58	PhiVc/2 < Vu <=	lt<=10", Not I	8.6	0.0	0.0
+E+1.60H	1	8.46	4.00	-4.90	4.90	2.90	0.56	8.80	PhiVc/2 < Vu <=	lt<=10", Not I	8.8	0.0	0.0
+E+1.60H	1	8.56	4.00	-5.07	5.07	2.41	0.70	9.12	PhiVc/2 < Vu <=	lt<=10", Not I	9.1	0.0	0.0
+E+1.60H	1	8.66	4.00	-5.24	5.24	1.91	0.92	9.62	PhiVc/2 < Vu <=	lt<=10", Not I	9.6	0.0	0.0
+E+1.60H	1	8.75	4.00	-5.41	5.41	1.38	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	8.85	4.00	-5.58	5.58	0.84	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	8.95	4.00	-5.75	5.75	0.28	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	9.000	9.84	10.31	0.95
+1.60H					
Span # 1	1	9.000	9.02	10.31	0.87
+E+1.60H					
Span # 1	1	9.000	9.84	10.31	0.95
+E+0.90H					
Span # 1	1	9.000	5.89	10.31	0.57

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+0.70E+H	1	0.0226	5.090		0.0000	0.000

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

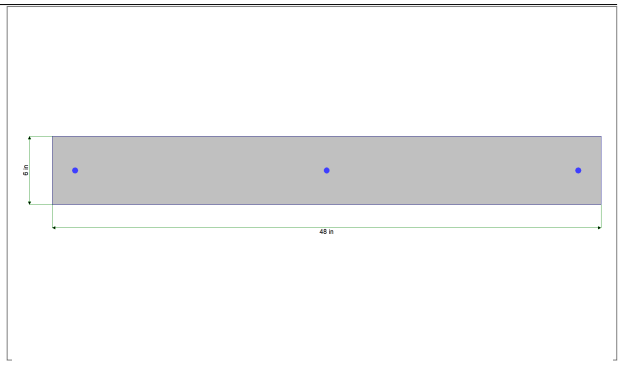
DESCRIPTION: Basement Slab-on-Grade (3-Span)

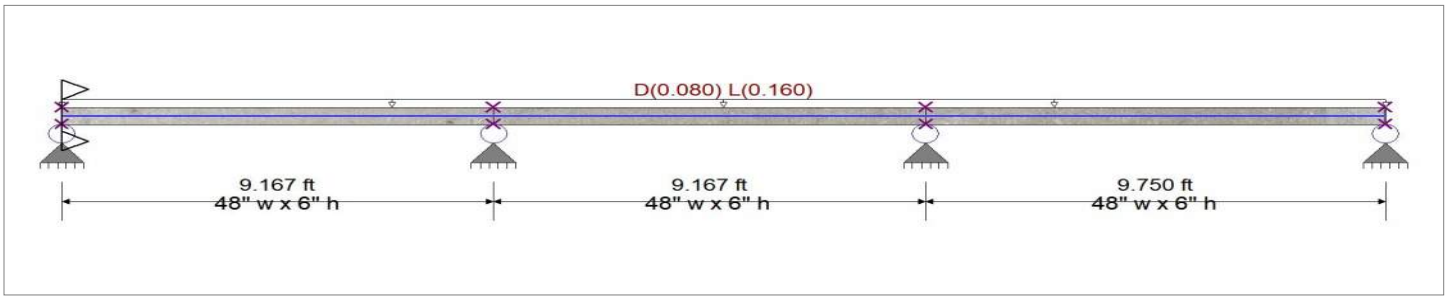
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	375.0 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	2,850.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2





Cross Section & Reinforcing Details

Rectangular Section, Width = 48.0 in, Height = 6.0 in
Span #1 Reinforcing....
3-#4 at 3.0 in from Bottom, from 0.0 to 9.167 ft in this span
Span #2 Reinforcing....
3-#4 at 3.0 in from Bottom, from 0.0 to 9.167 ft in this span
Span #3 Reinforcing....
3-#4 at 3.0 in from Bottom, from 0.0 to 9.750 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.020, L = 0.040

Uniform Load on ALL spans : D = 0.020, L = 0.040 ksf, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.893** : 1	Maximum Deflection			
Section used for this span		**Typical Section**	Max Downward Transient Deflection	0.010 in	Ratio =	11989 >=360
Mu : Applied		-6.807 k-ft	Max Upward Transient Deflection	-0.005 in	Ratio =	20473 >=360
Mn * Phi : Allowable		7.624 k-ft	Max Downward Total Deflection	0.026 in	Ratio =	4453 >=180
Location of maximum on span		0.000 ft	Max Upward Total Deflection	-0.005 in	Ratio =	20440 >=180
Span # where maximum occurs		Span # 3				

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	2.029	5.443	5.718	2.149
Overall MINimum	0.028	-0.171	-0.143	0.022
+D+H	1.365	3.681	3.891	1.454
+D+L+H, LL Comb Run (**L)	1.393	3.510	4.921	2.127
+D+L+H, LL Comb Run (*L*)	1.291	4.491	4.689	1.387
+D+L+H, LL Comb Run (*LL)	1.320	4.321	5.718	2.060
+D+L+H, LL Comb Run (L**)	2.001	4.633	3.748	1.476

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (3-Span)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
+D+L+H, LL Comb Run (L*L)	2.029	4.462	4.777	2.149
+D+L+H, LL Comb Run (LL*)	1.927	5.443	4.545	1.409
+D+L+H, LL Comb Run (LLL)	1.955	5.273	5.574	2.082
+D+Lr+H, LL Comb Run (**L)	1.365	3.681	3.891	1.454
+D+Lr+H, LL Comb Run (*L*)	1.365	3.681	3.891	1.454
+D+Lr+H, LL Comb Run (*LL)	1.365	3.681	3.891	1.454
+D+Lr+H, LL Comb Run (L**)	1.365	3.681	3.891	1.454
+D+Lr+H, LL Comb Run (L*L)	1.365	3.681	3.891	1.454
+D+Lr+H, LL Comb Run (LL*)	1.365	3.681	3.891	1.454
+D+Lr+H, LL Comb Run (LLL)	1.365	3.681	3.891	1.454
+D+S+H	1.365	3.681	3.891	1.454
+D+0.750Lr+0.750L+H, LL Comb Run (	1.386	3.553	4.663	1.958
+D+0.750Lr+0.750L+H, LL Comb Run (	1.310	4.289	4.489	1.404
+D+0.750Lr+0.750L+H, LL Comb Run (	1.331	4.161	5.261	1.908
+D+0.750Lr+0.750L+H, LL Comb Run (	1.842	4.395	3.784	1.470
+D+0.750Lr+0.750L+H, LL Comb Run (	1.863	4.267	4.556	1.975
+D+0.750Lr+0.750L+H, LL Comb Run (	1.786	5.003	4.382	1.420
+D+0.750Lr+0.750L+H, LL Comb Run (	1.808	4.875	5.154	1.925
+D+0.750L+0.750S+H, LL Comb Run (*	1.386	3.553	4.663	1.958
+D+0.750L+0.750S+H, LL Comb Run (*	1.310	4.289	4.489	1.404
+D+0.750L+0.750S+H, LL Comb Run (*	1.331	4.161	5.261	1.908
+D+0.750L+0.750S+H, LL Comb Run (L	1.842	4.395	3.784	1.470
+D+0.750L+0.750S+H, LL Comb Run (L	1.863	4.267	4.556	1.975
+D+0.750L+0.750S+H, LL Comb Run (L	1.786	5.003	4.382	1.420
+D+0.750L+0.750S+H, LL Comb Run (L	1.808	4.875	5.154	1.925
+D+0.60W+H	1.365	3.681	3.891	1.454
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.386	3.553	4.663	1.958
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.310	4.289	4.489	1.404
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.331	4.161	5.261	1.908
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.842	4.395	3.784	1.470
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.863	4.267	4.556	1.975
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.786	5.003	4.382	1.420
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.808	4.875	5.154	1.925
+D+0.750L+0.750S+0.450W+H, LL Comb	1.386	3.553	4.663	1.958
+D+0.750L+0.750S+0.450W+H, LL Comb	1.310	4.289	4.489	1.404
+D+0.750L+0.750S+0.450W+H, LL Comb	1.331	4.161	5.261	1.908
+D+0.750L+0.750S+0.450W+H, LL Comb	1.842	4.395	3.784	1.470
+D+0.750L+0.750S+0.450W+H, LL Comb	1.863	4.267	4.556	1.975
+D+0.750L+0.750S+0.450W+H, LL Comb	1.786	5.003	4.382	1.420
+D+0.750L+0.750S+0.450W+H, LL Comb	1.808	4.875	5.154	1.925
+0.60D+0.60W+0.60H	0.819	2.209	2.335	0.872
+D+0.70E+0.60H	1.365	3.681	3.891	1.454
+D+0.750L+0.750S+0.5250E+H, LL Com	1.386	3.553	4.663	1.958
+D+0.750L+0.750S+0.5250E+H, LL Com	1.310	4.289	4.489	1.404
+D+0.750L+0.750S+0.5250E+H, LL Com	1.331	4.161	5.261	1.908
+D+0.750L+0.750S+0.5250E+H, LL Com	1.842	4.395	3.784	1.470
+D+0.750L+0.750S+0.5250E+H, LL Com	1.863	4.267	4.556	1.975
+D+0.750L+0.750S+0.5250E+H, LL Com	1.786	5.003	4.382	1.420
+D+0.750L+0.750S+0.5250E+H, LL Com	1.808	4.875	5.154	1.925
+0.60D+0.70E+H	0.819	2.209	2.335	0.872
D Only	1.365	3.681	3.891	1.454
L Only, LL Comb Run (**L)	0.028	-0.171	1.029	0.673
L Only, LL Comb Run (*L*)	-0.074	0.810	0.797	-0.067
L Only, LL Comb Run (*LL)	-0.045	0.640	1.826	0.606
L Only, LL Comb Run (L**)	0.636	0.952	-0.143	0.022
L Only, LL Comb Run (L*L)	0.664	0.781	0.886	0.695
L Only, LL Comb Run (LL*)	0.562	1.762	0.654	-0.044
L Only, LL Comb Run (LLL)	0.590	1.592	1.683	0.629
H Only				

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (3-Span)

Shear Stirrup Requirements

Entire Beam Span Length : Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	9.167	-5.92	7.62	0.78
Span # 2	2	9.167	-6.60	7.62	0.87
Span # 3	3	9.750	-6.81	7.62	0.89
+1.40D+1.60H					
Span # 1	1	9.167	-4.07	7.62	0.53
Span # 2	2	9.167	-4.63	7.62	0.61
Span # 3	3	9.750	-4.78	7.62	0.63
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L)					
Span # 1	1	9.167	3.19	7.62	0.42
Span # 2	2	9.167	-5.63	7.62	0.74
Span # 3	3	9.750	-5.77	7.62	0.76
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*)					
Span # 1	1	9.167	-4.57	7.62	0.60
Span # 2	2	9.167	-4.94	7.62	0.65
Span # 3	3	9.750	-5.14	7.62	0.67
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL)					
Span # 1	1	9.167	-4.15	7.62	0.54
Span # 2	2	9.167	-6.60	7.62	0.87
Span # 3	3	9.750	-6.81	7.62	0.89
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**)					
Span # 1	1	9.167	5.04	7.62	0.66
Span # 2	2	9.167	-5.07	7.62	0.67
Span # 3	3	9.750	-3.75	7.62	0.49
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L)					
Span # 1	1	9.167	5.21	7.62	0.68
Span # 2	2	9.167	-5.29	7.62	0.69
Span # 3	3	9.750	5.83	7.62	0.76
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*)					
Span # 1	1	9.167	-5.92	7.62	0.78
Span # 2	2	9.167	-6.16	7.62	0.81
Span # 3	3	9.750	-4.79	7.62	0.63
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL)					
Span # 1	1	9.167	-5.50	7.62	0.72
Span # 2	2	9.167	-6.26	7.62	0.82
Span # 3	3	9.750	-6.46	7.62	0.85
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L)					
Span # 1	1	9.167	3.19	7.62	0.42
Span # 2	2	9.167	-5.63	7.62	0.74
Span # 3	3	9.750	-5.77	7.62	0.76
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*)					
Span # 1	1	9.167	-4.57	7.62	0.60
Span # 2	2	9.167	-4.94	7.62	0.65
Span # 3	3	9.750	-5.14	7.62	0.67
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL)					
Span # 1	1	9.167	-4.15	7.62	0.54
Span # 2	2	9.167	-6.60	7.62	0.87
Span # 3	3	9.750	-6.81	7.62	0.89
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**)					
Span # 1	1	9.167	5.04	7.62	0.66
Span # 2	2	9.167	-5.07	7.62	0.67
Span # 3	3	9.750	-3.75	7.62	0.49
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L)					
Span # 1	1	9.167	5.21	7.62	0.68
Span # 2	2	9.167	-5.29	7.62	0.69
Span # 3	3	9.750	5.83	7.62	0.76
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*)					
Span # 1	1	9.167	-5.92	7.62	0.78
Span # 2	2	9.167	-6.16	7.62	0.81
Span # 3	3	9.750	-4.79	7.62	0.63
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL)					
Span # 1	1	9.167	-5.50	7.62	0.72
Span # 2	2	9.167	-6.26	7.62	0.82
Span # 3	3	9.750	-6.46	7.62	0.85
+1.20D+1.60Lr+L+1.60H, LL Comb Run (**L)					

