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FILE NO. 170716

TITLE MERCER ISLAND RESIDENCE
5236 W. Mercer Way
New Construction

PREPARED BY Tom Wolfe, PE



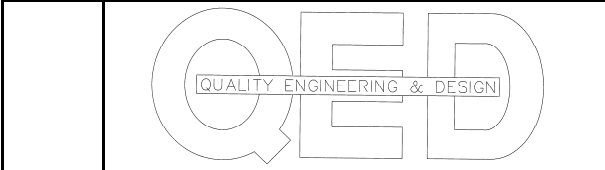
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Introduction

The following pages provide lateral and gravity load calculations, and details, for a new single family residence.

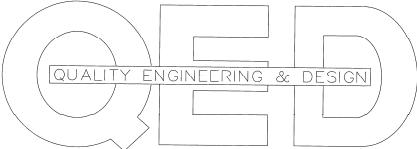
Site and geotechnical survey as well as soldier pile design are provided by others and are out of the scope of this report

The following Codes and references are used to develop loads and allowables:

- [1] "International Building Code (IBC)", 2015 Edition, International Code Council
- [2] ASCE 7-10, "Minimum Design Loads for Buildings and Other Structures", American Society of Civil Engineers
- [3] National Design Specification (NDS), "Design Allowables for Wood Construction", American Forest & Paper Association, American Wood Council
- [4] American Wood Council; Special Design Provisions for Wind and Seismic - SDPWS-2015
- [5] Simpson Strong-Tie, Catalog C-2015, "Wood Construction Connectors"
- [6] Frederick Merritt; Standard Handbook for Civil Engineers

The following computer programs were utilized in the completion of this report:

PROFIS Anchor, Version 2.6.2, produced by Hilti Corporation
FORTE, Version 5.1, produced by Weyerhaeuser Corporation

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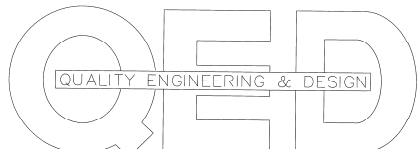
Introduction



WEST



SOUTH

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Seismic Loads

Ref.: Default Values

Site Classification, Ref. ASCE 7, Chapter 20

Site Class: **D**

Site	Description		
A	Hard rock	D	Stiff soil
B	Rock	E	Soft clay soil
C	Very dense soil and soft rock	F	Soils requiring site response analysis

Note: Typically, Site Class "D" can be assumed if no soils report is available, Ref. ASCE 7 Section 11.4.2

Latitude and Longitude of Site

Site:	5236 West Mercer Way, Seattle WA	
Latitude:	47.62551	°
Longitude:	-122.24144	°

Site-Specific Seismic Parameters:

(or use data from Geotech Report)

Ref.: <http://earthquake.usgs.gov/hazards/designmaps/>

Code: 2010 ASCE 7 (w/March 2013 errata)



[View Det](#)

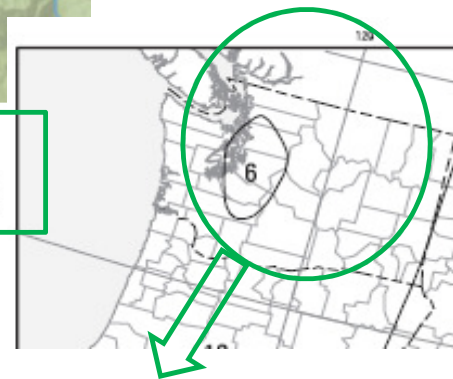
User-Specified Input

Report Title	Mills Residence 5236 W Mercer Way Sun July 16, 2017 19:29:04 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	47.555°N, 122.22627°W
Site Soil Classification	Site Class D - "Stiff Soil"
Risk Category	I/II/III



USGS-Provided Output

$S_B = 1.446$ g	$S_{HS} = 1.446$ g	$S_{DS} = 0.964$ g
$S_1 = 0.555$ g	$S_{H1} = 0.833$ g	$S_{D1} = 0.555$ g



Spectral Response Acceleration Parameters:

short period:	$S_s = 1.446$ g
1 sec period:	$S_1 = 0.555$ g
Transition period:	$T_L = 6$ sec

< Long Period transition period, Ref. ASCE 7, Fig. 22-12

Seismic Loads

Seismic Parameters:

Select Risk Category: Non substantial risk to human life
 I_e = Seismic Importance Factor for Risk Category II

$I_{e,Risk} =$

II
1.00

Ref. ASCE 7 Table 1.5-1
 Ref. ASCE 7 Table 1.5-2

Site Class
 S_S = Spectral Response Accel Param, short period
 S_1 = Spectral Response Accel Param, 1 sec period
 F_a = Site Coefficient (based on S_S and Site Class)
 F_v = Site Coefficient (based on S_1 and Site Class)
 S_{MS} = MCE_R Spectral Response, short period
 S_{M1} = MCE_R Spectral Response, 1 sec period
 S_{DS} = Design Spectral Response, short period
 S_{D1} = Design Spectral Response, 1 sec period
 Seismic Design Category based on S_{DS} : D
 (A = low, F = High) based on S_{D1} : D

D
$S_S = 1.446$ g
$S_1 = 0.555$ g
$F_a = 1$
$F_v = 1.5$
$S_{MS} = F_a S_S = 1.446$
$S_{M1} = F_v S_1 = 0.8325$
$S_{DS} = 2/3 * S_{MS} = 0.964$
$S_{D1} = 2/3 * S_{M1} = 0.555$
D

(use worst case)

Ref. previous page
 Ref. previous page
 Ref. previous page
 Ref. ASCE 7 Table 11.4-1
 Ref. ASCE 7 Table 11.4-2
 Ref. ASCE 7 Eqn. 11.4-1
 Ref. ASCE 7 Eqn. 11.4-2
 Ref. ASCE 7 Eqn. 11.4-3
 Ref. ASCE 7 Eqn. 11.4-4
 Ref. ASCE 7 Table 11.6-1,2

Seismic Coefficients:

Ref. ASCE 7, Table 12.2-1

Structure Type: Building Structure
 Description: Light Framed Wood Shear Walls
 $R =$ Response Modification Factor: **X:** $R_x = 7.00$
 $\Omega_0 =$ Overstrength Factor: $\Omega_{0,x} = 2.50$
 $C_d =$ Deflection Amplification Factor: $C_{d,x} = 4.00$
 $N =$ Number of Stories = $N = 3$

Can be different in X & Z directions.
Z: $R_z = 7.00$
 $\Omega_{0,z} = 2.50$
 $C_{d,z} = 4.00$

Seismic Loads

Calculate Fundamental Period of Structure:

h_n = Highest point on structure	35	Ft.
C_u =	1.4	Ref ASCE 7 Table 12.8-1
C_t = for "all other structural systems"	0.02	Ref ASCE 7 Table 12.8-2
x = for "all other structural systems"	0.75	Ref ASCE 7 Table 12.8-2
T_a = Approx Period = $(C_t) (h_n)^x$ =	0.29	Ref ASCE 7 Eq 12.8-7
T_{max} = Maximum Period = $(C_u) (T_a)$ =	0.40	Ref ASCE 7 Sec 12.8.2
T = Period = greater of T_{max} and T_a	0.40	
T_o = $(0.2) (S_{D1} / S_{DS})$ =	0.12	Ref ASCE 7 Sec 11.4.5
T_S = (S_{D1} / S_{DS}) =	0.58	
T_L = Long Transition Period	6	Ref. ASCE 7, Fig. 22-12

Design Spectral Response Acceleration:

S_a = Design Spectral Response Acceleratio 0.96 Ref ASCE 7 Sec 11.4.5

Seismic Design Procedure:

Seismic Design Category = D	
Risk Category = II	Based on these conditions, from Table 12.6-1:
Structure Type is Light Framed Wood Shear Walls	Equivalent Lateral Force Procedure is
Number of Stories = 3	Acceptable

Determine C_s :

$$C_s = \frac{SDS}{R / I_{seismic}} = 0.138$$

C_{sMax} = 0.197 Ref ASCE 7 Eq 12.8-3 and 12.8-4

C_{sMin} = 0.042 Ref ASCE 7 Eq 12.8-5 and 12.8-6

Governing Value for C_s = 0.138

Seismic Base Shear = $V = C_s \times W$

For Allowable Stress Procedure (ASD), $F_s = 0.7 \times C_s = 0.096$

Seismic Base Shear = $0.7C_s \times W$

Seismic Loads

Shear wall loads

S/W Designation	Allowable Load Lb. / Ft.
P1-6	242
P1-4	353
P1-3	456
P1-2	595
P2-6	484
P2-4	707
P2-3	911
P2-2	1190

Calculated Shear Wall values from SDPWS:

- a) use lower values for Seismic
- b) Use values for 15/32" structural panels per Footnote 2
- c) Assume Hem-fir #2 framing with G = 0.43 per Footnote 3

Wall Type	Tabulated Value (Table 4.3A)	Tabulated Value x 0.5 x 0.93	
P1-6	520	242	
P1-4	760	353	
P1-3	980	456	
P1-2	1280	595	
P2-6	1040	484	See Section 4.3.3.3
P2-4	1520	707	See Section 4.3.3.3
P2-3	1960	911	See Section 4.3.3.3
P2-2	2560	1190	See Section 4.3.3.3

Seismic Vertical Load Dist

Determine Seismic Weight:

Level	Area Ft ²	Roof Lb.	Floor Lb.	Ext Wall Lb.	Int Wall Lb.	Total Lb.
Roof Level	180	1800	0	4480	0	6280
3rd Floor	1404	5200	16400	15800	7120	44520
2nd Floor	1404	5100	7680	8690	3256	24726
1st Floor	1710	0	7680	22000	5456	35136
Total Seismic weight						110662

Seismic Base Shear = 0.7(Cs)(W) = 0.7(0.138)(W) = 10667.8

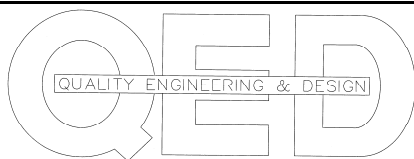
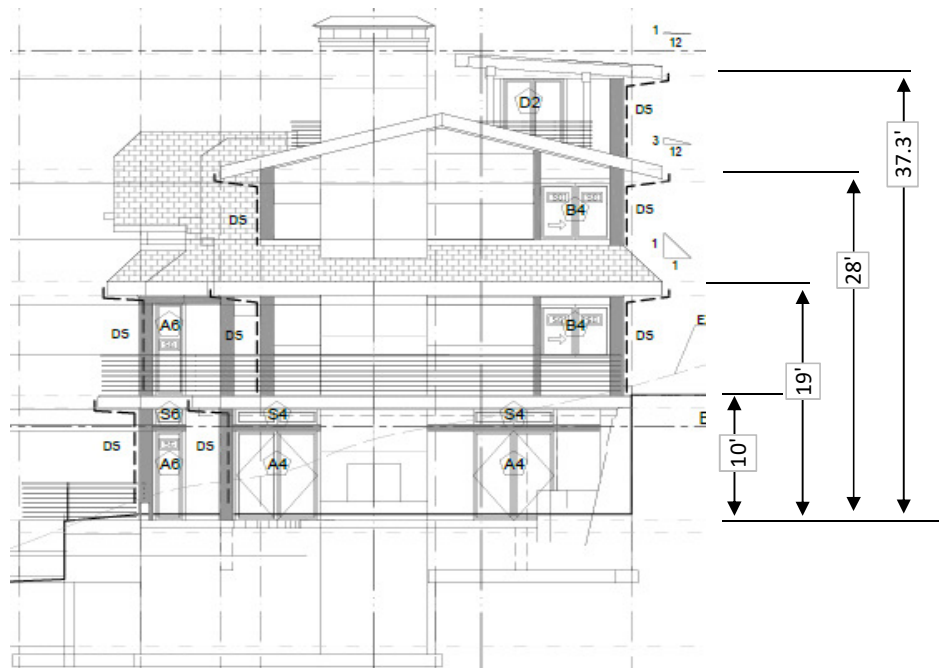
VERTICAL DISTRIBUTION OF SEISMIC FORCE

Level	w _x	h _x	w _x h _x ^k	C _{vx}	F _x
Roof Level	6280	37.3	234244	0.102	1085.5
3rd Floor	44520	28	1246560	0.542	5776.9
2nd Floor	24726	19	469794	0.204	2177.1
1st Floor	35136	10	351360	0.153	1628.3
SUM =	110662		2301958		10667.8

k = 1 for T < 0.5

$$C_{vx} = \frac{w_x h_x^k}{\sum_{i=1}^n w_i h_i^k}$$

$$F_x = C_{vx} V$$



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Wind Parameters

Use Directional Procedure per ASCE 7 Chapter 27

Per Section 27.4.6, for buildings meeting the requirements of Appendix D, paragraph D1.1, only Case 1 and 3 of Figure 27.4-8 need to be considered. Additionally, for flexible diaphragm structure, Case 1 will govern for shear wall design. Therefore, only Case 1 is considered.

Basic Wind Parameters:

Risk Category:	Non substantial risk to human life	II	ASCE 7 Table 1.5-1
$I_w =$ Wind Importance Factor	for Risk Category II	1.00	ASCE 7 Table 1.5-2
Exposure		C	
$V =$ Basic Wind Speed		110	ASCE 7 Figure 26.5-1
$K_{zt} =$ Spectral Response Accel Param, short period		1.60	ASCE 7 Section 26.8
$K_d =$		0.85	ASCE 7 Table 26.2-1
$G =$ Gust Factor		0.85	ASCE 7 Sec 26.9.1 & 26.9.2
$G_{cpi} =$ Site Coefficient (positive & Negative)		0.18	ASCE 7 Table 26.11-1

Story Heights:	11	Ft., Lower Floor	0	Ft., Roof Height
	11	Ft., Main Floor	32	Ft. Mean Roof Height
	10	Ft., Upper Floor		
	8	Roof Level Enclosure		

Wind Pressure at Upper Floor:

$$z = \frac{\text{Upper Floor} + \text{Main} + \text{Lower}}{2} = 27 \text{ Ft.} = \text{Mean wall height at upper floor}$$

$$z_g = 900 \text{ from Table 26.9-1} \quad K_z = 2.01 \times (z / z_g)^{(2/\alpha)} = 0.961$$

$$\alpha = 9.5 \text{ from Table 26.9-1} \quad K_h = 2.01 \times (h / z_g)^{(2/\alpha)} = 0.996$$

$$q_z = 0.00256(K_z)(K_{zt})(K_d)(V^2) = 40.47$$

$$q_h = 0.00256(K_h)(K_{zt})(K_d)(V^2) = 41.95$$

Wind Pressure at Main Floor:

$$z = \frac{\text{Main Floor} + \text{Lower}}{2} = 16.5 \text{ Ft.} = \text{Mean wall height at Main floor}$$

$$q_z = 0.00256(K_z)(K_{zt})(K_d)(V^2) = 36.49 \quad K_z = 2.01 \times (z / z_g)^{(2/\alpha)} = 0.866$$

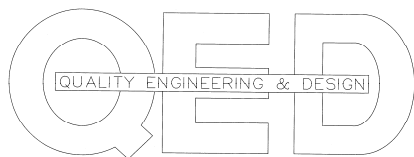
$$q_h = 0.00256(K_h)(K_{zt})(K_d)(V^2) = 41.95 \quad K_h = 2.01 \times (h / z_g)^{(2/\alpha)} = 0.996$$

Wind Pressure at Lower Floor:

$$z = \frac{\text{Lower Floor}}{2} = 5.5 \text{ Ft.} = \text{Mean wall height at Main floor}$$

$$q_z = 0.00256(K_z)(K_{zt})(K_d)(V^2) = 28.95 \quad K_z = 2.01 \times (z / z_g)^{(2/\alpha)} = 0.687$$

$$q_h = 0.00256(K_h)(K_{zt})(K_d)(V^2) = 41.95 \quad K_h = 2.01 \times (h / z_g)^{(2/\alpha)} = 0.996$$



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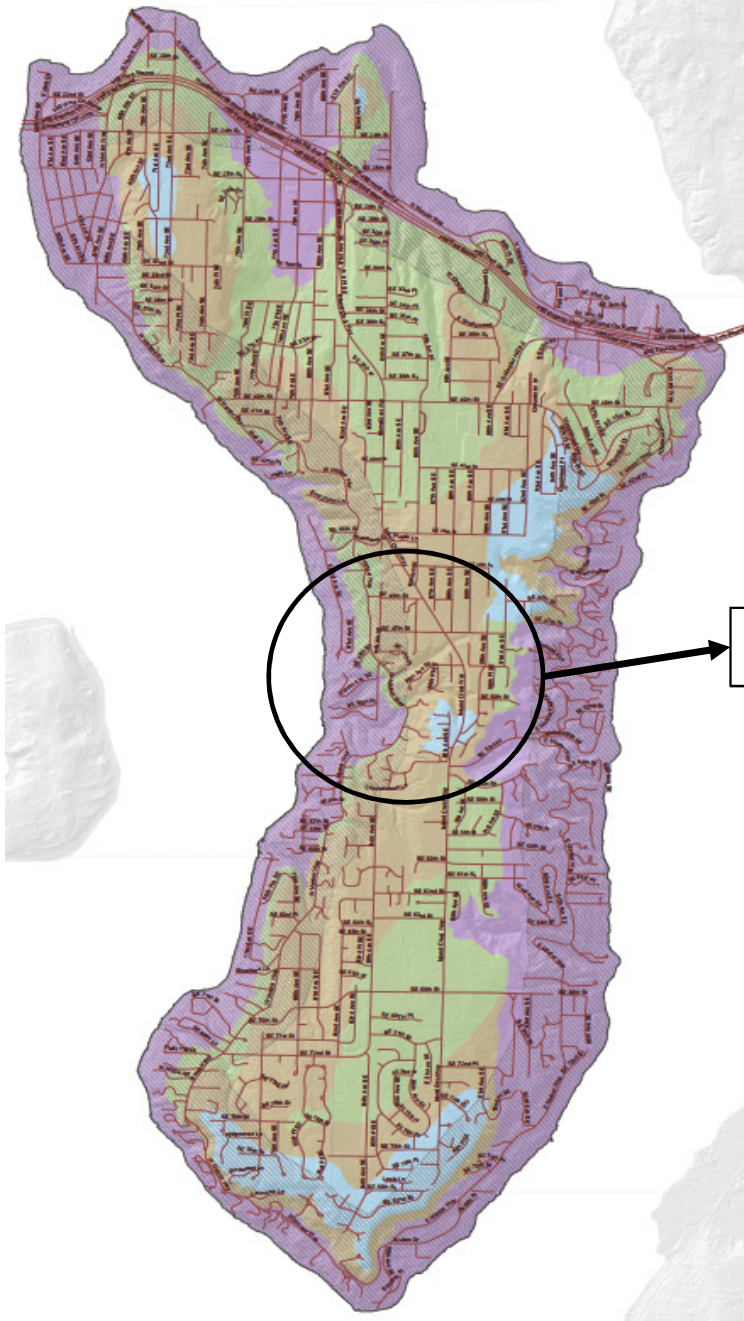
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Wind Loads-Kzt

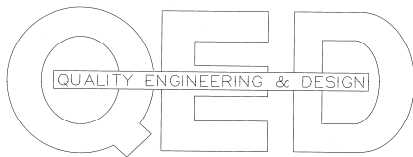
Calculate Kzt: Y
Kzt = 1.60 From Mercer Island Wind Map

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

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



See enlarged view on following page



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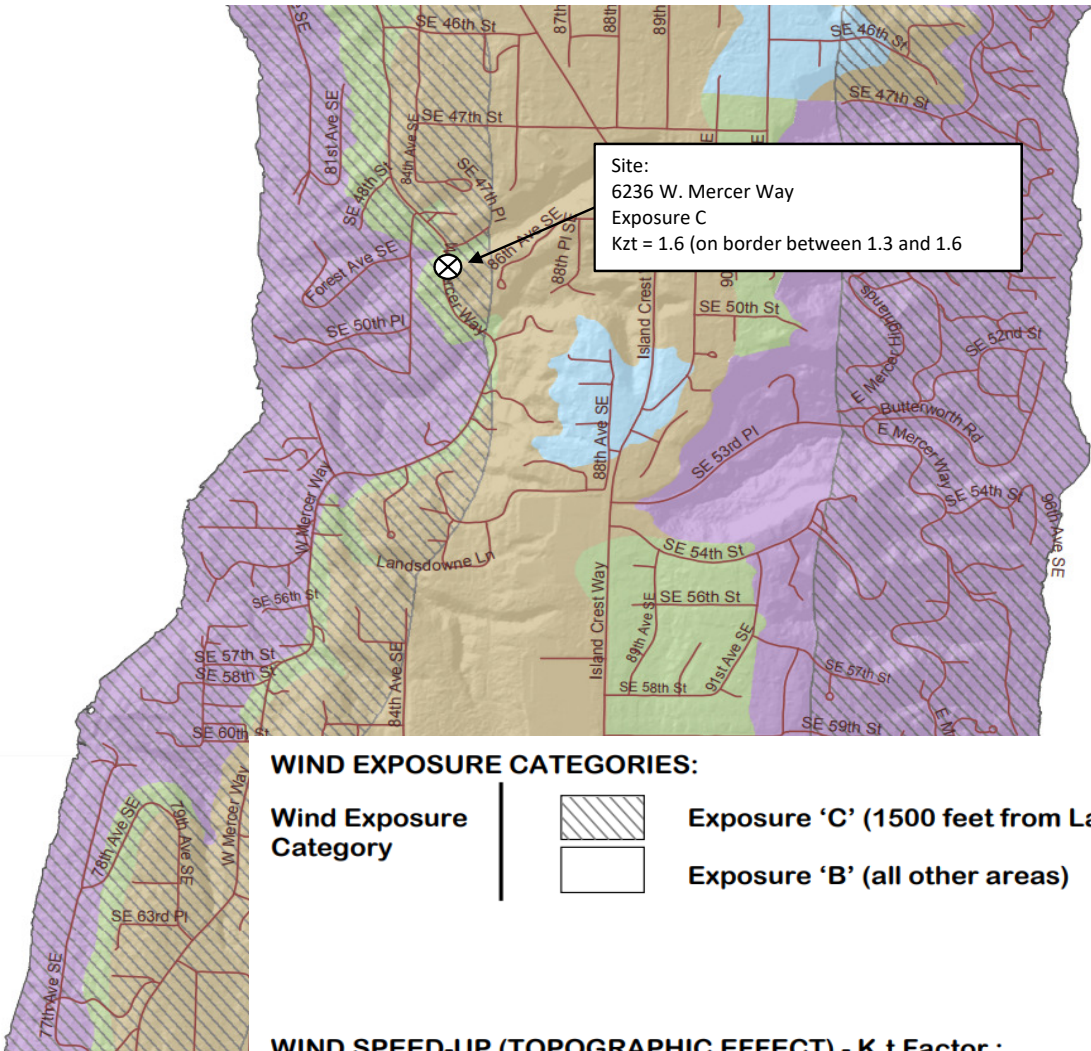
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Wind Loads-Kzt



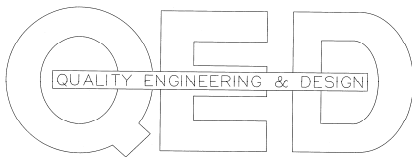
Site:
 6236 W. Mercer Way
 Exposure C
 Kzt = 1.6 (on border between 1.3 and 1.6)

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 :

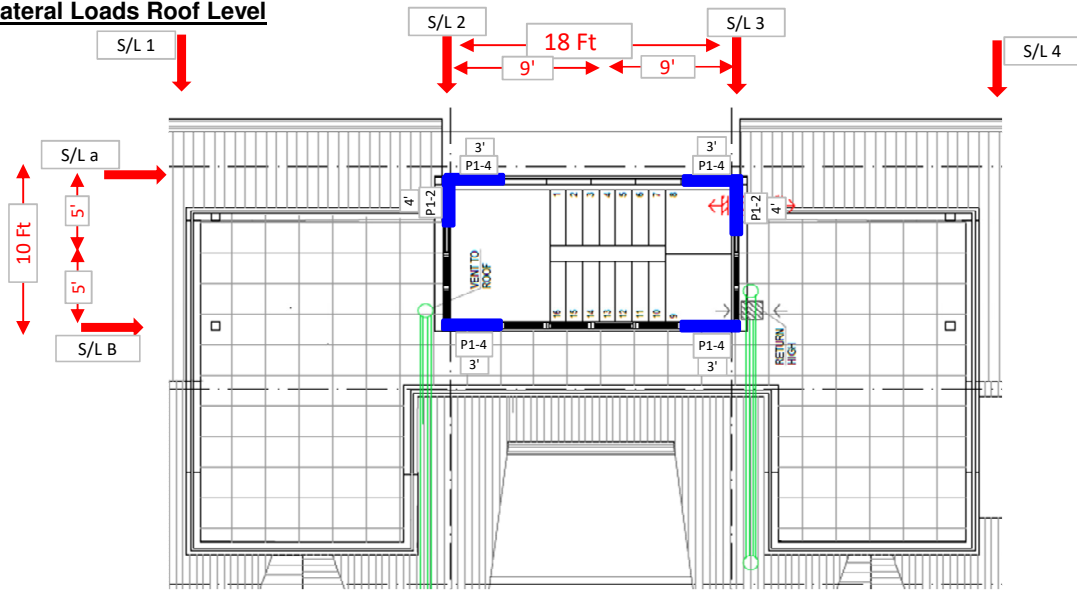
K_zt Factor		K_zt = 1.0
		K_zt = 1.3
		K_zt = 1.6
		K_zt = 1.9



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Lateral Loads Roof Level



Roof Level Plan
showing shear lines and tributary widths

Determine seismic weights per Shear Line (S/L):

Longitudinal Overall Length = 18 Ft
Transverse Overall Width = 10 Ft

Dead Load for Floor & Roof weight calculations = 10 psf
Dead Load for Exterior Wall weight calculations = 10 psf
Dead Load for Interior Wall weight calculations = 8 psf

Tributary Widths		
S/L a	5	Ft
S/L b	5	Ft
S/L c	0	Ft
S/L 1	0	Ft
S/L 2	9	Ft
S/L 3	9	Ft
S/L 4	0	Ft

SEISMIC WEIGHTS AND FORCE UPPER FLOOR				
S/L	Roof Area x 10	Floor (above) Area x 10	Exterior Walls = Lngth x Story Ht x 10	Interior Walls
a	900	0	2240	0
b	900	0	2240	0
c	0	0	0	0
d	0	0	0	0
TOTAL	1800	0	4480	0

Seismic Load Upper Floor = 1085.54

$$\text{Force per S/L} = \rho F_{\text{upper}} \times \frac{\text{Trib L}}{\text{Total L}}$$

SEISMIC LOAD PER S/L			
	Longitudinal	Transverse	
a	705.602	1	0
b	705.602	2	705.602
c	0	3	705.602
d	0	4	0

Rho = 1.3 for Upper Floor Longitudinal (see calculation in following section)

Rho = 1.3 for Upper Floor Transverse (see calculation in following section)

Lateral Loads Roof Level

WIND LOAD Cp FACTOR

LONGITUDINAL DIRECTION									
Parallel to Ridge									
WALLS					ROOF				
L / B	Cp				h / L	Pitch	Angle	Cp	
	Windward		Leeward			inch/Ft	Deg	Windward	Leeward
18/10= 1.8	0.8		-0.3		32/18= 1.8	0	0.00	-0.7	-0.18
TRANSVERSE DIRECTION									
Normal to Ridge									
10/18= 0.6	0.8		-0.5		32/10= 3.2	0	0.00	0.2	-0.6

CALCULATED WIND PRESSURE

LONGITUDINAL DIRECTION									
Parallel to Ridge									
Windward Wall	Leeward Wall	Total Wall		Windward Roof	Leeward Roof	Total Roof			
		Windward - Leeward				Horiz Comp			
(qzGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	38.22		(qhGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	-32.51			

TRANSVERSE DIRECTION									
Normal to Ridge									
(qzGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	45.35		(qhGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	-0.42			

GOVERNING WIND LOAD - COMPARE CALCULATED PRESSURE W/ MINIMUM ALLOWED

LONGITUDINAL	Wall	38.2	TRANSVERSE	Wall	45.3
	Roof	8.0		Roof	8.0
		Min per 27.4-1		Min per 27.4-1	

WIND LOADS PER SHEAR LINE

S/L	TRIBUTARY WIDTH	STORY HEIGHT	WALL WIND LOAD =W x Hw x Pw	ROOF WIND LOAD =W x Hr x Pr	TOTAL = (0.6)W
a	5	8	1528.7	0	917.2
b	5	8	1528.7	0	917.2
c	0	10	0.0	0	0.0
d					
Total Longitudinal Wind Load =					1,834.4

1	0	8	0.0	0.0	0.0
2	9	8	3265.0	0.0	1,959.0
3	9	8	3265.0	0.0	1,959.0
4	0	8	0.0	0.0	0.0
Total Transverse Wind Load =					3,918.1

COMPARING SEISMIC AND WIND LOADS:

Longitudinal Direction: WIND GOVERNS
 Transverse Direction: WIND GOVERNS

* Per Load Case 6 in ASCE
 7 Max wind load
 considered = 0.6W

Governing loads per shear line:

S/L	LOAD	S/L	LOAD
a	917	1	0
b	917	2	1,959
c	0	3	1,959
d	0	4	0

Wall Aspect Ratio

Min Allowed Wall Length = 8/3.5 = 2.3 Ft
 For walls < 8/2 = 4 Ft, Strength reduction =:
 (2b)/h per SDPWS 4.3.4.3
 For L = 2.5 → 0.50
 For L = 3 → 0.60

Lateral Loads Roof Level

UNIT LATERAL LOADS PER S/L				
S/L	S/W LENGTHS (ft)	TOTAL (ft.)	UNIT LOAD (plf)	S/W TYPE
a	(3+3)(0.6)	3.6	254.78	P1-4
b	(3+3)(0.6)	3.6	254.78	P1-4
c				
d				
1				
2	4'	4	489.76	P1-2
3	4'	4	489.76	P1-2
4				

CALCULATE SHEAR WALL UPLIFT & HOLD-DOWNS					
For resisting weight use 10 psf x 60% = 6 psf (60% of dead load resists overturning)					

S/L	WALL LENGTH	WALL WEIGHT*	WALL HEIGHT	UPLIFT (Unit Load x L)(H) - (Weight)(L / 2)	HOLD-DOWN TYPE
a	3	240	10	2427.8	MST37 (3815#)
	3	240	10	2427.8	MST37 (3815#)

b	3	240	10	2427.8	MST37 (3815#)
	3	240	10	2427.8	MST37 (3815#)

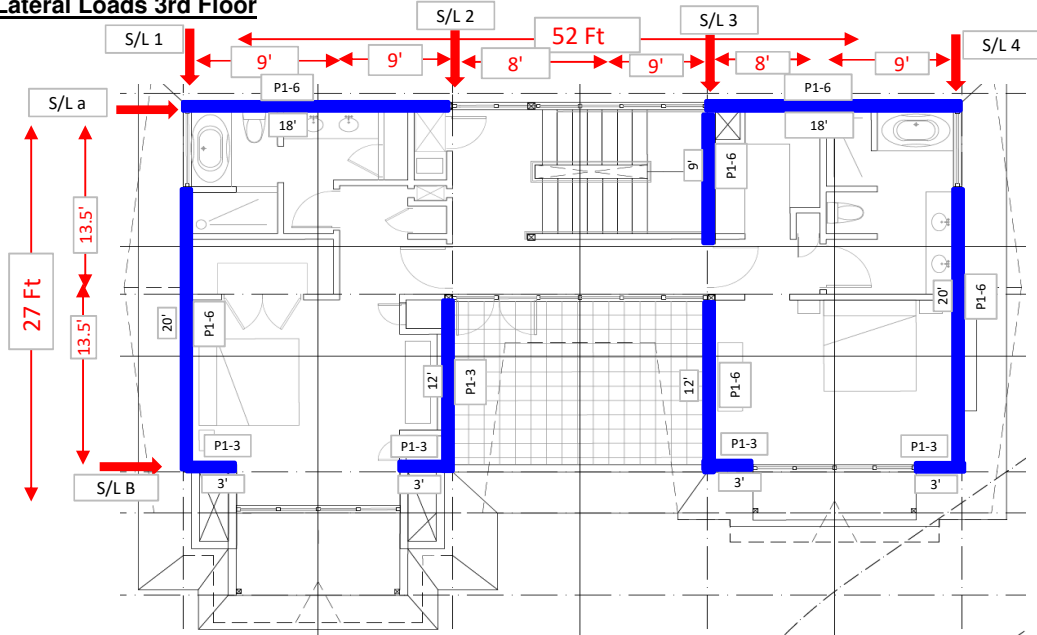
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2	4	200	10	4797.6	MST60 (5800#)

3	4	200	10	4797.6	MST60 (5800#)

4					

Lateral Loads 3rd Floor



Upper Floor Plan
showing shear lines and tributary widths

Determine seismic weights per Shear Line (S/L):

Longitudinal Overall Length = 52 Ft

Transverse Overall Width = 27 Ft

Dead Load for Floor area with Concrete Pavers = 10+15 = 25 psf

Dead Load for Floor & Roof weight calculations = 10 psf

Dead Load for Exterior Wall weight calculations = 10 psf

Dead Load for Interior Wall weight calculations = 8 psf

Tributary Widths		
S/L a	13.5	Ft
S/L b	13.5	Ft
S/L c	0	Ft
S/L 1	9	Ft
S/L 2	17	Ft
S/L 3	17	Ft
S/L 4	9	Ft

SEISMIC WEIGHTS AND FORCE UPPER FLOOR

S/L	Roof Area x 10	Floor (above) Area x 10	Exterior Walls = Length x Story Ht x 10	Interior Walls
a	2600	8200	7900	4400
b	2600	8200	7900	2720
c	0	0	0	0
d	0	0	0	0
TOTAL	5200	16400	15800	7120