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (3-Span)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
Span # 1	1	9.167	-3.23	7.62	0.42
Span # 2	2	9.167	-5.01	7.62	0.66
Span # 3	3	9.750	-5.14	7.62	0.67
+1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*)					
Span # 1	1	9.167	-4.16	7.62	0.55
Span # 2	2	9.167	-4.58	7.62	0.60
Span # 3	3	9.750	-4.75	7.62	0.62
+1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL)					
Span # 1	1	9.167	-3.91	7.62	0.51
Span # 2	2	9.167	-5.61	7.62	0.74
Span # 3	3	9.750	-5.79	7.62	0.76
+1.20D+1.60Lr+L+1.60H, LL Comb Run (L**)					
Span # 1	1	9.167	-4.34	7.62	0.57
Span # 2	2	9.167	-4.53	7.62	0.59
Span # 3	3	9.750	-3.88	7.62	0.51
+1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L)					
Span # 1	1	9.167	4.39	7.62	0.58
Span # 2	2	9.167	-4.80	7.62	0.63
Span # 3	3	9.750	4.93	7.62	0.65
+1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*)					
Span # 1	1	9.167	-5.01	7.62	0.66
Span # 2	2	9.167	-5.21	7.62	0.68
Span # 3	3	9.750	-4.53	7.62	0.59
+1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL)					
Span # 1	1	9.167	-4.75	7.62	0.62
Span # 2	2	9.167	-5.40	7.62	0.71
Span # 3	3	9.750	-5.57	7.62	0.73
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L)					
Span # 1	1	9.167	-3.49	7.62	0.46
Span # 2	2	9.167	-3.97	7.62	0.52
Span # 3	3	9.750	-4.10	7.62	0.54
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*)					
Span # 1	1	9.167	-3.49	7.62	0.46
Span # 2	2	9.167	-3.97	7.62	0.52
Span # 3	3	9.750	-4.10	7.62	0.54
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL)					
Span # 1	1	9.167	-3.49	7.62	0.46
Span # 2	2	9.167	-3.97	7.62	0.52
Span # 3	3	9.750	-4.10	7.62	0.54
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**)					
Span # 1	1	9.167	-3.49	7.62	0.46
Span # 2	2	9.167	-3.97	7.62	0.52
Span # 3	3	9.750	-4.10	7.62	0.54
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L)					
Span # 1	1	9.167	-3.49	7.62	0.46
Span # 2	2	9.167	-3.97	7.62	0.52
Span # 3	3	9.750	-4.10	7.62	0.54
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*)					
Span # 1	1	9.167	-3.49	7.62	0.46
Span # 2	2	9.167	-3.97	7.62	0.52
Span # 3	3	9.750	-4.10	7.62	0.54
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL)					
Span # 1	1	9.167	-3.49	7.62	0.46
Span # 2	2	9.167	-3.97	7.62	0.52
Span # 3	3	9.750	-4.10	7.62	0.54
+1.20D+L+1.60S+1.60H, LL Comb Run (**L)					
Span # 1	1	9.167	-3.23	7.62	0.42
Span # 2	2	9.167	-5.01	7.62	0.66
Span # 3	3	9.750	-5.14	7.62	0.67
+1.20D+L+1.60S+1.60H, LL Comb Run (*L*)					
Span # 1	1	9.167	-4.16	7.62	0.55
Span # 2	2	9.167	-4.58	7.62	0.60
Span # 3	3	9.750	-4.75	7.62	0.62
+1.20D+L+1.60S+1.60H, LL Comb Run (*LL)					
Span # 1	1	9.167	-3.91	7.62	0.51
Span # 2	2	9.167	-5.61	7.62	0.74
Span # 3	3	9.750	-5.79	7.62	0.76
+1.20D+L+1.60S+1.60H, LL Comb Run (L**)					
Span # 1	1	9.167	-4.34	7.62	0.57

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (3-Span)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
Span # 2	2	9.167	-4.53	7.62	0.59
Span # 3	3	9.750	-3.88	7.62	0.51
+1.20D+L+1.60S+1.60H, LL Comb Run (L*L)					
Span # 1	1	9.167	4.39	7.62	0.58
Span # 2	2	9.167	-4.80	7.62	0.63
Span # 3	3	9.750	4.93	7.62	0.65
+1.20D+L+1.60S+1.60H, LL Comb Run (LL*)					
Span # 1	1	9.167	-5.01	7.62	0.66
Span # 2	2	9.167	-5.21	7.62	0.68
Span # 3	3	9.750	-4.53	7.62	0.59
+1.20D+L+1.60S+1.60H, LL Comb Run (LLL)					
Span # 1	1	9.167	-4.75	7.62	0.62
Span # 2	2	9.167	-5.40	7.62	0.71
Span # 3	3	9.750	-5.57	7.62	0.73
+1.20D+1.60S+0.50W+1.60H					
Span # 1	1	9.167	-3.49	7.62	0.46
Span # 2	2	9.167	-3.97	7.62	0.52
Span # 3	3	9.750	-4.10	7.62	0.54
+1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L)					
Span # 1	1	9.167	-3.23	7.62	0.42
Span # 2	2	9.167	-5.01	7.62	0.66
Span # 3	3	9.750	-5.14	7.62	0.67
+1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*)					
Span # 1	1	9.167	-4.16	7.62	0.55
Span # 2	2	9.167	-4.58	7.62	0.60
Span # 3	3	9.750	-4.75	7.62	0.62
+1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL)					
Span # 1	1	9.167	-3.91	7.62	0.51
Span # 2	2	9.167	-5.61	7.62	0.74
Span # 3	3	9.750	-5.79	7.62	0.76
+1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**)					
Span # 1	1	9.167	-4.34	7.62	0.57
Span # 2	2	9.167	-4.53	7.62	0.59
Span # 3	3	9.750	-3.88	7.62	0.51
+1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L)					
Span # 1	1	9.167	4.39	7.62	0.58
Span # 2	2	9.167	-4.80	7.62	0.63
Span # 3	3	9.750	4.93	7.62	0.65
+1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*)					
Span # 1	1	9.167	-5.01	7.62	0.66
Span # 2	2	9.167	-5.21	7.62	0.68
Span # 3	3	9.750	-4.53	7.62	0.59
+1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL)					
Span # 1	1	9.167	-4.75	7.62	0.62
Span # 2	2	9.167	-5.40	7.62	0.71
Span # 3	3	9.750	-5.57	7.62	0.73
+1.20D+L+0.50S+W+1.60H, LL Comb Run (**L)					
Span # 1	1	9.167	-3.23	7.62	0.42
Span # 2	2	9.167	-5.01	7.62	0.66
Span # 3	3	9.750	-5.14	7.62	0.67
+1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*)					
Span # 1	1	9.167	-4.16	7.62	0.55
Span # 2	2	9.167	-4.58	7.62	0.60
Span # 3	3	9.750	-4.75	7.62	0.62
+1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL)					
Span # 1	1	9.167	-3.91	7.62	0.51
Span # 2	2	9.167	-5.61	7.62	0.74
Span # 3	3	9.750	-5.79	7.62	0.76
+1.20D+L+0.50S+W+1.60H, LL Comb Run (L**)					
Span # 1	1	9.167	-4.34	7.62	0.57
Span # 2	2	9.167	-4.53	7.62	0.59
Span # 3	3	9.750	-3.88	7.62	0.51
+1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L)					
Span # 1	1	9.167	4.39	7.62	0.58
Span # 2	2	9.167	-4.80	7.62	0.63
Span # 3	3	9.750	4.93	7.62	0.65
+1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*)					
Span # 1	1	9.167	-5.01	7.62	0.66
Span # 2	2	9.167	-5.21	7.62	0.68

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (3-Span)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
Span # 3	3	9.750	-4.53	7.62	0.59
+1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL)					
Span # 1	1	9.167	-4.75	7.62	0.62
Span # 2	2	9.167	-5.40	7.62	0.71
Span # 3	3	9.750	-5.57	7.62	0.73
+0.90D+W+1.60H					
Span # 1	1	9.167	-2.62	7.62	0.34
Span # 2	2	9.167	-2.98	7.62	0.39
Span # 3	3	9.750	-3.07	7.62	0.40
+1.20D+L+0.20S+E+1.60H, LL Comb Run (**L)					
Span # 1	1	9.167	-3.23	7.62	0.42
Span # 2	2	9.167	-5.01	7.62	0.66
Span # 3	3	9.750	-5.14	7.62	0.67
+1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*)					
Span # 1	1	9.167	-4.16	7.62	0.55
Span # 2	2	9.167	-4.58	7.62	0.60
Span # 3	3	9.750	-4.75	7.62	0.62
+1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL)					
Span # 1	1	9.167	-3.91	7.62	0.51
Span # 2	2	9.167	-5.61	7.62	0.74
Span # 3	3	9.750	-5.79	7.62	0.76
+1.20D+L+0.20S+E+1.60H, LL Comb Run (L**)					
Span # 1	1	9.167	-4.34	7.62	0.57
Span # 2	2	9.167	-4.53	7.62	0.59
Span # 3	3	9.750	-3.88	7.62	0.51
+1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L)					
Span # 1	1	9.167	4.39	7.62	0.58
Span # 2	2	9.167	-4.80	7.62	0.63
Span # 3	3	9.750	4.93	7.62	0.65
+1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*)					
Span # 1	1	9.167	-5.01	7.62	0.66
Span # 2	2	9.167	-5.21	7.62	0.68
Span # 3	3	9.750	-4.53	7.62	0.59
+1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL)					
Span # 1	1	9.167	-4.75	7.62	0.62
Span # 2	2	9.167	-5.40	7.62	0.71
Span # 3	3	9.750	-5.57	7.62	0.73
+0.90D+E+0.90H					
Span # 1	1	9.167	-2.62	7.62	0.34
Span # 2	2	9.167	-2.98	7.62	0.39
Span # 3	3	9.750	-3.07	7.62	0.40

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H, LL Comb Run (L*L)	1	0.0208	4.217	+D+L+H, LL Comb Run (L*L)	-0.0007	9.350
+D+L+H, LL Comb Run (*L*)	2	0.0055	4.584	+D+L+H, LL Comb Run (L*L)	-0.0054	5.684
+D+L+H, LL Comb Run (L*L)	3	0.0263	5.265		0.0000	5.684

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

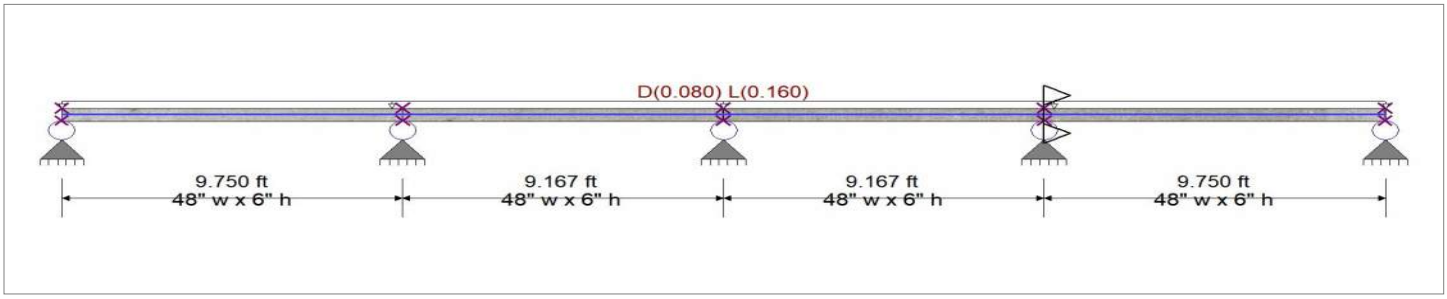
DESCRIPTION: Basement Slab-on-Grade (4-Span)

CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	375.0 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	2,850.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 48.0 in, Height = 6.0 in
Span #1 Reinforcing....
4-#4 at 3.0 in from Bottom, from 0.0 to 9.750 ft in this span
Span #2 Reinforcing....
4-#4 at 3.0 in from Bottom, from 0.0 to 9.167 ft in this span
Span #3 Reinforcing....
4-#4 at 3.0 in from Bottom, from 0.0 to 9.167 ft in this span
Span #4 Reinforcing....
4-#4 at 3.0 in from Bottom, from 0.0 to 9.750 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.020, L = 0.040

Uniform Load on ALL spans : D = 0.020, L = 0.040 ksf, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.722** : 1	Maximum Deflection			
Section used for this span		**Typical Section**	Max Downward Transient Deflection	0.010 in	Ratio =	12260 >=360
Mu : Applied		-7.186 k-ft	Max Upward Transient Deflection	-0.005 in	Ratio =	22712 >=360
Mn * Phi : Allowable		9.953 k-ft	Max Downward Total Deflection	0.025 in	Ratio =	4662 >=180
Location of maximum on span		0.000 ft	Max Upward Total Deflection	-0.003 in	Ratio =	33645 >=180
Span # where maximum occurs		Span # 4				

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5
Overall MAXimum	2.120	5.914	4.727	5.914	2.120
Overall MINimum	-0.007	0.045	-0.182	0.045	-0.007
+D+H	1.429	4.047	3.045	4.047	1.429
+D+L+H, LL Comb Run (***L)	1.422	4.092	2.863	5.079	2.102
+D+L+H, LL Comb Run (**L*)	1.447	3.931	3.886	4.837	1.364

DESCRIPTION: Basement Slab-on-Grade (4-Span)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5
+D+L+H, LL Comb Run (**LL)	1.440	3.976	3.704	5.869	2.036
+D+L+H, LL Comb Run (*L**)	1.364	4.837	3.886	3.931	1.447
+D+L+H, LL Comb Run (*L*L)	1.357	4.882	3.704	4.963	2.120
+D+L+H, LL Comb Run (*LL*)	1.382	4.721	4.727	4.721	1.382
+D+L+H, LL Comb Run (*LLL)	1.375	4.765	4.545	5.753	2.054
+D+L+H, LL Comb Run (L***)	2.102	5.079	2.863	4.092	1.422
+D+L+H, LL Comb Run (L**L)	2.095	5.124	2.680	5.124	2.095
+D+L+H, LL Comb Run (L*L*)	2.120	4.963	3.704	4.882	1.357
+D+L+H, LL Comb Run (L*LL)	2.113	5.008	3.521	5.914	2.030
+D+L+H, LL Comb Run (LL**)	2.036	5.869	3.704	3.976	1.440
+D+L+H, LL Comb Run (LL*L)	2.030	5.914	3.521	5.008	2.113
+D+L+H, LL Comb Run (LLL*)	2.054	5.753	4.545	4.765	1.375
+D+L+H, LL Comb Run (LLLL)	2.048	5.797	4.362	5.797	2.048
+D+Lr+H, LL Comb Run (***L)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (**L*)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (**LL)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (*L**)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (*L*L)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (*LL*)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (*LLL)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (L***)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (L**L)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (L*L*)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (L*LL)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (LL**)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (LL*L)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (LLL*)	1.429	4.047	3.045	4.047	1.429
+D+Lr+H, LL Comb Run (LLLL)	1.429	4.047	3.045	4.047	1.429
+D+S+H	1.429	4.047	3.045	4.047	1.429
+D+0.750Lr+0.750L+H, LL Comb Run (	1.424	4.081	2.908	4.821	1.934
+D+0.750Lr+0.750L+H, LL Comb Run (	1.443	3.960	3.676	4.639	1.380
+D+0.750Lr+0.750L+H, LL Comb Run (	1.438	3.994	3.539	5.414	1.885
+D+0.750Lr+0.750L+H, LL Comb Run (	1.380	4.639	3.676	3.960	1.443
+D+0.750Lr+0.750L+H, LL Comb Run (	1.375	4.673	3.539	4.734	1.947
+D+0.750Lr+0.750L+H, LL Comb Run (	1.394	4.552	4.307	4.552	1.394
+D+0.750Lr+0.750L+H, LL Comb Run (	1.389	4.586	4.170	5.326	1.898
+D+0.750Lr+0.750L+H, LL Comb Run (	1.934	4.821	2.908	4.081	1.424
+D+0.750Lr+0.750L+H, LL Comb Run (	1.929	4.855	2.772	4.855	1.929
+D+0.750Lr+0.750L+H, LL Comb Run (	1.947	4.734	3.539	4.673	1.375
+D+0.750Lr+0.750L+H, LL Comb Run (	1.942	4.768	3.402	5.447	1.879
+D+0.750Lr+0.750L+H, LL Comb Run (	1.885	5.414	3.539	3.994	1.438
+D+0.750Lr+0.750L+H, LL Comb Run (	1.879	5.447	3.402	4.768	1.942
+D+0.750Lr+0.750L+H, LL Comb Run (	1.898	5.326	4.170	4.586	1.389
+D+0.750Lr+0.750L+H, LL Comb Run (	1.893	5.360	4.033	5.360	1.893
+D+0.750L+0.750S+H, LL Comb Run (*	1.424	4.081	2.908	4.821	1.934
+D+0.750L+0.750S+H, LL Comb Run (*	1.443	3.960	3.676	4.639	1.380
+D+0.750L+0.750S+H, LL Comb Run (*	1.438	3.994	3.539	5.414	1.885
+D+0.750L+0.750S+H, LL Comb Run (*	1.380	4.639	3.676	3.960	1.443
+D+0.750L+0.750S+H, LL Comb Run (*	1.375	4.673	3.539	4.734	1.947
+D+0.750L+0.750S+H, LL Comb Run (*	1.394	4.552	4.307	4.552	1.394
+D+0.750L+0.750S+H, LL Comb Run (*	1.389	4.586	4.170	5.326	1.898
+D+0.750L+0.750S+H, LL Comb Run (L	1.934	4.821	2.908	4.081	1.424
+D+0.750L+0.750S+H, LL Comb Run (L	1.929	4.855	2.772	4.855	1.929
+D+0.750L+0.750S+H, LL Comb Run (L	1.947	4.734	3.539	4.673	1.375
+D+0.750L+0.750S+H, LL Comb Run (L	1.942	4.768	3.402	5.447	1.879
+D+0.750L+0.750S+H, LL Comb Run (L	1.885	5.414	3.539	3.994	1.438
+D+0.750L+0.750S+H, LL Comb Run (L	1.879	5.447	3.402	4.768	1.942
+D+0.750L+0.750S+H, LL Comb Run (L	1.898	5.326	4.170	4.586	1.389
+D+0.750L+0.750S+H, LL Comb Run (L	1.893	5.360	4.033	5.360	1.893

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (4-Span)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5
+D+0.60W+H	1.429	4.047	3.045	4.047	1.429
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.424	4.081	2.908	4.821	1.934
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.443	3.960	3.676	4.639	1.380
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.438	3.994	3.539	5.414	1.885
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.380	4.639	3.676	3.960	1.443
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.375	4.673	3.539	4.734	1.947
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.394	4.552	4.307	4.552	1.394
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.389	4.586	4.170	5.326	1.898
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.934	4.821	2.908	4.081	1.424
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.929	4.855	2.772	4.855	1.929
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.947	4.734	3.539	4.673	1.375
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.942	4.768	3.402	5.447	1.879
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.885	5.414	3.539	3.994	1.438
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.879	5.447	3.402	4.768	1.942
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.898	5.326	4.170	4.586	1.389
+D+0.750Lr+0.750L+0.450W+H, LL Com	1.893	5.360	4.033	5.360	1.893
+D+0.750L+0.750S+0.450W+H, LL Comb	1.424	4.081	2.908	4.821	1.934
+D+0.750L+0.750S+0.450W+H, LL Comb	1.443	3.960	3.676	4.639	1.380
+D+0.750L+0.750S+0.450W+H, LL Comb	1.438	3.994	3.539	5.414	1.885
+D+0.750L+0.750S+0.450W+H, LL Comb	1.380	4.639	3.676	3.960	1.443
+D+0.750L+0.750S+0.450W+H, LL Comb	1.375	4.673	3.539	4.734	1.947
+D+0.750L+0.750S+0.450W+H, LL Comb	1.394	4.552	4.307	4.552	1.394
+D+0.750L+0.750S+0.450W+H, LL Comb	1.389	4.586	4.170	5.326	1.898
+D+0.750L+0.750S+0.450W+H, LL Comb	1.934	4.821	2.908	4.081	1.424
+D+0.750L+0.750S+0.450W+H, LL Comb	1.929	4.855	2.772	4.855	1.929
+D+0.750L+0.750S+0.450W+H, LL Comb	1.947	4.734	3.539	4.673	1.375
+D+0.750L+0.750S+0.450W+H, LL Comb	1.942	4.768	3.402	5.447	1.879
+D+0.750L+0.750S+0.450W+H, LL Comb	1.885	5.414	3.539	3.994	1.438
+D+0.750L+0.750S+0.450W+H, LL Comb	1.879	5.447	3.402	4.768	1.942
+D+0.750L+0.750S+0.450W+H, LL Comb	1.898	5.326	4.170	4.586	1.389
+D+0.750L+0.750S+0.450W+H, LL Comb	1.893	5.360	4.033	5.360	1.893
+0.60D+0.60W+0.60H	0.858	2.428	1.827	2.428	0.858
+D+0.70E+0.60H	1.429	4.047	3.045	4.047	1.429
+D+0.750L+0.750S+0.5250E+H, LL Com	1.424	4.081	2.908	4.821	1.934
+D+0.750L+0.750S+0.5250E+H, LL Com	1.443	3.960	3.676	4.639	1.380
+D+0.750L+0.750S+0.5250E+H, LL Com	1.438	3.994	3.539	5.414	1.885
+D+0.750L+0.750S+0.5250E+H, LL Com	1.380	4.639	3.676	3.960	1.443
+D+0.750L+0.750S+0.5250E+H, LL Com	1.375	4.673	3.539	4.734	1.947
+D+0.750L+0.750S+0.5250E+H, LL Com	1.394	4.552	4.307	4.552	1.394
+D+0.750L+0.750S+0.5250E+H, LL Com	1.389	4.586	4.170	5.326	1.898
+D+0.750L+0.750S+0.5250E+H, LL Com	1.934	4.821	2.908	4.081	1.424
+D+0.750L+0.750S+0.5250E+H, LL Com	1.929	4.855	2.772	4.855	1.929
+D+0.750L+0.750S+0.5250E+H, LL Com	1.947	4.734	3.539	4.673	1.375
+D+0.750L+0.750S+0.5250E+H, LL Com	1.942	4.768	3.402	5.447	1.879
+D+0.750L+0.750S+0.5250E+H, LL Com	1.885	5.414	3.539	3.994	1.438
+D+0.750L+0.750S+0.5250E+H, LL Com	1.879	5.447	3.402	4.768	1.942
+D+0.750L+0.750S+0.5250E+H, LL Com	1.898	5.326	4.170	4.586	1.389
+D+0.750L+0.750S+0.5250E+H, LL Com	1.893	5.360	4.033	5.360	1.893
+0.60D+0.70E+H	0.858	2.428	1.827	2.428	0.858
D Only	1.429	4.047	3.045	4.047	1.429
L Only, LL Comb Run (***L)	-0.007	0.045	-0.182	1.032	0.673
L Only, LL Comb Run (**L*)	0.018	-0.116	0.841	0.790	-0.066
L Only, LL Comb Run (**LL)	0.011	-0.071	0.658	1.822	0.607
L Only, LL Comb Run (*L**)	-0.066	0.790	0.841	-0.116	0.018
L Only, LL Comb Run (*L*L)	-0.072	0.834	0.658	0.916	0.691
L Only, LL Comb Run (*LL*)	-0.048	0.673	1.682	0.673	-0.048
L Only, LL Comb Run (*LLL)	-0.054	0.718	1.499	1.705	0.625
L Only, LL Comb Run (L***)	0.673	1.032	-0.182	0.045	-0.007
L Only, LL Comb Run (L**L)	0.666	1.077	-0.365	1.077	0.666