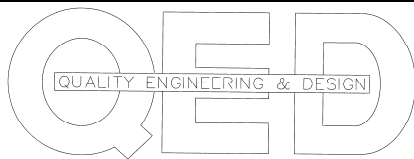
Seismic Load Upper Floor = 5776.85

$$\text{Force per S/L} = \rho F_{\text{upper}} \times \frac{\text{Trib L}}{\text{Total L}}$$

SEISMIC LOAD PER S/L			
	Longitudinal	Transverse	
a	3754.95	1	1299.79
b	3754.95	2	2455.16
c	0	3	2455.16
d	0	4	1299.79

Rho = 1.3 for Upper Floor Longitudinal (see calculation in following section)

Rho = 1.3 for Upper Floor Transverse (see calculation in following section)



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Lateral Loads 3rd Floor

WIND LOAD Cp FACTOR

LONGITUDINAL DIRECTION									
Parallel to Ridge									
WALLS					ROOF				
L / B	Cp				h / L	Pitch	Angle	Cp	
	Windward		Leeward			inch/Ft	Deg	Windward	Leeward
52/27= 1.9	0.8		-0.3		32/52= 0.6	0	0.00	-0.7	-0.18
TRANSVERSE DIRECTION									
Normal to Ridge									
27/52= 0.5	0.8		-0.5		32/27= 1.2	0	0.00	0.2	-0.6

CALCULATED WIND PRESSURE

LONGITUDINAL DIRECTION									
Parallel to Ridge									
Windward Wall	Leeward Wall	Total Wall		Windward Roof	Leeward Roof	Total Roof			
		Windward - Leeward				Horiz Comp			
(qzGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	38.22		(qhGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	-32.51			

TRANSVERSE DIRECTION									
Normal to Ridge									
(qzGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	45.35		(qhGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	-0.42			

GOVERNING WIND LOAD - COMPARE CALCULATED PRESSURE W/ MINIMUM ALLOWED

LONGITUDINAL	Wall	38.2	TRANSVERSE	Wall	45.3
	Roof	8.0		Roof	8.0
		Min per 27.4-1		Min per 27.4-1	

WIND LOADS PER SHEAR LINE

S/L	TRIBUTARY WIDTH	STORY HEIGHT	WALL WIND LOAD =W x Hw x Pw	ROOF WIND LOAD =W x Hr x Pr	TOTAL = (0.6)W
a	13.5	10	5159.3	0	3,095.6
b	13.5	10	5159.3	0	3,095.6
c	0	10	0.0	0	0.0
d					
Total Longitudinal Wind Load =					6,191.2

1	9	10	4081.3	0.0	2,448.8
2	17	10	7709.1	0.0	4,625.5
3	17	10	7709.1	0.0	4,625.5
4	9	10	4081.3	0.0	2,448.8
Total Transverse Wind Load =					14,148.5

COMPARING SEISMIC AND WIND LOADS:

Longitudinal Direction: WIND GOVERNS
 Transverse Direction: WIND GOVERNS

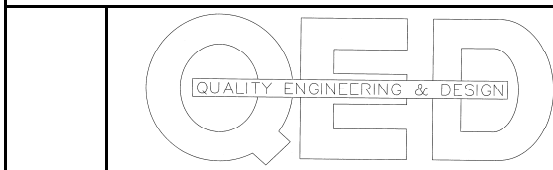
* Per Load Case 6 in ASCE
 7 Max wind load
 considered = 0.6W

Governing loads per shear line:

S/L	LOAD	S/L	LOAD
a	3,096	1	2,449
b	3,096	2	4,625
c	0	3	4,625
d	0	4	2,449

Wall Aspect Ratio

Min Allowed Wall Length = 10/3.5 = 2.9 Ft
 For walls < 10/2 = 5 Ft, Strength reduction =:
 (2b)/h per SDPWS 4.3.4.3
 For L = 3.5 → 0.70
 For L = 3 → 0.60



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Lateral Loads 3rd Floor

UNIT LATERAL LOADS PER S/L				
S/L	S/W LENGTHS (ft)	TOTAL (ft.)	UNIT LOAD (plf)	S/W TYPE
a	18' + 17"	35	88.45	P1-6
b	(3'+3'+3'+3')(0.6)	7.2	429.94	P1-3
c				
d				
1	20'	20	122.44	P1-6
2	12'	12	385.46	P1-3
3	9'+12'	21	220.26	P1-6
4	20'	20	122.44	P1-6

CALCULATE SHEAR WALL UPLIFT & HOLD-DOWNS					
For resisting weight use 10 psf x 60% = 6 psf (60% of dead load resists overturning)					

S/L	WALL LENGTH	WALL WEIGHT*	WALL HEIGHT	UPLIFT (Unit Load x L)(H) - (Weight)(L / 2)	HOLD-DOWN TYPE
a	18	1800	10	-15.5	MST37 (3815#)
	17	1700	10	34.5	MST37 (3815#)

b	3	300	10	4149.4	MST60 (5800#)
	3	300	10	4149.4	MST60 (5800#)
	3	300	10	4149.4	MST60 (5800#)
	3	300	10	4149.4	MST60 (5800#)

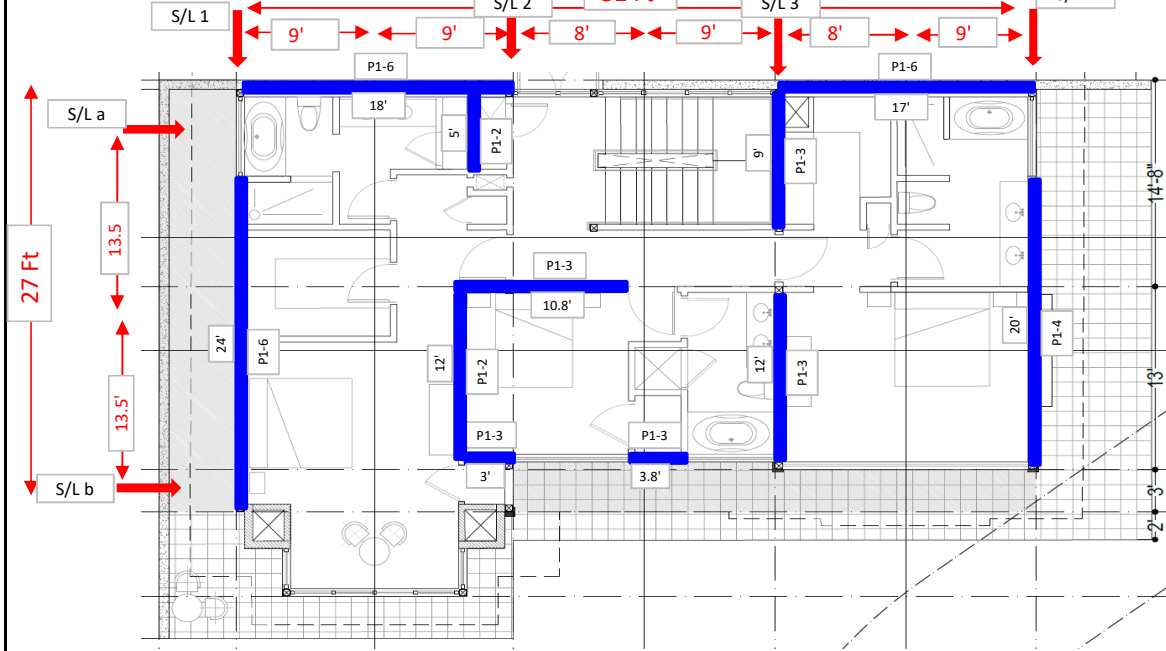
1	20	1200	10	624.4	MST37 (3815#)

2	12	720	10	3494.6	MST60 (5800#)

3	9	540	10	1932.6	MST37 (3815#)
	12	720	10	1842.6	MST37 (3815#)

4	20	1200	10	624.4	MST37 (3815#)

Lateral Loads 2nd Floor



Main Floor Plan
showing shear lines and tributary widths

Determine seismic weights per Shear Line (S/L):

Longitudinal Overall Length = 52 Ft

Transverse Overall Width = 33 Ft

Dead Load for Floor area with Concrete Pavers = 10+15 = 25 psf

Dead Load for Floor & Roof weight calculations = 10 psf

Dead Load for Exterior Wall weight calculations = 10 psf

Dead Load for Interior Wall weight calculations = 8 psf

Tributary Widths		
S/L a	13.5	Ft
S/L b	13.5	Ft
S/L c	0	Ft
S/L 1	9	Ft
S/L 2	17	Ft
S/L 3	17	Ft
S/L 4	9	Ft

SEISMIC WEIGHTS & FORCE FOR MAIN FLOOR				
S/L	Deck	Floor (above)	Exterior Walls	Interior Walls
	Above	Area x 10	= L x H x 10	
a	2550	3840	1485	3256
b	2550	3840	7205	0
c	0	0	0	0
d	0	0	0	0
TOTAL	5100	7680	8690	3256

Seismic Load Upper Floor = 2177.14

$$\text{Force per S/L} = \rho F_{\text{upper}} \times \frac{\text{Trib L}}{\text{Total L}}$$

SEISMIC LOAD PER S/L			
	Longitudinal	Transverse	
a	1157.84	1	489.856
b	1157.84	2	925.283
c	0	3	925.283
d	0	4	489.856

Rho = 1.3 for Main Floor Longitudinal (see calculation in following section)

Rho = 1.3 for Main Floor Transverse (see calculation in following section)

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Lateral Loads 2nd Floor

WIND LOAD Cp FACTOR

LONGITUDINAL DIRECTION		WALLS		Parallel to Ridge		ROOF			
L / B		Cp		h / L	Pitch	Angle	Cp		
		Windward	Leeward		inch/Ft	Deg	Windward	Leeward	
52/33=	1.6	0.8	-0.3	32/52=	0.6	0	0.00	-0.7	-0.18

TRANSVERSE DIRECTION		WALLS		Parallel to Ridge		ROOF			
L / B		Cp		h / L	Pitch	Angle	Cp		
33/52=	0.6	0.8	-0.5	32/33=	1.0	0	0.00	0.2	-0.6

CALCULATED WIND PRESSURE

LONGITUDINAL DIRECTION		WALLS		Parallel to Ridge		ROOF			
Windward Wall	Leeward Wall	Total Wall		Windward Roof	Leeward Roof	Total Roof			
(qzGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	Windward - Leeward		(qhGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	Horiz Comp			
		34.11				-32.51			

TRANSVERSE DIRECTION		WALLS		Parallel to Ridge		ROOF			
(qzGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	Total Wall		(qhGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	Total Roof			
		42.64				-0.42			

GOVERNING WIND LOAD - COMPARE CALCULATED PRESSURE W/ MINIMUM ALLOWED

LONGITUDINAL	Wall	34.1	TRANSVERSE	Wall	42.6
		Roof		8.0	
		Min per 27.4-1			Min per 27.4-1

WIND LOADS PER SHEAR LINE

S/L	TRIBUTARY WIDTH	STORY HEIGHT	WALL WIND LOAD =W x Hw x Pw	ROOF WIND LOAD =W x Hr x Pr	TOTAL (= 0.6W)	COMBINED TOTAL add upper floor
a	13.5	11	5,066.0	0.0	3,039.6	6,135.2
b	13.5	11	5,066.0	0.0	3,039.6	6,135.2
c	0	11	0.0	0.0	0.0	0.0
d	0	11	0.0	0.0	0.0	0.0
Total Longitudinal Wind Load =					6,079.2	12,270.4

1	9	11	4,221.1	0.0	2,532.7	4,981.5
2	17	11	7,973.2	0.0	4,783.9	9,409.4
3	17	11	7,973.2	0.0	4,783.9	9,409.4
4	9	11	4,221.1	0.0	2,532.7	4,981.5
Total Transverse Wind Load =					14,633.2	28,781.7

COMPARING SEISMIC AND WIND LOADS:

Longitudinal Direction: WIND GOVERNS
 Transverse Direction: WIND GOVERNS

* Per Load Case 6 in ASCE 7
 Max wind load considered = 0.6W

Governing loads per shear line:

S/L	LOAD	S/L	LOAD
a	6135.18	1	4981.45
b	6135.18	2	9409.41
c	0	3	9409.41
d	0	4	4981.45

Wall Aspect Ratio

Min Allowed Wall Length = 11/3.5 = 3.1 Ft
 For walls < 11/2 = 5.5 Ft, Strength reduction =:
 (2b)/h per SDPWS 4.3.4.3
 For L = 3 → 0.60
 For L = 3.75 → 0.75

Lateral Loads 2nd Floor

UNIT LATERAL LOADS PER S/L				
S/L	S/W LENGTHS (ft)	TOTAL (Ft.)	UNIT LOAD (plf)	S/W TYPE
a	18'+17'	35	175.29	P1-6
b	(3)(0.6)+(3.75)(0.75)+10.8	15.4	398.07	P1-3
c				
d				
1	24'	24	207.56	P1-6
2	12'+5'	17	553.49	P1-2
3	9'+12'	21	448.07	P1-3
4	20'	20	249.07	P1-4

CALCULATE SHEAR WALL UPLIFT & HOLD-DOWNS					
For resisting weight use 10 psf x 60% = 6 psf (60% of dead load resists overturning)					
S/L	WALL LENGTH	WALL WEIGHT	C.G. HEIGHT	UPLIFT (Unit Load x L)(H) - (Weight)(L / 2)	HOLD-DOWN TYPE
a	18	4000	10.5	-159	No Hold-Down Required
	17	3775	10.5	-47	No Hold-Down Required
b	3	1330	10.5	3,515	MST37 (3815#)
	3.75	1660	10.5	3,350	MST37 (3815#)
	10.8	2400	10.5	2,980	MST37 (3815#)



Load is applied at average height of upper and main floor walls for purposes of determining overturning

$$= \frac{[H_{main} \times (H_{main} / 2)] + [H_{upper} \times ((H_{upper} / 2) + H_{main})]}{H_{main} + H_{upper}}$$

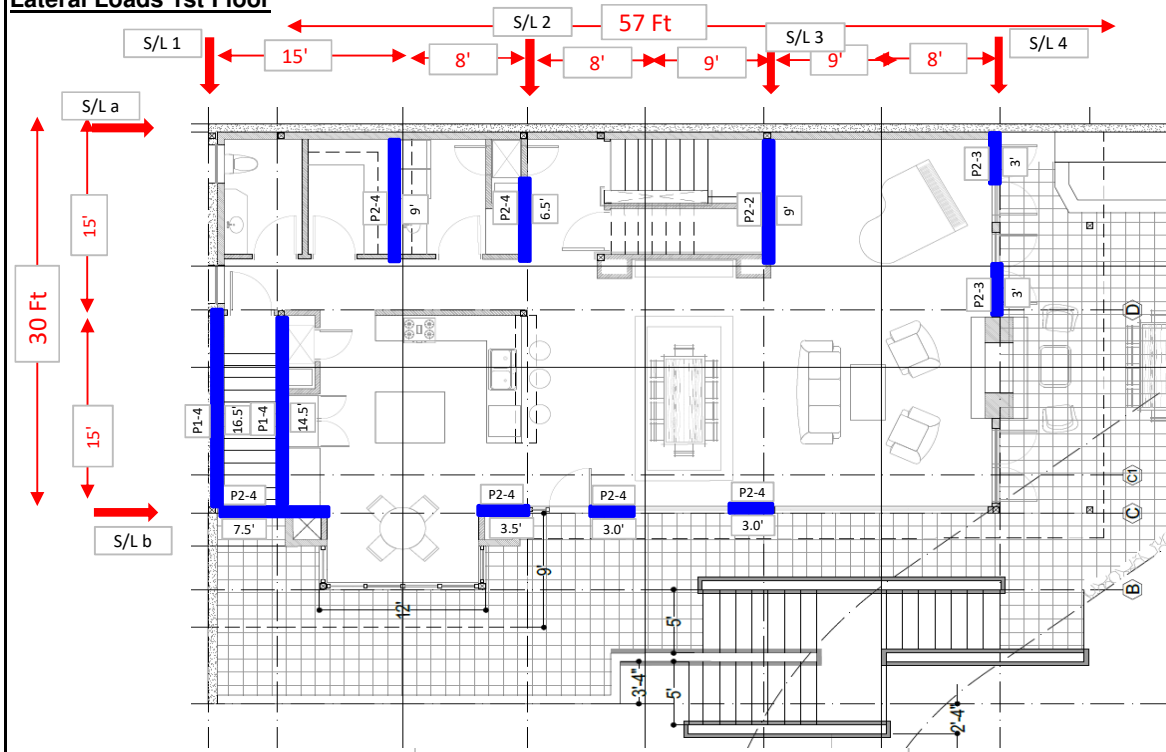
Lateral Loads 2nd Floor

CALCULATE SHEAR WALL UPLIFT & HOLD-DOWNS					
For resisting weight use 10 psf x 60% = 6 psf (60% of dead load resists overturning)					
S/L	WALL LENGTH	WALL WEIGHT	C.G. HEIGHT	UPLIFT (Unit Load x L)(H) - (Weight)(L / 2)	HOLD-DOWN TYPE
1	24	3000	10.5	679	MST37 (3815#)
2	12	1500	10.5	5,062	MST60 (5800#)
	5	650	10.5	3,855	MST48 (4460#)
3	9	1200	10.5	4,105	MST48 (4460#)
	12	1500	10.5	3,955	MST48 (4460#)
4	20	2525	10.5	1,353	MST37 (3815#)

↑
 Load is applied at average height of upper and main floor walls for purposes of determining overturning

$$= \frac{[H_{main} \times (H_{main} / 2)] + [H_{upper} \times ((H_{upper} / 2) + H_{main})]}{H_{main} + H_{upper}}$$

Lateral Loads 1st Floor



Determine seismic weights per Shear 6235 Lake Washington Blvd

Longitudinal Overall Length = 70 Ft

Transverse Overall Width = 49 Ft

Dead Load for Floor & Roof weight calculations = 10 psf

Dead Load for Exterior Wall weight calculations = 10 psf

Dead Load for Interior Wall weight calculations = 8 psf

Tributary Widths		
S/L a	15	Ft
S/L b	15	Ft
S/L c	0	Ft
S/L 1	15	Ft
S/L 2	16	Ft
S/L 3	18	Ft
S/L 4	8	Ft

SEISMIC WEIGHTS & FORCE FOR LOWER FLOOR

S/L	Roof A x 10	Floor (above) Area x 10	Exterior Walls = L x H x 10	Interior Walls
a	0	3840	11000	4136
b	0	3840	11000	1320
c	0	0		0
d				
TOTAL	0	7680	22000	5456

Seismic Load Upper Floor = 1628.29

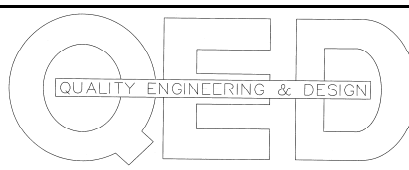
$$\text{Force per S/L} = \rho F_{\text{upper}} \times \frac{\text{Trib L}}{\text{Total L}}$$

SEISMIC LOAD PER S/L			
	Longitudinal	Transverse	
a	647.991	1	453.594
b	647.991	2	483.833
c	0	3	544.312
d	0	4	241.917

Rho = 1.3 for Main Floor Longitudinal (see calculation in following section)

Rho = 1.3 for Main Floor Transverse (see calculation in following section)

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Lateral Loads 1st Floor									
WIND LOAD Cp FACTOR									
LONGITUDINAL DIRECTION					Parallel to Ridge				
WALLS					ROOF				
L / B	Cp		h / L	Pitch	Angle	Cp			
	Windward	Leeward		inch/Ft	Deg	Windward	Leeward		
70/49= 1.4	0.8	-0.3	32/70= 0.5	0	0.00	-0.3	-0.18		
TRANSVERSE DIRECTION					Normal to Ridge				
49/70= 0.7	0.8	-0.5	32/49= 0.7	0	0.00	-0.4	-0.6		
CALCULATED WIND PRESSURE									
LONGITUDINAL DIRECTION					Parallel to Ridge				
Windward Wall	Leeward Wall	Total Wall	Windward Roof	Leeward Roof	Total Roof				
(qzGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	Windward - Leeward	(qhGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	Horiz Comp				
		30.38			-18.25				
TRANSVERSE DIRECTION					Normal to Ridge				
(qzGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	37.51	(qhGCp) - (qhGcpi)	(qhGCp) - (qhGcpi)	-21.81				
GOVERNING WIND LOAD - COMPARE CALCULATED PRESSURE W/ MINIMUM ALLOWED									
LONGITUDINAL	Wall	30.4	TRANSVERSE	Wall	37.5				
	Roof	8.0		Roof	8.0	Min per 27.4-1			
WIND LOADS PER SHEAR LINE									
S/L	TRIBUTARY WIDTH	STORY HEIGHT	WALL WIND LOAD =W x Hw x Pw	ROOF WIND LOAD =W x Hr x Pr	TOTAL (= 0.6 W)	COMBINED TOTAL add upper floor walls			
a	15	11	5,013.3	0.0	3,008.0	9,143.2			
b	15	11	5,013.3	0.0	3,008.0	9,143.2			
c	0	11	0.0	0.0	0.0	0.0			
d									
Total Longitudinal Wind Load =					6,016.0	18,286.3			
1	15	11	6,189.9	0.0	3,713.9	8,695.4			
2	16	0	0.0	0.0	0.0	9,409.4			
3	18	0	0.0	0.0	0.0	9,409.4			
4	8	0	0.0	0.0	0.0	4,981.5			
Total Transverse Wind Load =					3,713.9	32,495.6			
COMPARING SEISMIC AND WIND LOADS:									
Longitudinal Direction: WIND GOVERNS									
Transverse Direction: WIND GOVERNS									
Governing loads per shear line:					Wall Aspect Ratio				
S/L	LOAD		S/L	LOAD	Min Allowed Wall Length = 11/3.5 = 3.1 Ft				
a	9143.16		1	8695.38	For walls < 11/2 = 5.5 Ft, Strength reduction =:				
b	9143.16		2	9409.41	(2b)/h per SDPWS 4.3.4.3				
c	0		3	9409.41	For L = 3 ➡ 0.60				
d			4	4981.45	For L = 3.5 ➡ 0.70				
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Lateral Loads 1st Floor

UNIT LATERAL LOADS PER S/L				
S/L	S/W LENGTHS (ft)	TOTAL (Ft.)	UNIT LOAD (plf)	S/W TYPE
a	N/A. Resolved to foundation at level above			
b	7.5+(3.5)(0.7)+(3+3)(0.6)	13.55	674.77	P2-4
1	16.5'+14.5'	31	280.50	P1-4
2	9'+6.5'	15.5	607.06	P2-4
3	9'	9	1045.49	P2-2
4	3'+3'	6	830.24	P2-3

CALCULATE SHEAR WALL UPLIFT & HOLD-DOWNS					
For resisting weight use 10 psf x 60% = 6 psf (60% of dead load resists overturning)					
S/L	WALL LENGTH	WALL WEIGHT*	C.G. HEIGHT	UPLIFT (Unit Load x L)(H) - (Weight)(L / 2)	HOLD-DOWN TYPE
a	N/A. Resolved to foundation at level above				

b	7.5	2500	16	9,546	HDU14- 8x Stud (14390#)
	3.5	1175	16	10,209	HDU14- 8x Stud (14390#)
	3	1000	16	10,296	HDU14- 8x Stud (14390#)

1	16.5	2200	16	3,388	STHD14 (5785#)
	14.5	2000	16	3,488	MST48 (4460#)

2	9	1200	16	9,113	HDU11- 6x Stud (9535#)
	6.5	875	16	9,275	HDU11- 6x Stud (9535#)

3	9	2550	16	15,453	HDU14- 8x Stud (14390#) 3X

4	3	550	16	13,009	HDU14- 8x Stud (14390#)
	3	550	16	13,009	HDU14- 8x Stud (14390#)

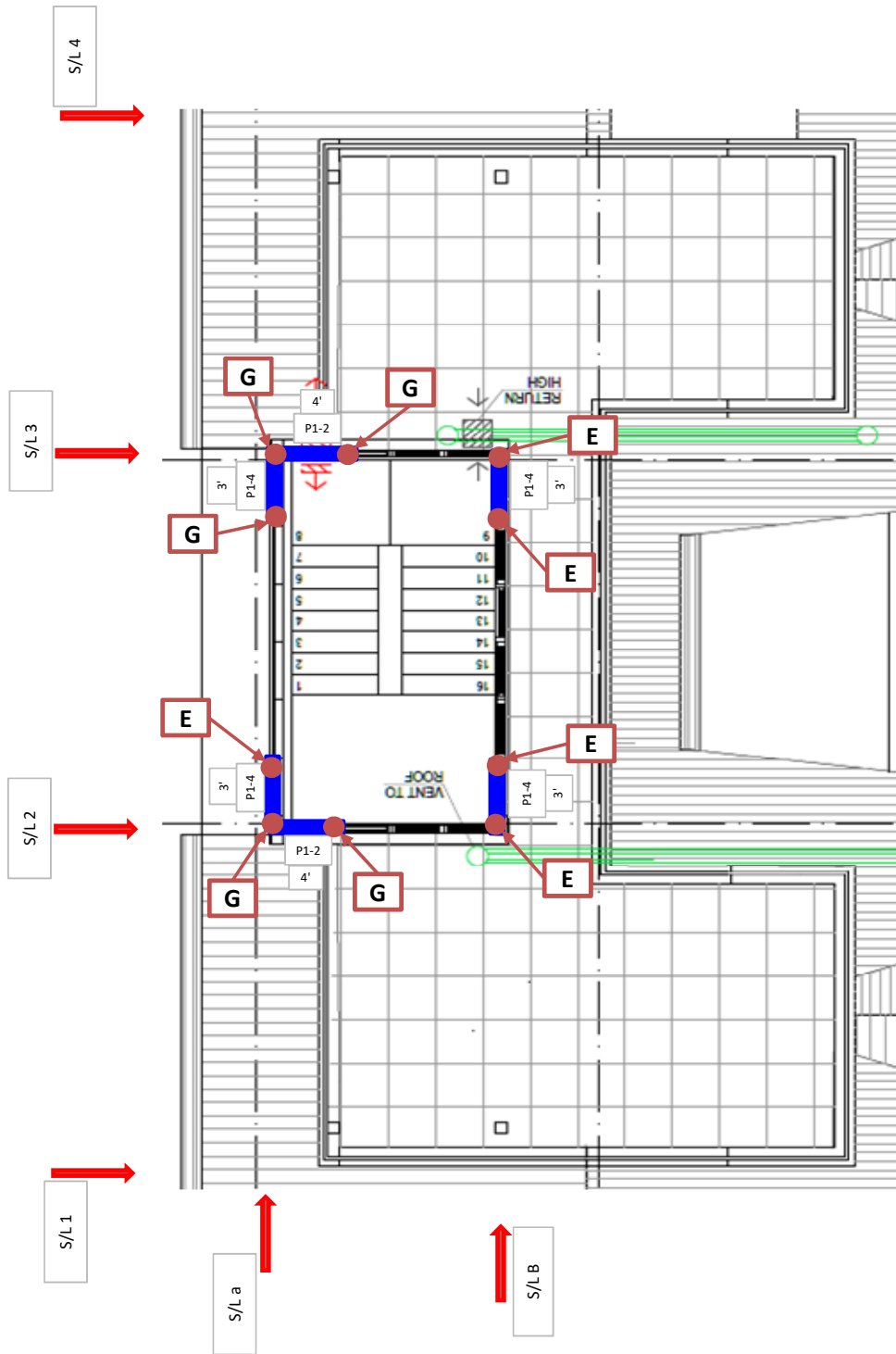
↑
Load is applied at center of gravity of wall stack up for purposes of determining overturning

$$= [H_{lower} \times (H_{lower/2})] + [H_{main} \times ((H_{main} / 2) + H_{lower})] + [H_{upper} \times ((H_{upper/2}) + H_{main} + H_{lower})]$$

$$H_{lower} + H_{main} + H_{upper}$$

- * Install STHD14 into new concrete of MST48 into existing.
- ** Install MST48 Strap. Bolt to face of existing foundation wall and nail to shear wall (see Detail)

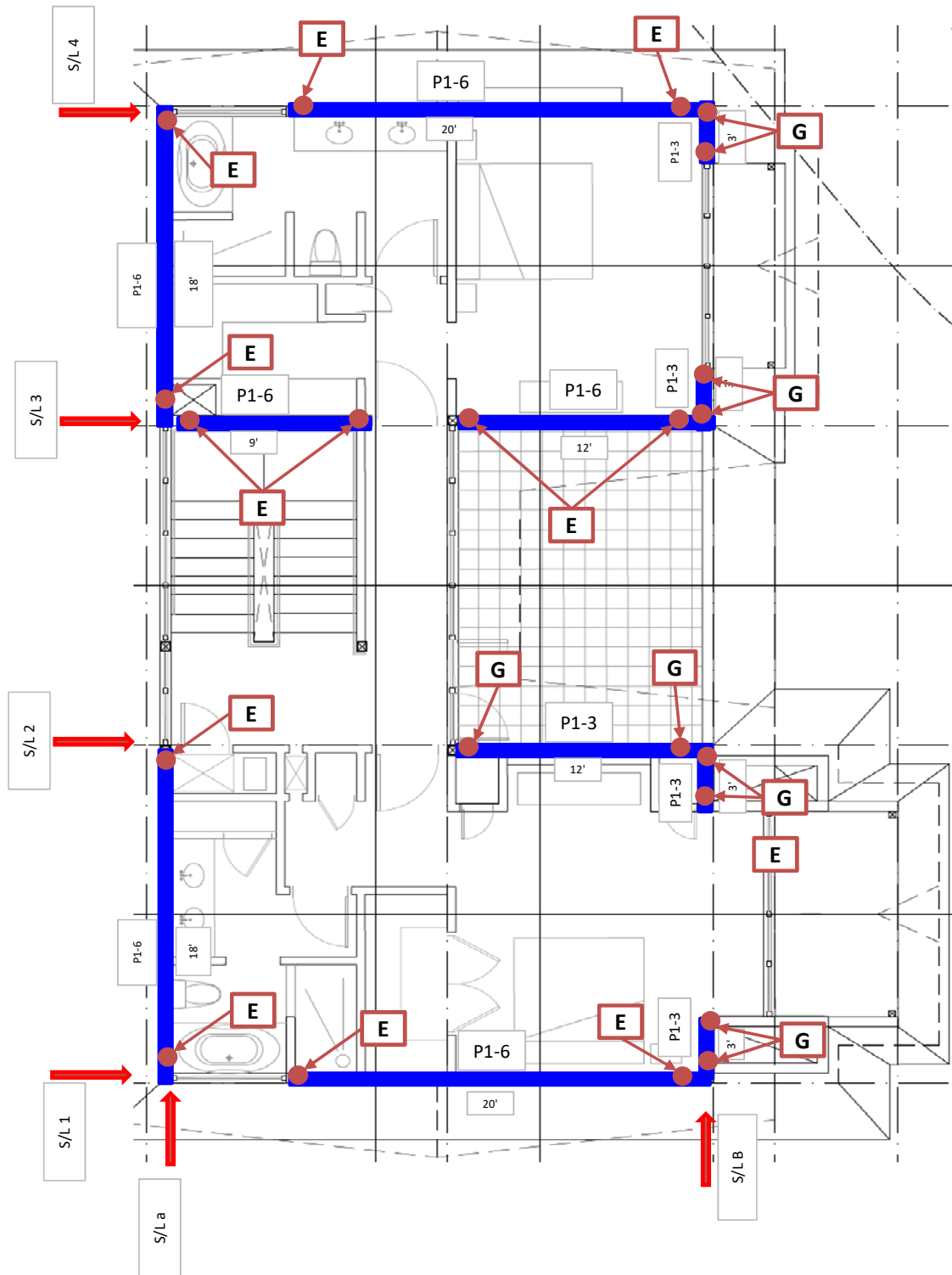
Lateral Engineering Sketches



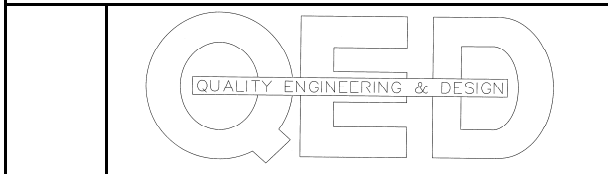
Roof Level Shear Plan

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Lateral Engineering Sketches



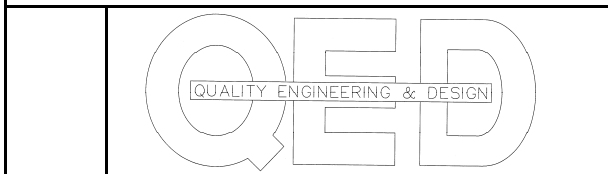
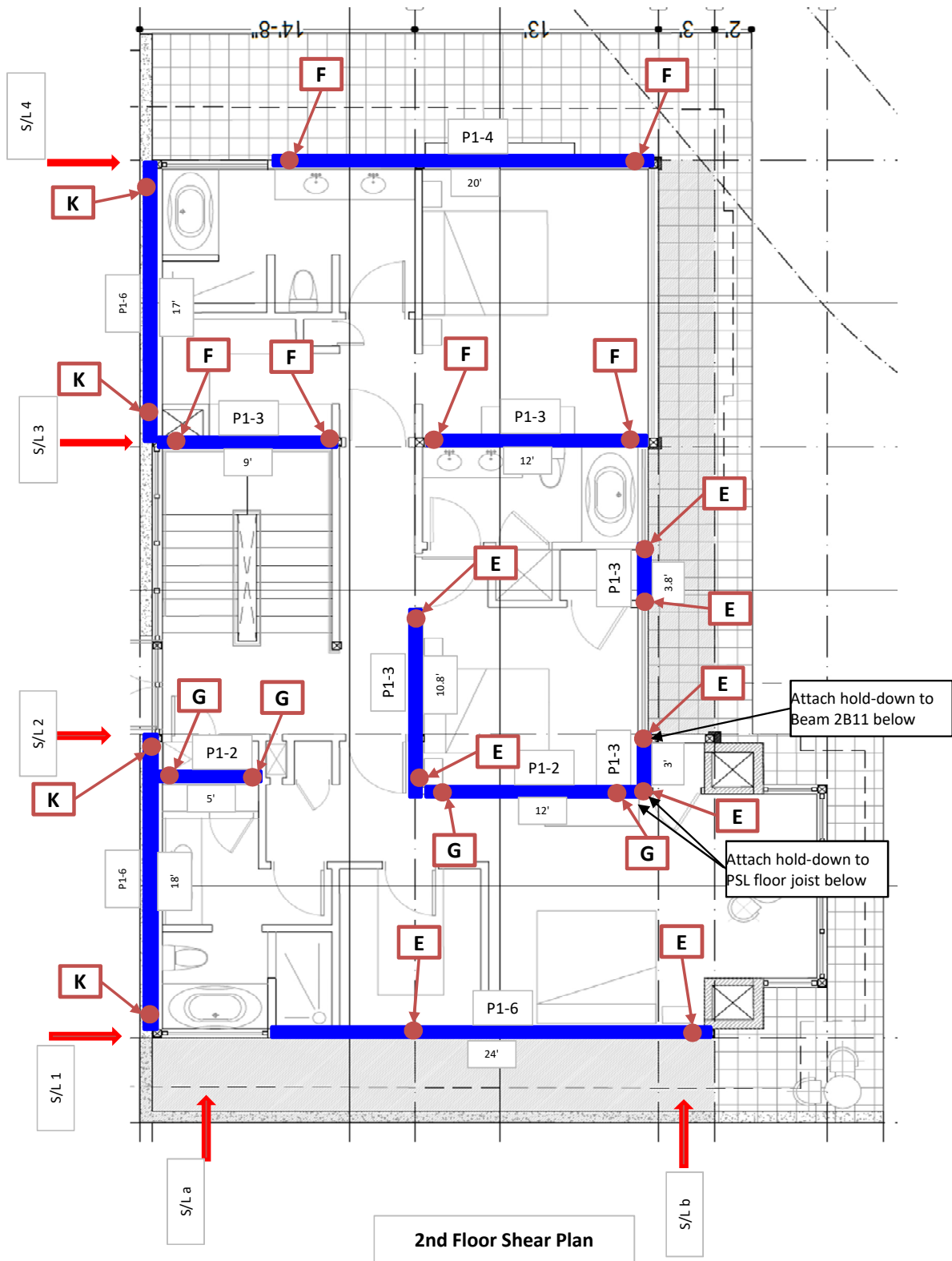
3rd Floor Shear Plan



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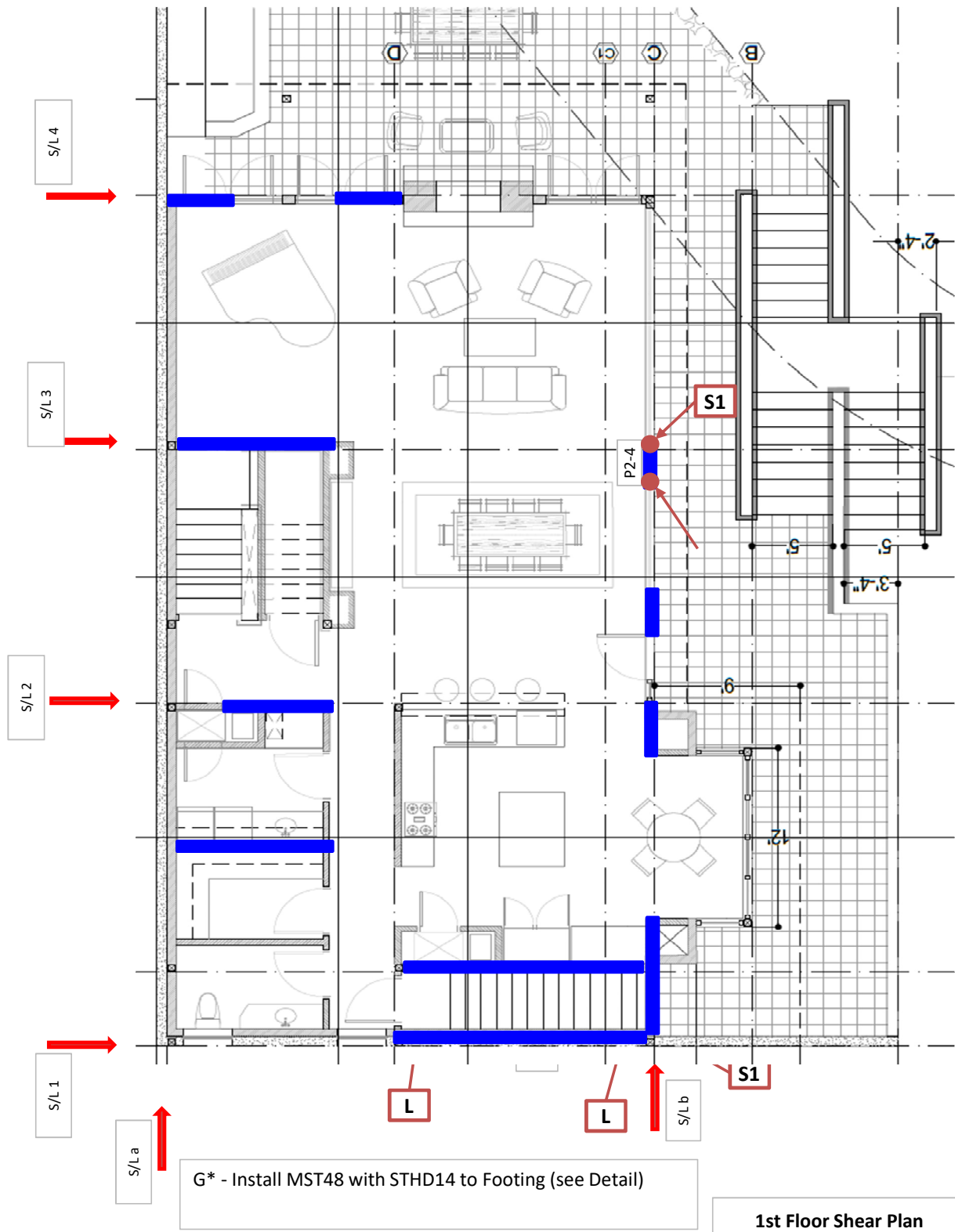
Lateral Engineering Sketches



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Lateral Engineering Sketches



1st Floor Shear Plan

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Lateral Engineering Sketches

SHEAR WALL SCHEDULE						
DESIGNATION	NAIL SIZE	NAIL SPACING		BLOCKING Y / N	BOTTOM PLATE ANCHORAGE	DESIGN LOAD (PLF)
		EDGE	FIELD			
P1-6	8d	6"	12"	YES	(2) 16d AT 6" O.C. OR 5/8" BOLTS AT 32" O.C.	242
P1-4	8d	4"	12"	YES	(2) 16d AT 6" O.C. OR 5/8" BOLTS AT 24" O.C.	353
P1-3	8d	3"	12"	YES	(3) 16d AT 5" O.C. OR 5/8" BOLTS AT 24" O.C.	456
P1-2	8d	2"	12"	YES	(3) 16d AT 5" O.C. OR 3/4" BOLTS AT 24" O.C.	595
P2-6	8d	6"	12"	YES	(2) 16d AT 5" O.C. OR 5/8" BOLTS AT 24" O.C.	484
P2-4	8d	4"	12"	YES	(3) 16d AT 5" O.C. OR 3/4" BOLTS AT 24" O.C.	707
P2-3	8d	3"	12"	YES	(4) 16d AT 5" O.C. OR 3/4" BOLTS AT 20" O.C.	911
P2-2	8d	2"	12"	YES	(4) 16d AT 4" O.C. OR 3/4" BOLTS AT 16" O.C.	1190

SHEAR WALL SCHEDULE NOTES

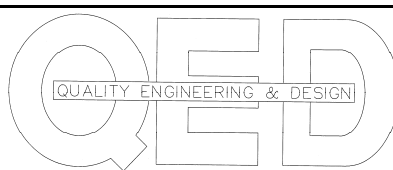
- P1 SHEAR WALL TO HAVE 7/16" A.P.A. RATED PLYWOOD OR ORIENTED STRAND BOARD (O.S.B.) ON ONE SIDE
P2 SHEAR WALL TO HAVE 7/16" A.P.A. RATED PLYWOOD OR ORIENTED STRAND BOARD (O.S.B.) ON BOTH SIDES
- FOR P1-3 THROUGH P2-4 WALLS, 3X STUDS ARE REQUIRED AT ALL PANEL EDGES
- NAILS ARE COMMON IN THE SIZE INDICATED
- FOR DOUBLE SIDED SHEAR WALLS (P2-X), SEAMS SHALL BE STAGGERED ON EACH SIDE (NO TWO SEAMS ON SAME STUD).
- PANEL EDGES TO BE BLOCKED WITH FULL WIDTH 2X NOMINAL FRAMING FOR P1-6 AND P1-4 WALLS. PANEL EDGES FOR P1-3 THROUGH P2-4 WALLS SHALL BE BLOCKED WITH 3X NOMINAL FRAMING. PANELS MAY BE INSTALLED EITHER VERTICALLY OR HORIZONTALLY.
- ANCHOR BOLTS SHALL BE EMBEDDED IN CONCRETE A MINIMUM OF 7", AND SHALL BE INSTALLED WITH 3" SQUARE X 0.229" WASHERS.

KEY TO LATERAL ENGINEERING SKETCHES

  Designates Hold-Down Location
See schedule on following page for hold-down type

 Shear Wall

 Shear Wall Designation. See Schedule for details

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Lateral Engineering Sketches

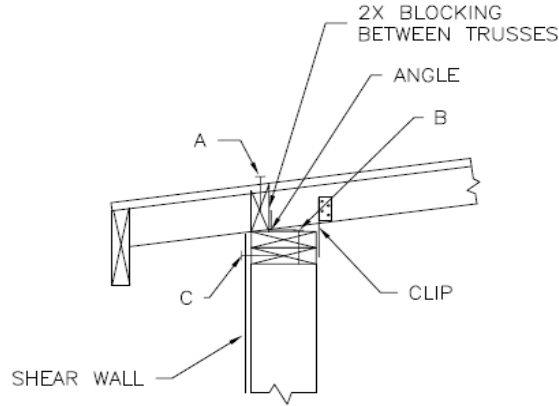
HOLDDOWN SCHEDULE

DESIGNATION	DESCRIPTION	ALLOWABLE DESIGN LOAD (lb)		
A	CMST12	9,215 (End length = 44" w/ (49) 10d each end)		
B	CMST14	6,490 (End Length = 34" w/ (38) 10d each end)		
C	CS16	1,700 (End Length = 12" w/ (11) 10d each end)		
D	CS14	2,490 (End Length = 16" w/ (15) 10d each end)		WOOD TO WOOD CONNECTION
E	MST37	3,815		
F	MST48	4,460		
G	MST60	5,800		
		<u>6" Wall</u>	<u>8" Wall</u>	
H	LSTHD8	1,695	1,695	
J	STHD8	2,345	3,195	
K	STHD10	3,185	3,725	CONCRETE STRAP (Based on 2000 psi Concrete)
L	STHD14	4,805	5,785	
M	HDU2-SDS2.5	3,075		BOLTED TO CONCRETE NAILED TO STUDS
O	HDU4-SDS2.5	4,565 (5/8" bolt)		
P	HDU5-SDS2.5	5,645 (5/8" bolt)		
Q	HDU8-SDS2.5	6970 (w/ 3 1/2" thick end studs**)		BOLTED TO CONCRETE SCREWED TO STUDS
R1	HDU11-SDS2.5	9535 (w/ 5 1/2" thick end studs**)		
R2	HDU11-SDS2.5	11175 (w/ 7 1/4" thick end studs**)		
S1	HDU14-SDS2.5	14390 (w/ 7 1/4" thick end studs**)		
S2	HDU14-SDS2.5	14925 (w/ 5 1/2 x 5 1/2 thick end studs)		

** Dimension shown is in direction parallel to SDS screws. Dimension perpendicular to screws (wall thickness) is 3 1/2" minimum except for Type S2 which requires a 6x6 post

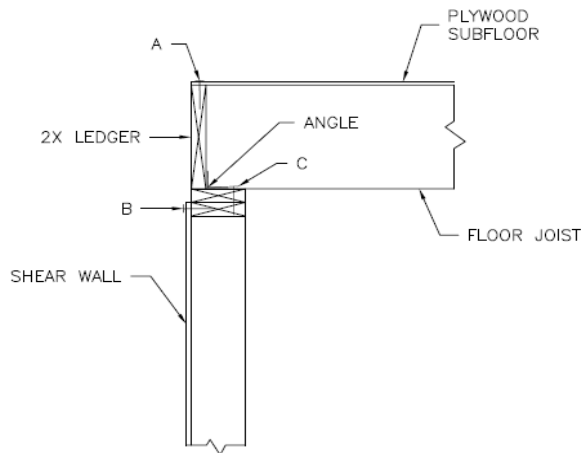
HOLD-DOWNS LISTED ABOVE ARE SIMPSON STRONG-TIE

Lateral Engineering Sketches



ROOF DIAPHRAGM TO EXTERIOR SHEAR WALL

SHEAR WALL	ANGLE		NAIL						CLIP
			A		B		C		
TYPE	TYPE	SPACING	SIZE	SPACING	SIZE	SPACING	SIZE	SPACING	TYPE
P1-6	A34	18"	10d	6"	10d	6"	10d	6"	H1
P1-4	A34	12"	10d	4"	10d	4"	10d	4"	H1
P1-3	A23	12"	10d	3"	10d	3"	10d	3"	H1
P1-2	A23	9"	10d	2"	10d	2"	10d	2"	H1



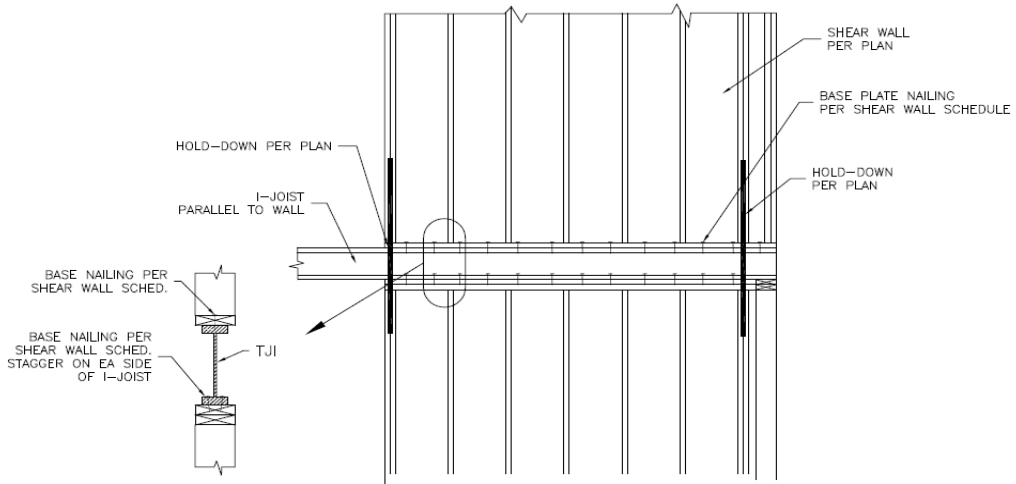
FLOOR DIAPHRAGM TO SHEAR WALL BELOW

FLOOR JOISTS PERPENDICULAR

SHEAR WALL	ANGLE		NAIL					
			A		B		C	
TYPE	TYPE	SPACING	SIZE	SPACING	SIZE	SPACING	SIZE	SPACING
P1-6	A23	24"	10d	6"	10d	6"	10d	6"
P1-4	A23	18"	10d	4"	10d	4"	10d	4"
P1-3	A23	12"	10d	3"	10d	3"	10d	3"
P1-2	A23	9"	10d	2"	10d	2"	10d	2"

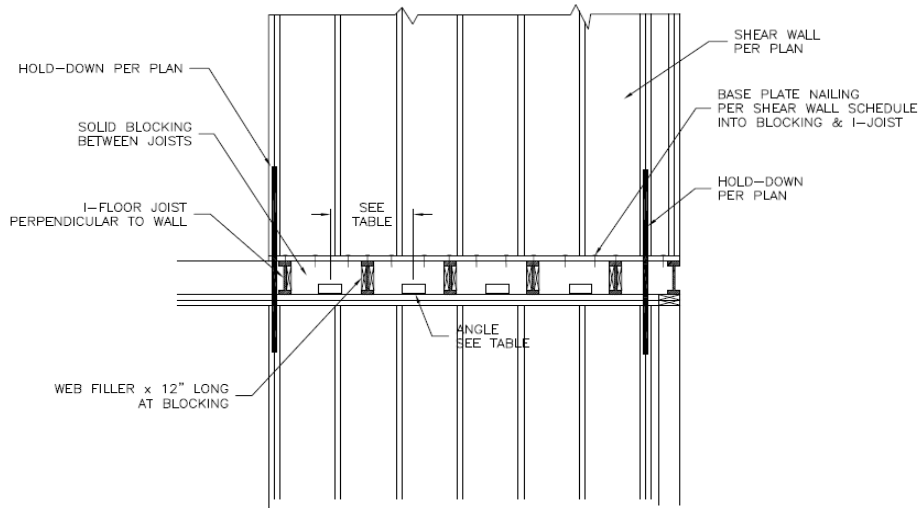
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Lateral Engineering Sketches



SHEAR WALL CONNECTION
JOISTS PARALLEL TO SHEAR WALL

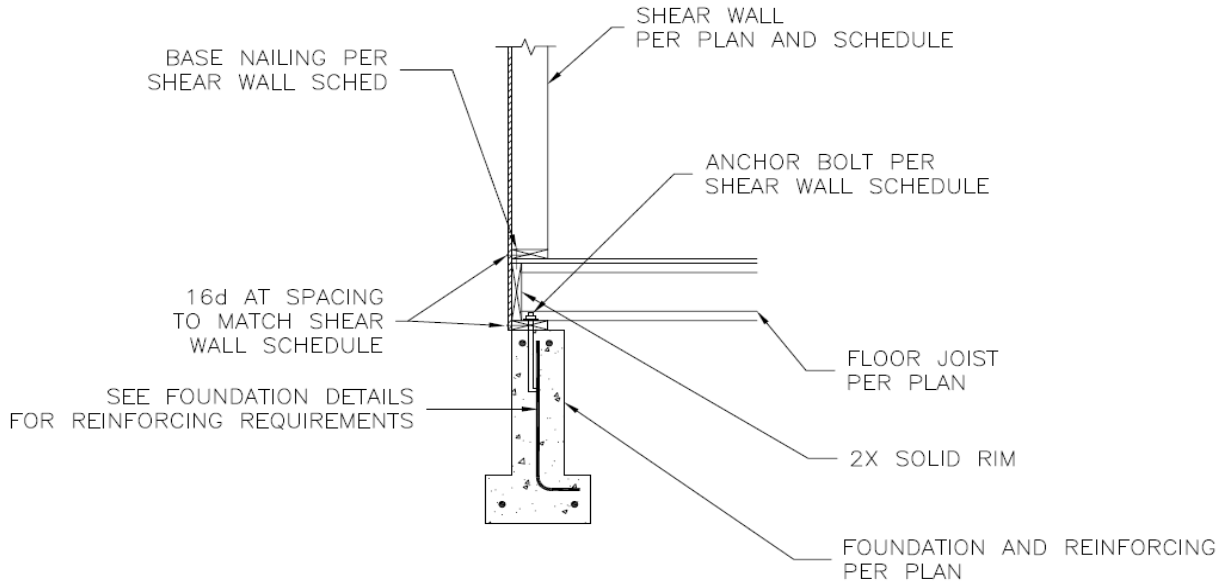
SHEAR WALL TYPE	ANGLE	
	TYPE	SPACING
P1-6	A23	24"
P1-4	A23	18"
P1-3	A23	12"
P1-2	A23	9"



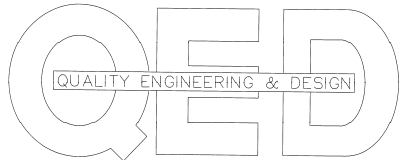
SHEAR WALL CONNECTION
JOISTS PERPENDICULAR TO SHEAR WALL

SHEAR WALL TYPE	ANGLE	
	TYPE	SPACING
P1-6	A23	24"
P1-4	A23	18"
P1-3	A23	12"
P1-2	A23	9"

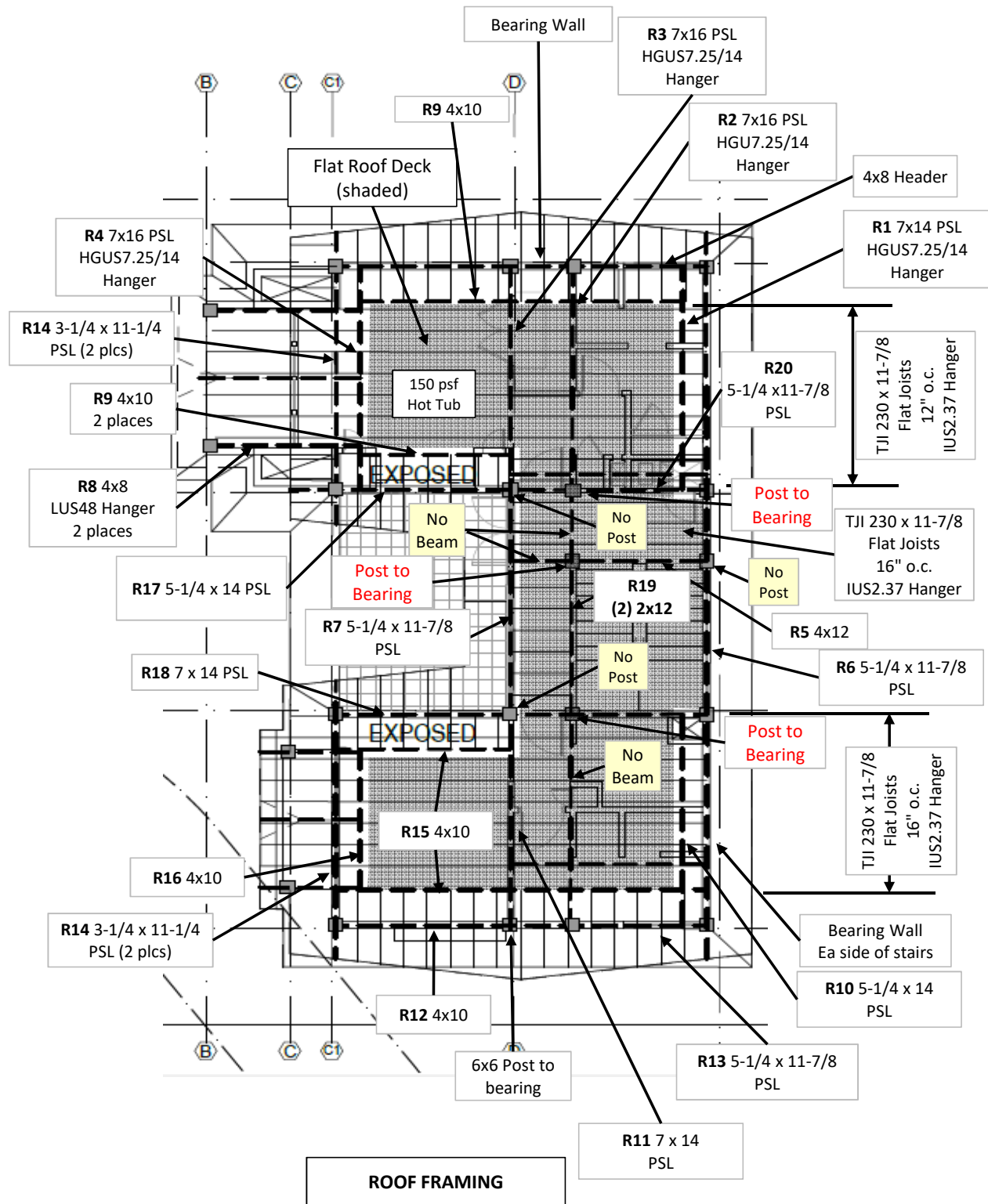
Lateral Engineering Sketches



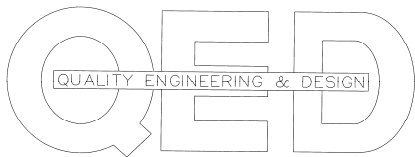
SHEAR WALL ANCHORAGE

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Roof Framing



ROOF FRAMING



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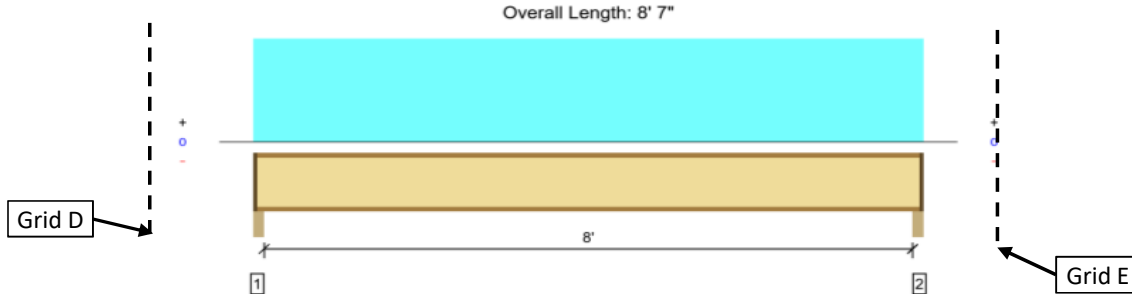
Roof Framing

Flat Roof Deck Joists at Hot Tub



MEMBER REPORT ROOF, Flat Joist at hot tub
1 piece(s) 11 7/8" TJI® 230 @ 12" OC

PASSED



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)	691 @ 2 1/2"	1183 (2.25")	Passed (58%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	660 @ 3 1/2"	1655	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1376 @ 4' 3 1/2"	4215	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Def. (in)	0.059 @ 4' 3 1/2"	0.204	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Def. (in)	0.065 @ 4' 3 1/2"	0.408	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	68	40	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 7' 4" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 5" o/c unless detailed otherwise.
- 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: None

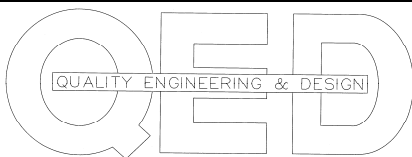
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - LVL	3.50"	2.25"	1.75"	64	644	708	1 1/4" Rim Board
2 - Beam - LVL	3.50"	2.25"	1.75"	64	644	708	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 8' 7"	12"	15.0	150.0	Roof with Hot Tub

Member Notes

Flat roof joists at hot tub area. Design for 12.5' span with intermediate beam



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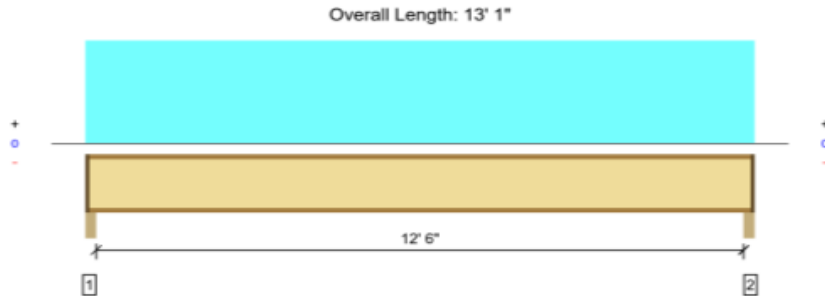
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Roof Framing

Flat Roof Deck west of hot tub.
60 psf deck loading + 35 psf provision for pavers

FORTE MEMBER REPORT ROOF, Flat Joist west of hot tub
1 piece(s) 11 7/8" TJI@ 230 @ 12" OC

PASSED



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)	1191 @ 2 1/2"	1183 (2.25")	Passed (101%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1156 @ 3 1/2"	1655	Passed (70%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3710 @ 6' 6 1/2"	4215	Passed (88%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.267 @ 6' 6 1/2"	0.317	Passed (L/568)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.330 @ 6' 6 1/2"	0.633	Passed (L/461)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	58	40	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 11" o/c unless detailed otherwise.
- 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: None

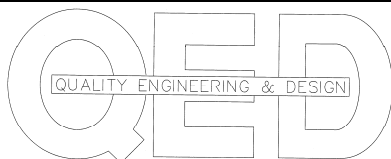
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - LVL	3.50"	2.25"	2.28"	229	981	1210	1 1/4" Rim Board
2 - Beam - LVL	3.50"	2.25"	2.28"	229	981	1210	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 13' 1"	12"	35.0	150.0	Roof deck with provisions for pavers

Member Notes

Flat roof joists northwest deck. Span 12.5' w/ 150 psf loading for hot tub



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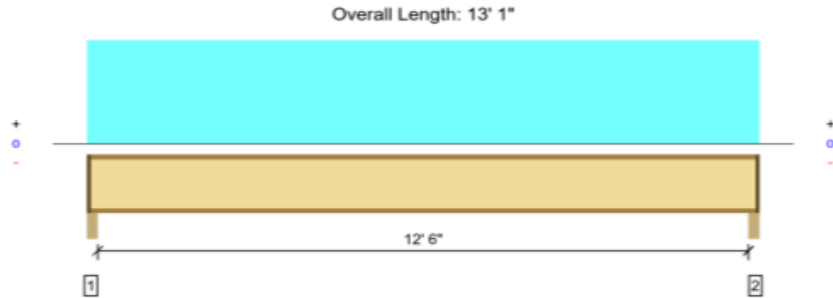
Roof Framing

Flat Roof Deck south end of roof.
60 psf deck loading + 35 psf provision for pavers



MEMBER REPORT ROOF, Flat Joist South end
1 piece(s) 11 7/8" TJI® 230 @ 16" OC

PASSED



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)	815 @ 2 1/2"	1183 (2.25")	Passed (69%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	792 @ 3 1/2"	1655	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2540 @ 6' 6 1/2"	4215	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.139 @ 6' 6 1/2"	0.317	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.220 @ 6' 6 1/2"	0.633	Passed (L/691)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	54	40	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 5' 4" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 11" o/c unless detailed otherwise.
- 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: None

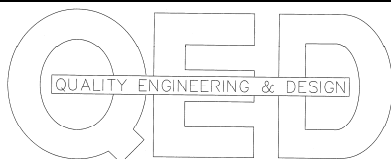
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - LVL	3.50'	2.25'	1.75'	305	523	828	1 1/4" Rim Board
2 - Beam - LVL	3.50'	2.25'	1.75'	305	523	828	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 13' 1"	16"	35.0	60.0	Roof deck with provisions for pavers

Member Notes

Flat roof joists on south end. Span 12.5' w/ 60 psf loading



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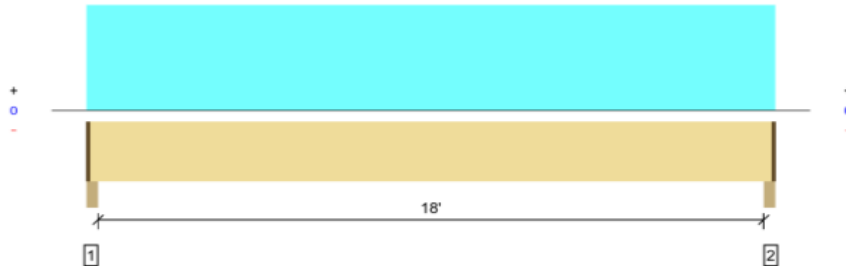
Roof Framing

Roof Beam R1
North east corner at hot tub

FORTE MEMBER REPORT ROOF, Beam R1
1 piece(s) 7" x 14" 2.0E Parallam® PSL

PASSED

Overall Length: 18' 7"



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)	7287 @ 2"	9844 (2.25")	Passed (74%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	6213 @ 1' 5 1/2"	18947	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	33022 @ 9' 3 1/2"	54324	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.539 @ 9' 3 1/2"	0.608	Passed (L/407)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.657 @ 9' 3 1/2"	0.913	Passed (L/333)	--	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/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 5" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

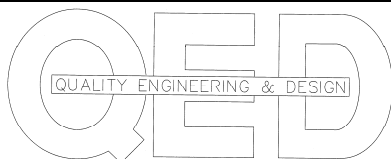
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Beam - PSL	3.50'	2.25"	1.67"	1327	6040	697	8064	1 1/4" Rim Board
2 - Beam - PSL	3.50'	2.25"	1.67"	1327	6040	697	8064	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 18' 5 3/4"	N/A	30.7			
1 - Uniform (PLF)	0 to 18' 7" (Front)	N/A	75.0	650.0	-	Deck load at hot tub
2 - Uniform (PSF)	0 to 18' 7" (Front)	2' 6"	15.0	-	30.0	Rafters on east side

Member Notes

Roof beam northeast corner at hot tub



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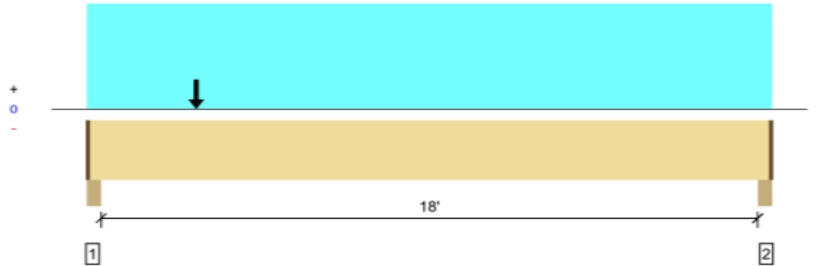
Roof Framing

Roof Beam R2
North end at hot tub

FORTE MEMBER REPORT ROOF, Beam R2
1 piece(s) 7" x 16" 2.0E Parallam® PSL

PASSED

Overall Length: 18' 9"