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (4-Span)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5
L Only, LL Comb Run (L*L*)	0.691	0.916	0.658	0.834	-0.072
L Only, LL Comb Run (L*LL)	0.684	0.961	0.476	1.866	0.600
L Only, LL Comb Run (LL**)	0.607	1.822	0.658	-0.071	0.011
L Only, LL Comb Run (LL*L)	0.600	1.866	0.476	0.961	0.684
L Only, LL Comb Run (LLL*)	0.625	1.705	1.499	0.718	-0.054
L Only, LL Comb Run (LLLL)	0.618	1.750	1.317	1.750	0.618
H Only					

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	0.00	3.00	2.82	2.82	0.00	1.00	11.76	Vu < PhiVc/2	lot Reqd 9.6.	11.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	0.62	3.00	2.39	2.39	1.60	0.37	10.82	Vu < PhiVc/2	lot Reqd 9.6.	10.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	1.23	3.00	1.96	1.96	2.94	0.17	10.51	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	1.85	3.00	1.53	1.53	4.02	0.10	10.40	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	2.46	3.00	1.10	1.10	4.82	0.06	10.35	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	3.08	3.00	0.66	0.66	5.37	0.03	10.31	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	3.69	3.00	0.23	0.23	5.64	0.01	10.28	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	4.31	3.00	-0.34	0.34	5.03	0.02	10.29	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	4.93	3.00	-0.77	0.77	4.69	0.04	10.32	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	5.54	3.00	-1.20	1.20	4.08	0.07	10.37	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	6.16	3.00	-1.64	1.64	3.20	0.13	10.45	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	6.77	3.00	-2.07	2.07	2.06	0.25	10.64	Vu < PhiVc/2	lot Reqd 9.6.	10.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	7.39	3.00	-2.50	2.50	0.66	0.95	11.68	Vu < PhiVc/2	lot Reqd 9.6.	11.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	8.01	3.00	-2.93	2.93	1.01	0.72	11.35	Vu < PhiVc/2	lot Reqd 9.6.	11.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	8.62	3.00	-3.36	3.36	2.95	0.28	10.69	Vu < PhiVc/2	lot Reqd 9.6.	10.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	1	9.24	3.00	-3.79	3.79	5.15	0.18	10.54	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	9.85	3.00	3.63	3.63	6.83	0.13	10.46	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	10.43	3.00	3.22	3.22	4.85	0.17	10.51	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	11.00	3.00	2.82	2.82	3.10	0.23	10.60	Vu < PhiVc/2	lot Reqd 9.6.	10.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	11.58	3.00	2.41	2.41	1.59	0.38	10.83	Vu < PhiVc/2	lot Reqd 9.6.	10.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	12.16	3.00	2.00	2.00	0.31	1.00	11.76	Vu < PhiVc/2	lot Reqd 9.6.	11.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	12.74	3.00	1.60	1.60	0.73	0.55	11.08	Vu < PhiVc/2	lot Reqd 9.6.	11.1	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	13.32	3.00	1.19	1.19	1.54	0.19	10.55	Vu < PhiVc/2	lot Reqd 9.6.	10.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	13.90	3.00	0.79	0.79	2.11	0.09	10.40	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	14.48	3.00	0.44	0.44	0.86	0.13	10.45	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	15.06	3.00	-0.47	0.47	2.24	0.05	10.34	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	15.64	3.00	-0.88	0.88	1.85	0.12	10.44	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	16.22	3.00	-1.28	1.28	1.22	0.26	10.65	Vu < PhiVc/2	lot Reqd 9.6.	10.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	16.79	3.00	-1.69	1.69	0.37	1.00	11.76	Vu < PhiVc/2	lot Reqd 9.6.	11.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	17.37	3.00	-2.09	2.09	0.73	0.72	11.34	Vu < PhiVc/2	lot Reqd 9.6.	11.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	17.95	3.00	-2.50	2.50	2.06	0.30	10.72	Vu < PhiVc/2	lot Reqd 9.6.	10.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	2	18.53	3.00	-2.90	2.90	3.62	0.20	10.56	Vu < PhiVc/2	lot Reqd 9.6.	10.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	19.11	3.00	3.04	3.04	4.19	0.18	10.53	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	19.69	3.00	2.63	2.63	2.55	0.26	10.65	Vu < PhiVc/2	lot Reqd 9.6.	10.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	20.27	3.00	2.23	2.23	1.15	0.49	10.99	Vu < PhiVc/2	lot Reqd 9.6.	11.0	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	20.85	3.00	1.82	1.82	0.03	1.00	11.76	Vu < PhiVc/2	lot Reqd 9.6.	11.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	21.43	3.00	1.42	1.42	0.96	0.37	10.81	Vu < PhiVc/2	lot Reqd 9.6.	10.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	22.00	3.00	1.01	1.01	1.67	0.15	10.49	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	22.58	3.00	0.61	0.61	2.13	0.07	10.37	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	23.16	3.00	-0.35	0.35	0.93	0.09	10.40	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	23.74	3.00	-0.65	0.65	2.25	0.07	10.37	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	24.32	3.00	-1.06	1.06	1.76	0.15	10.49	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	24.90	3.00	-1.46	1.46	1.03	0.36	10.80	Vu < PhiVc/2	lot Reqd 9.6.	10.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	25.48	3.00	-1.87	1.87	0.06	1.00	11.76	Vu < PhiVc/2	lot Reqd 9.6.	11.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	26.06	3.00	-2.27	2.27	1.14	0.50	11.01	Vu < PhiVc/2	lot Reqd 9.6.	11.0	0.0	0.0

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (4-Span)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	26.64	3.00	-2.68	2.68	2.57	0.26	10.65	Vu < PhiVc/2	lot Reqd 9.6.	10.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	27.22	3.00	-3.09	3.09	4.24	0.18	10.53	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	3	27.79	3.00	-3.49	3.49	6.15	0.14	10.47	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	28.39	3.00	3.93	3.93	5.94	0.17	10.51	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	29.01	3.00	3.50	3.50	3.65	0.24	10.62	Vu < PhiVc/2	lot Reqd 9.6.	10.6	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	29.62	3.00	3.07	3.07	1.63	0.47	10.97	Vu < PhiVc/2	lot Reqd 9.6.	11.0	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	30.24	3.00	2.64	2.64	0.13	1.00	11.76	Vu < PhiVc/2	lot Reqd 9.6.	11.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	30.86	3.00	2.21	2.21	1.62	0.34	10.77	Vu < PhiVc/2	lot Reqd 9.6.	10.8	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	31.47	3.00	1.78	1.78	2.85	0.16	10.49	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	32.09	3.00	1.35	1.35	3.82	0.09	10.39	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	32.70	3.00	0.92	0.92	4.51	0.05	10.34	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	33.32	3.00	0.49	0.49	4.94	0.02	10.30	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	33.93	3.00	0.13	0.13	2.86	0.01	10.28	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	34.55	3.00	-0.52	0.52	5.49	0.02	10.30	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	35.17	3.00	-0.95	0.95	5.03	0.05	10.33	Vu < PhiVc/2	lot Reqd 9.6.	10.3	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	35.78	3.00	-1.38	1.38	4.31	0.08	10.38	Vu < PhiVc/2	lot Reqd 9.6.	10.4	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	36.40	3.00	-1.81	1.81	3.33	0.14	10.46	Vu < PhiVc/2	lot Reqd 9.6.	10.5	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	37.01	3.00	-2.25	2.25	2.08	0.27	10.66	Vu < PhiVc/2	lot Reqd 9.6.	10.7	0.0	0.0
+1.20D+1.60L+0.50S+1.60H, LL Comb	4	37.63	3.00	-2.68	2.68	0.56	1.00	11.76	Vu < PhiVc/2	lot Reqd 9.6.	11.8	0.0	0.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	9.750	-6.76	9.95	0.68
Span # 2	2	9.167	-7.19	9.95	0.72
Span # 3	3	9.167	-6.83	9.95	0.69
Span # 4	4	9.750	-7.19	9.95	0.72
+1.40D+1.60H					
Span # 1	1	9.750	-4.80	9.95	0.48
Span # 2	2	9.167	-5.11	9.95	0.51
Span # 3	3	9.167	-4.86	9.95	0.49
Span # 4	4	9.750	-5.11	9.95	0.51
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (***L)					
Span # 1	1	9.750	-4.22	9.95	0.42
Span # 2	2	9.167	-4.49	9.95	0.45
Span # 3	3	9.167	-5.82	9.95	0.58
Span # 4	4	9.750	-6.06	9.95	0.61
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L*)					
Span # 1	1	9.750	-3.84	9.95	0.39
Span # 2	2	9.167	-4.10	9.95	0.41
Span # 3	3	9.167	-5.08	9.95	0.51
Span # 4	4	9.750	-5.40	9.95	0.54
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**LL)					
Span # 1	1	9.750	-3.94	9.95	0.40
Span # 2	2	9.167	-4.21	9.95	0.42
Span # 3	3	9.167	-6.73	9.95	0.68
Span # 4	4	9.750	-7.08	9.95	0.71
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L**)					
Span # 1	1	9.750	-5.13	9.95	0.51
Span # 2	2	9.167	-5.40	9.95	0.54
Span # 3	3	9.167	-3.90	9.95	0.39
Span # 4	4	9.750	-4.10	9.95	0.41
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*L)					
Span # 1	1	9.750	-5.23	9.95	0.53
Span # 2	2	9.167	-5.51	9.95	0.55
Span # 3	3	9.167	-5.55	9.95	0.56
Span # 4	4	9.750	-5.78	9.95	0.58
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL*)					
Span # 1	1	9.750	-4.85	9.95	0.49
Span # 2	2	9.167	-5.12	9.95	0.51
Span # 3	3	9.167	-4.81	9.95	0.48
Span # 4	4	9.750	-5.12	9.95	0.51

Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (4-Span)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LLL)					
Span # 1	1	9.750	-4.95	9.95	0.50
Span # 2	2	9.167	-5.23	9.95	0.53
Span # 3	3	9.167	-6.47	9.95	0.65
Span # 4	4	9.750	-6.80	9.95	0.68
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L***)					
Span # 1	1	9.750	-5.65	9.95	0.57
Span # 2	2	9.167	-6.06	9.95	0.61
Span # 3	3	9.167	-4.27	9.95	0.43
Span # 4	4	9.750	-4.49	9.95	0.45
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**L)					
Span # 1	1	9.750	-5.75	9.95	0.58
Span # 2	2	9.167	-6.16	9.95	0.62
Span # 3	3	9.167	-5.92	9.95	0.59
Span # 4	4	9.750	-6.16	9.95	0.62
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L*)					
Span # 1	1	9.750	5.68	9.95	0.57
Span # 2	2	9.167	-5.78	9.95	0.58
Span # 3	3	9.167	-5.18	9.95	0.52
Span # 4	4	9.750	-5.51	9.95	0.55
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*LL)					
Span # 1	1	9.750	5.64	9.95	0.57
Span # 2	2	9.167	-5.88	9.95	0.59
Span # 3	3	9.167	-6.83	9.95	0.69
Span # 4	4	9.750	-7.19	9.95	0.72
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL**)					
Span # 1	1	9.750	-6.66	9.95	0.67
Span # 2	2	9.167	-7.08	9.95	0.71
Span # 3	3	9.167	-4.00	9.95	0.40
Span # 4	4	9.750	-4.21	9.95	0.42
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*L)					
Span # 1	1	9.750	-6.76	9.95	0.68
Span # 2	2	9.167	-7.19	9.95	0.72
Span # 3	3	9.167	-5.66	9.95	0.57
Span # 4	4	9.750	-5.88	9.95	0.59
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL*)					
Span # 1	1	9.750	-6.38	9.95	0.64
Span # 2	2	9.167	-6.80	9.95	0.68
Span # 3	3	9.167	-4.91	9.95	0.49
Span # 4	4	9.750	-5.23	9.95	0.53
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLLL)					
Span # 1	1	9.750	-6.49	9.95	0.65
Span # 2	2	9.167	-6.91	9.95	0.69
Span # 3	3	9.167	-6.57	9.95	0.66
Span # 4	4	9.750	-6.91	9.95	0.69
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (***L)					
Span # 1	1	9.750	-4.22	9.95	0.42
Span # 2	2	9.167	-4.49	9.95	0.45
Span # 3	3	9.167	-5.82	9.95	0.58
Span # 4	4	9.750	-6.06	9.95	0.61
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L*)					
Span # 1	1	9.750	-3.84	9.95	0.39
Span # 2	2	9.167	-4.10	9.95	0.41
Span # 3	3	9.167	-5.08	9.95	0.51
Span # 4	4	9.750	-5.40	9.95	0.54
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (**LL)					
Span # 1	1	9.750	-3.94	9.95	0.40
Span # 2	2	9.167	-4.21	9.95	0.42
Span # 3	3	9.167	-6.73	9.95	0.68
Span # 4	4	9.750	-7.08	9.95	0.71
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L**)					
Span # 1	1	9.750	-5.13	9.95	0.51
Span # 2	2	9.167	-5.40	9.95	0.54
Span # 3	3	9.167	-3.90	9.95	0.39
Span # 4	4	9.750	-4.10	9.95	0.41
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*L)					
Span # 1	1	9.750	-5.23	9.95	0.53
Span # 2	2	9.167	-5.51	9.95	0.55
Span # 3	3	9.167	-5.55	9.95	0.56

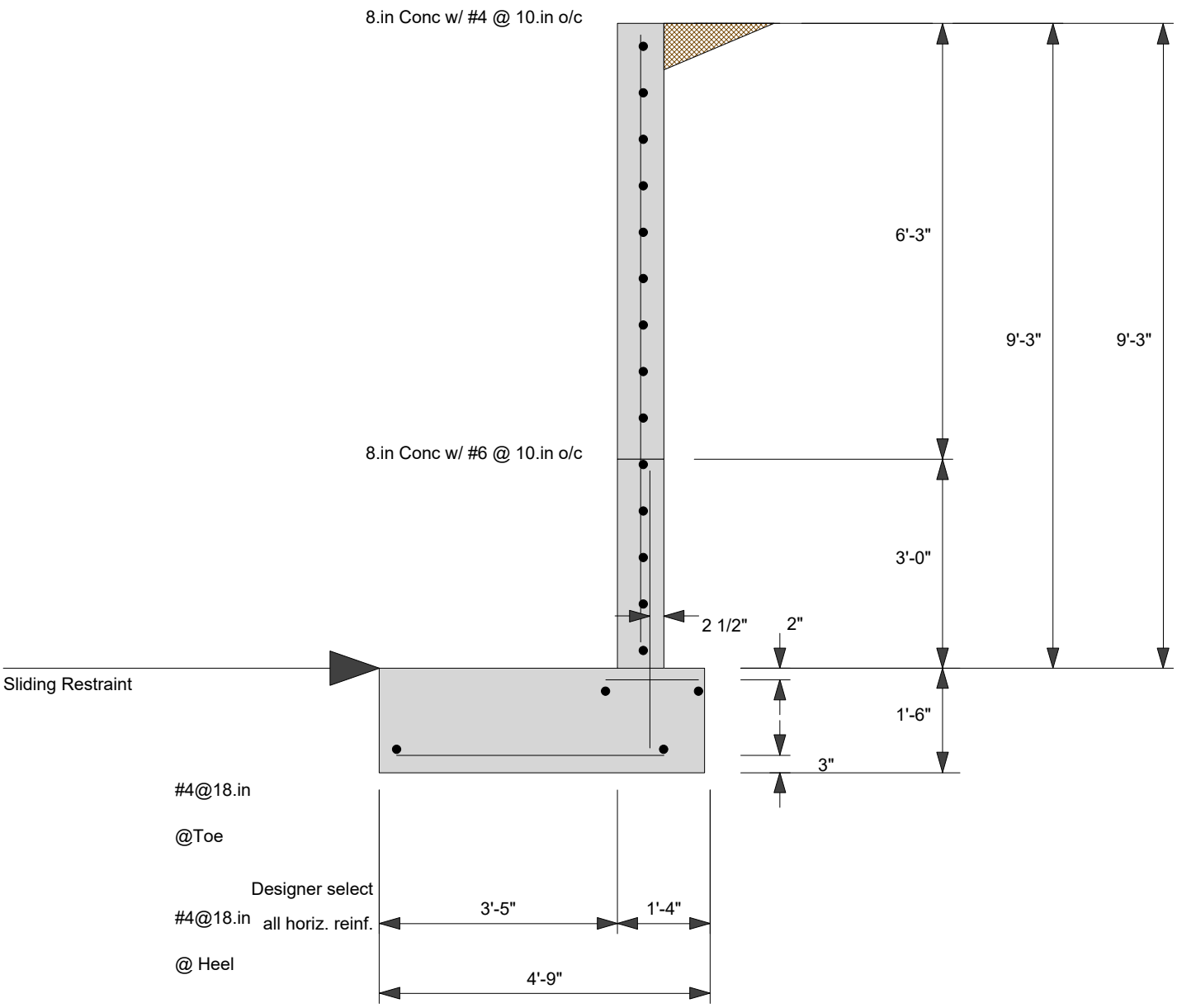
Concrete Beam

DESCRIPTION: Basement Slab-on-Grade (4-Span)

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
Span # 4	4	9.750	-5.78	9.95	0.58
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL*)					
Span # 1	1	9.750	-4.85	9.95	0.49
Span # 2	2	9.167	-5.12	9.95	0.51
Span # 3	3	9.167	-4.81	9.95	0.48
Span # 4	4	9.750	-5.12	9.95	0.51
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LLL)					
Span # 1	1	9.750	-4.95	9.95	0.50
Span # 2	2	9.167	-5.23	9.95	0.53
Span # 3	3	9.167	-6.47	9.95	0.65
Span # 4	4	9.750	-6.80	9.95	0.68
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L***)					
Span # 1	1	9.750	-5.65	9.95	0.57
Span # 2	2	9.167	-6.06	9.95	0.61
Span # 3	3	9.167	-4.27	9.95	0.43
Span # 4	4	9.750	-4.49	9.95	0.45
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**L)					
Span # 1	1	9.750	-5.75	9.95	0.58
Span # 2	2	9.167	-6.16	9.95	0.62
Span # 3	3	9.167	-5.92	9.95	0.59
Span # 4	4	9.750	-6.16	9.95	0.62
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L*)					
Span # 1	1	9.750	5.68	9.95	0.57
Span # 2	2	9.167	-5.78	9.95	0.58
Span # 3	3	9.167	-5.18	9.95	0.52
Span # 4	4	9.750	-5.51	9.95	0.55
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*LL)					
Span # 1	1	9.750	5.64	9.95	0.57
Span # 2	2	9.167	-5.88	9.95	0.59
Span # 3	3	9.167	-6.83	9.95	0.69
Span # 4	4	9.750	-7.19	9.95	0.72
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL**)					
Span # 1	1	9.750	-6.66	9.95	0.67
Span # 2	2	9.167	-7.08	9.95	0.71
Span # 3	3	9.167	-4.00	9.95	0.40
Span # 4	4	9.750	-4.21	9.95	0.42
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*L)					
Span # 1	1	9.750	-6.76	9.95	0.68
Span # 2	2	9.167	-7.19	9.95	0.72
Span # 3	3	9.167	-5.66	9.95	0.57
Span # 4	4	9.750	-5.88	9.95	0.59
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL*)					
Span # 1	1	9.750	-6.38	9.95	0.64
Span # 2	2	9.167	-6.80	9.95	0.68
Span # 3	3	9.167	-4.91	9.95	0.49
Span # 4	4	9.750	-5.23	9.95	0.53
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLLL)					
Span # 1	1	9.750	-6.49	9.95	0.65
Span # 2	2	9.167	-6.91	9.95	0.69
Span # 3	3	9.167	-6.57	9.95	0.66
Span # 4	4	9.750	-6.91	9.95	0.69

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H, LL Comb Run (L*L*)	1	0.0251	4.362	+D+L+H, LL Comb Run (L*L*)	-0.0008	9.991
+D+L+H, LL Comb Run (*L*L)	2	0.0089	5.066	+D+L+H, LL Comb Run (L*L*)	-0.0033	1.689
+D+L+H, LL Comb Run (L*L*)	3	0.0089	4.101	+D+L+H, LL Comb Run (*L*L)	-0.0033	7.478
+D+L+H, LL Comb Run (*L*L)	4	0.0251	5.388		0.0000	7.478


8.in Conc w/ #4 @ 10.in o/c
6'-3"
9'-3"
9'-3"
8.in Conc w/ #6 @ 10.in o/c
3'-0"
2 1/2"
2"
Sliding Restraint
1'-6"
3"
#4@18.in
@Toe
Designer select
all horiz. reinf.
#4@18.in
@ Heel
3'-5"
1'-4"
4'-9"

Cantilevered Retaining Wall

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Wall Design Only

Calculations per ACI 318-14, TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	9.25 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Vertical component of active Lateral soil pressure options:
NOT USED for Soil Pressure.
NOT USED for Sliding Resistance.
NOT USED for Overturning Resistance.

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
Toe Active Pressure	=	35.0 psf/ft
Passive Pressure	=	150.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	120.00 pcf
Friction Coeff btwn Ftg & Soil	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	72.0 plf
...Height to Top	=	9.25 ft
...Height to Bottom	=	0.00 ft
Wind on Exposed Stem	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.2 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	0.82	UNSTABLE!
Sliding	=	0.45	OK

Slab Resists All Sliding !

Total Bearing Load	=	2,734 lbs	
...resultant ecc.	=	37.42 in	

Resultant Exceeds Ftg. Width!

Soil Pressure @ Toe	=	0 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	3,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	0 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	3.4 psi	OK
Footing Shear @ Heel	=	5.7 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs Slab Resists All Sliding !

Lateral Sliding Force	=	2,649.0 lbs	
less 100% Passive Force	= -	93.8 lbs	
less 100% Friction Force	= -	1,098.0 lbs	
Added Force Req'd	=	1,461.8 lbs	NG
....for 1.5 : 1 Stability	=	2,786.3 lbs	NG

Load Factors

Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	3.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Thickness	in =	8.00	8.00
Rebar Size	=	# 4	# 6
Rebar Spacing	in =	10.00	10.00
Rebar Placed at	=	Center	Edge
Design Data			
fb/FB + fa/Fa	=	0.906	0.863
Total Force @ Section	lbs =	1,543.8	3,061.8
Moment....Actual	ft-l =	3,684.9	10,467.1
Moment.....Allowable	ft-l =	4,065.1	12,131.4
Shear.....Actual	psi =	37.8	51.3
Shear.....Allowable	psi =	82.2	82.2
Wall Weight	psf =	100.0	100.0
Rebar Depth 'd'	in =	4.00	5.63
Lap splice if above	in =	17.09	25.63
Lap splice if below	in =	17.09	10.70
Hook embed into footing	in =	17.09	10.70
Concrete Data			
f'c	psi =	3,000.0	3,000.0
Fy	psi =	60,000.0	60,000.0

Cantilevered Retaining Wall

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

DESCRIPTION: Wall Design Only

Footing Dimensions & Strengths

Toe Width	=	3.42 ft
Heel Width	=	1.33
Total Footing Width	=	4.75
Footing Thickness	=	18.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 2,500 psi Fy = 60,000 psi

Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top 2.00	@ Btm.=	3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	0	0	psf
Mu' : Upward	=	0	0	ft-lb
Mu' : Downward	=	1,576	356	ft-lb
Mu: Design	=	1,576	356	ft-lb
Actual 1-Way Shear	=	3.43	5.74	psi
Allow 1-Way Shear	=	75.00	75.00	psi

Toe Reinforcing	=	# 4 @ 18.00 in
Heel Reinforcing	=	# 4 @ 18.00 in
Key Reinforcing	=	None Spec'd