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)	11639 @ 3"	14219 (3.25")	Passed (82%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	9654 @ 1' 8 1/2"	21653	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	51792 @ 9' 4 3/16"	69909	Passed (74%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.551 @ 9' 4 1/2"	0.608	Passed (L/397)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.704 @ 9' 4 3/8"	0.913	Passed (L/311)	--	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/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 18' 7" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

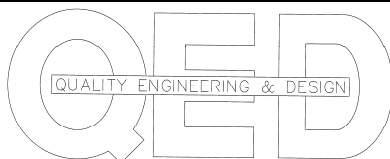
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Beam - PSL	4.50"	3.25"	2.66"	2624	9141	331	12096	1 1/4" Rim Board
2 - Beam - PSL	4.50"	3.25"	2.63"	2487	9141	59	11687	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0- Self Weight (PLF)	1 1/4" to 18' 7 3/4"	N/A	35.1			
1- Uniform (PSF)	0 to 18' 9" (Front)	6' 6"	35.0	150.0	-	Joists at hot tub
2- Point (lb)	3' (Front)	N/A	195	-	390	Point load from lookout rafters

Member Notes

Roof beam at hot tub



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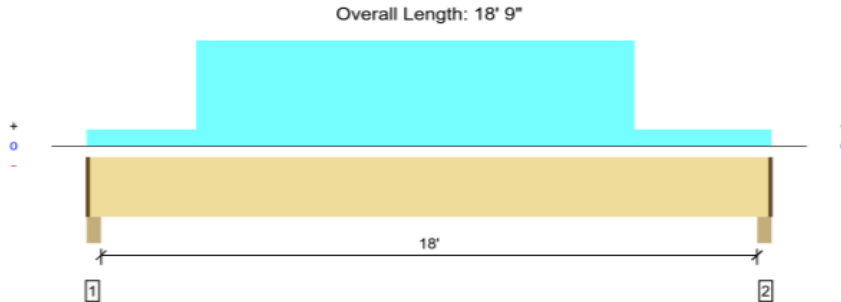
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Roof Framing

Roof Beam R3
North end deck, center

FORTE MEMBER REPORT ROOF, Beam R3
1 piece(s) 7" x 16" 2.0E Parallam® PSL

PASSED



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)	9529 @ 3"	14219 (3.25")	Passed (67%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	9130 @ 1' 8 1/2"	21653	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	52778 @ 9' 3 1/4"	69909	Passed (75%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.533 @ 9' 4 1/16"	0.608	Passed (L/411)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.704 @ 9' 4 1/16"	0.913	Passed (L/311)	--	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/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 18' 7" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

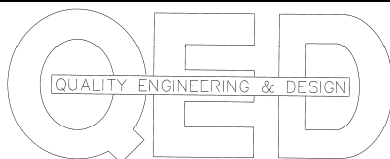
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - PSL	4.50"	3.25"	2.18"	2430	7122	9552	1 1/4" Rim Board
2 - Beam - PSL	4.50"	3.25"	2.05"	2322	6659	8981	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 18' 7 3/4"	N/A	35.1		
1 - Uniform (PSF)	0 to 18' 9" (Front)	2' 3"	35.0	60.0	Joists at deck area
2 - Uniform (PSF)	3' to 15' (Front)	6' 3"	35.0	150.0	Joists at hot tub

Member Notes

Roof beam at North deck, center



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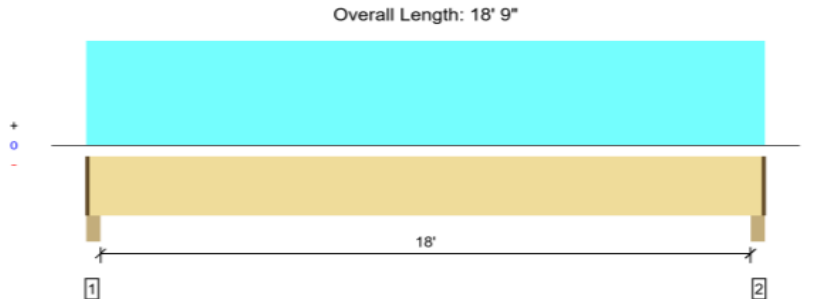
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Roof Framing

Roof Beam R4
North end deck, West side

FORTE MEMBER REPORT *ROOF, Beam R4*
1 piece(s) 7" x 16" 2.0E Parallam® PSL

PASSED



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)	12870 @ 3"	14219 (3.25")	Passed (91%)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	10456 @ 1' 8 1/2"	21653	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	56780 @ 9' 4 1/2"	69909	Passed (81%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.544 @ 9' 4 1/2"	0.608	Passed (L/403)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.785 @ 9' 4 1/2"	0.913	Passed (L/279)	--	1.0 D + 0.75 L + 0.75 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 7" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

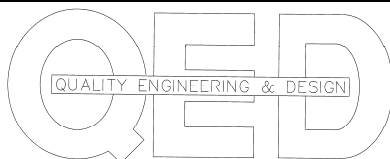
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Beam - PSL	4.50"	3.25"	2.94"	3993	8789	3234	16016	1 1/4" Rim Board
2 - Beam - PSL	4.50"	3.25"	2.94"	3993	8789	3234	16016	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 18' 7 3/4"	N/A	35.1			
1 - Uniform (PSF)	0 to 18' 9" (Front)	6' 3"	35.0	150.0	-	Joists at deck
2 - Uniform (PSF)	0 to 18' 9" (Front)	11' 6"	15.0	-	30.0	Roof Joists west side

Member Notes

Roof beam at North deck, west end



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Roof Framing

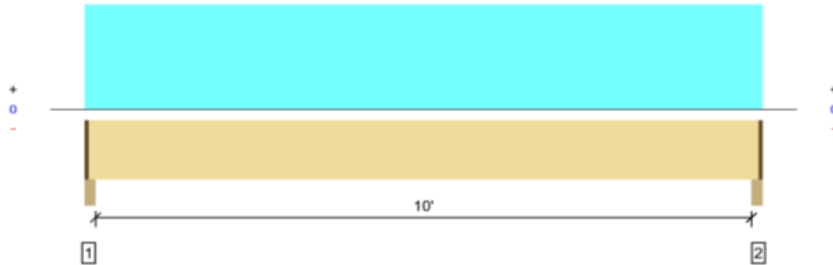
Roof Beam R5
Roof at stair upper landing



MEMBER REPORT ROOF, Beam R5
1 piece(s) 4 x 12 Douglas Fir-Larch No. 2

PASSED

Overall Length: 10' 7"



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)	1906 @ 2"	4922 (2.25")	Passed (39%)	-	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1493 @ 1' 2 3/4"	4725	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (FtHbs)	4826 @ 5' 3 1/2"	6091	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.097 @ 5' 3 1/2"	0.256	Passed (L/999+)	-	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.137 @ 5' 3 1/2"	0.512	Passed (L/895)	-	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 5" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

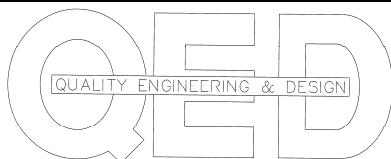
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - PSL	3.50"	2.25"	1.50"	568	1376	1944	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	568	1376	1944	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 10' 5 3/4"	N/A	10.0		
1 - Uniform (PSF)	0 to 10' 7" (Front)	1'	15.0	40.0	Floor load upper landing
2 - Uniform (PSF)	0 to 10' 7" (Front)	5' 6"	15.0	40.0	Stair load

Member Notes

Roof beam at top of stairs



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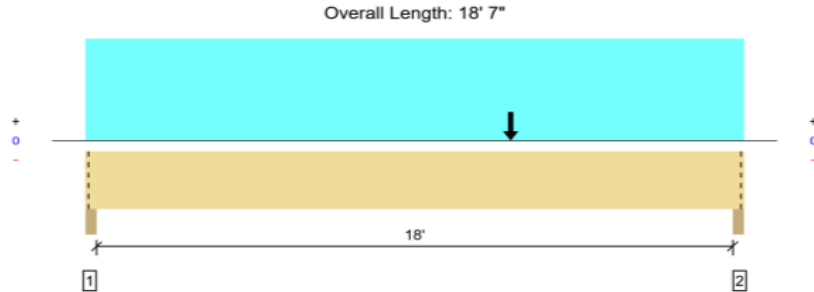
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Roof Framing

Roof Beam R6
Roof support east of stairs

FORTE MEMBER REPORT *ROOF, Beam R6*
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	3479 @ 18' 5"	11484 (3.50")	Passed (30%)	-	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	3144 @ 17' 3 5/8"	15066	Passed (21%)	1.25	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Moment (Ft-lbs)	16705 @ 11' 5 3/4"	37317	Passed (45%)	1.25	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Live Load Defl. (in)	0.425 @ 9' 6 1/2"	0.608	Passed (L/515)	-	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.689 @ 9' 6 5/16"	0.913	Passed (L/318)	-	1.0 D + 0.75 L + 0.75 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 7" o/c unless detailed otherwise.

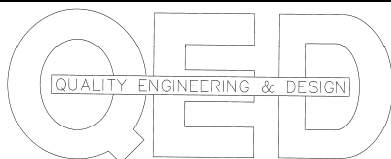
Supports	Beaming Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	3.50"	3.50"	1.50"	1173	516	1951	3640	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	1334	906	1951	4193	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	0 to 18' 7"	N/A	19.5			
1 - Uniform (PSF)	0 to 18' 7" (Front)	7'	12.0	-	30.0	Roof Load over stairs
2 - Point (lb)	12' (Front)	N/A	575	1400	-	Reaction from Beam R5
3 - Uniform (PSF)	0 (Front)	7'	15.0	40.0	-	Floor joists at upper landing

Member Notes

Roof Beam east of stairs



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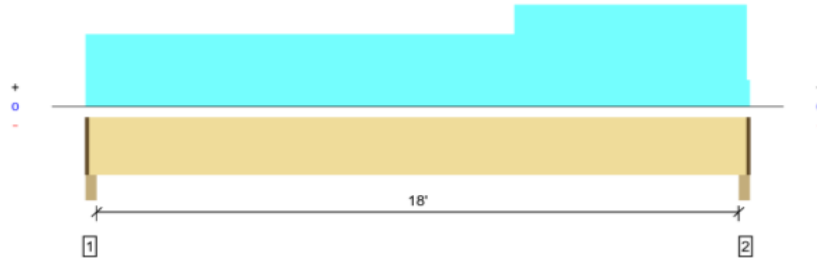
Roof Framing

Roof Beam R7
West side of upper hallway

FORTE MEMBER REPORT ROOF, Beam R7
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL

PASSED

Overall Length: 18' 7"



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)	3632 @ 18' 5"	7383 (2.25")	Passed (49%)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	3020 @ 17' 3 5/8"	12053	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	14022 @ 9' 10 3/8"	29854	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.387 @ 9' 4 3/4"	0.456	Passed (L/566)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.635 @ 9' 4 11/16"	0.913	Passed (L/345)	--	1.0 D + 0.75 L + 0.75 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 5" o/c unless detailed otherwise.

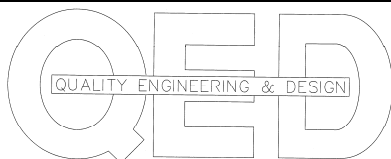
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	1236	1704	836	3776	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	1403	2148	836	4387	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 18' 5 3/4"	N/A	19.5	-	-	
1 - Uniform (PSF)	0 to 18' 7" (Front)	3'	15.0	-	30.0	Roof Eave over lower deck west side
2 - Uniform (PSF)	0 to 12' (Front)	4' 3"	15.0	40.0	-	Hallway joists
3 - Uniform (PSF)	12' to 18' 6" (Front)	7'	15.0	40.0	-	Landing joists

Member Notes

Roof beam at top of stairs west end of hallway next to stairs



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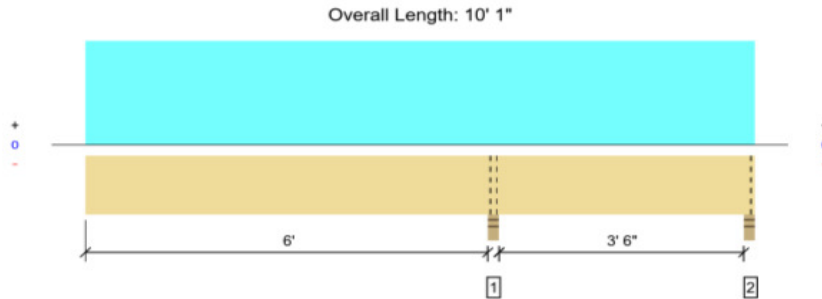
Roof Framing

Roof Beam R8
Gable support at northeast dormer

FORTE MEMBER REPORT ROOF, Beam R8
1 piece(s) 4 x 8 Douglas Fir-Larch No. 2

FAILED

Left cantilever length exceeds 1/3 member length or 1/2 back span length.



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)	671 @ 6' 1 3/4"	4961 (3.50")	Passed (14%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	316 @ 6' 10 3/4"	3806	Passed (8%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	-971 @ 6' 1 3/4"	3737	Passed (26%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.093 @ 0	0.410	Passed (2L/999+)	--	1.0 D + 1.0 Lr (Alt Spans)
Total Load Defl. (in)	0.157 @ 0	0.615	Passed (2L/938)	--	1.0 D + 1.0 Lr (Alt Spans)

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 1" c/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 1" c/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Stud wall - HF	3.50"	3.50"	1.50"	279	391	670	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	-63	-119	-182	Blocking

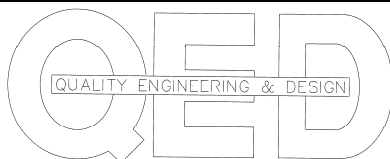
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	0 to 10' 1"	N/A	6.4		
1 - Uniform (PSF)	0 to 10' 1" (Front)	1'	15.0	30.0	Roof

Member Notes

Gable support at northwest dormer roof

Beam failed due to uplift from cantilever
Install LUS48 hanger with upload capability of 1000#



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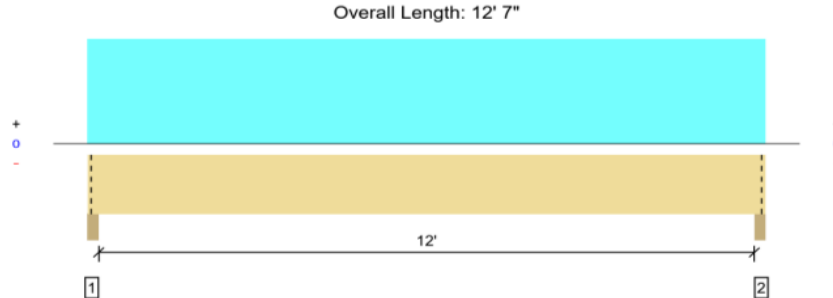
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Roof Framing

Roof Beam R9
Supports rafters at lower deck (2 places)

FORTE MEMBER REPORT ROOF, Beam R9
1 piece(s) 2 x 10 Hem-Fir No. 2

PASSED



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 @ 2"	2126 (3.50")	Passed (28%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	489 @ 1' 3/4"	1734	Passed (28%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	1754 @ 6' 3 1/2"	2083	Passed (84%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.236 @ 6' 3 1/2"	0.408	Passed (L/622)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.368 @ 6' 3 1/2"	0.613	Passed (L/399)	--	1.0 D + 1.0 Lr (All Spans)

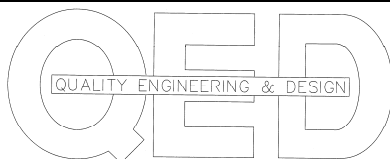
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Ptch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 7" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Beam - HF	3.50"	3.50"	1.50"	211	378	589	Blocking
2 - Beam - HF	3.50"	3.50"	1.50"	211	378	589	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
0 - SelfWeight (PLF)	0 to 12' 7"	N/A	3.5		
1 - Uniform (PSF)	0 to 12' 7" (Front)	2	15.0	30.0	Roof



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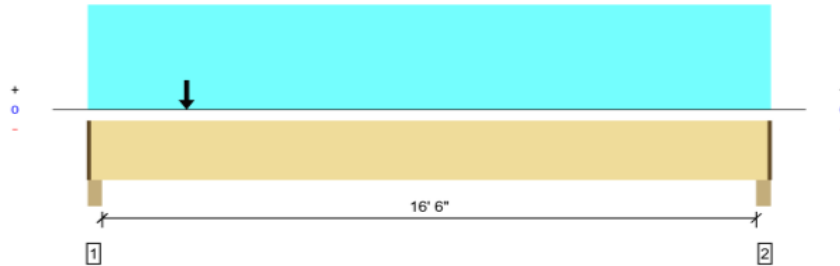
Roof Framing

Roof Beam R10
Supports deck joists at south deck

FORTE MEMBER REPORT ROOF, Beam R10
1 piece(s) 5 1/4" x 14" 2.0E Parallam® PSL

PASSED

Overall Length: 17' 3"



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)	6326 @ 3"	6910 (3.25")	Passed (92%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5293 @ 1' 6 1/2"	14210	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	25451 @ 8' 6 15/16"	40743	Passed (62%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.333 @ 8' 7 1/2"	0.419	Passed (L/604)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.576 @ 8' 7 3/8"	0.837	Passed (L/349)	--	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 1" o/c unless detailed otherwise.

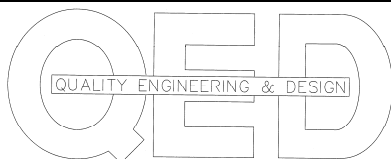
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Beam - HF	4.50"	3.25"	2.97"	2775	3622	933	7330	1 1/4" Rim Board
2 - Beam - HF	4.50"	3.25"	2.89"	2600	3623	582	6805	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 1 3/4"	N/A	23.0			
1 - Uniform (PSF)	0 to 17' 3" (Front)	7'	35.0	60.0	-	Deck area
2 - Uniform (PSF)	0 to 17' 3" (Front)	2'	15.0	-	30.0	Roof rafters
3 - Point (lb)	2' 6" (Front)	N/A	240	-	480	

Member Notes

South roof deck, East side



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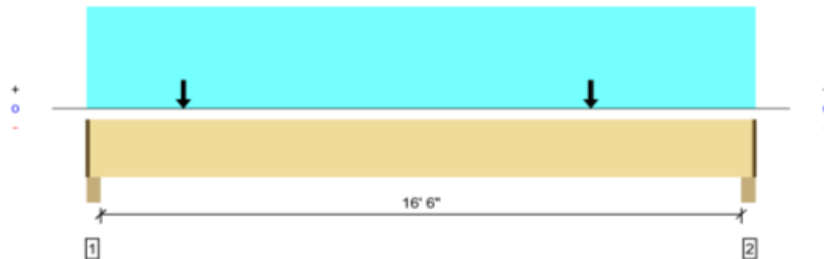
Roof Framing

Roof Beam R11
Supports deck joists at south deck

FORTE MEMBER REPORT ROOF, Beam R11
1 piece(s) 7" x 14" 2.0E Parallam® PSL

PASSED

Overall Length: 17' 3"



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)	10498 @ 3"	14219 (3.25")	Passed (74%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	8815 @ 1' 6 1/2"	18947	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	42497 @ 8' 7 15/16"	54324	Passed (78%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.428 @ 8' 7 1/2"	0.419	Passed (L/470)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.723 @ 8' 7 9/16"	0.837	Passed (L/278)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 17' 1" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

System : Floor
Member Type : Rush Beam
Building Use : Residential
Building Code : IBC2015
Design Methodology : ASD

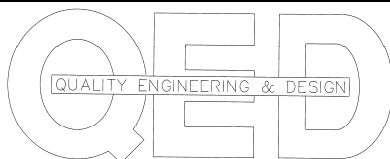
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Beam - PSL	4.50'	3.25'	2.40'	4407	6210	1100	11717	1 1/4" Rim Board
2 - Beam - PSL	4.50'	3.25'	2.37'	4291	6210	985	11486	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 1 3/4"	N/A	30.7			
1 - Uniform (PSF)	0 to 17' 3" (Front)	12'	35.0	60.0	-	Deck area
2 - Point (lb)	2' 6" (Front)	N/A	240	-	480	parapet wall supporting roof rafters
3 - Point (lb)	2' 6" (Front)	N/A	240	-	480	parapet wall supporting roof rafters
4 - Point (lb)	13' (Front)	N/A	450	-	1125	parapet wall supporting roof rafters

Member Notes

South roof deck, middle



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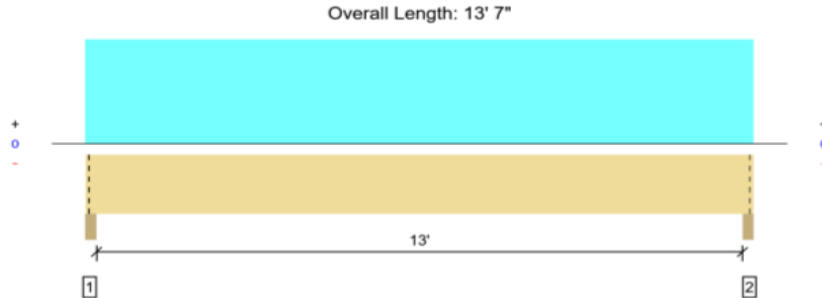
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Roof Framing

Roof Beam R12
Supports rafters at south end of deck

FORTE MEMBER REPORT ROOF, Beam R12
1 piece(s) 4 x 10 Douglas Fir-Larch No. 1

PASSED



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)	1278 @ 2"	7656 (3.50")	Passed (17%)	-	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	1078 @ 1' 3/4"	4856	Passed (22%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	4130 @ 6' 9 1/2"	6239	Passed (66%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.212 @ 6' 9 1/2"	0.442	Passed (L/750)	-	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.333 @ 6' 9 1/2"	0.663	Passed (L/478)	-	1.0 D + 1.0 Lr (All Spans)

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 13' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 13' 7" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

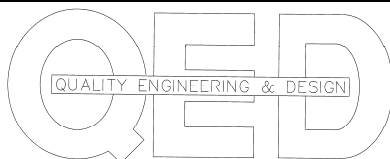
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Column - DF	3.50"	3.50"	1.50"	463	815	1278	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	463	815	1278	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	0 to 13' 7"	N/A	8.2		
1 - Uniform (PSF)	0 to 13' 7" (Front)	4'	15.0	30.0	Roof

Member Notes

Supports lookout rafters on south end



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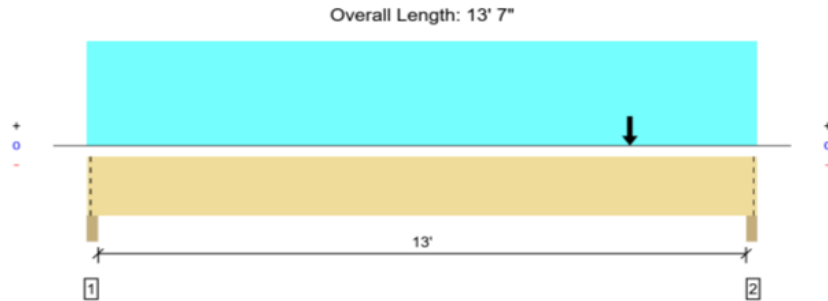
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Roof Framing

Roof Beam R13
Supports rafters at south end of deck + R10

FORTE MEMBER REPORT *ROOF, Beam R13*
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	6213 @ 13' 5"	11484 (3.50")	Passed (54%)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	5668 @ 12' 3 5/8"	12053	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	13680 @ 11'	29854	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.158 @ 7' 5"	0.442	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.290 @ 7' 4 15/16"	0.663	Passed (L/549)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)

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

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

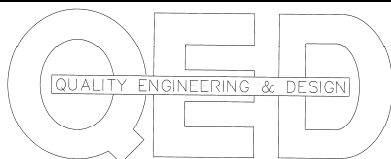
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	3.50"	3.50"	1.50"	1046	661	985	2692	Blocking
2 - Column - DF	3.50"	3.50"	1.89"	2809	2961	1578	7348	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	0 to 13' 7"	N/A	19.5			
1 - Uniform (PSF)	0 to 13' 7" (Front)	4'	15.0	-	30.0	Roof
2 - Point (lb)	11' (Front)	N/A	2775	3622	933	Beam R10 reaction

Member Notes

Supports lookout rafters on south end



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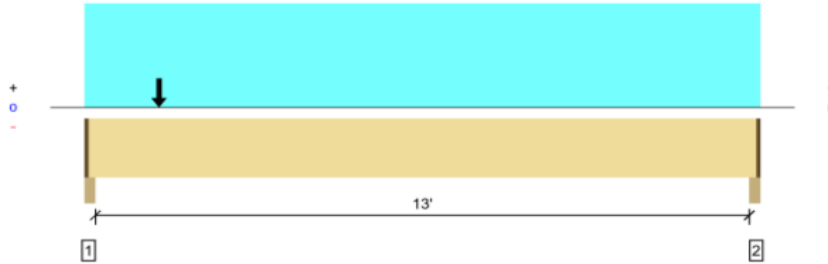
Roof Framing

Roof Beam R15
Supports rafters at south deck

FORTE MEMBER REPORT ROOF, Beam R15
1 piece(s) 4 x 10 Douglas Fir-Larch No. 2

PASSED

Overall Length: 13' 7"



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)	1286 @ 2"	4922 (2.25")	Passed (26%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	1192 @ 1' 3/4"	4856	Passed (25%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	2647 @ 6' 7/8"	5615	Passed (47%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Def. (in)	0.147 @ 6' 6 15/16"	0.442	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Def. (in)	0.232 @ 6' 7 1/4"	0.663	Passed (L/686)	--	1.0 D + 1.0 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 13' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 13' 5" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

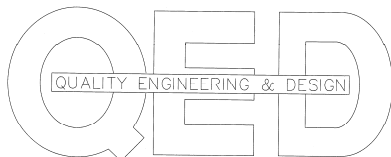
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Beam - DF	3.50"	2.25"	1.50"	438	857	1295	1 1/4" Rim Board
2 - Beam - DF	3.50"	2.25"	1.50"	279	458	737	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow 1.25)	Comments
0 - SelfWeight (PLF)	1 1/4" to 13' 5 3/4"	N/A	8.2		
1 - Uniform (PSF)	0 to 13' 7" (Front)	2'	15.0	30.0	Roof
2 - Point (lb)	1' 6" (Front)	N/A	200	500	Reaction from Beam R16

Member Notes

Supports inner end of layout rafters around deck (north and south decks)



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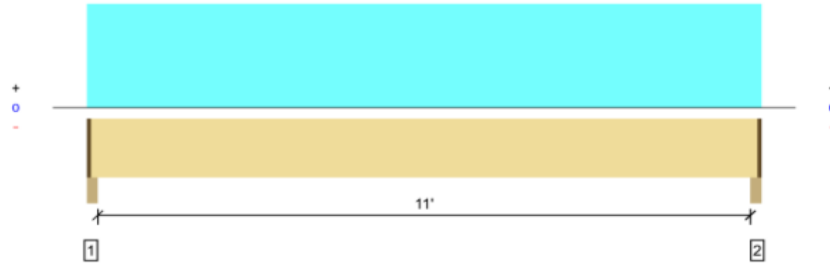
Roof Framing

Roof Beam R16
Supports rafters at south deck

FORTE MEMBER REPORT *ROOF, Beam R16*
1 piece(s) 4 x 10 Douglas Fir-Larch No. 2

PASSED

Overall Length: 11' 7"



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)	559 @ 2"	4922 (2.25")	Passed (11%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	464 @ 1' 3/4"	4856	Passed (10%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	1554 @ 5' 9 1/2"	5615	Passed (28%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.059 @ 5' 9 1/2"	0.375	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.096 @ 5' 9 1/2"	0.563	Passed (L/999+)	--	1.0 D + 1.0 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 11' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 11' 5" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

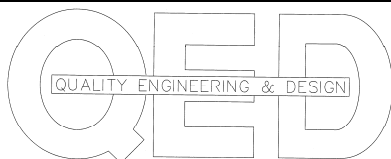
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Beam - DF	3.50"	2.25"	1.50"	220	348	568	1 1/4" Rim Board
2 - Beam - DF	3.50"	2.25"	1.50"	220	348	568	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 11' 5 3/4"	N/A	8.2		
1 - Uniform (PSF)	0 to 11' 7" (Front)	2'	15.0	30.0	Roof

Member Notes

Supports end of rafters at south deck



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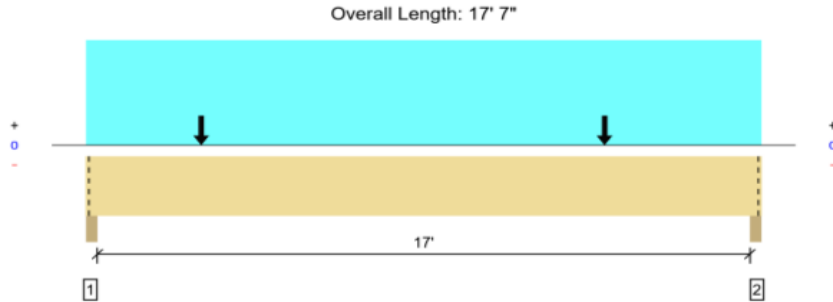
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Roof Framing

Roof Beam R14
Supports rafters at south deck

FORTE MEMBER REPORT ROOF, Beam R14
1 piece(s) 3 1/2" x 11 1/4" 2.0E Parallam® PSL

PASSED



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)	3083 @ 2"	7656 (3.50")	Passed (40%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	2846 @ 1' 2 3/4"	9516	Passed (30%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	11591 @ 9' 2 5/8"	22463	Passed (52%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.522 @ 8' 10 1/16"	0.575	Passed (L/397)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.818 @ 8' 10 1/16"	0.863	Passed (L/253)	--	1.0 D + 1.0 Lr (All Spans)

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 7" o/c unless detailed otherwise.

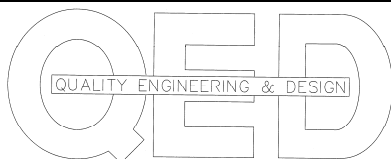
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Column - DF	3.50"	3.50"	1.50"	1114	1969	3083	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	1057	1861	2918	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (nonsnow: 1.25)	Comments
0 - SelfWeight (PLF)	0 to 17' 7"	N/A	12.3		
1 - Uniform (PSF)	0 to 17' 7" (Front)	4'	15.0	30.0	Roof
2 - Point (lb)	3' (Front)	N/A	450	860	R15 Reaction
3 - Point (lb)	13' 6" (Front)	N/A	450	860	R15 Reaction

Member Notes

Supports rafters at southwest corner



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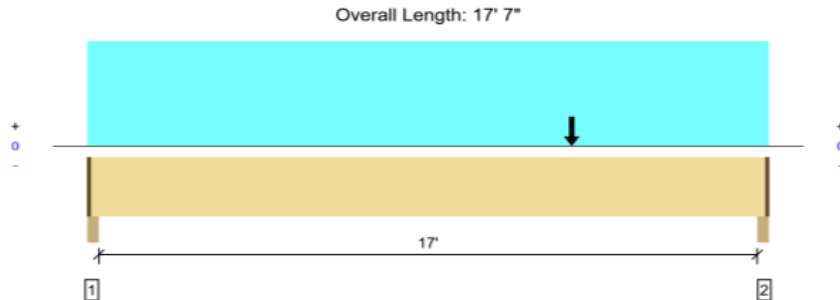
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Roof Framing

Roof Beam R17
Supports rafters at lower deck + Beam R3

FORTE MEMBER REPORT ROOF, Beam R17
1 piece(s) 5 1/4" x 14" 2.0E Parallam® PSL

PASSED



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)	7219 @ 17' 5"	7383 (2.25")	Passed (98%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	7107 @ 16' 1 1/2"	14210	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	34467 @ 12' 6"	40743	Passed (85%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.424 @ 9' 8 1/16"	0.431	Passed (L/488)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.652 @ 9' 6 15/16"	0.863	Passed (L/318)	--	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 5" o/c unless detailed otherwise.