Other Acceptable Sizes & Spacings

Toe: Not req'd, Mu < S * Fr
Heel: Not req'd, Mu < S * Fr
Key: No key defined

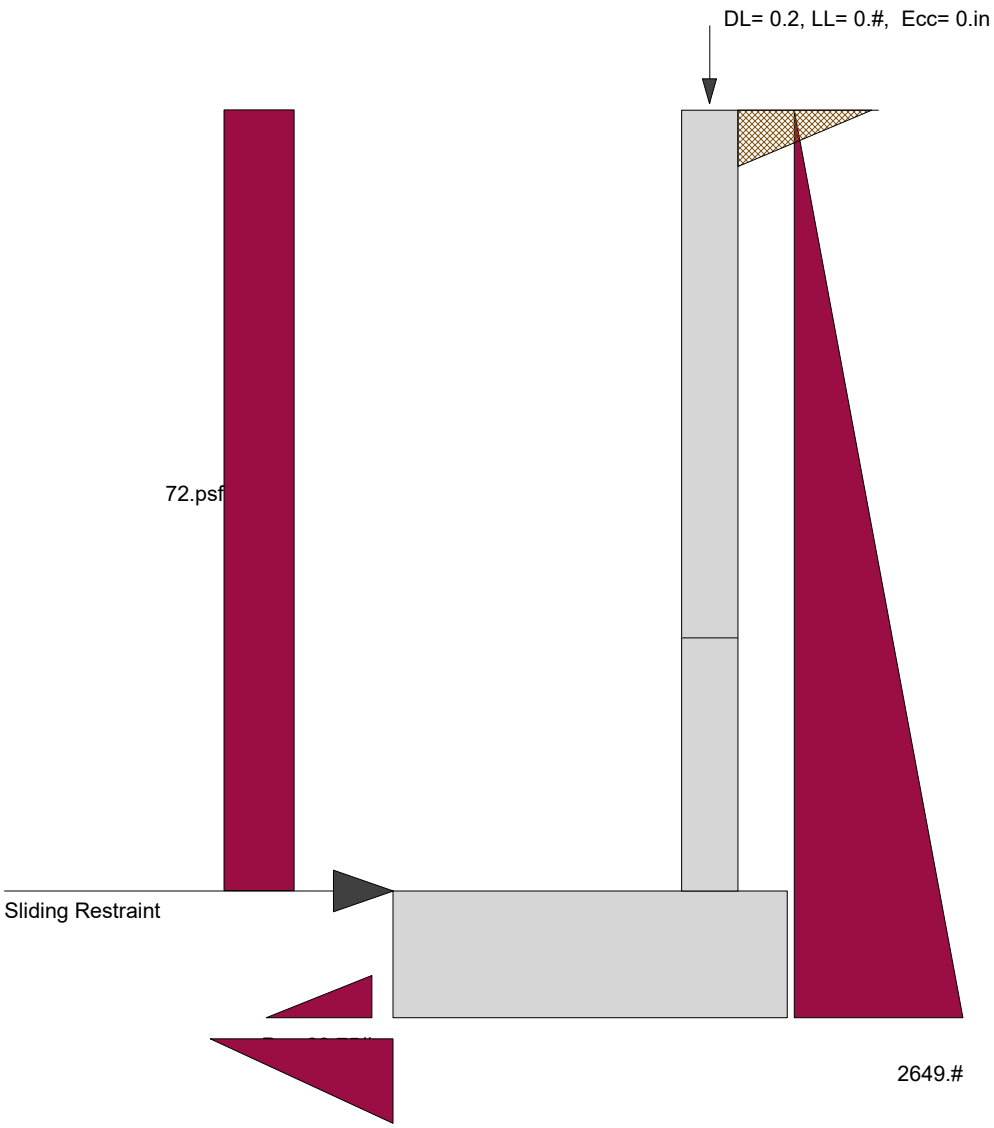
Summary of Overturning & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-lb			.....RESISTING..... Force lbs	Distance ft	Moment ft-lb
Heel Active Pressure	=	2,022.3	3.58	7,246.7	Soil Over Heel	=	739.6	4.42	3,266.8
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Toe Active Pressure	=	-39.4	0.50	-19.7	Surcharge Over Heel	=			
Surcharge Over Toe	=				Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Stem	=	0.2	3.75	0.8
Added Lateral Load	=	666.0	6.13	4,079.3	* Axial Live Load on Stem	=			
Load @ Stem Above Soil	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	925.0	3.75	3,469.1
					Earth @ Stem Transitions	=			
					Footing Weight	=	1,068.8	2.38	2,538.3
					Key Weight	=			
					Vert. Component	=			
Total	=	2,649.0	O.T.M. =	11,306.3	Total	=	2,733.6 lbs	R.M. =	9,274.9

Resisting/Overturning Ratio = 0.82

Vertical Loads used for Soil Pressure = 2,733.6 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.


DL= 0.2, LL= 0.#, Ecc= 0.in
72.psf
Sliding Restraint
2649.#

Cantilever Retaining Wall Grade Beam and Pile Analysis

Soil Weight	120	psf	
Active Pressure	40	psf	
Seismic Surcharge	8	H	
Pile Spacing	36	in	
Wall Height	9.25	ft	8" thick wall
Ftg Thick	1.5	ft	
Ftg Width	57	in	

Overturning Moment		
Soil	5276	lb-ft
Seismic	3166	lb-ft

Resisting Moment			M Arm		Weight	
Wall	2775	lb-ft	3.00	ft	925	
Footing	1737	lb-ft	1.63	ft	1069	
Soil	2726	lb-ft	3.7	ft	744	
DL	897	lb-ft	3.25	ft	276	
					3013	
OT FOS.	1.5	≥1.5 OK			Grade beam spacing	
EQ OT FOS	1.1	≥1.1 OK			13.27	ft max

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

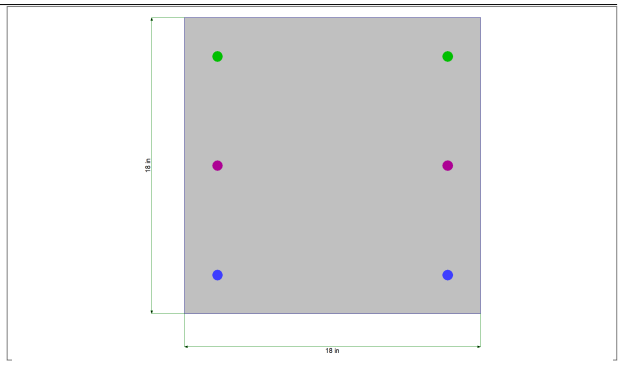
DESCRIPTION: Retaining Wall Grade Beam Span Horizonal (Supports bottom 3' of wall)

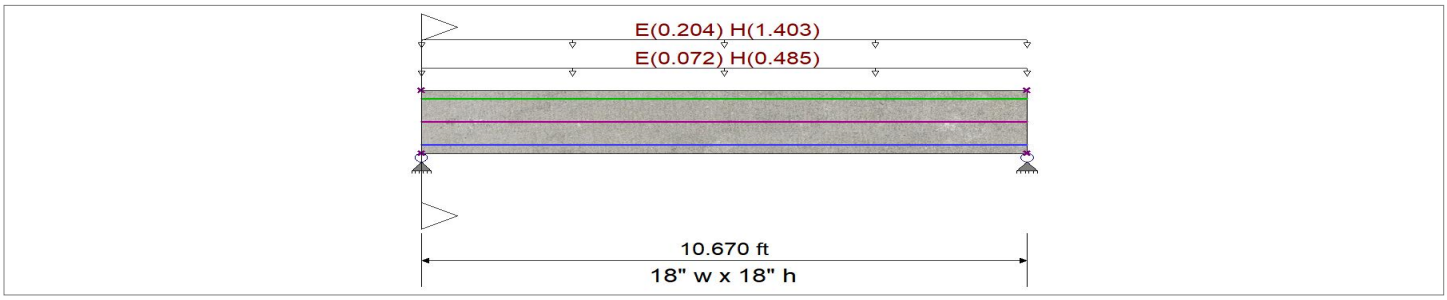
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2





Cross Section & Reinforcing Details

Rectangular Section, Width = 18.0 in, Height = 18.0 in
Span #1 Reinforcing....
2-#5 at 2.375 in from Bottom, from 0.0 to 10.670 ft in this span
2-#5 at 9.0 in from Bottom, from 0.0 to 10.670 ft in this span
2-#5 at 2.375 in from Top, from 0.0 to 10.670 ft in this span

Load for Span Number 1
Uniform Load : E = 0.0720, H = 0.4850 ksf, Tributary Width = 1.0 ft, (Soil Load at Grade Beam)
Uniform Load : E = 0.2040, H = 1.403 k/ft, Tributary Width = 1.0 ft, (Soil Load From 3' of Wall)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.727** : 1	Maximum Deflection			
Section used for this span		**Typical Section**	Max Downward Transient Deflection	0.003 in	Ratio =	43458 >=360
Mu : Applied		46.917 k-ft	Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Mn * Phi : Allowable		64.549 k-ft	Max Downward Total Deflection	0.022 in	Ratio =	5763 >=180
Location of maximum on span		5.345 ft	Max Upward Total Deflection	0.000 in	Ratio =	0 <180.0
Span # where maximum occurs		Span # 1				

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	11.103	11.103
Overall MINimum	1.472	1.472
H Only	10.072	10.072
+0.60H	6.043	6.043
+0.70E+0.60H	7.074	7.074
+0.5250E+H	10.846	10.846
+0.70E+H	11.103	11.103
E Only	1.472	1.472

Concrete Beam

DESCRIPTION: Retaining Wall Grade Beam Span Horizonal (Supports bottom 3' of wall)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	0.00	15.63	17.59	17.59	0.00	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	0.12	15.63	17.20	17.20	2.03	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	0.23	15.63	16.82	16.82	4.01	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	0.35	15.63	16.44	16.44	5.95	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	0.47	15.63	16.05	16.05	7.85	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	0.58	15.63	15.67	15.67	9.69	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	0.70	15.63	15.28	15.28	11.50	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	0.82	15.63	14.90	14.90	13.26	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	0.93	15.63	14.51	14.51	14.97	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	1.05	15.63	14.13	14.13	16.64	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	1.17	15.63	13.74	13.74	18.27	0.98	24.23	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	1.28	15.63	13.36	13.36	19.85	0.88	23.99	PhiVc/2 < Vu <=	Min 9.6.3.1	38.7	7.8	7.0
+E+1.60H	1	1.40	15.63	12.98	12.98	21.38	0.79	23.79	PhiVc/2 < Vu <=	Min 9.6.3.1	38.5	7.8	7.0
+E+1.60H	1	1.52	15.63	12.59	12.59	22.88	0.72	23.62	PhiVc/2 < Vu <=	Min 9.6.3.1	38.4	7.8	7.0
+E+1.60H	1	1.63	15.63	12.21	12.21	24.32	0.65	23.47	PhiVc/2 < Vu <=	Min 9.6.3.1	38.2	7.8	7.0
+E+1.60H	1	1.75	15.63	11.82	11.82	25.72	0.60	23.34	PhiVc/2 < Vu <=	Min 9.6.3.1	38.1	7.8	7.0
+E+1.60H	1	1.87	15.63	11.44	11.44	27.08	0.55	23.23	Vu < PhiVc/2	lot Reqd 9.6.	23.2	0.0	0.0
+E+1.60H	1	1.98	15.63	11.05	11.05	28.39	0.51	23.13	Vu < PhiVc/2	lot Reqd 9.6.	23.1	0.0	0.0
+E+1.60H	1	2.10	15.63	10.67	10.67	29.66	0.47	23.04	Vu < PhiVc/2	lot Reqd 9.6.	23.0	0.0	0.0
+E+1.60H	1	2.22	15.63	10.28	10.28	30.88	0.43	22.96	Vu < PhiVc/2	lot Reqd 9.6.	23.0	0.0	0.0
+E+1.60H	1	2.33	15.63	9.90	9.90	32.05	0.40	22.89	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+E+1.60H	1	2.45	15.63	9.52	9.52	33.19	0.37	22.82	Vu < PhiVc/2	lot Reqd 9.6.	22.8	0.0	0.0
+E+1.60H	1	2.57	15.63	9.13	9.13	34.27	0.35	22.76	Vu < PhiVc/2	lot Reqd 9.6.	22.8	0.0	0.0
+E+1.60H	1	2.68	15.63	8.75	8.75	35.32	0.32	22.70	Vu < PhiVc/2	lot Reqd 9.6.	22.7	0.0	0.0
+E+1.60H	1	2.80	15.63	8.36	8.36	36.31	0.30	22.65	Vu < PhiVc/2	lot Reqd 9.6.	22.6	0.0	0.0
+E+1.60H	1	2.92	15.63	7.98	7.98	37.27	0.28	22.60	Vu < PhiVc/2	lot Reqd 9.6.	22.6	0.0	0.0
+E+1.60H	1	3.03	15.63	7.59	7.59	38.17	0.26	22.55	Vu < PhiVc/2	lot Reqd 9.6.	22.6	0.0	0.0
+E+1.60H	1	3.15	15.63	7.21	7.21	39.04	0.24	22.51	Vu < PhiVc/2	lot Reqd 9.6.	22.5	0.0	0.0
+E+1.60H	1	3.27	15.63	6.82	6.82	39.85	0.22	22.47	Vu < PhiVc/2	lot Reqd 9.6.	22.5	0.0	0.0
+E+1.60H	1	3.38	15.63	6.44	6.44	40.63	0.21	22.43	Vu < PhiVc/2	lot Reqd 9.6.	22.4	0.0	0.0
+E+1.60H	1	3.50	15.63	6.06	6.06	41.36	0.19	22.39	Vu < PhiVc/2	lot Reqd 9.6.	22.4	0.0	0.0
+E+1.60H	1	3.61	15.63	5.67	5.67	42.04	0.18	22.36	Vu < PhiVc/2	lot Reqd 9.6.	22.4	0.0	0.0
+E+1.60H	1	3.73	15.63	5.29	5.29	42.68	0.16	22.33	Vu < PhiVc/2	lot Reqd 9.6.	22.3	0.0	0.0
+E+1.60H	1	3.85	15.63	4.90	4.90	43.27	0.15	22.29	Vu < PhiVc/2	lot Reqd 9.6.	22.3	0.0	0.0
+E+1.60H	1	3.96	15.63	4.52	4.52	43.82	0.13	22.26	Vu < PhiVc/2	lot Reqd 9.6.	22.3	0.0	0.0
+E+1.60H	1	4.08	15.63	4.13	4.13	44.33	0.12	22.23	Vu < PhiVc/2	lot Reqd 9.6.	22.2	0.0	0.0
+E+1.60H	1	4.20	15.63	3.75	3.75	44.79	0.11	22.21	Vu < PhiVc/2	lot Reqd 9.6.	22.2	0.0	0.0
+E+1.60H	1	4.31	15.63	3.36	3.36	45.20	0.10	22.18	Vu < PhiVc/2	lot Reqd 9.6.	22.2	0.0	0.0
+E+1.60H	1	4.43	15.63	2.98	2.98	45.57	0.09	22.15	Vu < PhiVc/2	lot Reqd 9.6.	22.1	0.0	0.0
+E+1.60H	1	4.55	15.63	2.60	2.60	45.90	0.07	22.12	Vu < PhiVc/2	lot Reqd 9.6.	22.1	0.0	0.0
+E+1.60H	1	4.66	15.63	2.21	2.21	46.18	0.06	22.10	Vu < PhiVc/2	lot Reqd 9.6.	22.1	0.0	0.0
+E+1.60H	1	4.78	15.63	1.83	1.83	46.41	0.05	22.07	Vu < PhiVc/2	lot Reqd 9.6.	22.1	0.0	0.0
+E+1.60H	1	4.90	15.63	1.44	1.44	46.60	0.04	22.05	Vu < PhiVc/2	lot Reqd 9.6.	22.0	0.0	0.0
+E+1.60H	1	5.01	15.63	1.06	1.06	46.75	0.03	22.02	Vu < PhiVc/2	lot Reqd 9.6.	22.0	0.0	0.0
+E+1.60H	1	5.13	15.63	0.67	0.67	46.85	0.02	22.00	Vu < PhiVc/2	lot Reqd 9.6.	22.0	0.0	0.0
+E+1.60H	1	5.25	15.63	0.29	0.29	46.90	0.01	21.97	Vu < PhiVc/2	lot Reqd 9.6.	22.0	0.0	0.0
+E+1.60H	1	5.36	15.63	-0.10	0.10	46.92	0.00	21.96	Vu < PhiVc/2	lot Reqd 9.6.	22.0	0.0	0.0
+E+1.60H	1	5.48	15.63	-0.48	0.48	46.88	0.01	21.98	Vu < PhiVc/2	lot Reqd 9.6.	22.0	0.0	0.0
+E+1.60H	1	5.60	15.63	-0.87	0.87	46.80	0.02	22.01	Vu < PhiVc/2	lot Reqd 9.6.	22.0	0.0	0.0
+E+1.60H	1	5.71	15.63	-1.25	1.25	46.68	0.03	22.03	Vu < PhiVc/2	lot Reqd 9.6.	22.0	0.0	0.0
+E+1.60H	1	5.83	15.63	-1.63	1.63	46.51	0.05	22.06	Vu < PhiVc/2	lot Reqd 9.6.	22.1	0.0	0.0
+E+1.60H	1	5.95	15.63	-2.02	2.02	46.30	0.06	22.08	Vu < PhiVc/2	lot Reqd 9.6.	22.1	0.0	0.0
+E+1.60H	1	6.06	15.63	-2.40	2.40	46.04	0.07	22.11	Vu < PhiVc/2	lot Reqd 9.6.	22.1	0.0	0.0
+E+1.60H	1	6.18	15.63	-2.79	2.79	45.74	0.08	22.14	Vu < PhiVc/2	lot Reqd 9.6.	22.1	0.0	0.0

Concrete Beam

DESCRIPTION: Retaining Wall Grade Beam Span Horizonal (Supports bottom 3' of wall)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	6.30	15.63	-3.17	3.17	45.39	0.09	22.16	Vu < PhiVc/2	lot Reqd 9.6.	22.2	0.0	0.0
+E+1.60H	1	6.41	15.63	-3.56	3.56	45.00	0.10	22.19	Vu < PhiVc/2	lot Reqd 9.6.	22.2	0.0	0.0
+E+1.60H	1	6.53	15.63	-3.94	3.94	44.56	0.12	22.22	Vu < PhiVc/2	lot Reqd 9.6.	22.2	0.0	0.0
+E+1.60H	1	6.65	15.63	-4.33	4.33	44.08	0.13	22.25	Vu < PhiVc/2	lot Reqd 9.6.	22.2	0.0	0.0
+E+1.60H	1	6.76	15.63	-4.71	4.71	43.55	0.14	22.28	Vu < PhiVc/2	lot Reqd 9.6.	22.3	0.0	0.0
+E+1.60H	1	6.88	15.63	-5.09	5.09	42.98	0.15	22.31	Vu < PhiVc/2	lot Reqd 9.6.	22.3	0.0	0.0
+E+1.60H	1	7.00	15.63	-5.48	5.48	42.37	0.17	22.34	Vu < PhiVc/2	lot Reqd 9.6.	22.3	0.0	0.0
+E+1.60H	1	7.11	15.63	-5.86	5.86	41.70	0.18	22.38	Vu < PhiVc/2	lot Reqd 9.6.	22.4	0.0	0.0
+E+1.60H	1	7.23	15.63	-6.25	6.25	41.00	0.20	22.41	Vu < PhiVc/2	lot Reqd 9.6.	22.4	0.0	0.0
+E+1.60H	1	7.35	15.63	-6.63	6.63	40.25	0.21	22.45	Vu < PhiVc/2	lot Reqd 9.6.	22.5	0.0	0.0
+E+1.60H	1	7.46	15.63	-7.02	7.02	39.45	0.23	22.49	Vu < PhiVc/2	lot Reqd 9.6.	22.5	0.0	0.0
+E+1.60H	1	7.58	15.63	-7.40	7.40	38.61	0.25	22.53	Vu < PhiVc/2	lot Reqd 9.6.	22.5	0.0	0.0
+E+1.60H	1	7.70	15.63	-7.79	7.79	37.73	0.27	22.58	Vu < PhiVc/2	lot Reqd 9.6.	22.6	0.0	0.0
+E+1.60H	1	7.81	15.63	-8.17	8.17	36.80	0.29	22.62	Vu < PhiVc/2	lot Reqd 9.6.	22.6	0.0	0.0
+E+1.60H	1	7.93	15.63	-8.55	8.55	35.82	0.31	22.67	Vu < PhiVc/2	lot Reqd 9.6.	22.7	0.0	0.0
+E+1.60H	1	8.05	15.63	-8.94	8.94	34.80	0.33	22.73	Vu < PhiVc/2	lot Reqd 9.6.	22.7	0.0	0.0
+E+1.60H	1	8.16	15.63	-9.32	9.32	33.74	0.36	22.79	Vu < PhiVc/2	lot Reqd 9.6.	22.8	0.0	0.0
+E+1.60H	1	8.28	15.63	-9.71	9.71	32.63	0.39	22.85	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+E+1.60H	1	8.40	15.63	-10.09	10.09	31.47	0.42	22.92	Vu < PhiVc/2	lot Reqd 9.6.	22.9	0.0	0.0
+E+1.60H	1	8.51	15.63	-10.48	10.48	30.27	0.45	23.00	Vu < PhiVc/2	lot Reqd 9.6.	23.0	0.0	0.0
+E+1.60H	1	8.63	15.63	-10.86	10.86	29.03	0.49	23.08	Vu < PhiVc/2	lot Reqd 9.6.	23.1	0.0	0.0
+E+1.60H	1	8.75	15.63	-11.25	11.25	27.74	0.53	23.18	Vu < PhiVc/2	lot Reqd 9.6.	23.2	0.0	0.0
+E+1.60H	1	8.86	15.63	-11.63	11.63	26.41	0.57	23.28	Vu < PhiVc/2	lot Reqd 9.6.	23.3	0.0	0.0
+E+1.60H	1	8.98	15.63	-12.01	12.01	25.03	0.63	23.40	PhiVc/2 < Vu <=	Min 9.6.3.1	38.1	7.8	7.0
+E+1.60H	1	9.10	15.63	-12.40	12.40	23.60	0.68	23.54	PhiVc/2 < Vu <=	Min 9.6.3.1	38.3	7.8	7.0
+E+1.60H	1	9.21	15.63	-12.78	12.78	22.14	0.75	23.70	PhiVc/2 < Vu <=	Min 9.6.3.1	38.4	7.8	7.0
+E+1.60H	1	9.33	15.63	-13.17	13.17	20.62	0.83	23.88	PhiVc/2 < Vu <=	Min 9.6.3.1	38.6	7.8	7.0
+E+1.60H	1	9.45	15.63	-13.55	13.55	19.06	0.93	24.10	PhiVc/2 < Vu <=	Min 9.6.3.1	38.8	7.8	7.0
+E+1.60H	1	9.56	15.63	-13.94	13.94	17.46	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	9.68	15.63	-14.32	14.32	15.81	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	9.80	15.63	-14.71	14.71	14.12	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	9.91	15.63	-15.09	15.09	12.38	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	10.03	15.63	-15.47	15.47	10.60	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	10.15	15.63	-15.86	15.86	8.78	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	10.26	15.63	-16.24	16.24	6.90	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	10.38	15.63	-16.63	16.63	4.99	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	10.50	15.63	-17.01	17.01	3.03	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0
+E+1.60H	1	10.61	15.63	-17.40	17.40	1.02	1.00	24.28	PhiVc/2 < Vu <=	Min 9.6.3.1	39.0	7.8	7.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	10.670	46.92	64.55	0.73
+1.60H					
Span # 1	1	10.670	42.99	64.55	0.67
+E+1.60H					
Span # 1	1	10.670	46.92	64.55	0.73
+E+0.90H					
Span # 1	1	10.670	28.11	64.55	0.44

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+0.70E+H	1	0.0222	5.335		0.0000	0.000

Concrete Beam

Lic. # : KW-06005835

QUANTUM CONSULTING ENGINEERS

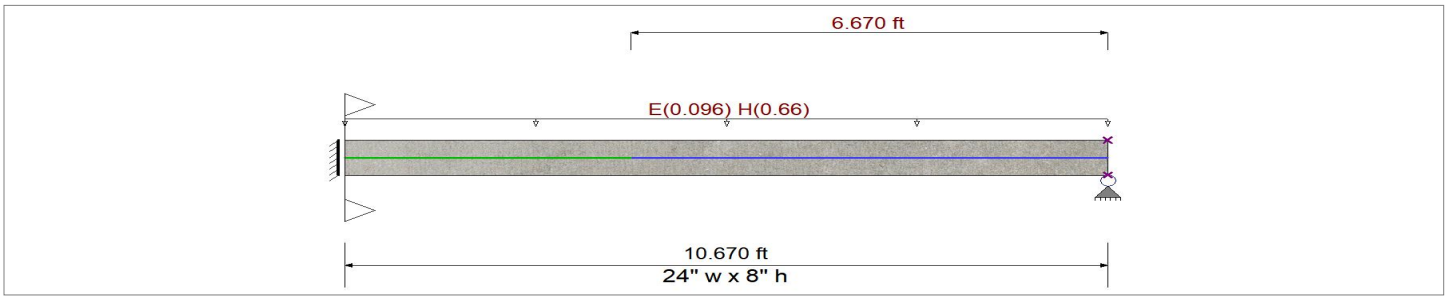
DESCRIPTION: Retaining Wall Span Horizonal (7' Below Grade)

CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c$^{1/2}$ * 7.50	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 8.0 in
Span #1 Reinforcing....
2-#5 at 4.0 in from Bottom, from 0.0 to 10.670 ft in this span
2-#5 at 4.0 in from Top, from 0.0 to 4.0 ft in this span

Load for Span Number 1
Uniform Load : E = 0.0480, H = 0.330 ksf, Tributary Width = 2.0 ft, (Soil Load At Base)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.894** : 1	Maximum Deflection			
Section used for this span		**Typical Section**	Max Downward Transient Deflection	0.004 in	Ratio =	35167 >=360
Mu : Applied		9.222 k-ft	Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Mn * Phi : Allowable		10.312 k-ft	Max Downward Total Deflection	0.029 in	Ratio =	4464 >=180
Location of maximum on span		6.666 ft	Max Upward Total Deflection	0.000 in	Ratio =	0 <180.0
Span # where maximum occurs		Span # 1				