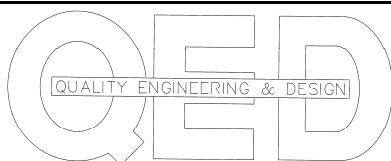
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	1420	1898	1319	4637	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	2.20"	2465	4761	1319	8545	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 5 3/4"	N/A	23.0			
1 - Point (lb)	12' 6" (Top)	N/A	2430	6659	-	Beam R3
2 - Uniform (PSF)	0 to 17' 7" (Top)	5'	12.0	-	30.0	roof load at lower deck

Member Notes

Supports small roof load +R3



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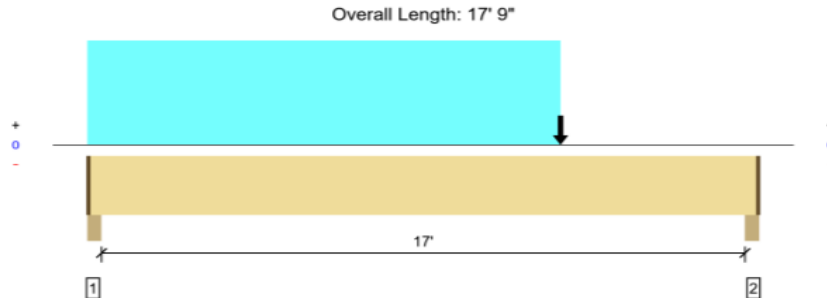
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Roof Framing

Roof Beam R18
Supports rafters at lower deck + Beam R7+R11

FORTE MEMBER REPORT ROOF, Beam R18
1 piece(s) 7" x 14" 2.0E Parallam® PSL

PASSED



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)	10487 @ 17' 6"	14219 (3.25")	Passed (74%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	10443 @ 16' 2 1/2"	18947	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	52029 @ 12' 6"	54324	Passed (96%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.409 @ 9' 7 3/4"	0.431	Passed (L/506)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.729 @ 9' 7 5/8"	0.863	Passed (L/284)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 17' 7" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

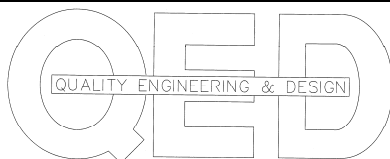
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	4.50"	3.25"	1.50"	2247	2423	1295	5965	1 1/4" Rim Board
2 - Column - DF	4.50"	3.25"	2.40"	4552	5935	1766	12253	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 7 3/4"	N/A	30.7			
1 - Uniform (PSF)	0 to 12' 6" (Front)	3'	12.0	-	30.0	Lower deck roof
2 - Point (lb)	12' 6" (Front)	N/A	4407	6210	1100	R11 end reaction
3 - Point (lb)	12' 6" (Front)	N/A	1403	2148	836	R7 end reaction

Member Notes

South end of lower deck. Supports lower deck roof + R11 reaction + R7 reaction



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Roof Framing

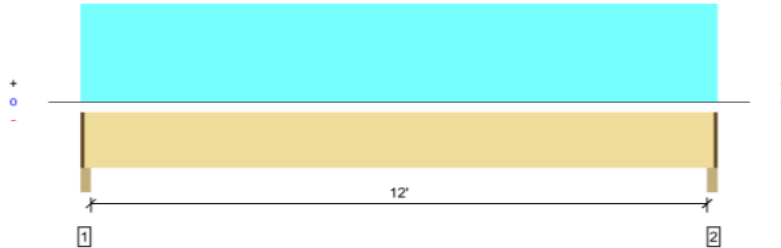
Roof Beam R19
Supports floor joists west of stairs



MEMBER REPORT ROOF, Beam R19
2 piece(s) 2 x 12 Hem-Fir No. 2

PASSED

Overall Length: 12' 7"



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)	777 @ 2"	2734 (2.25")	Passed (28%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	636 @ 1' 2 3/4"	3375	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2355 @ 6' 3 1/2"	4482	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.099 @ 6' 3 1/2"	0.306	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.137 @ 6' 3 1/2"	0.613	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 5" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

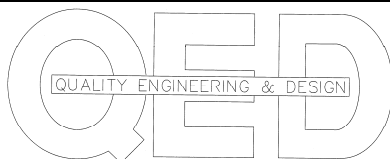
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	223	566	789	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	223	566	789	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 12' 5 3/4"	N/A	8.6		
1 - Uniform (PSF)	0 to 12' 7" (Front)	2' 3"	12.0	40.0	Residential - Living Areas

Member Notes

Floor Beam west of stairs



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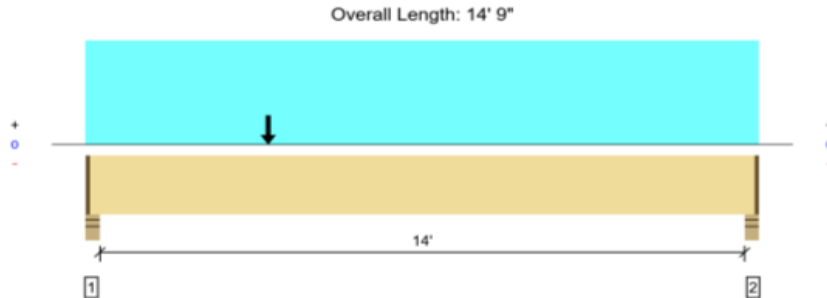
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Roof Framing

Roof Beam R20

FORTE MEMBER REPORT ROOF, Beam R20
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	6062 @ 3"	7252 (3.25")	Passed (84%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5952 @ 1' 4 3/8"	12053	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	22071 @ 4'	29854	Passed (74%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.370 @ 6' 8 3/16"	0.428	Passed (L/462)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.467 @ 6' 8 1/2"	0.712	Passed (L/366)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/400) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 14' 7" o/c unless detailed otherwise.

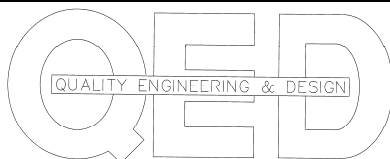
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Stud wall - SPF	4.50"	3.25"	2.72"	1235	4834	514	6583	1 1/4" Rim Board
2 - Stud wall - SPF	4.50"	3.25"	1.50"	606	1973	183	2762	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 14' 7 3/4"	N/A	19.5			
1 - Uniform (PSF)	0 to 14' 9" (Front)	1' 3 5/8"	12.0	40.0	-	Residential - Living Area
2 - Point (lb)	4' (Front)	N/A	1327	6040	697	R1 Reaction

Member Notes

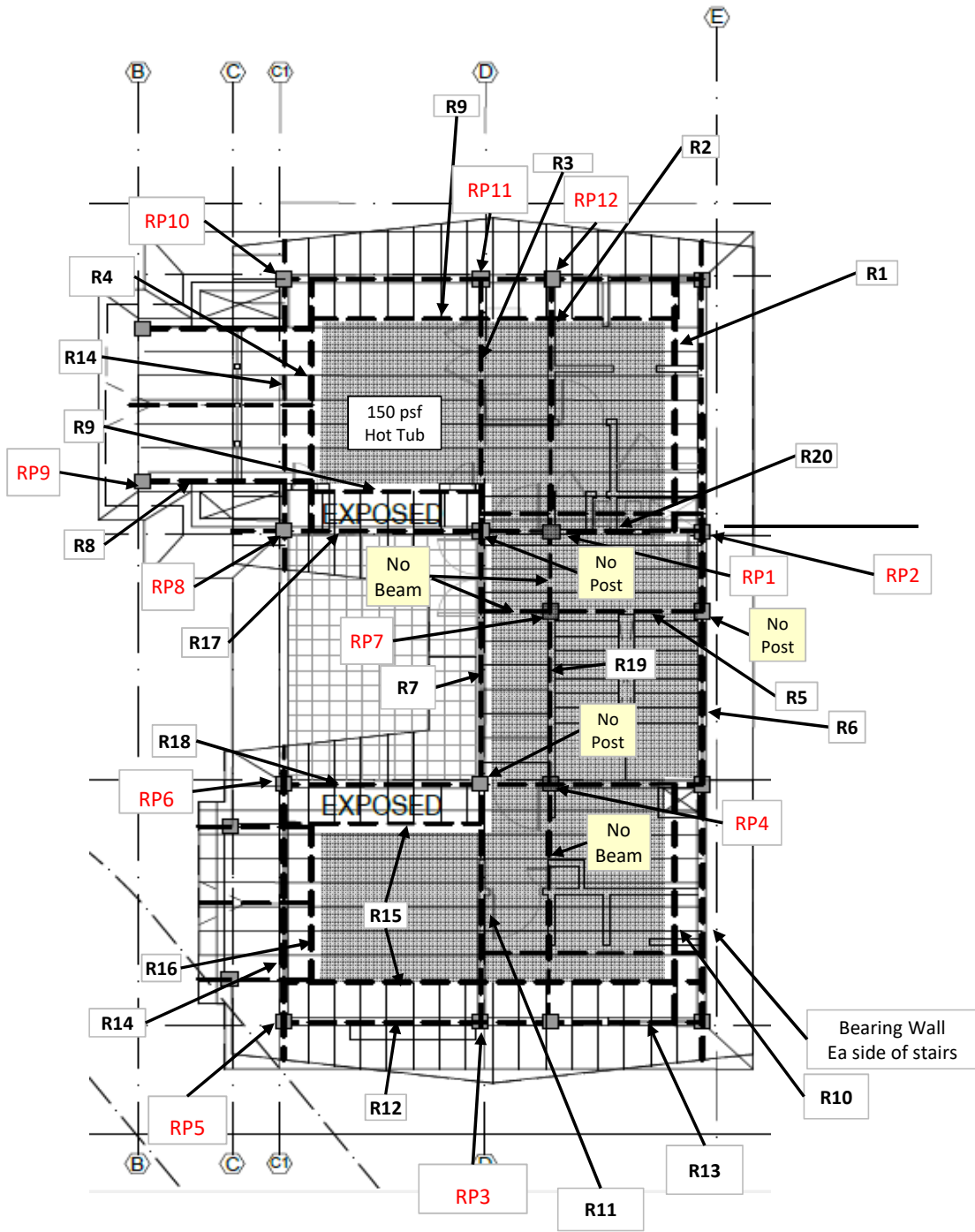
Supports R1



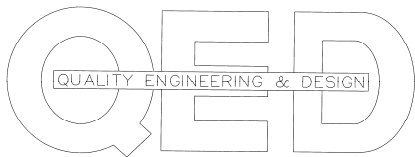
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Roof Framing-Posts



ROOF FRAMING POSTS



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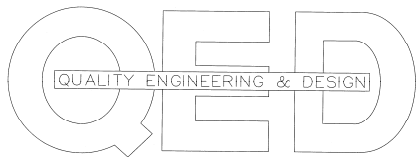
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Roof Framing-Posts

BEAM ID	POST ID	POST SIZE	HANGER TYPE	NOTES
R1			HGUS7.25/14	
R2			HGU7.25/14	
	RP1	5-1/4 x 5-1/4 PSL		23000 lb Total
R3			HGUS7.25/14	
R4			HGUS7.25/14	
R5			HUS412	
R6				Lands on Post
	RP2	5-1/4 x 5-1/4 PSL		10,800 Lb Total
R7			HHUS5.5/10	
R8		4x4 D-Fir	LUS48	
R9			LUS210	
R10			HGUS5.50/14	
R11			HHGU7.25-SDS	
R12			LUS410	
R13			HGUS5.50/12	
	RP3	5-1/4 x 5-1/4 PSL		
R14				
R15			U410	
R16			U410	
R17			Custom	8600 lb. needs to hang on 5" post
R18			Custom	12500 lb
R19			U210-2	
R20			HGUS5.50/12	
	RP4	6x6 D-Fir		13,100 lb.
	RP5	3-1/2 x 3-1/2 PSL		
	RP6	3-1/2 x 7 PSL		
	RP7	4x4 D-Fir		
	RP8	3-1/2 x 5-1/4 PSL		
	RP9	4x4 D-Fir		
	RP10	4x4 D-Fir		
	RP11	5-1/4 x 5-1/4 PSL		
	RP12	5-1/4 x 5-1/4 PSL		



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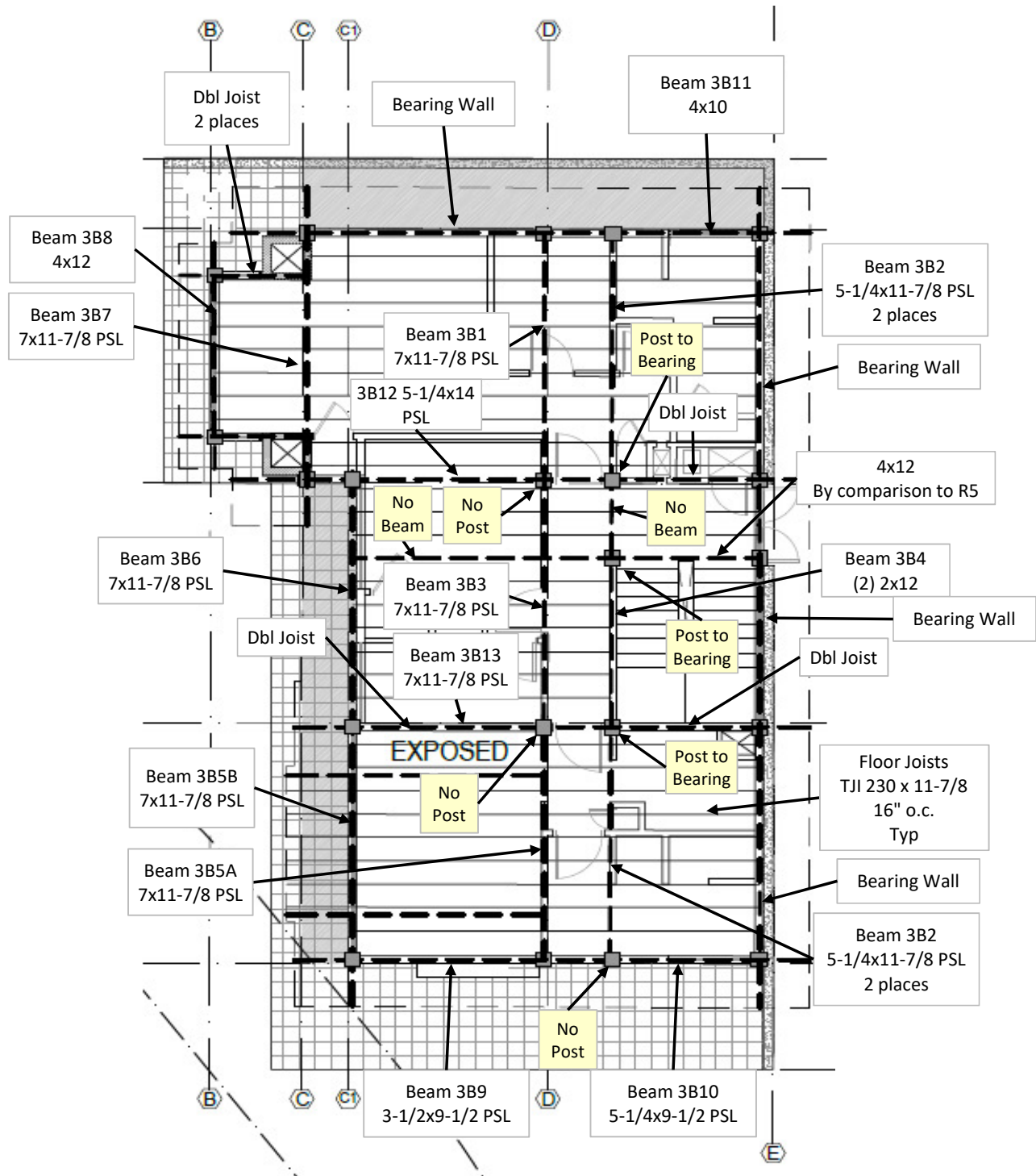
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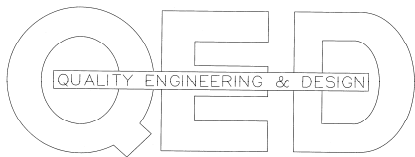
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3rd Floor Framing



THIRD FLOOR FRAMING



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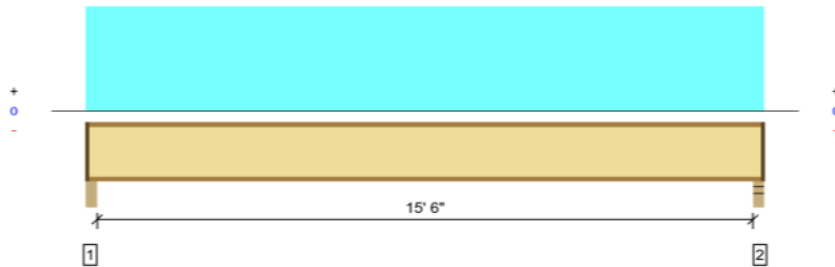
3rd Floor Framing

3rd Floor Joists

FORTE MEMBER REPORT 3rd FLOOR, 3rd Floor Joists
1 piece(s) 11 7/8" TJI® 230 @ 16" OC

PASSED

Overall Length: 16' 1"



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)	550 @ 2 1/2"	1183 (2.25")	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	537 @ 3 1/2"	1655	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2127 @ 8' 1/2"	4215	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.201 @ 8' 1/2"	0.392	Passed (L/935)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.261 @ 8' 1/2"	0.783	Passed (L/719)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	45	40	Passed	--	--

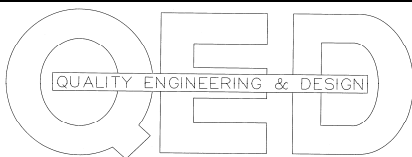
System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 5' 10" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 11" o/c unless detailed otherwise.
- 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: None

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - PSL	3.50"	2.25"	1.75"	129	429	558	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.75"	129	429	558	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 16' 1"	16"	12.0	40.0	Residential - Living Areas



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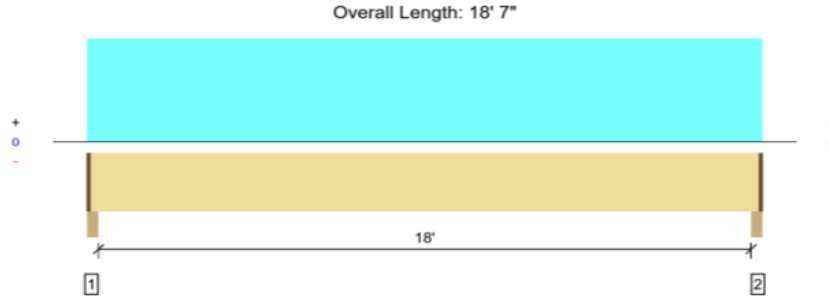
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3rd Floor Framing

3rd Floor Beam 3B1

FORTE MEMBER REPORT 3rd FLOOR, 3B1
1 piece(s) 7" x 11 7/8" 2.0E Paralam® PSL

PASSED



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 (Pattem)
Member Reaction (lbs)	5017 @ 2"	9844 (2.25")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4374 @ 1' 3 3/8"	16071	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	22733 @ 9' 3 1/2"	39805	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.534 @ 9' 3 1/2"	0.608	Passed (L/410)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.729 @ 9' 3 1/2"	0.913	Passed (L/300)	--	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/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 5" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

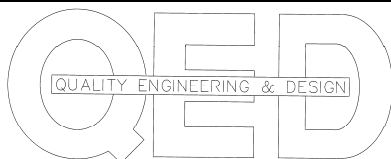
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	1354	3717	5071	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	1354	3717	5071	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 18' 5 3/4"	N/A	26.0		
1 - Uniform (PSF)	0 to 18' 7" (Front)	10'	12.0	40.0	Residential - Living Areas

Member Notes

Floor beam north end



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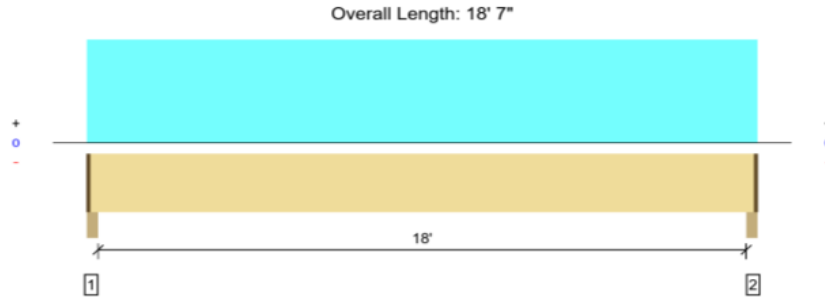
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3rd Floor Framing

3rd Floor Beam 3B2

FORTE MEMBER REPORT 3rd FLOOR, 3B2
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	4001 @ 2"	7383 (2.25")	Passed (54%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3488 @ 1' 3 3/8"	12053	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	18131 @ 9' 3 1/2"	29854	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.570 @ 9' 3 1/2"	0.608	Passed (L/384)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.775 @ 9' 3 1/2"	0.913	Passed (L/282)	--	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/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 5" o/c unless detailed otherwise.

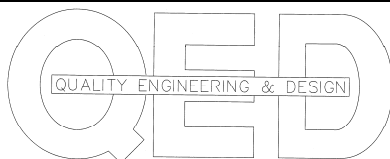
Supports	Bea ing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	1071	2973	4044	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	1071	2973	4044	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 18' 5 3/4"	N/A	19.5		
1 - Uniform (PSF)	0 to 18' 7" (Front)	8'	12.0	40.0	Residential - Living Areas

Member Notes

Floor beam north end



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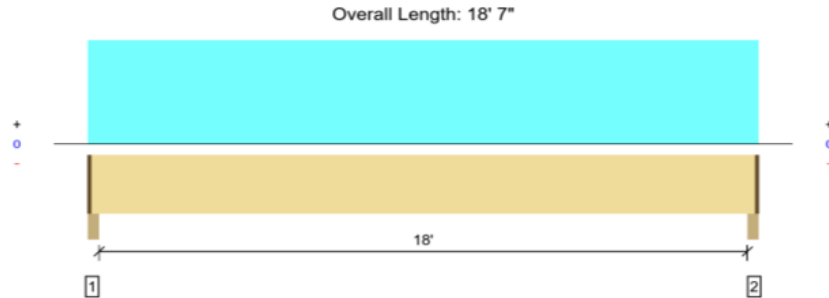
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3rd Floor Framing

3rd Floor Beam 3B3

FORTE MEMBER REPORT 3rd FLOOR, 3B3
 1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	4539 @ 2"	9844 (2.25")	Passed (46%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3957 @ 1' 3 3/8"	16071	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	20568 @ 9' 3 1/2"	39805	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.481 @ 9' 3 1/2"	0.608	Passed (L/456)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.660 @ 9' 3 1/2"	0.913	Passed (L/332)	--	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/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 5" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

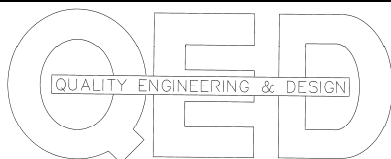
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	1243	3345	4588	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	1243	3345	4588	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 18' 5 3/4"	N/A	26.0		
1 - Uniform (PSF)	0 to 18' 7" (Front)	9'	12.0	40.0	Residential - Living Areas

Member Notes

Floor beam center section



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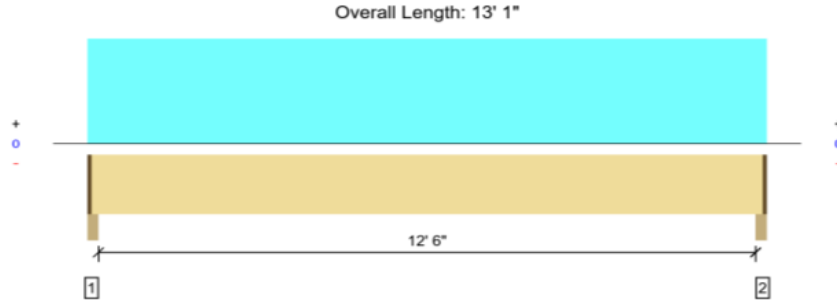
3rd Floor Framing

3rd Floor Beam 3B4



MEMBER REPORT 3rd FLOOR, 3B4
2 piece(s) 2 x 12 Hem-Fir No. 2

PASSED



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)	892 @ 2"	2734 (2.25")	Passed (33%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	736 @ 1' 2 3/4"	3375	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2815 @ 6' 6 1/2"	4482	Passed (63%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.128 @ 6' 6 1/2"	0.319	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.178 @ 6' 6 1/2"	0.637	Passed (L/859)	--	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 11" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

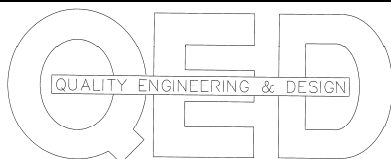
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	251	654	905	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	251	654	905	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 12' 11 3/4"	N/A	8.6		
1 - Uniform (PSF)	0 to 13' 1" (Front)	2' 6"	12.0	40.0	Residential - Living Areas

Member Notes

Adjacent to stairs



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3rd Floor Framing

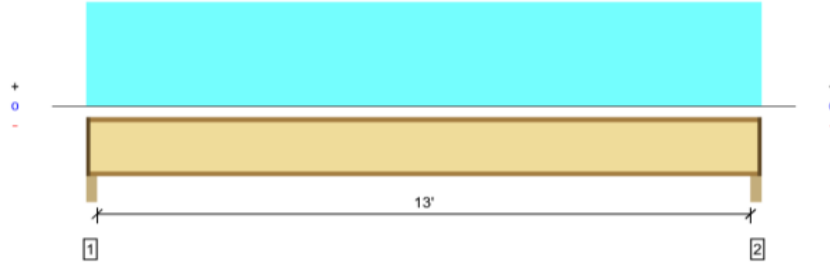
Double joists adjacent to deck and stairs supporting bearing walls above



MEMBER REPORT 3rd FLOOR, Double Joist adjacent to deck and stairs
2 piece(s) 11 7/8" IJI® 230

PASSED

Overall Length: 13' 7"



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)	2008 @ 2"	2957 (2.25")	Passed (68%)	1.25	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	1952 @ 3 1/2"	4138	Passed (47%)	1.25	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Moment (Ft-lbs)	6590 @ 6' 9 1/2"	10538	Passed (63%)	1.25	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Live Load Defl. (in)	0.185 @ 6' 9 1/2"	0.331	Passed (L/860)	-	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.359 @ 6' 9 1/2"	0.663	Passed (L/443)	-	1.0 D + 0.75 L + 0.75 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 8" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 13' 5" o/c unless detailed otherwise.

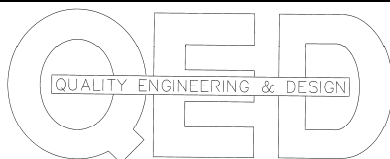
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Beam - DF	3.50"	2.25"	1.75"	990	380	1019	2389	1 1/4" Rim Board
2 - Beam - DF	3.50"	2.25"	1.75"	990	380	1019	2389	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 13' 5 3/4"	N/A	6.0			
1 - Uniform (PSF)	0 to 13' 7" (Top)	1' 4 13/16"	12.0	40.0	-	Residential - Living Areas
2 - Uniform (PSF)	0 to 13' 7" (Top)	5'	15.0	-	30.0	Rafters on bearing wall above
3 - Uniform (PLF)	0 to 13' 7" (Top)	N/A	48.0	-	-	wall weight above

Member Notes

Supports 3rd floor load + bearing wall above



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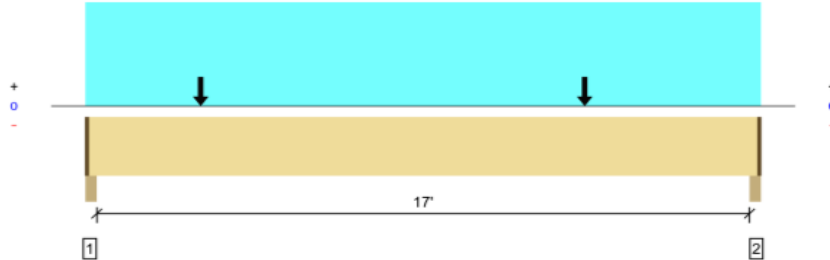
3rd Floor Framing

3rd Floor Beam 3B5A, Inner Beam

FORTE MEMBER REPORT 3rd FLOOR, 3B5
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED

Overall Length: 17' 7"



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)	4557 @ 2"	9844 (2.25")	Passed (46%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4006 @ 1' 3 3/8"	16071	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	19041 @ 8' 10 9/16"	39805	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Def. (in)	0.364 @ 8' 9 1/2"	0.431	Passed (L/568)	--	1.0 D + 1.0 L (All Spans)
Total Load Def. (in)	0.554 @ 8' 9 5/8"	0.863	Passed (L/374)	--	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 5" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

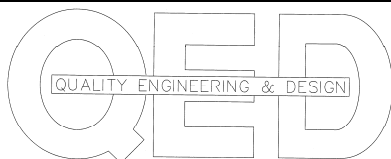
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	1614	2989	955	5558	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	1532	2989	795	5316	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 5 3/4"	N/A	26.0			
1 - Uniform (PSF)	0 to 17' 7" (Front)	8' 6"	12.0	40.0	-	Residential - Living Areas
2 - Point (lb)	3' (Top)	N/A	450	-	875	Reaction from R15 above
3 - Point (lb)	13' (Top)	N/A	450	-	875	Reaction from R15 above

Member Notes

Floor beam south section center, Supports floor joists + 2x RB15



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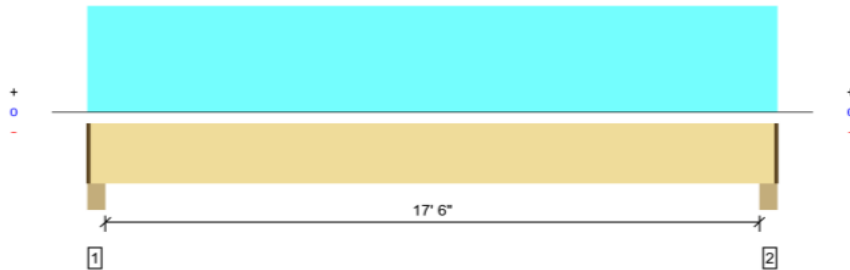
3rd Floor Framing

3rd Floor Beam 3B6

FORTE MEMBER REPORT 3rd FLOOR, 3B6
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED

Overall Length: 18' 5"



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)	5481 @ 4"	18594 (4.25")	Passed (29%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4672 @ 1' 5 3/8"	16071	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	23709 @ 9' 2 1/2"	39805	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.557 @ 9' 2 1/2"	0.592	Passed (L/382)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.721 @ 9' 2 1/2"	0.887	Passed (L/295)	--	1.0 D + 1.0 L (All Spans)

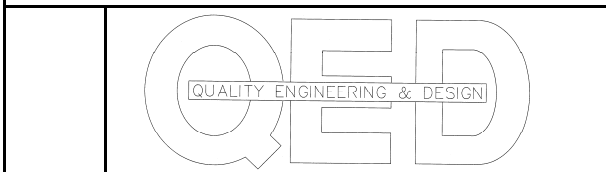
System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 3" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	5.50"	4.25"	1.50"	1259	4282	5541	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.50"	1259	4282	5541	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - SelfWeight (PLF)	1 1/4" to 18' 3 3/4"	N/A	26.0		
1 - Uniform (PSF)	0 to 18' 5" (Front)	6' 3"	12.0	60.0	Deck area
2 - Uniform (PSF)	0 to 18' 5" (Front)	3'	12.0	30.0	Roof Load



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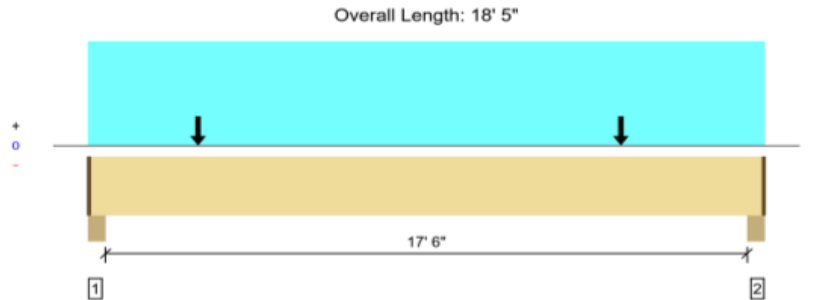
3rd Floor Framing

3rd Floor Beam 3B7



MEMBER REPORT 3rd FLOOR, 3B7
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	5886 @ 4"	18594 (4.25")	Passed (32%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5083 @ 1' 5 3/8"	16071	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	24865 @ 9' 2 15/16"	39805	Passed (62%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.527 @ 9' 2 1/2"	0.592	Passed (L/404)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.762 @ 9' 2 9/16"	0.887	Passed (L/280)	--	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/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 3" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

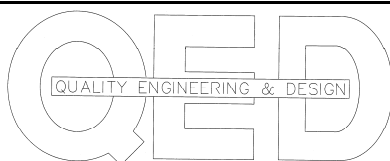
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	5.50"	4.25"	1.50"	1894	4052	1104	7050	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.50"	1851	4052	996	6899	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 18' 3 3/4"	N/A	26.0			
1 - Uniform (PSF)	0 to 18' 5" (Front)	11'	12.0	40.0	-	Residential - Living Areas
2 - Point (lb)	3' (Front)	N/A	420	-	1050	Roof Beam above
3 - Point (lb)	14' 6" (Front)	N/A	420	-	1050	Roof Beam above

Member Notes

floor beam northwest corner



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3rd Floor Framing

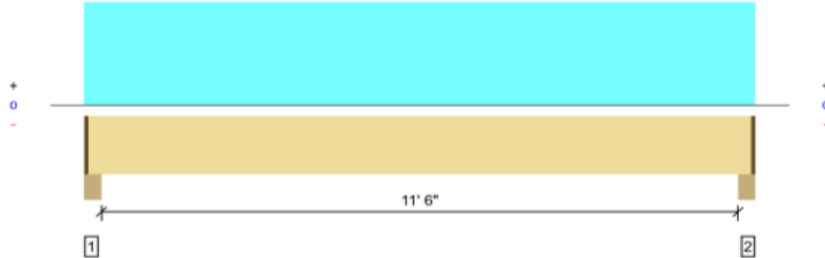
3rd Floor Beam 3B8



MEMBER REPORT 3rd FLOOR, 3B8
1 piece(s) 4 x 12 Douglas Fir-Larch Nbr. 1

PASSED

Overall Length: 12' 5"



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)	1695 @ 4"	9297 (4.25")	Passed (18%)	-	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	1126 @ 1' 4 3/4"	4725	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4038 @ 6' 2 1/2"	6768	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.112 @ 6' 2 1/2"	0.392	Passed (L/999+)	-	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.169 @ 6' 2 1/2"	0.587	Passed (L/836)	-	1.0 D + 0.75 L + 0.75 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

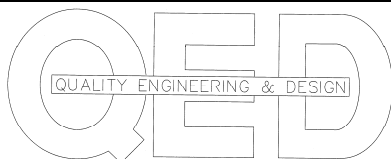
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	5.50"	4.25"	1.50"	582	869	652	2103	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.50"	582	869	652	2103	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 12' 3 3/4"	N/A	10.0			
1 - Uniform (PSF)	0 to 12' 5" (Front)	3' 6"	12.0	40.0	-	Residential - Living Areas
2 - Uniform (PSF)	0 to 12' 5" (Front)	3' 6"	12.0	-	30.0	Roof Load

Member Notes

floor beam northwest corner



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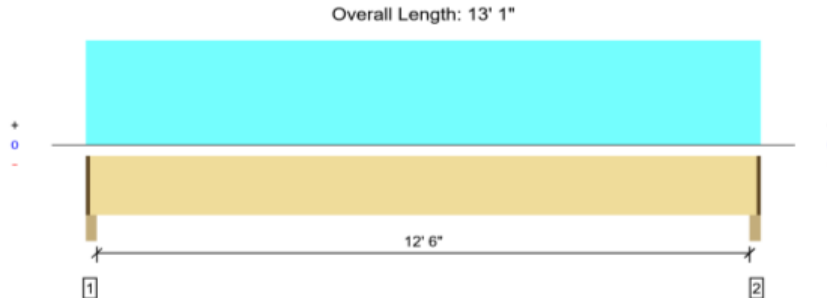
3rd Floor Framing

3rd Floor Beam 3B9



MEMBER REPORT 3rd FLOOR, 3B9
1 piece(s) 3 1/2" x 9 1/2" 2.0E Parallam® PSL

PASSED



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)	1335 @ 2"	4922 (2.25")	Passed (27%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	1132 @ 1' 1"	8035	Passed (14%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	4214 @ 6' 6 1/2"	16321	Passed (26%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.132 @ 6' 6 1/2"	0.319	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.261 @ 6' 6 1/2"	0.637	Passed (L/586)	--	1.0 D + 1.0 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 11" o/c unless detailed otherwise.