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	4.819	2.940
Overall MINimum	0.640	0.384
H Only	4.397	2.645
+0.60H	2.641	1.584
+0.70E+0.60H	3.089	1.853
+0.5250E+H	4.717	2.863
+0.70E+H	4.819	2.940
E Only	0.640	0.384

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	0.00	4.00	7.68	7.68	16.39	0.16	7.86	PhiVc/2 < Vu <=	It<=10", Not I	7.9	0.0	0.0
+E+1.60H	1	0.12	4.00	7.55	7.55	15.51	0.16	7.87	PhiVc/2 < Vu <=	It<=10", Not I	7.9	0.0	0.0

Concrete Beam

DESCRIPTION: Retaining Wall Span Horizonal (7' Below Grade)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	0.23	4.00	7.41	7.41	14.63	0.17	7.89	PhiVc/2 < Vu <=	lt<=10", Not I	7.9	0.0	0.0
+E+1.60H	1	0.35	4.00	7.28	7.28	13.78	0.18	7.90	PhiVc/2 < Vu <=	lt<=10", Not I	7.9	0.0	0.0
+E+1.60H	1	0.47	4.00	7.15	7.15	12.94	0.18	7.92	PhiVc/2 < Vu <=	lt<=10", Not I	7.9	0.0	0.0
+E+1.60H	1	0.58	4.00	7.01	7.01	12.11	0.19	7.94	PhiVc/2 < Vu <=	lt<=10", Not I	7.9	0.0	0.0
+E+1.60H	1	0.70	4.00	6.88	6.88	11.30	0.20	7.96	PhiVc/2 < Vu <=	lt<=10", Not I	8.0	0.0	0.0
+E+1.60H	1	0.82	4.00	6.74	6.74	10.51	0.21	7.99	PhiVc/2 < Vu <=	lt<=10", Not I	8.0	0.0	0.0
+E+1.60H	1	0.93	4.00	6.61	6.61	9.73	0.23	8.02	PhiVc/2 < Vu <=	lt<=10", Not I	8.0	0.0	0.0
+E+1.60H	1	1.05	4.00	6.47	6.47	8.97	0.24	8.05	PhiVc/2 < Vu <=	lt<=10", Not I	8.1	0.0	0.0
+E+1.60H	1	1.17	4.00	6.34	6.34	8.22	0.26	8.09	PhiVc/2 < Vu <=	lt<=10", Not I	8.1	0.0	0.0
+E+1.60H	1	1.28	4.00	6.20	6.20	7.49	0.28	8.14	PhiVc/2 < Vu <=	lt<=10", Not I	8.1	0.0	0.0
+E+1.60H	1	1.40	4.00	6.07	6.07	6.77	0.30	8.19	PhiVc/2 < Vu <=	lt<=10", Not I	8.2	0.0	0.0
+E+1.60H	1	1.52	4.00	5.94	5.94	6.07	0.33	8.25	PhiVc/2 < Vu <=	lt<=10", Not I	8.3	0.0	0.0
+E+1.60H	1	1.63	4.00	5.80	5.80	5.39	0.36	8.33	PhiVc/2 < Vu <=	lt<=10", Not I	8.3	0.0	0.0
+E+1.60H	1	1.75	4.00	5.67	5.67	4.72	0.40	8.42	PhiVc/2 < Vu <=	lt<=10", Not I	8.4	0.0	0.0
+E+1.60H	1	1.87	4.00	5.53	5.53	4.07	0.45	8.55	PhiVc/2 < Vu <=	lt<=10", Not I	8.5	0.0	0.0
+E+1.60H	1	1.98	4.00	5.40	5.40	3.43	0.52	8.71	PhiVc/2 < Vu <=	lt<=10", Not I	8.7	0.0	0.0
+E+1.60H	1	2.10	4.00	5.26	5.26	2.81	0.63	8.95	PhiVc/2 < Vu <=	lt<=10", Not I	8.9	0.0	0.0
+E+1.60H	1	2.22	4.00	5.13	5.13	2.20	0.78	9.30	PhiVc/2 < Vu <=	lt<=10", Not I	9.3	0.0	0.0
+E+1.60H	1	2.33	4.00	5.00	5.00	1.61	1.00	9.82	PhiVc/2 < Vu <=	lt<=10", Not I	9.8	0.0	0.0
+E+1.60H	1	2.45	4.00	4.86	4.86	1.04	1.00	9.82	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0	0.0
+E+1.60H	1	2.57	4.00	4.73	4.73	0.48	1.00	9.82	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0	0.0
+E+1.60H	1	2.68	4.00	4.59	4.59	0.07	1.00	9.82	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0	0.0
+E+1.60H	1	2.80	4.00	4.46	4.46	0.59	1.00	9.82	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0	0.0
+E+1.60H	1	2.92	4.00	4.32	4.32	1.11	1.00	9.82	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0	0.0
+E+1.60H	1	3.03	4.00	4.19	4.19	1.60	0.87	9.52	Vu < PhiVc/2	lot Reqd 9.6.	9.5	0.0	0.0
+E+1.60H	1	3.15	4.00	4.06	4.06	2.08	0.65	9.00	Vu < PhiVc/2	lot Reqd 9.6.	9.0	0.0	0.0
+E+1.60H	1	3.27	4.00	3.92	3.92	2.55	0.51	8.68	Vu < PhiVc/2	lot Reqd 9.6.	8.7	0.0	0.0
+E+1.60H	1	3.38	4.00	3.79	3.79	3.00	0.42	8.47	Vu < PhiVc/2	lot Reqd 9.6.	8.5	0.0	0.0
+E+1.60H	1	3.50	4.00	3.65	3.65	3.43	0.35	8.32	Vu < PhiVc/2	lot Reqd 9.6.	8.3	0.0	0.0
+E+1.60H	1	3.61	4.00	3.52	3.52	3.85	0.30	8.20	Vu < PhiVc/2	lot Reqd 9.6.	8.2	0.0	0.0
+E+1.60H	1	3.73	4.00	3.38	3.38	4.25	0.27	8.11	Vu < PhiVc/2	lot Reqd 9.6.	8.1	0.0	0.0
+E+1.60H	1	3.85	4.00	3.25	3.25	4.64	0.23	8.04	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	3.96	4.00	3.11	3.11	5.01	0.21	7.97	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	4.08	4.00	2.98	2.98	5.37	0.19	7.92	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	4.20	4.00	2.85	2.85	5.71	0.17	7.88	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	4.31	4.00	2.71	2.71	6.03	0.15	7.84	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.43	4.00	2.58	2.58	6.34	0.14	7.81	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.55	4.00	2.44	2.44	6.63	0.12	7.78	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.66	4.00	2.31	2.31	6.91	0.11	7.75	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	4.78	4.00	2.17	2.17	7.17	0.10	7.73	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	4.90	4.00	2.04	2.04	7.42	0.09	7.71	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	5.01	4.00	1.91	1.91	7.65	0.08	7.69	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	5.13	4.00	1.77	1.77	7.86	0.08	7.67	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	5.25	4.00	1.64	1.64	8.06	0.07	7.65	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	5.36	4.00	1.50	1.50	8.24	0.06	7.63	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.48	4.00	1.37	1.37	8.41	0.05	7.62	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.60	4.00	1.23	1.23	8.56	0.05	7.60	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.71	4.00	1.10	1.10	8.70	0.04	7.59	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.83	4.00	0.97	0.97	8.82	0.04	7.58	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	5.95	4.00	0.83	0.83	8.92	0.03	7.57	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.06	4.00	0.70	0.70	9.01	0.03	7.55	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	6.18	4.00	0.56	0.56	9.08	0.02	7.54	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.30	4.00	0.43	0.43	9.14	0.02	7.53	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.41	4.00	0.29	0.29	9.18	0.01	7.52	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0

Concrete Beam

DESCRIPTION: Retaining Wall Span Horizonal (7' Below Grade)

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+E+1.60H	1	6.53	4.00	0.16	0.16	9.21	0.01	7.51	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.65	4.00	0.03	0.03	9.22	0.00	7.49	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.76	4.00	-0.11	0.11	9.22	0.00	7.50	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	6.88	4.00	-0.24	0.24	9.20	0.01	7.51	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	7.00	4.00	-0.38	0.38	9.16	0.01	7.52	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	7.11	4.00	-0.51	0.51	9.11	0.02	7.54	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	7.23	4.00	-0.65	0.65	9.04	0.02	7.55	Vu < PhiVc/2	lot Reqd 9.6.	7.5	0.0	0.0
+E+1.60H	1	7.35	4.00	-0.78	0.78	8.96	0.03	7.56	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	7.46	4.00	-0.92	0.92	8.86	0.03	7.57	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	7.58	4.00	-1.05	1.05	8.74	0.04	7.59	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	7.70	4.00	-1.18	1.18	8.61	0.05	7.60	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	7.81	4.00	-1.32	1.32	8.47	0.05	7.61	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	7.93	4.00	-1.45	1.45	8.31	0.06	7.63	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	8.05	4.00	-1.59	1.59	8.13	0.07	7.64	Vu < PhiVc/2	lot Reqd 9.6.	7.6	0.0	0.0
+E+1.60H	1	8.16	4.00	-1.72	1.72	7.94	0.07	7.66	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	8.28	4.00	-1.86	1.86	7.73	0.08	7.68	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	8.40	4.00	-1.99	1.99	7.50	0.09	7.70	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	8.51	4.00	-2.12	2.12	7.26	0.10	7.72	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	8.63	4.00	-2.26	2.26	7.01	0.11	7.74	Vu < PhiVc/2	lot Reqd 9.6.	7.7	0.0	0.0
+E+1.60H	1	8.75	4.00	-2.39	2.39	6.74	0.12	7.77	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	8.86	4.00	-2.53	2.53	6.45	0.13	7.80	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	8.98	4.00	-2.66	2.66	6.15	0.14	7.83	Vu < PhiVc/2	lot Reqd 9.6.	7.8	0.0	0.0
+E+1.60H	1	9.10	4.00	-2.80	2.80	5.83	0.16	7.86	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	9.21	4.00	-2.93	2.93	5.50	0.18	7.91	Vu < PhiVc/2	lot Reqd 9.6.	7.9	0.0	0.0
+E+1.60H	1	9.33	4.00	-3.06	3.06	5.15	0.20	7.95	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	9.45	4.00	-3.20	3.20	4.78	0.22	8.01	Vu < PhiVc/2	lot Reqd 9.6.	8.0	0.0	0.0
+E+1.60H	1	9.56	4.00	-3.33	3.33	4.40	0.25	8.08	Vu < PhiVc/2	lot Reqd 9.6.	8.1	0.0	0.0
+E+1.60H	1	9.68	4.00	-3.47	3.47	4.00	0.29	8.16	Vu < PhiVc/2	lot Reqd 9.6.	8.2	0.0	0.0
+E+1.60H	1	9.80	4.00	-3.60	3.60	3.59	0.33	8.27	Vu < PhiVc/2	lot Reqd 9.6.	8.3	0.0	0.0
+E+1.60H	1	9.91	4.00	-3.74	3.74	3.16	0.39	8.41	Vu < PhiVc/2	lot Reqd 9.6.	8.4	0.0	0.0
+E+1.60H	1	10.03	4.00	-3.87	3.87	2.72	0.47	8.60	Vu < PhiVc/2	lot Reqd 9.6.	8.6	0.0	0.0
+E+1.60H	1	10.15	4.00	-4.00	4.00	2.26	0.59	8.87	Vu < PhiVc/2	lot Reqd 9.6.	8.9	0.0	0.0
+E+1.60H	1	10.26	4.00	-4.14	4.14	1.79	0.77	9.29	Vu < PhiVc/2	lot Reqd 9.6.	9.3	0.0	0.0
+E+1.60H	1	10.38	4.00	-4.27	4.27	1.29	1.00	9.82	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0	0.0
+E+1.60H	1	10.50	4.00	-4.41	4.41	0.79	1.00	9.82	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0	0.0
+E+1.60H	1	10.61	4.00	-4.54	4.54	0.27	1.00	9.82	Vu < PhiVc/2	lot Reqd 9.6.	9.8	0.0	0.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	10.670	9.22	10.31	0.89
+1.60H					
Span # 1	1	10.670	8.45	10.31	0.82
+E+1.60H					
Span # 1	1	10.670	9.22	10.31	0.89
+E+0.90H					
Span # 1	1	10.670	5.52	10.31	0.54

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+0.70E+H	1	0.0287	6.210		0.0000	0.000