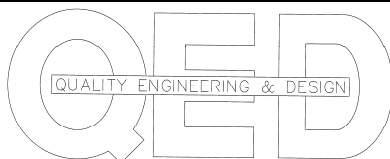
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	669	687	1356	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	669	687	1356	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 12' 11 3/4"	N/A	10.4		
1 - Uniform (PSF)	0 to 13' 1" (Front)	3' 6"	12.0	30.0	Roof load
2 - Uniform (PLF)	0 to 13' 1" (Front)	N/A	50.0	-	Dead weight of wall above

Member Notes

Beam in south wall



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3rd Floor Framing

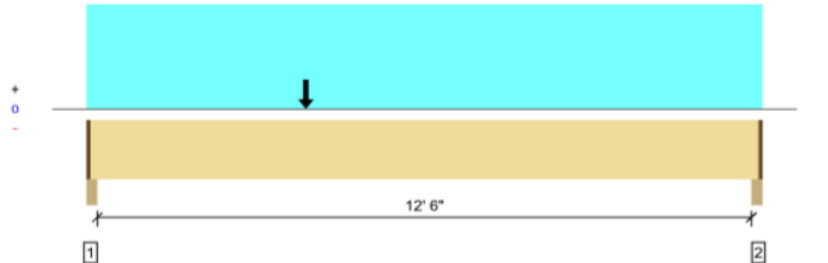
3rd Floor Beam 3B10



MEMBER REPORT 3rd FLOOR, 3B10
1 piece(s) 5 1/4" x 9 1/2" 2.0E Parallam® PSL

PASSED

Overall Length: 13' 1"



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)	3443 @ 2"	7383 (2.25")	Passed (47%)	-	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	3336 @ 1' 1"	9643	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	13128 @ 4' 3"	19585	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.263 @ 5' 11 3/8"	0.319	Passed (L/581)	-	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.447 @ 6' 13 16"	0.637	Passed (L/342)	-	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 11" o/c unless detailed otherwise.

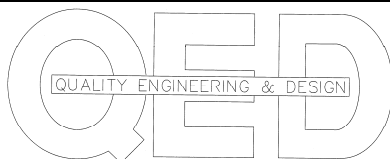
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	1430	2021	687	4138	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	1045	952	687	2684	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 12' 11 3/4"	N/A	15.6			
1 - Uniform (PSF)	0 to 13' 1" (Top)	3' 6"	12.0	-	30.0	Roof load
2 - Uniform (PLF)	0 to 13' 1" (Top)	N/A	50.0	-	-	Dead weight of wall above
3 - Point (lb)	4' 3" (Top)	N/A	1071	2973	-	

Member Notes

Beam in south wall



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3rd Floor Framing

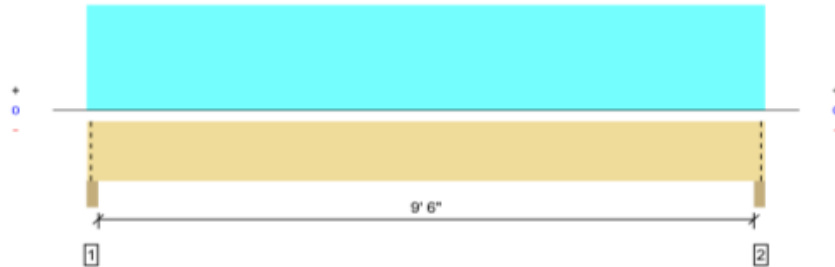
3rd Floor Beam 3B11



MEMBER REPORT 3rd FLOOR, 3B11
1 piece(s) 4 x 10 Douglas Fir-Larch No. 2

PASSED

Overall Length: 10' 1"



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)	1221 @ 2"	7656 (3.50")	Passed (16%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	964 @ 1' 3/4"	4856	Passed (20%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	2878 @ 5' 1/2"	5615	Passed (51%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.050 @ 5' 1/2"	0.325	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.133 @ 5' 1/2"	0.488	Passed (L/877)	--	1.0 D + 1.0 Lr (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 1" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

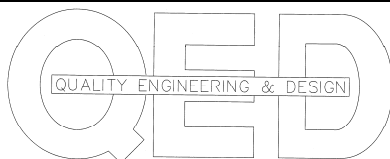
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Column - DF	3.50"	3.50"	1.50"	767	454	1221	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	767	454	1221	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	0 to 10' 1"	N/A	8.2		
1 - Uniform (PSF)	0 to 10' 1" (Top)	3'	12.0	30.0	Roof
2 - Uniform (PLF)	0 to 10' 1" (Top)	N/A	108.0	-	Dead load from walls above

Member Notes

Header at windows in Northeast corner



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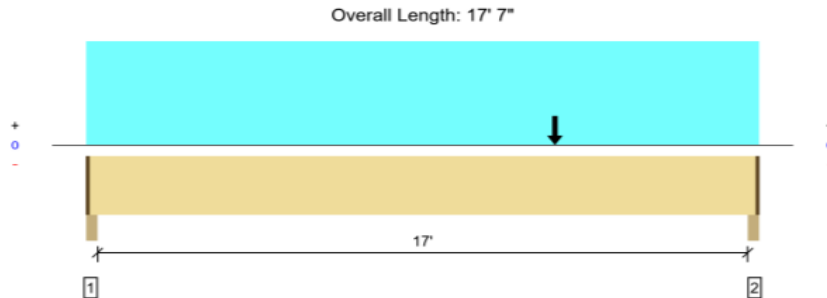
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3rd Floor Framing

3rd Floor Beam 3B12

FORTE MEMBER REPORT 3rd FLOOR, 3B12
1 piece(s) 5 1/4" x 14" 2.0E Parallam® PSL

PASSED



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)	7400 @ 17' 5"	7383 (2.25")	Passed (100%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	7301 @ 16' 1 1/2"	14210	Passed (51%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	37236 @ 12' 3"	40743	Passed (91%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.467 @ 9' 7 9/16"	0.470	Passed (L/444)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.702 @ 9' 6 11/16"	0.863	Passed (L/295)	--	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/440) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 5" o/c unless detailed otherwise.

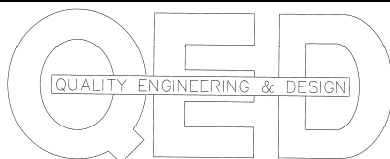
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	1417	2115	3532	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	2.26"	2458	4947	7405	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 5 3/4"	N/A	23.0		
1 - Uniform (PLF)	0 to 17' 7" (Front)	N/A	50.0	-	Wall weight above
2 - Point (lb)	12' 3" (Front)	N/A	1354	3717	Beam 3B1
3 - Point (lb)	12' 3" (Front)	N/A	1243	3345	Beam 3B3

Member Notes

North end of lower deck. Supports wall load +3B1+3B3



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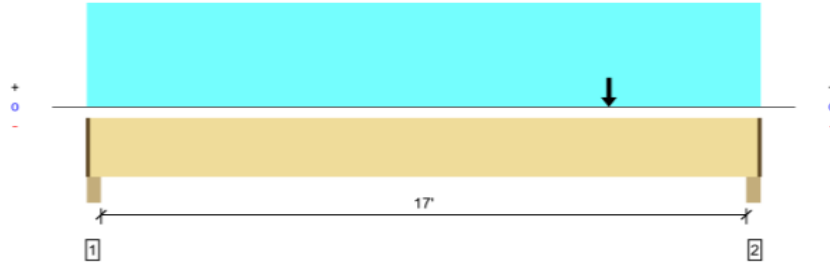
3rd Floor Framing

3rd Floor Beam 3B13

FORTE MEMBER REPORT 3rd FLOOR, 3B13
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED

Overall Length: 17' 9"



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)	7860 @ 17' 6"	14219 (3.25")	Passed (55%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	7764 @ 16' 4 5/8"	16071	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	28898 @ 13' 9"	39805	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.391 @ 9' 11 5/16"	0.431	Passed (L/529)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.648 @ 9' 9 5/8"	0.863	Passed (L/320)	--	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 7" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

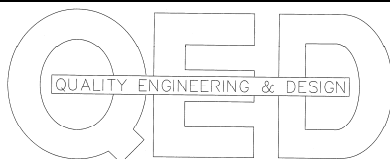
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	4.50"	3.25"	1.50"	1293	1377	208	2878	1 1/4" Rim Board
2 - Column - DF	4.50"	3.25"	1.80"	2908	4957	747	8612	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 7 3/4"	N/A	26.0			
1 - Uniform (PLF)	0 to 17' 9" (Front)	N/A	50.0	-	-	Wall weight above
2 - Point (lb)	13' 9" (Front)	N/A	1614	2989	955	Beam 3B5
3 - Point (lb)	13' 9" (Front)	N/A	1243	3345	-	Beam 3B3

Member Notes

At south end of stairs. Supports wall weight above + 3B3+3B5



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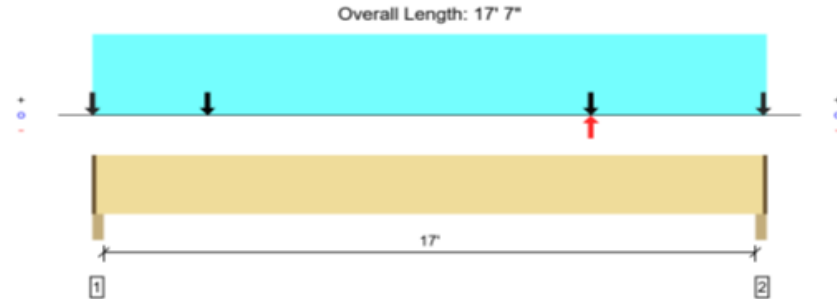
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3rd Floor Framing

3rd Floor Beam 3B5B, West side, with seismic loading, including Overstrength included

FORTE MEMBER REPORT 3rd FLOOR, 3B5-With Seismic
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	5250 @ 2"	9844 (2.25")	Passed (53%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3494 @ 1' 3 3/8"	16071	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	16423 @ 8' 10 7/8"	39805	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.286 @ 10' 7/16"	0.575	Passed (L/723)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.488 @ 9' 6 15/16"	0.863	Passed (L/424)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)

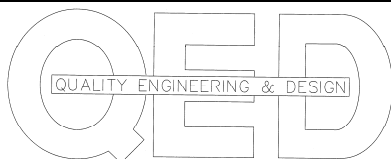
System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 5" o/c unless detailed otherwise.
- -511 lbs uplift at support 3/4". Strapping or other restraint may be required.
- -565 lbs uplift at support 17' 3 3/4". Strapping or other restraint may be required.
- Member should be side-loaded from both sides of the member to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Seismic	Total	
1 - Column - DF	3.50'	2.25'	1.50"	3253	2242	716	3518/-3518	9729/-3518	1 1/4" Rim Board
2 - Column - DF	3.50'	2.25'	1.50"	3162	2242	596	3518/-3518	9518/-3518	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 5 3/4"	N/A	26.0				
1 - Uniform (PSF)	0 to 17' 7" (Front)	8' 6"	13.2	30.0	-	-	Residential - Living Areas
2 - Point (lb)	3' (Top)	N/A	-495	-	656	-	Reaction from R15 above
3 - Point (lb)	13' (Top)	N/A	-495	-	656	-	Reaction from R15 above
4 - Point (lb)	3' (Top)	N/A	-	-	-	6068	Seismic reaction from wall above including Overstrength
5 - Point (lb)	13' (Top)	N/A	-	-	-	-6068	Seismic reaction from wall above including Overstrength
6 - Point (lb)	0 (Top)	N/A	1500	-	-	-	Load added to simulate Hold-down strap
7 - Point (lb)	17' 6" (Top)	N/A	1500	-	-	-	Load added to simulate Hold-down strap



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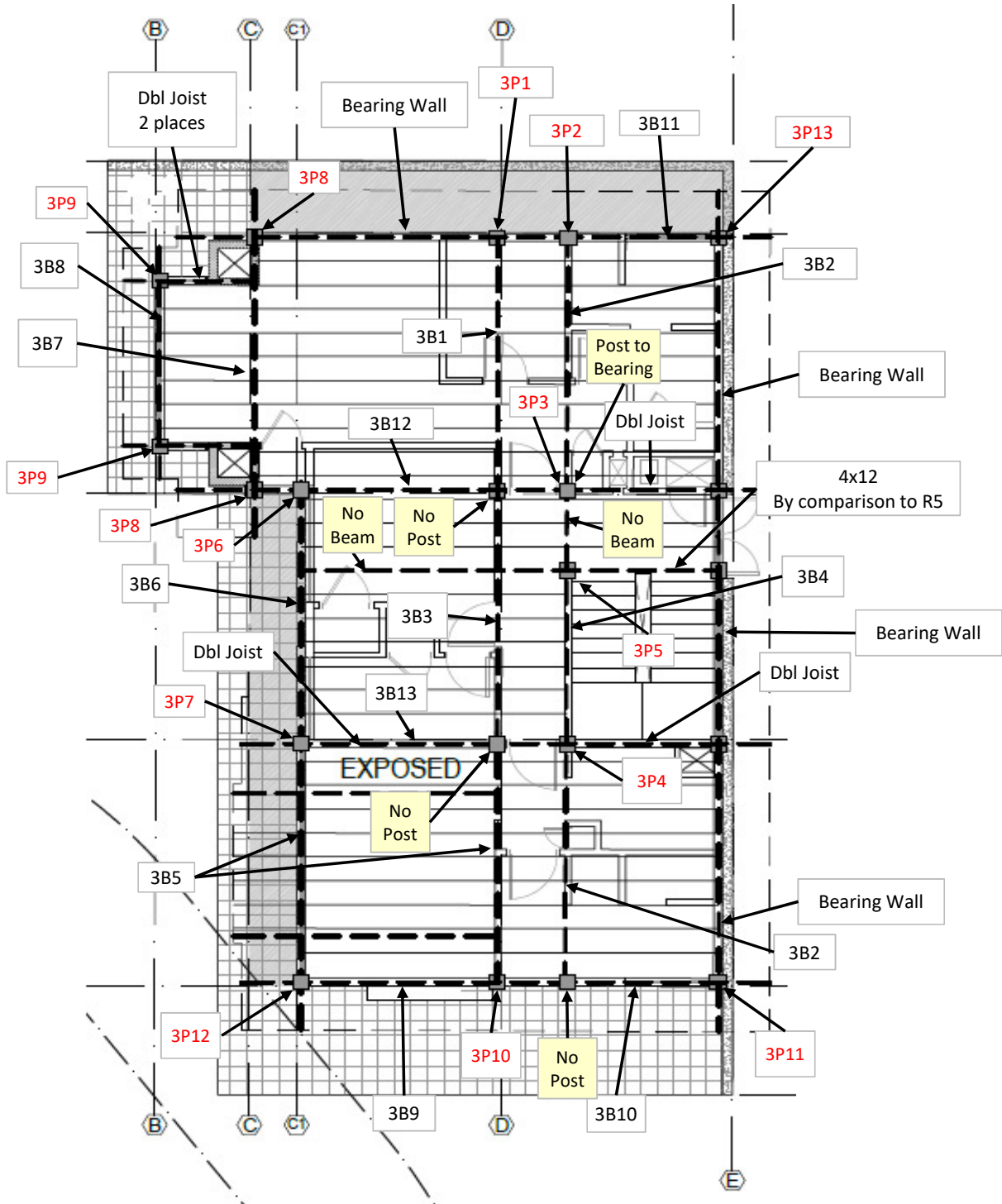
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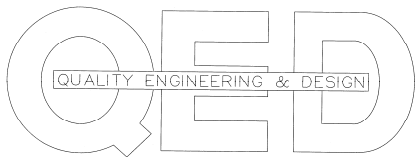
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3rd Floor Posts



THIRD FLOOR FRAMING POSTS

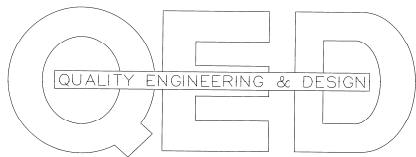


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3rd Floor Posts

BEAM ID	POST ID	POST SIZE	HANGER TYPE	NOTES
3B1	3P1	4x6 D-Fir	HHUS7.25/10	
3B2	3P2	4x4 D-Fir		
	3P3	5-1/4 x 5-1/4 PSL	12,000 lb.	12,000 lb.
	3P4	5-1/4 x 5-1/4 PSL	15,000 lb.	15,000 lb.
3B3			HGUS7.25/12	
3B4			U210-2	
	3P5	4x4 D-Fir		3000 lb.
3B5			HGUS7.25/12	
3B6	3P6	5-1/4 x 5-1/4 PSL		
	3P7	5-1/4 x 5-1/4 PSL		
3B7	3P8	6x6 D-Fir		
3B8	3P9	4x4 D-Fir		
3B9	3P10	6x6 D-Fir		
	3P11	4x4 D-Fir		4200 lb.
3B10	3P12	6x6 D-Fir		
3B11	3P13	4x4 D-Fir		
3B12			HGUS5.50/14	
3B13			HGUS7.25/12	



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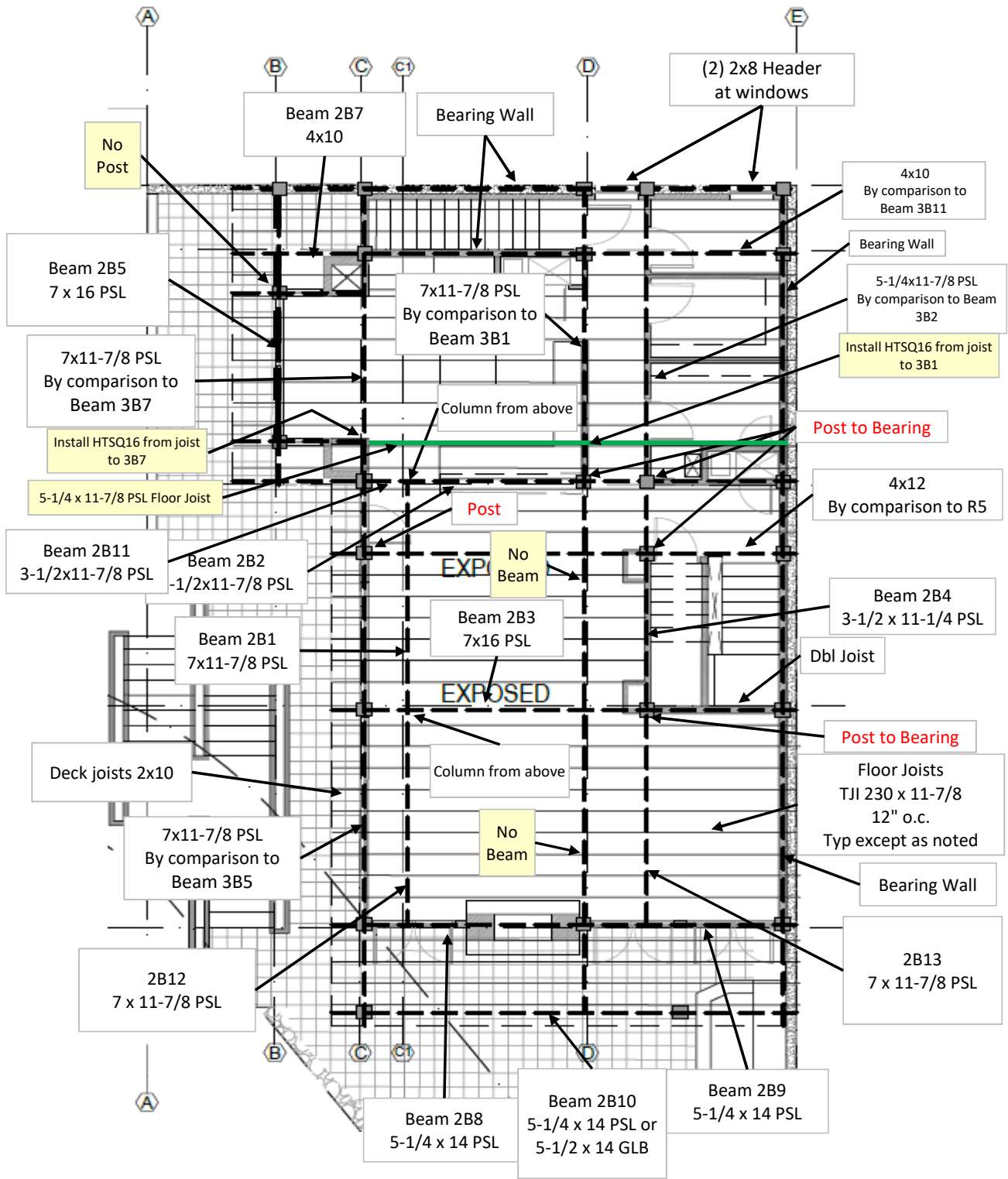
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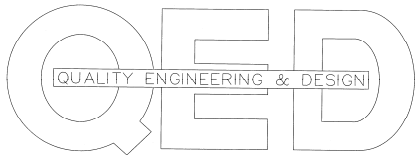
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2nd Floor Framing



SECOND FLOOR FRAMING



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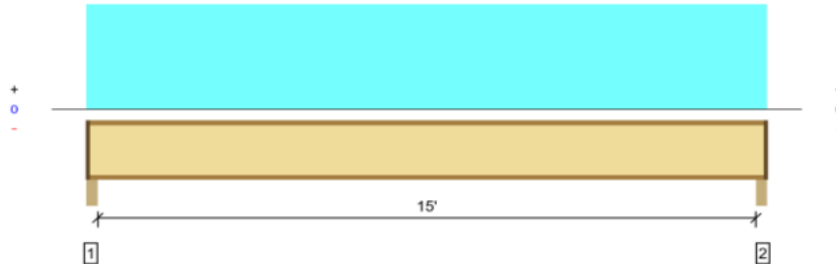
2nd Floor Framing

2nd Floor Joists

FORTE MEMBER REPORT 2nd FLOOR, 2nd Floor Joists
1 piece(s) 11 7/8" TJI® 230 @ 16" OC

PASSED

Overall Length: 15' 7"



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)	533 @ 2 1/2"	1183 (2.25")	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	520 @ 3 1/2"	1655	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1994 @ 7' 9 1/2"	4215	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.178 @ 7' 9 1/2"	0.379	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.232 @ 7' 9 1/2"	0.758	Passed (L/785)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	46	40	Passed	--	--

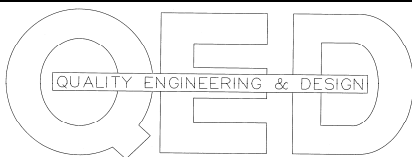
System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 5" o/c unless detailed otherwise.
- 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: None

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - PSL	3.50"	2.25"	1.75"	125	416	541	1 1/4" Rim Board
2 - Beam - PSL	3.50"	2.25"	1.75"	125	416	541	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 7"	16"	12.0	40.0	Residential - Living Areas



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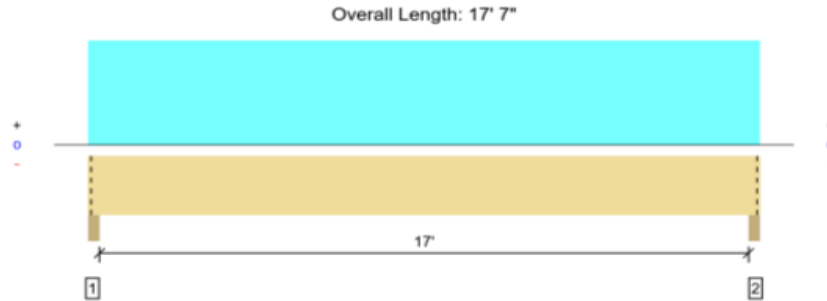
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2nd Floor Framing

2nd Floor Beam 2B1

FORTE MEMBER REPORT 2nd FLOOR, 2B1
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	6752 @ 2"	15313 (3.50")	Passed (44%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5768 @ 1' 3 3/8"	16071	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	28567 @ 8' 9 1/2"	39805	Passed (72%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.557 @ 8' 9 1/2"	0.575	Passed (L/372)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.823 @ 8' 9 1/2"	0.863	Passed (L/252)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 17' 7" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

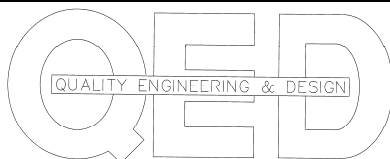
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	3.50"	1.54"	2181	4572	6753	Blocking
2 - Column - DF	3.50"	3.50"	1.54"	2181	4572	6753	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 17' 7"	NA	26.0		
1 - Uniform (PSF)	0 to 17' 7" (Top)	8' 6"	12.0	40.0	Residential - Living Areas
2 - Uniform (PSF)	0 to 17' 7" (Top)	3'	40.0	60.0	Deck area - contingency for pavers

Member Notes

West wall, center



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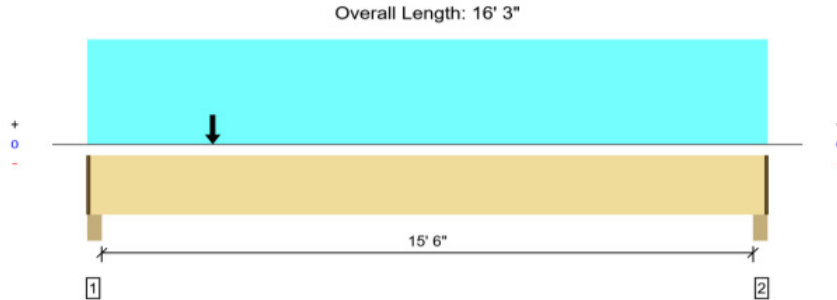
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2nd Floor Framing

2nd Floor Beam 2B2

FORTE MEMBER REPORT 2nd FLOOR, 2B2
1 piece(s) 3 1/2" x 11 1/4" 2.0E Parallam® PSL

PASSED



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)	5274 @ 3"	7109 (3.25")	Passed (74%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5168 @ 1' 3 3/4"	7613	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	14137 @ 3'	17970	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.392 @ 7' 1"	0.394	Passed (L/483)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.657 @ 7' 3 15/16"	0.788	Passed (L/288)	--	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 16' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 16' 1" o/c unless detailed otherwise.

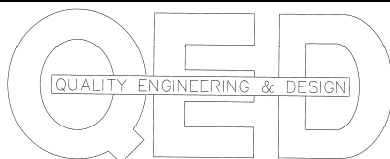
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	4.50"	3.25"	2.41"	1747	3534	5281	1 1/4" Rim Board
2 - Column - DF	4.50"	3.25"	1.50"	928	748	1676	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 16' 1 3/4"	N/A	12.3		
1 - Point (lb)	3' (Top)	N/A	1259	4282	Post from 3B6
2 - Uniform (PLF)	0 to 16' 3" (Top)	N/A	75.0	-	Bearing Wall above

Member Notes

Grid line 3
 Supports post from beam 3B6



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2nd Floor Framing

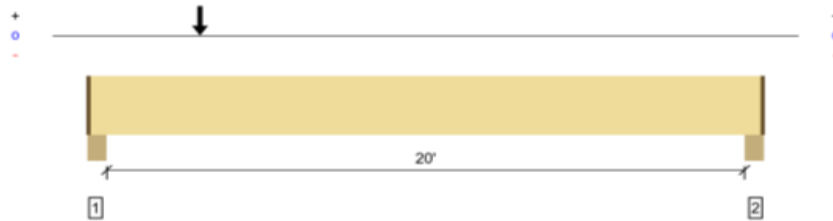
2nd Floor Beam 2B3



MEMBER REPORT 2nd FLOOR, 2B3
1 piece(s) 7" x 16" 2.0E Parallam® PSL

PASSED

Overall Length: 21'



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)	20470 @ 4 1/2"	20781 (4.75")	Passed (99%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	20409 @ 3' 10"	21653	Passed (94%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	63767 @ 3' 6"	69909	Passed (91%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.503 @ 9' 1 3/16"	0.506	Passed (L/483)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.754 @ 9' 1 7/8"	1.013	Passed (L/322)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 20' 10" o/c unless detailed other wise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 20' 10" o/c unless detailed other wise.
- Member should be side-loaded from both sides of the member to prevent rotation.

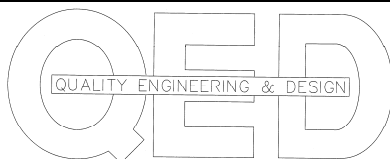
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	6.00'	4.75"	4.68"	6515	13955	808	21278	1 1/4" Rim Board
2 - Column - DF	6.00'	4.75"	1.50"	1487	2546	147	4180	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 20' 10 3/4"	N/A	35.1			
1 - Point (lb)	3' 6" (Top)	N/A	1259	4282	-	Post from 3B6
2 - Point (lb)	3' 6" (Top)	N/A	1614	2989	955	Post from 3B5
3 - Point (lb)	3' 6" (Top)	N/A	2181	4572	-	Beam 2B1
4 - Point (lb)	3' 6" (Top)	N/A	2219	4658	-	Beam 2B12

Member Notes

Supports post from 3B3, 3B6, 3B5(x2)



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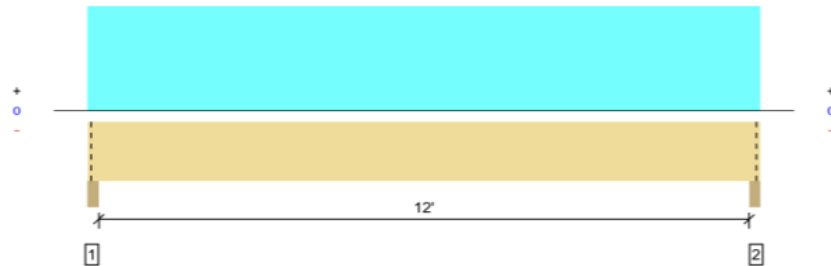
2nd Floor Framing

2nd Floor Beam 2B4

FORTE MEMBER REPORT 2nd FLOOR, 2B4
1 piece(s) 3 1/2" x 11 1/4" 2.0E Parallam® PSL

PASSED

Overall Length: 12' 7"



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)	3349 @ 2"	7656 (3.50")	Passed (44%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2695 @ 1' 2 3/4"	7613	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	9984 @ 6' 3 1/2"	17970	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.266 @ 6' 3 1/2"	0.408	Passed (L/553)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.354 @ 6' 3 1/2"	0.613	Passed (L/415)	--	1.0 D + 1.0 L (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 7" o/c unless detailed otherwise.

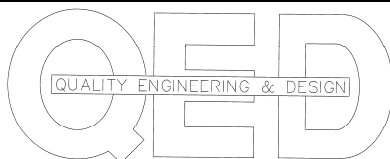
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	3.50"	1.53"	832	2517	3349	Blocking
2 - Column - DF	3.50"	3.50"	1.53"	832	2517	3349	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 12' 7"	N/A	12.3		
1 - Uniform (PSF)	0 to 12' 7" (Front)	10'	12.0	40.0	Residential - Living Areas

Member Notes

west side of stairs



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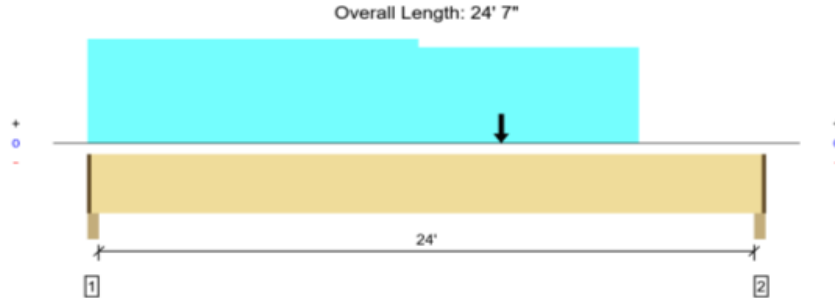
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2nd Floor Framing

2nd Floor Beam 2B5

FORTE MEMBER REPORT 2nd FLOOR, 2B5
1 piece(s) 7" x 16" 2.0E Parallam® PSL

PASSED



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)	7935 @ 2"	9844 (2.25")	Passed (81%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	7049 @ 1' 7 1/2"	21653	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	53433 @ 13' 6 7/8"	69909	Passed (76%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.699 @ 12' 4 13/16"	0.728	Passed (L/416)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	1.205 @ 12' 4 5/8"	1.212	Passed (L/242)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Rush Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/400) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 24' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 24' 5" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

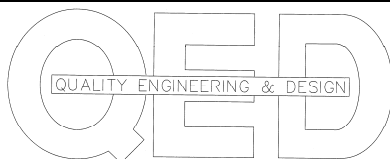
Supports	Bearing Length			Load to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	3.50"	2.25"	1.81"	3403	4589	957	8949	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	2819	3751	303	6873	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 24' 5 3/4"	N/A	35.1			
1 - Uniform (PSF)	0 to 12' (Front)	3'	12.0	40.0	-	Residential - Living Areas
2 - Uniform (PSF)	0 to 12' (Front)	3' 6"	40.0	60.0	-	Deck area - Contingency for Rovers
3 - Uniform (PSF)	0 to 12' (Front)	3' 6"	12.0	-	30.0	Roof
4 - Uniform (PSF)	12' to 20' (Front)	6'	40.0	60.0	-	Deck area - Contingency for Rovers
5 - Point (lb)	15" (Top)	N/A	831	1500	-	Post Load

Member Notes

supports roof and deck in northwest corner



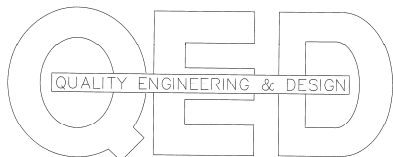
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2nd Floor Framing

2nd Floor Beam 2B6

Beam 2B6 eliminated at Rev 2
Combined with 2B5



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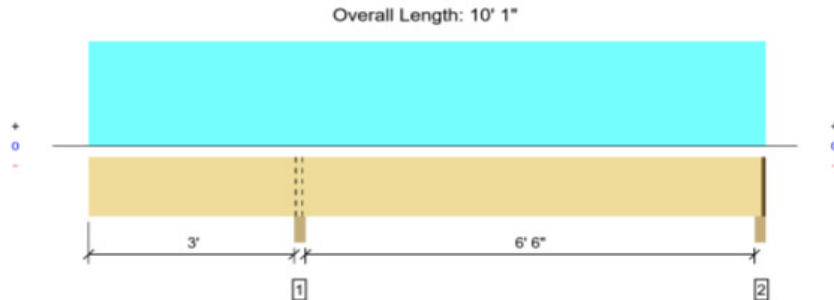
2nd Floor Framing

2nd Floor Beam 2B7



MEMBER REPORT 2nd FLOOR, 2B7
1 piece(s) 4 x 10 Douglas Fir-Larch No. 2

PASSED



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)	1875 @ 3' 1 3/4"	7656 (3.50")	Passed (24%)	-	1.0 D + 1.0 L (All Spans)
Shear (lbs)	826 @ 4' 3/4"	3885	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-1278 @ 3' 1 3/4"	4492	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.033 @ 0	0.200	Passed (2L/999+)	-	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.037 @ 0	0.315	Passed (2L/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).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' o/c unless detailed otherwise.
- Applicable calculations are based on NDS

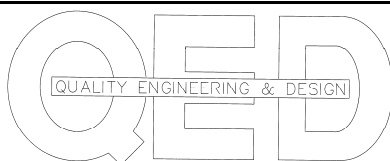
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - DF	3.50"	3.50"	1.50"	786	1089	1875	Blocking
2 - Column - DF	3.50"	2.25"	1.50"	304	533/-94	837/-94	1 1/4" Rim Board

- 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.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 9' 11 3/4"	N/A	8.2		
1 - Uniform (PSF)	0 to 10' 1" (Top)	2' 6"	40.0	60.0	Deck area (contingency for pavers)

Member Notes

Deck Beam northwest corner



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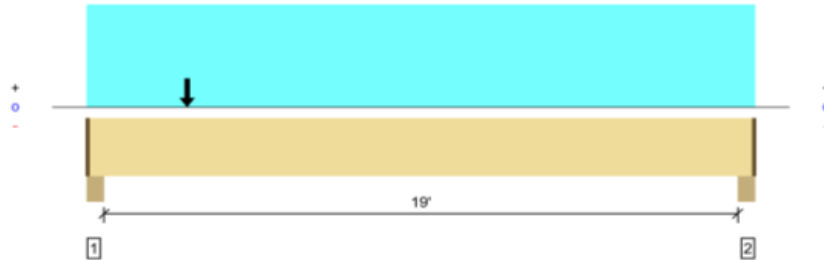
2nd Floor Framing

2nd Floor Beam 2B8

FORTE MEMBER REPORT 2nd FLOOR, 2B8
1 piece(s) 5 1/4" x 14" 2.0E Parallam® PSL

PASSED

Overall Length: 19' 11"



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)	11274 @ 4"	13945 (4.25")	Passed (81%)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	9008 @ 1' 7 1/2"	14210	Passed (63%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	27615 @ 7' 5"	40743	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.470 @ 9' 2 15/16"	0.481	Passed (L/491)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.869 @ 9' 3 11/16"	0.962	Passed (L/266)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)

System : Floor
 Member Type : Rush Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 19' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 19' 9" o/c unless detailed otherwise.

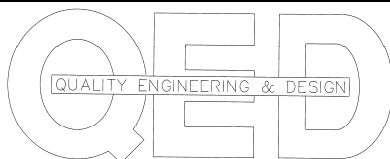
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	5.50"	4.25"	3.44"	4946	4666	3813	13425	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.50"	2155	2505	613	5273	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 19' 9 3/4"	N/A	230			
1 - Uniform (PSF)	0 to 19' 11" (Top)	3' 6"	400	60.0	-	Deck area (contingency for pavers)
2 - Point (lb)	3' (Top)	N/A	463	-	815	Beam R12
3 - Point (lb)	3' (Top)	N/A	1114	-	1969	Beam R14
4 - Point (lb)	3' (Top)	N/A	1614	2989	955	Beam 3B5
5 - Point (lb)	3' (Top)	N/A	669	-	687	Beam 3B9

Member Notes

South wall. Supports deck + post from Beam 3B5, 3B9, R14, R12.



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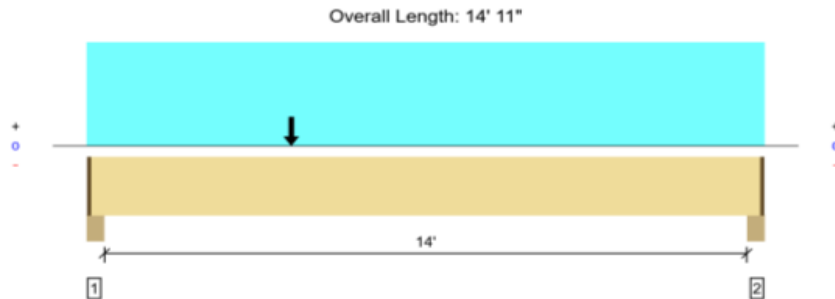
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2nd Floor Framing

2nd Floor Beam 2B9

FORTE MEMBER REPORT 2nd FLOOR, 2B9
1 piece(s) 5 1/4" x 14" 2.0E Parallam® PSL

PASSED



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)	10218 @ 4"	13945 (4.25")	Passed (73%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	9651 @ 1' 7 1/2"	14210	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	38982 @ 4' 6"	40743	Passed (96%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.383 @ 6' 11 1/16"	0.428	Passed (L/447)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.555 @ 6' 11 1/2"	0.712	Passed (L/308)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/400) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 9" o/c unless detailed otherwise.

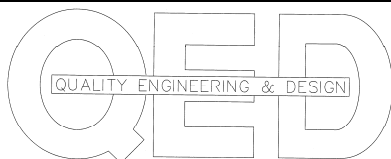
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	5.50"	4.25"	3.11"	3161	7093	10254	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.78"	2018	3850	5868	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 14' 9 3/4"	N/A	23.0		
1 - Uniform (PSF)	0 to 14' 11" (Front)	3' 6"	40.0	60.0	Deck area (contingency for pavers)
2 - Point (lb)	4' 6" (Top)	N/A	1071	2973	Beam 3B2
3 - Point (lb)	4' 6" (Top)	N/A	1682	4838	Beam 2B13

Member Notes

Supports deck on south end + Beam 3B2 (x2)



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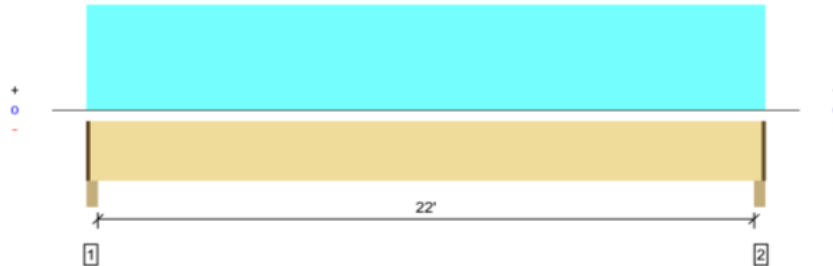
2nd Floor Framing

2nd Floor Beam 2B10

FORTE MEMBER REPORT 2nd FLOOR, 2B10
1 piece(s) 5 1/4" x 14" 2.0E Parallam® PSL

PASSED

Overall Length: 22' 7"



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)	4732 @ 2"	7383 (2.25")	Passed (64%)	-	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4159 @ 1' 5 1/2"	14210	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	26175 @ 11' 3 1/2"	40743	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Def. (in)	0.574 @ 11' 3 1/2"	0.668	Passed (L/465)	-	1.0 D + 1.0 L (All Spans)
Total Load Def. (in)	1.013 @ 11' 3 1/2"	1.112	Passed (L/264)	-	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/400) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 22' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 22' 5" o/c unless detailed otherwise.

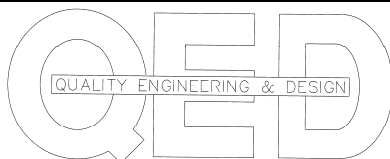
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	2064	2710	4774	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	2064	2710	4774	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 22' 5 3/4"	N/A	23.0		
1 - Uniform (PSF)	0 to 22' 7" (Front)	4'	40.0	60.0	Deck area (contingency for pavers)

Member Notes

Deck Beam south end



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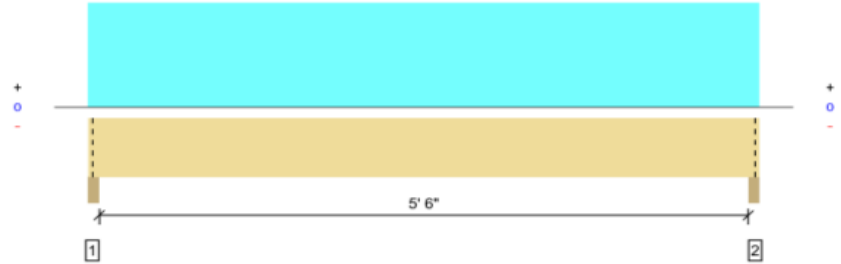
2nd Floor Framing

2nd Floor Beam 2B11

FORTE MEMBER REPORT 2nd FLOOR, 2B11
1 piece(s) 3 1/2" x 11 1/4" 2.0E Parallam® PSL

PASSED

Overall Length: 6' 1"



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)	2276 @ 2"	7656 (3.50")	Passed (30%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1356 @ 1' 2 3/4"	7613	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3093 @ 3' 1/2"	17970	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.024 @ 3' 1/2"	0.192	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.031 @ 3' 1/2"	0.287	Passed (L/999+)	--	1.0 D + 1.0 L (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 6' 1" o/c unless detailed otherwise.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	3.50"	1.50"	512	1764	2276	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	512	1764	2276	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 1"	N/A	12.3		
1 - Uniform (PSF)	0 to 6' 1" (Top)	10'	12.0	40.0	Residential - Living Areas
2 - Uniform (PSF)	0 to 6' 1" (Top)	3'	12.0	60.0	Deck area

Member Notes
 West wall, center

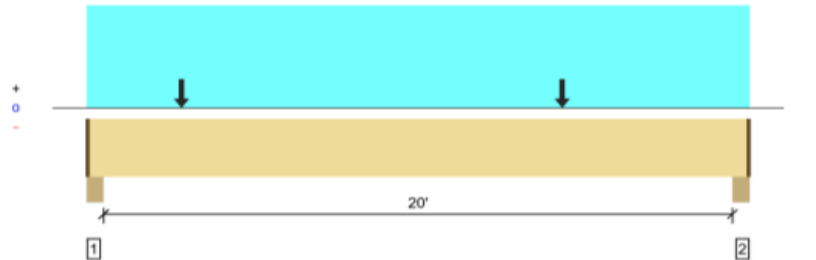
See calculation on following pages for Beam 2B11 with seismic load included

2nd Floor Framing

2nd Floor Joist at shear wall hold-down connection for lateral load along S/L b

FORTE MEMBER REPORT 2nd FLOOR, 2nd Floor Joists-Seismic-b
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL @ 12" OC

Overall Length: 20' 11"



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)	6822 @ 4 1/2"	13945 (4.25")	Passed (49%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	6392 @ 1' 5 3/8"	10848	Passed (59%)	0.90	1.0 D (All Spans)
Moment (Ft-lbs)	22662 @ 15'	27943	Passed (81%)	0.90	1.0 D (All Spans)
Live Load Defl. (in)	0.100 @ 10' 5 1/2"	0.672	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	1.227 @ 10' 6 13/16"	1.008	Failed (L/197)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	61	35	Passed	--	--

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Input live load span ratio deflection limit is below building code minimum value of L/360. This minimum value was used for design.
- Input total load span ratio deflection limit is below building code minimum value of L/240. This minimum value was used for design.
- Top Edge Bracing (Lu): Top compression edge must be braced at 20' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 20' 9" o/c unless detailed otherwise.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- 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: None

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - PSL	5.50"	4.25"	2.08"	6409	418	6827	1 1/4" Rim Board
2 - Beam - PSL	5.50"	4.25"	1.50"	4127	418	4545	1 1/4" Rim Board

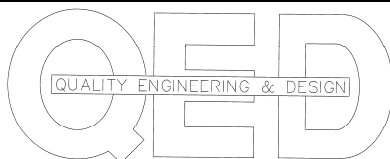
- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Loads	Location (Side)	Spacing	Dead (1.00)	Floor Live (1.00)	Comments
1- Unifrm (PSF)	0 to 20' 11"	12"	12.0	40.0	Residential - Living Areas
2- Point (lb)	3'	N/A	5810	-	Seismic load from wall above, including Overstrength
3- Point (lb)	15'	N/A	4475	-	Seismic load from wall above, including Overstrength

Member Notes

2nd floor joists in center section that have seismic hold-down straps attached. Loads are factored to include Overstrength
 Includes seismic load along S/L b from 2 shear walls

Beam program shows total deflection exceeds allowable, but this is N/A since additional deflection is allowable for a seismic condition. DL + LL deflection is less than L / 480



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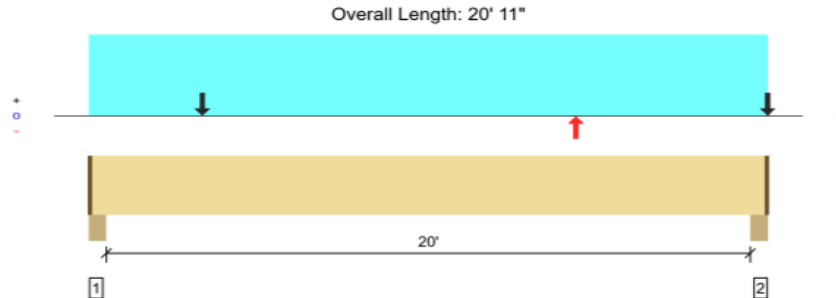
2nd Floor Framing

2nd Floor Joist at shear wall hold-down connection for lateral load along S/L 2



MEMBER REPORT 2nd FLOOR, 2nd Floor Joists- seismic-2
1 piece(s) 3 1/2" x 11 7/8" 2.0E Parallam® PSL @ 12" OC

PASSED



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)	1285 @ 4 1/2"	9297 (4.25")	Passed (14%)	-	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1216 @ 1' 5 3/8"	8035	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-3653 @ 15'	18629	Passed (20%)	0.90	1.0 D (All Spans)
Live Load Def. (in)	0.147 @ 10' 5 1/2"	0.672	Passed (L/999+)	-	1.0 D + 1.0 L (All Spans)
Total Load Def. (in)	0.110 @ 6' 9"	1.008	Passed (L/999+)	-	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	57	35	Passed	-	-

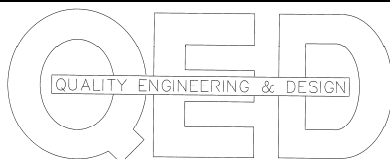
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 20' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 20' 9" o/c unless detailed otherwise.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- 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: None

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - PSL	5.50"	4.25"	1.50"	873	418	1291	1 1/4" Rim Board
2 - Beam - PSL	5.50"	4.25"	1.50"	28	418	446	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 20' 11"	12"	12.0	40.0	Residential - Living Areas
2 - Point (lb)	3' 6"	N/A	1310	-	Seismic load from wall above, including Overstrength
3 - Point (lb)	15'	N/A	-1310	-	Seismic load from wall above, including Overstrength
4 - Point (lb)	20' 10 13/16"	N/A	650	-	This load added to negate the uplift force



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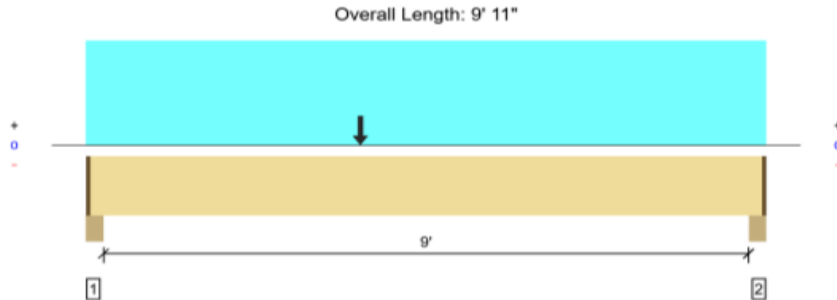
2nd Floor Framing

2nd Floor Joist at shear wall hold-down connection for lateral load along S/L 2 from shear wall near top of stairs (back of dumwaiter closet)



MEMBER REPORT 2nd FLOOR, Floor Joists- Seismic-2.2
1 piece(s) 3 1/2" x 11 7/8" 2.0E Parallam® PSL @ 12" OC

PASSED



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)	4279 @ 4' 1/2"	9297 (4.25")	Passed (46%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4068 @ 1' 5 3/8"	7232	Passed (56%)	0.90	1.0 D (All Spans)
Moment (Ft-lbs)	14716 @ 4'	18629	Passed (79%)	0.90	1.0 D (All Spans)
Live Load Defl. (in)	0.007 @ 4' 11 7/16"	0.306	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.210 @ 4' 8 7/8"	0.458	Passed (L/524)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	72	35	Passed	--	--

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 9' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 9" o/c unless detailed otherwise.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- 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: None

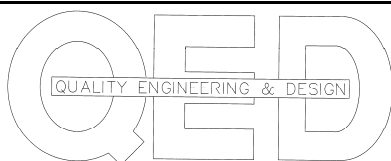
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - PSL	5.50"	4.25"	1.96"	4086	198	4284	1 1/4" Rim Board
2 - Beam - PSL	5.50"	4.25"	1.50"	2693	198	2891	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor-Live (1.00)	Comments
1 - Uniform (PSF)	0 to 9' 11"	12"	12.0	40.0	Residential - Living Areas
2 - Point (lb)	4'	N/A	6660	-	Seismic load from wall above, including Overstrength

Member Notes

2nd floor joists in center section that have seismic hold-down straps attached. Loads are factored to include Overstrength
Includes seismic load along S/L 2 due to lateral load on shear wall near top of stairs



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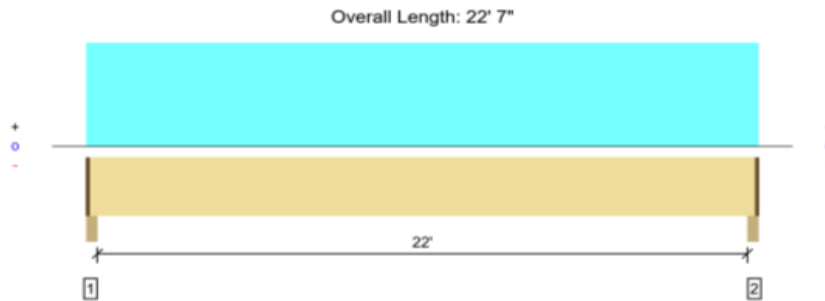
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2nd Floor Framing

Beam 2B10 - GLULAM Option

FORTE MEMBER REPORT 2nd FLOOR, 2B10-GLULAM
1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam

PASSED



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)	4684 @ 2"	8044 (2.25")	Passed (58%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4117 @ 1' 5 1/2"	13603	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	25911 @ 11' 2 1/4"	34932	Passed (74%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.585 @ 11' 3 1/2"	0.668	Passed (L/457)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	1.020 @ 11' 3 1/2"	1.112	Passed (L/262)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/400) and TL (L/240).
- Top Edge Bracing (L_u): Top compression edge must be braced at 22' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (L_b): Bottom compression edge must be braced at 22' 5" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.97 that was calculated using length L = 22' 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.

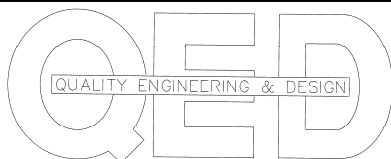
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	350"	2.25"	1.50"	2016	2710	4726	1 1/4" Rim Board
2 - Column - DF	350"	2.25"	1.50"	2016	2710	4726	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 22' 5 3/4"	N/A	18.7		
1 - Uniform (PSF)	0 to 22' 7" (Front)	4'	40.0	60.0	Deck area (contingency for pavers)

Member Notes

Deck Beam south end



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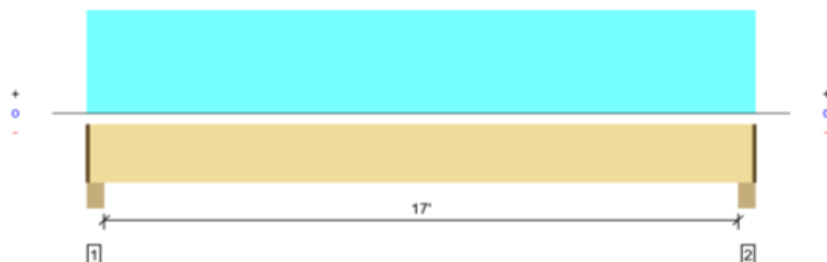
2nd Floor Framing

Beam 2B12

FORTE MEMBER REPORT 2nd FLOOR, 2B12
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED

Overall Length: 17' 11"



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)	6800 @ 4"	18594 (4.25")	Passed (37%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5768 @ 1' 5 3/8"	16071	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	28567 @ 8' 11 1/2"	39805	Passed (72%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.557 @ 8' 11 1/2"	0.575	Passed (L/372)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.823 @ 8' 11 1/2"	0.863	Passed (L/252)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 17' 9" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

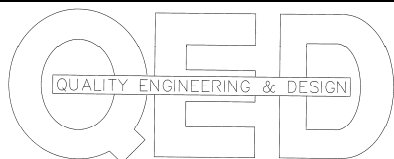
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	5.50"	4.25"	1.55"	2219	4658	6877	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.55"	2219	4658	6877	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 9 3/4"	NA	26.0		
1 - Uniform (PSF)	0 to 17' 11" (Front)	3'	40.0	60.0	Deck area (contingency for pavers)
2 - Uniform (PSF)	0 to 17' 11" (Front)	8' 6"	12.0	40.0	Residential living area

Member Notes

Supports floor joists and deck joists



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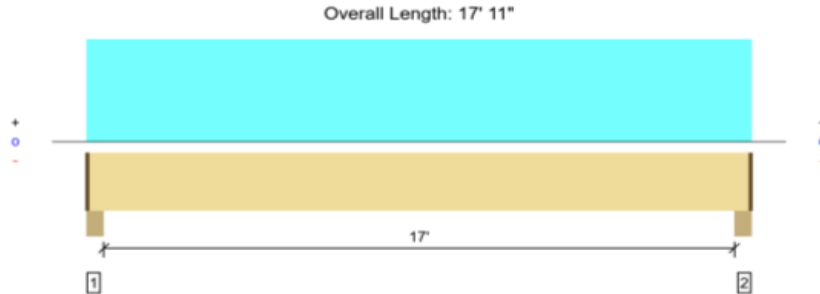
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2nd Floor Framing

Beam 2B13

FORTE MEMBER REPORT 2nd FLOOR, 2B13
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	6446 @ 4"	18594 (4.25")	Passed (35%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5468 @ 1' 5 3/8"	16071	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	27079 @ 8' 11 1/2"	39805	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.578 @ 8' 11 1/2"	0.575	Passed (L/358)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.780 @ 8' 11 1/2"	0.863	Passed (L/265)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 17' 9" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

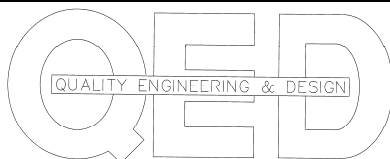
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	5.50'	4.25"	1.50'	1682	4838	6520	1 1/4" Rim Board
2 - Column - DF	5.50'	4.25"	1.50'	1682	4838	6520	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 9 3/4"	N/A	26.0		
1 - Uniform (PSF)	0 to 17' 11" (Front)	5'	12.0	40.0	Residential Living Area
2 - Uniform (PSF)	0 to 17' 11" (Front)	8' 6"	12.0	40.0	Residential living area

Member Notes

Supports floor joists and deck joists



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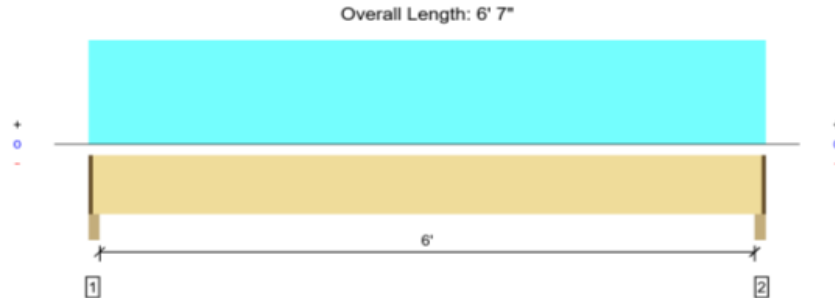
2nd Floor Framing

2nd Floor Deck Joists



MEMBER REPORT 2nd FLOOR, 2nd Floor Deck Joists
1 piece(s) 2 x 10 Hem-Fir No. 2 @ 16" OC

PASSED



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)	425 @ 2' 1/2"	1367 (2.25")	Passed (31%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	297 @ 1' 3/4"	1388	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	634 @ 3' 3 1/2"	1917	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.020 @ 3' 3 1/2"	0.154	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.034 @ 3' 3 1/2"	0.308	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	--	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 6' 5" o/c unless detailed otherwise.
- 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.

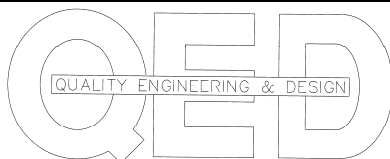
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - PSL	3.50"	2.25"	1.50"	176	263	439	1 1/4" Rim Board
2 - Beam - PSL	3.50"	2.25"	1.50"	176	263	439	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 6' 7"	16"	40.0	60.0	Deck area. Contingency for pavers

Member Notes

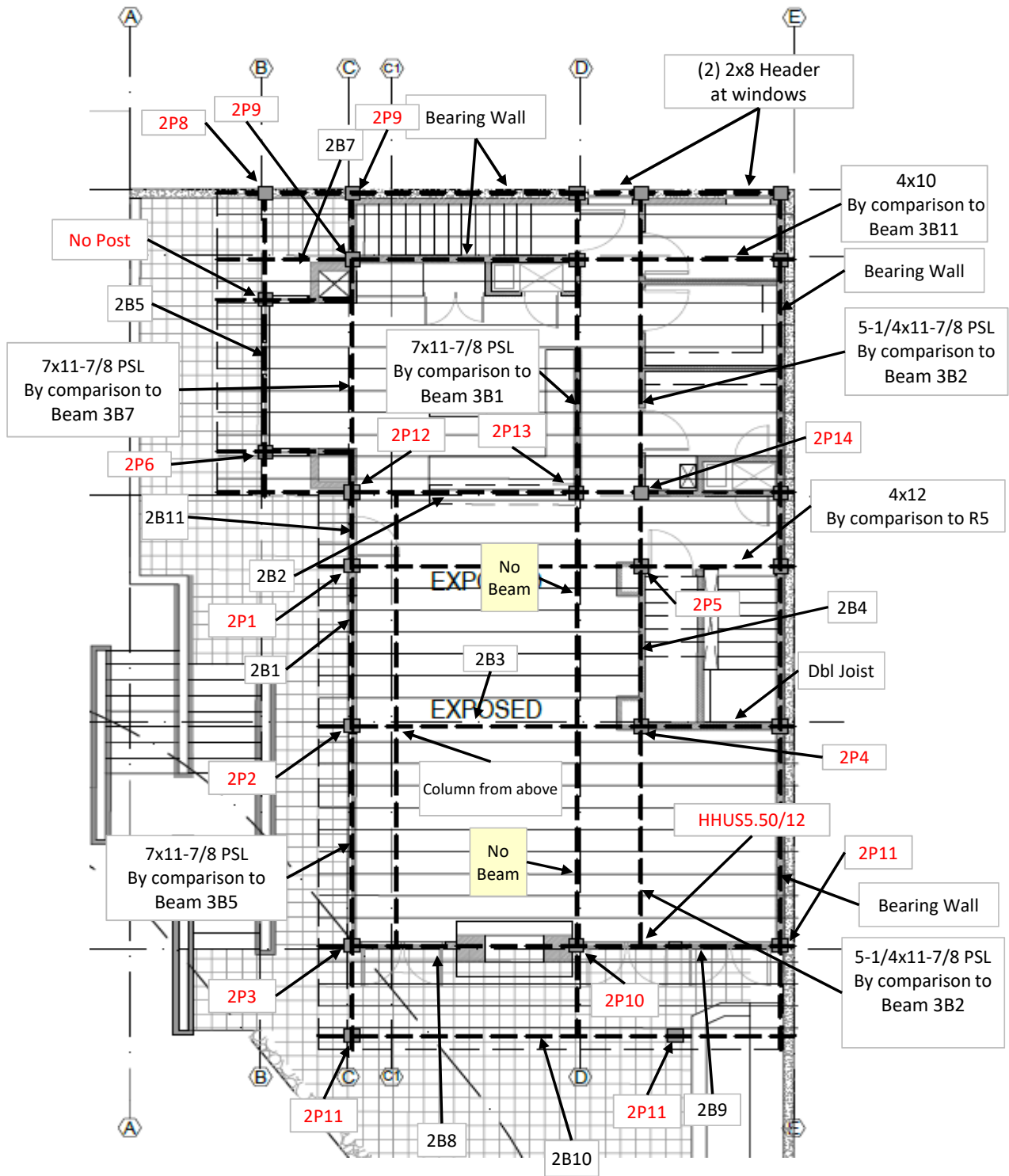
6' Span



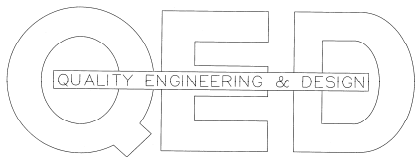
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2nd Floor Posts



SECOND FLOOR FRAMING POSTS

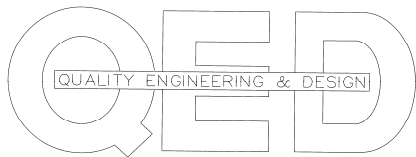


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2nd Floor Posts

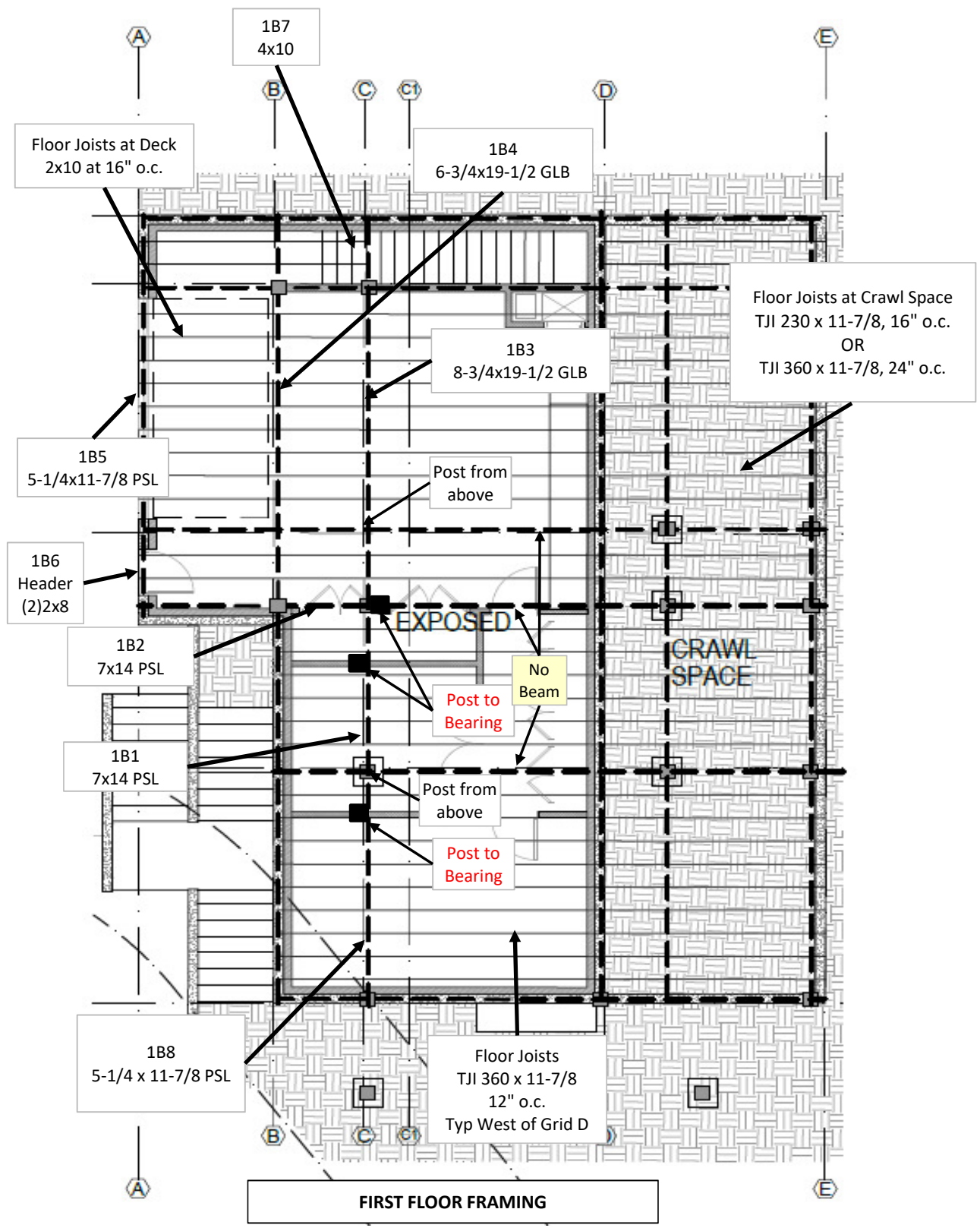
BEAM ID	POST ID	POST SIZE	HANGER TYPE	NOTES
2B1	2P1	6x6 D-Fir	HHUS410	
2B2			HHUS410	
2B3	2P2	5-1/4 x 5-1/4 PSL		
	2P3	5-1/4 x 5-1/4 PSL		
2B4	2P4	7 x 7 PSL		17500 + 3P4 = 32500
	2P5	6x6 D-Fir		5400 + 3P5 = 8400
2B5	2P6	4x4 D-Fir		
	2P7	6x6 D-Fir		
2B6	2P8	4x6 D-Fir		
2B7	2P9	4x4 D-Fir		
2B8	2P10	5-1/4 x 7 PSL		Land on Post 2P3 & 2P10
2B9	2P11	6x6 D-Fir		5150 + 3P11 = 9350
2B10	2P11	6x6 D-Fir		6,000 lb.
2B11	2P12	5-1/4 x 5-1/4 PSL		
	2P13	6x6 D-Fir		10,500 lb.
	2P14	6x6 D-Fir		6,000 lb.



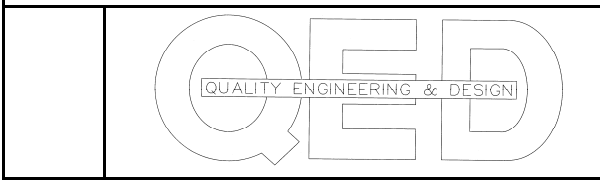
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1st Floor Framing



FIRST FLOOR FRAMING



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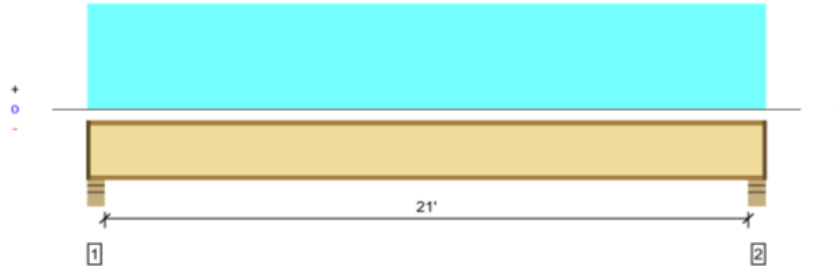
1st Floor Framing

1st Floor Joists

FORTE MEMBER REPORT 1st FLOOR, 1st Floor Joist
1 piece(s) 11 7/8" TJI® 360 @ 12" OC

PASSED

Overall Length: 21' 11"



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)	564 @ 4 1/2"	1505 (3.50")	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	546 @ 5 1/2"	1705	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2912 @ 10' 11 1/2"	6180	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Def. (in)	0.415 @ 10' 11 1/2"	0.529	Passed (L/612)	-	1.0 D + 1.0 L (All Spans)
Total Load Def. (in)	0.540 @ 10' 11 1/2"	1.058	Passed (L/470)	-	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	38	38	Passed	-	-

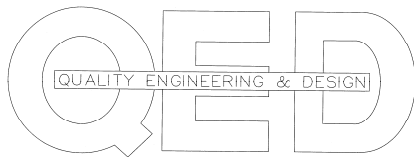
System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 5' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 21' 9" o/c unless detailed otherwise.
- 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: None

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	4.25"	1.75"	132	438	570	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.75"	132	438	570	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 21' 11"	12"	12.0	40.0	Residential - Living Areas



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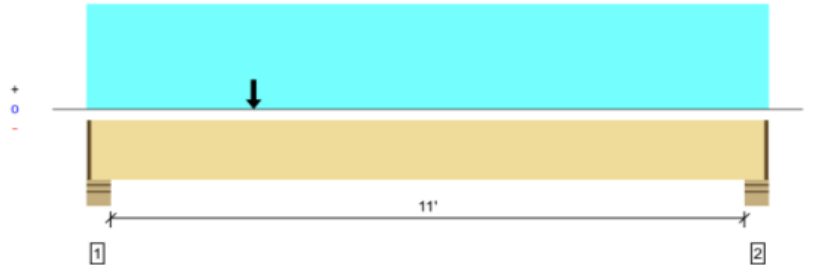
1st Floor Framing

Beam 1B1

FORTE MEMBER REPORT 1st FLOOR, 1B1
 1 piece(s) 7" x 14" 2.0E Parallam® PSL

PASSED

Overall Length: 12' 3"



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)	17266 @ 6"	18594 (6.25")	Passed (93%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	16293 @ 1' 9 1/2"	18947	Passed (86%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	40792 @ 3'	54324	Passed (75%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.201 @ 5' 7 7/8"	0.281	Passed (L/673)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.283 @ 5' 7 13/16"	0.563	Passed (L/477)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 1" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

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

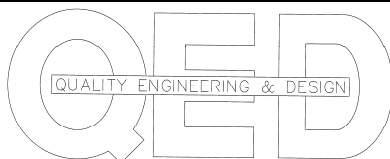
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Stud wall - SPF	7.50"	6.25"	5.80"	5068	12255	1388	18711	1 1/4" Rim Board
2 - Stud wall - SPF	7.50"	6.25"	2.49"	2131	5339	396	7866	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	1 1/4" to 12' 1 3/4"	N/A	30.7			
1 - Uniform (PSF)	0 to 12' 3" (Front)	10' 6"	12.0	40.0	-	Residential - Living Areas
2 - Point (lb)	3' (Top)	N/A	908	3146	-	2B1
3 - Point (lb)	3' (Top)	N/A	2764	6314	829	2B3
4 - Point (lb)	3' (Top)	N/A	1614	2989	955	3B5 (on 2nd Floor)

Member Notes

Supports post fro 2B1, 2B3 and 3B5 (on 2nd floor)



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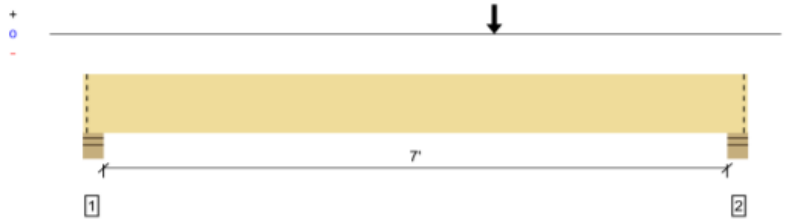
1st Floor Framing

Beam 1B2

FORTE MEMBER REPORT 1st FLOOR, 1B2
1 piece(s) 7" x 14" 2.0E Parallam® PSL

PASSED

Overall Length: 8' 1"



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)	18681 @ 7' 8"	19338 (6.50")	Passed (97%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	18628 @ 6' 4 1/2"	18947	Passed (98%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	49671 @ 5'	54324	Passed (91%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.119 @ 5'	0.242	Passed (L/728)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.168 @ 5'	0.363	Passed (L/519)	--	1.0 D + 1.0 L (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 8' 1" o/c unless detailed otherwise.
- Member should be side-loaded from both sides of the member to prevent rotation.

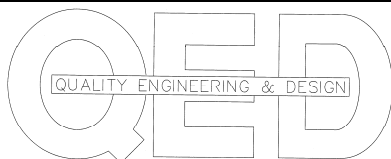
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Stud wall - SPF	6.50"	6.50"	3.67"	3198	7723	465	11386	Blocking
2 - Stud wall - SPF	6.50"	6.50"	6.28"	5407	13273	799	19479	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - SelfWeight (PLF)	0 to 8' 1"	N/A	30.7			
1 - Point (lb)	5' (Top)	N/A	908	3146	-	2B1
2 - Point (lb)	5' (Top)	N/A	2131	5339	396	1B1
3 - Point (lb)	5' (Top)	N/A	5318	12511	868	1B3

Member Notes

Header supports 2B1+2B2+3B7(2nd floor)



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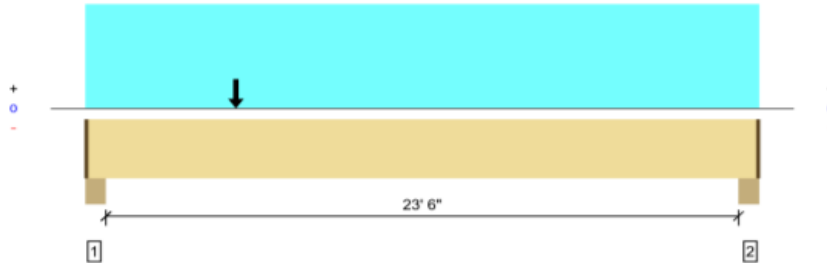
1st Floor Framing

Beam 1B3

FORTE MEMBER REPORT 1st FLOOR, 1B3
1 piece(s) 8 3/4" x 19 1/2" 24F-V4 DF Glulam

PASSED

Overall Length: 24' 7"



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)	17773 @ 5"	29859 (5.25")	Passed (60%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	16561 @ 2' 2"	30144	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	82851 @ 7' 3 3/16"	98922	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.591 @ 11' 7 1/8"	0.594	Passed (L/482)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.839 @ 11' 6 15/16"	1.188	Passed (L/340)	--	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 24' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 24' 5" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.89 that was calculated using length L = 23' 9".
- 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

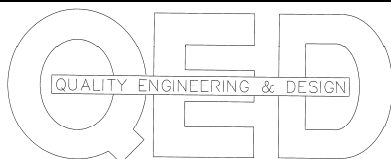
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Column - DF	6.50"	5.25"	3.12"	5318	12511	868	18697	1 1/4" Rim Board
2 - Column - DF	6.50"	5.25"	1.77"	2943	7164	236	10343	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - SelfWeight (PLF)	1 1/4" to 24' 5 3/4"	N/A	41.5			
1 - Uniform (PSF)	0 to 24' 7" (Front)	10' 6"	12.0	40.0	-	Residential - Living Areas
2 - Point (lb)	5' 6" (Top)	N/A	1747	3534	-	2B2
3 - Point (lb)	5' 6" (Top)	N/A	1894	4052	1104	3B7 (on 2nd Floor)
4 - Point (lb)	5' 6" (Top)	N/A	512	1764	-	2B11

Member Notes

Supports post from



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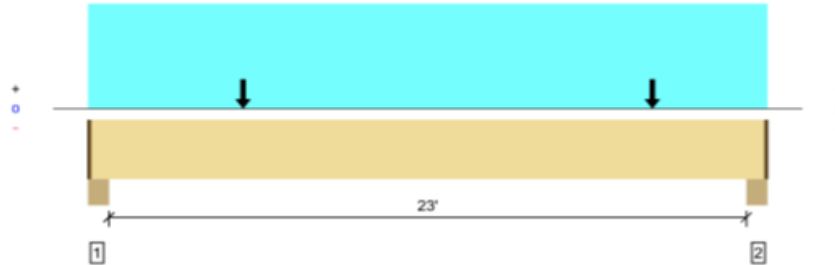
1st Floor Framing

Beam 1B4

FORTE MEMBER REPORT 1st FLOOR, 1B4
1 piece(s) 6 3/4" x 19 1/2" 24F-V4 DF Glulam

PASSED

Overall Length: 24' 1"



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)	14237 @ 23' 8"	23034 (5.25")	Passed (62%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	12870 @ 21' 11"	23254	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	64249 @ 12' 8 3/16"	78485	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.561 @ 12' 2 3/8"	0.581	Passed (L/497)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.867 @ 12' 2 9/16"	1.163	Passed (L/322)	--	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 23' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 23' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.92 that was calculated using length L = 23' 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.

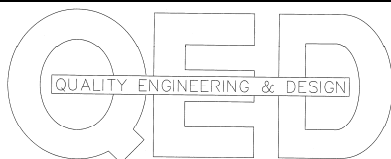
Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Total	
1 - Glulam - DF	6.50"	5.25"	2.52"	3886	7251	571	11708	1 1/4" Rim Board
2 - Glulam - DF	6.50"	5.25"	3.24"	5087	9216	645	14948	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0- SelfWeight (PLF)	1 1/4" to 23' 11 3/4"	N/A	32.0			
1- Uniform (PSF)	0 to 24' 1" (Front)	5'	35.0	60.0	-	Deck Load with provision for concrete pavers
2- Uniform (PSF)	0 to 24' 1" (Back)	3'	12.0	40.0	-	Residential living area
3- Point (lb)	20' (Top)	N/A	754	1911	608	2B5 (North end)
4- Point (lb)	5' 6" (Top)	N/A	754	1911	608	2B5 (South end)
5- Point (lb)	20' (Top)	N/A	1620	2530	-	2B6

Member Notes

Supports first floor joists + deck joists + posts from 2B5 (2 places) + 2B6



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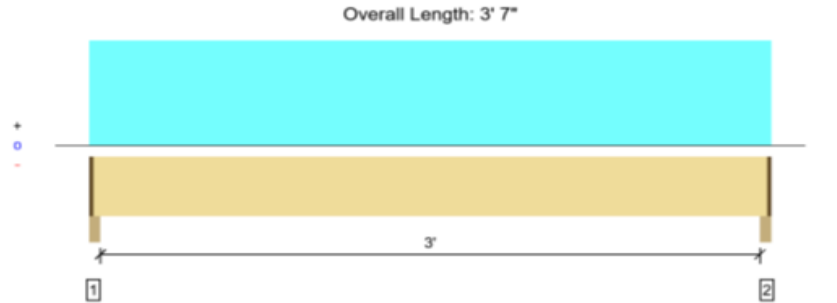
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1st Floor Framing

Beam 1B5 (header at door south of garage door)

FORTE MEMBER REPORT 1st FLOOR, 1B6
2 piece(s) 2 x 8 Hem-Fir No. 2

PASSED



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)	731 @ 2"	2734 (2.25")	Passed (27%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	388 @ 10 3/4"	2175	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	572 @ 1' 9 1/2"	2234	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.005 @ 1' 9 1/2"	0.081	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.009 @ 1' 9 1/2"	0.162	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 5" o/c unless detailed other wise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 3' 5" o/c unless detailed other wise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	3.50"	2.25"	1.50"	291	484	775	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	291	484	775	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 3' 5 3/4"	N/A	5.5		
1 - Uniform (PSF)	0 to 3' 7" (Front)	4' 6"	35.0	60.0	Deck load with provision for concrete pavers

Member Notes
 door header south of garage door

1st Floor Framing

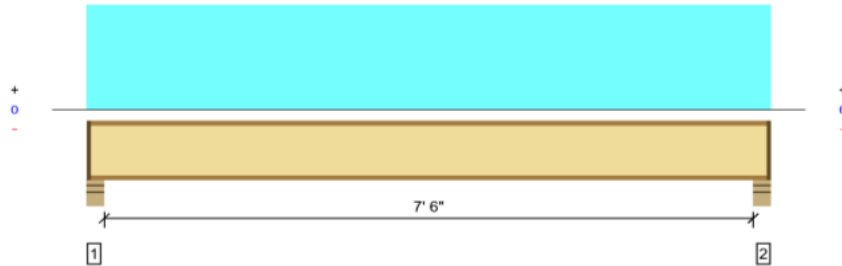
Floor Joists over Crawl space



MEMBER REPORT 1st FLOOR, 1st Floor Joist over Crawl Space
1 piece(s) 11 7/8" TJI @ 230 @ 16" OC

PASSED

Overall Length: 8' 5"



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 (Pattem)
Member Reaction (lbs)	285 @ 4' 1/2"	1485 (3.50")	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	260 @ 5' 1/2"	1655	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	509 @ 4' 2 1/2"	4215	Passed (12%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.017 @ 4' 2 1/2"	0.192	Passed (L/999+)	-	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.022 @ 4' 2 1/2"	0.383	Passed (L/999+)	-	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	67	38	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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 3" o/c unless detailed otherwise.
- 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: None

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	4.25"	1.75"	67	224	291	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.75"	67	224	291	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 8' 5"	16"	12.0	40.0	Residential - Living Areas

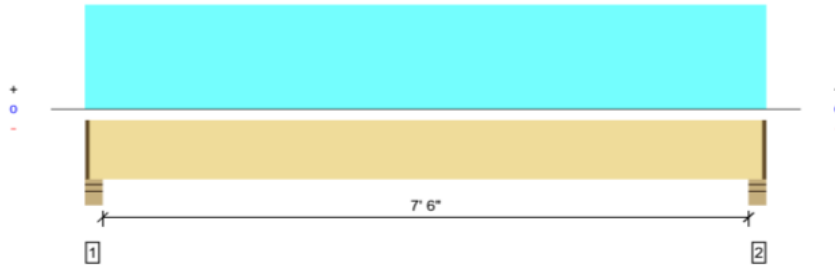
1st Floor Framing

Floor Joists over Deck

FORTE MEMBER REPORT 1st FLOOR, Joists at Deck
1 piece(s) 2 x 10 Hem-Fir No. 2 @ 16" OC

PASSED

Overall Length: 8' 5"



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)	520 @ 4' 1/2"	2582 (4.25")	Passed (20%)	-	1.0 D + 1.0 L (All Spans)
Shear (lbs)	377 @ 1' 2 3/4"	1388	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	931 @ 4' 2 1/2"	1917	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.048 @ 4' 2 1/2"	0.192	Passed (L/999+)	-	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.077 @ 4' 2 1/2"	0.383	Passed (L/999+)	-	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	--	-	--

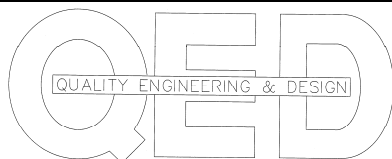
System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 3" o/c unless detailed otherwise.
- 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	Total	
1 - Stud wall - SPF	5.50"	4.25"	1.50"	196	337	533	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.50"	196	337	533	1 1/4" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 8' 5"	16"	35.0	60.0	Deck Load with provision for concrete pavers



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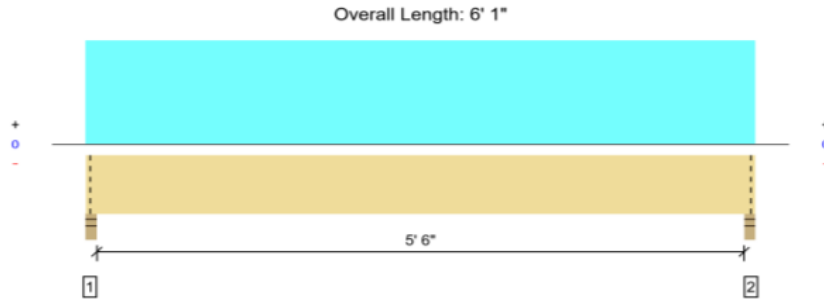
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1st Floor Framing

Beam 1B7

FORTE MEMBER REPORT 1st FLOOR, 1B7
1 piece(s) 4 x 10 Douglas Fir-Larch No. 2

PASSED



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)	1614 @ 2"	7656 (3.50")	Passed (21%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1050 @ 1' 3/4"	3885	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2193 @ 3' 1/2"	4492	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.022 @ 3' 1/2"	0.192	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.035 @ 3' 1/2"	0.287	Passed (L/999+)	--	1.0 D + 1.0 L (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).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 1" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

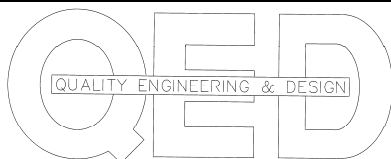
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - DF	3.50"	3.50"	1.50"	610	1004	1614	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.50"	610	1004	1614	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 1"	N/A	8.2		
1 - Uniform (PSF)	0 to 6' 1" (Front)	5' 6"	35.0	60.0	Deck Load with provision for concrete pavers

Member Notes

Deck Beam, North end over stairs



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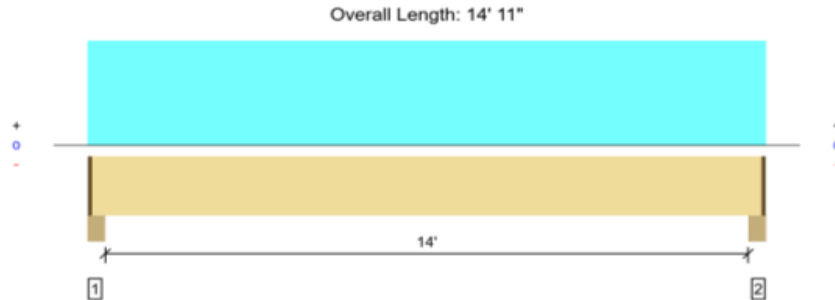
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1st Floor Framing

Beam 1B8

FORTE MEMBER REPORT 1st FLOOR, 1B8
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL

PASSED



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)	5409 @ 4"	13945 (4.25")	Passed (39%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4421 @ 1' 5 3/8"	12053	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	18669 @ 7' 5 1/2"	29854	Passed (63%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.340 @ 7' 5 1/2"	0.356	Passed (L/503)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.500 @ 7' 5 1/2"	0.712	Passed (L/342)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Rush Beam
 Building Use : Residential
 Building Code : IBC2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 9" o/c unless detailed otherwise.

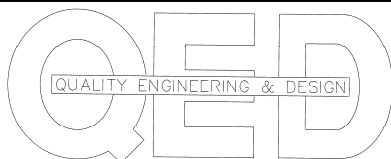
Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - DF	550"	4.25"	1.65"	1754	3729	5483	1 1/4" Rim Board
2 - Column - DF	550"	4.25"	1.65"	1754	3729	5483	1 1/4" Rim Board

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 14' 9 3/4"	N/A	19.5		
1 - Uniform (PSF)	0 to 14' 11" (Front)	8'	12.0	40.0	Residential - Living Areas
2 - Uniform (PSF)	0 to 14' 11" (Front)	3'	40.0	60.0	Deck area- Contingency for concrete tile

Member Notes

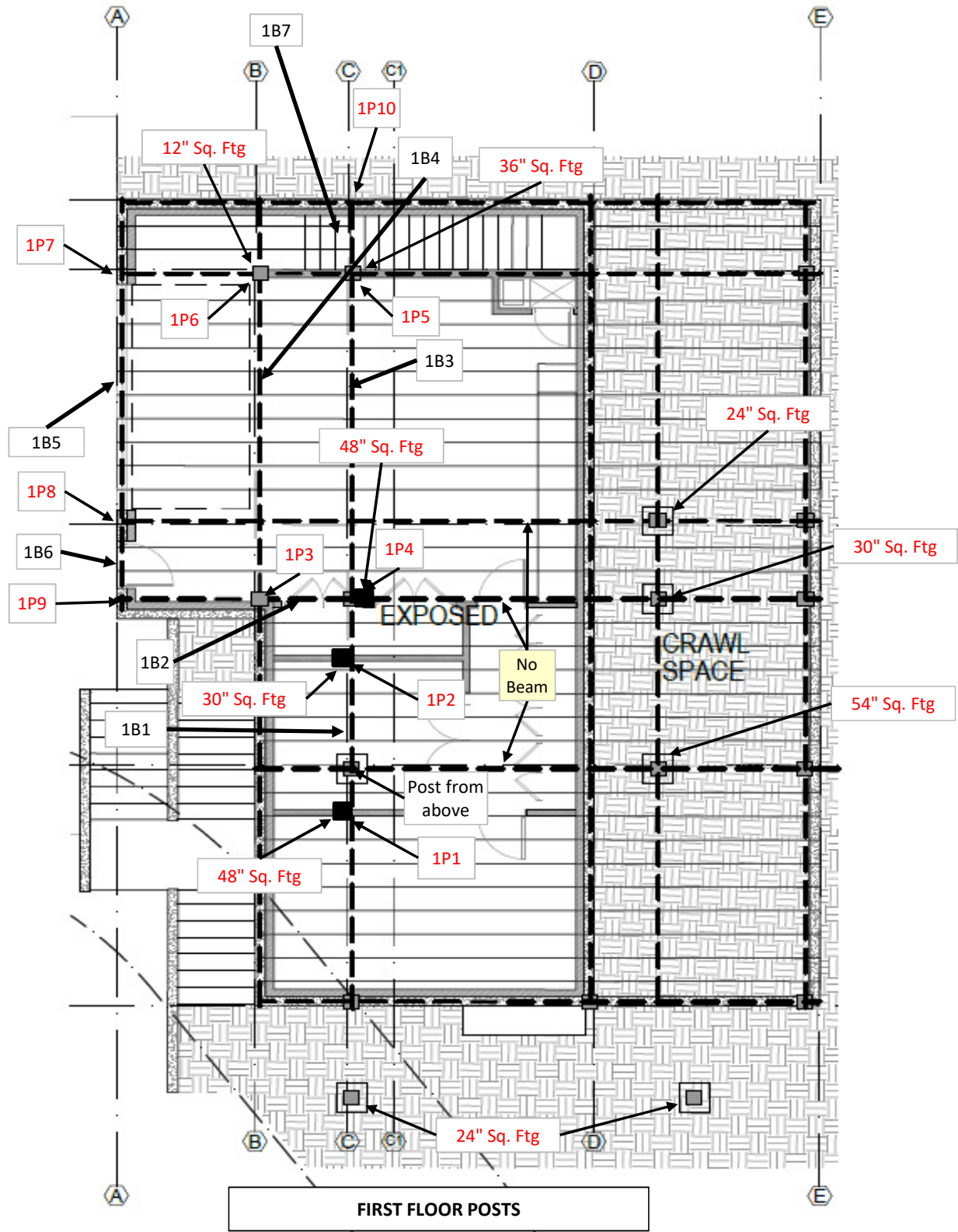
Supports Floor Joists on Main Floor



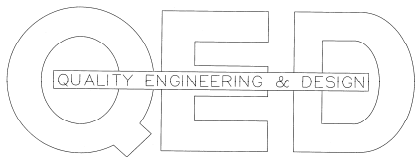
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1st Floor Posts



FIRST FLOOR POSTS

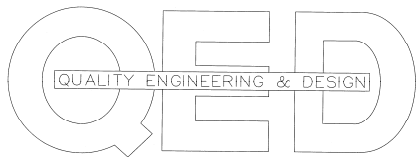


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1st Floor Posts

BEAM ID	POST ID	POST SIZE	HANGER TYPE	NOTES
1B1	1P1	5-1/4 x 5-1/4 PSL	EG9	18,711 lb.
	1P2	6x6 D-Fir		8000
1B2	1P3	5-1/4 x 7 PSL		27,000 lb.
	1P4	5-1/4 x 5-1/4 PSL		20000 lb.
1B3				18697
	1P5	6x6 D-Fir		12,500 lb.
1B4	1P6	6x6 D-Fir		12,000
1B5	1P7	4x6 D-Fir		4000
	1P8	4x6 D-Fir		5,000 lb.
1B6	1P9	4x4 D-Fir		1,000 lb.
1B7	1P10	4x4 D-Fir	1,700 lb.	



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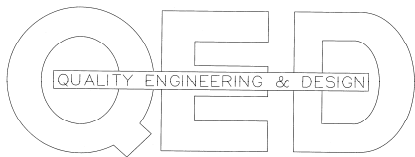
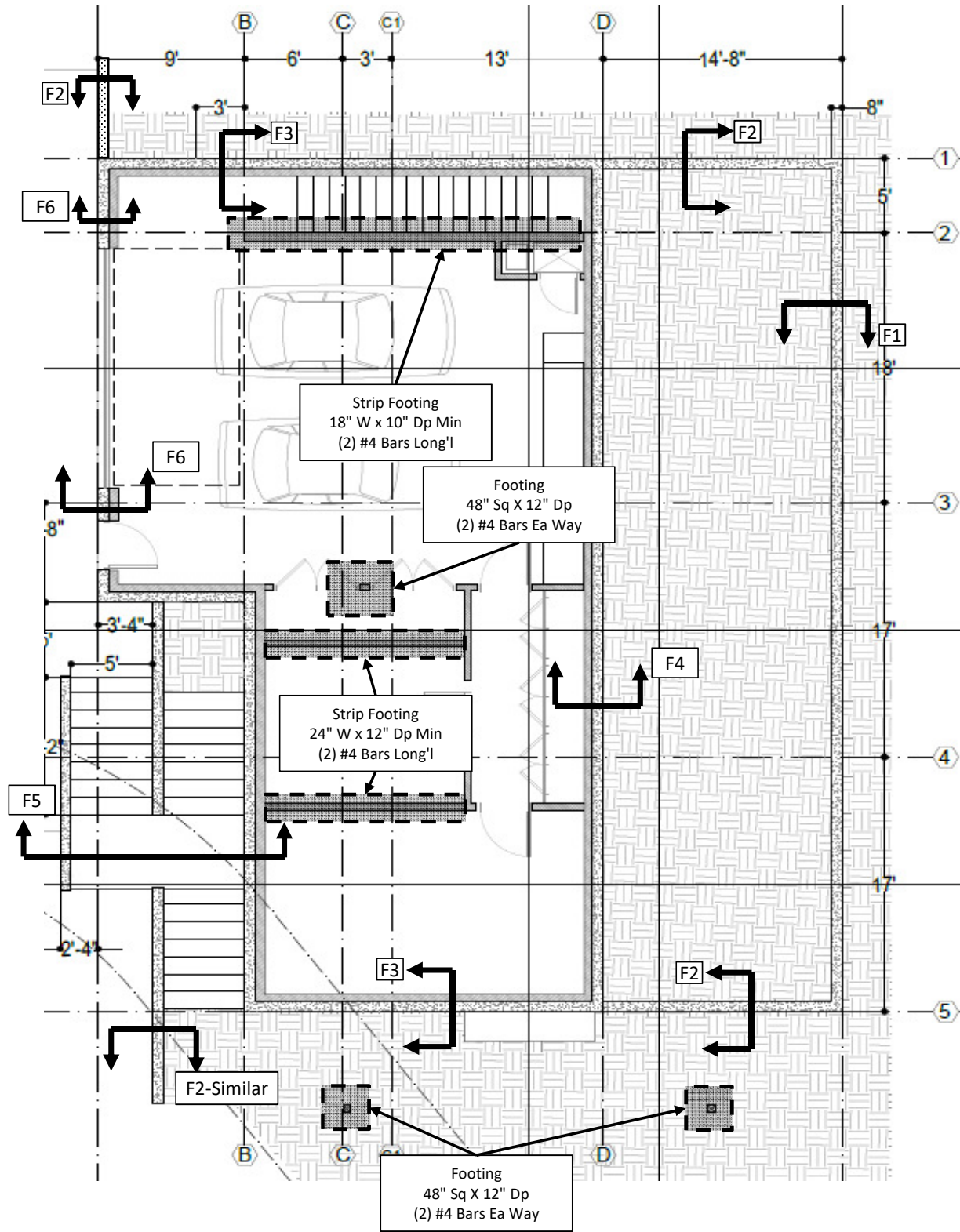
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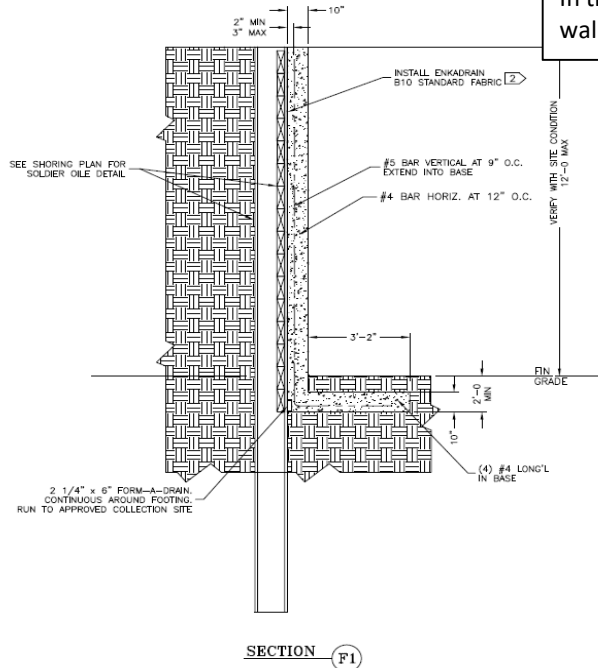
Foundation Plan



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Foundation Wall F1



NOTE:

In this area all lateral soil pressure is resisted by soldier pile wall. Concrete wall only supports lateral seismic force = 7H

$$\text{Retained Soil Height, } H_{\text{soil}} = 0 \text{ Ft.}$$

$$\text{Stem Wall Height, } H_{\text{wall}} = 12.5 \text{ Ft.}$$

$$\text{Stem Wall Width, } w_{\text{stem}} = 10 \text{ in.}$$

$$W_{\text{stem}} = 0.83 \text{ Ft.}$$

$$\text{Width of Base, } W_{\text{base}} = 4 \text{ Ft.}$$

$$\text{Base thickness, } t_{\text{base}} = 10 \text{ in.}$$

$$T_{\text{base}} = 0.83333 \text{ Ft.}$$

$$\text{Dist Toe to Face, } X_{\text{toe}} = 38 \text{ in.}$$

$$X_{\text{toe}} = 3.16667 \text{ Ft.}$$

$$\text{Heel width, } X_{\text{heel}} = 0.00 \text{ Ft.}$$

$$\text{Unit Weight of Soil, } D_{\text{soil}} = 90 \text{ Lb./Ft}^3$$

$$\text{Unit Weight of Concrete, } D_{\text{conc}} = 150 \text{ Lb./Ft}^3$$

$$\text{Wall Embed, } H_{\text{embed}} = 0.83 \text{ Ft}$$

Weight / C.G.

$$\text{Concrete Wall Weight} = [(W_{\text{stem}} \times (H_{\text{wall}} + H_{\text{embed}})) + (W_{\text{base}} \times T_{\text{base}})] \times D_{\text{conc}} = 2166.67 \text{ Lb. per Lineal Foot}$$

$$\text{Weight of Soil over Heel} = (X_{\text{heel}} \times [H_{\text{soil}} + H_{\text{embed}}]) \times D_{\text{soil}} = 0 \text{ Lb. per Lineal Foot}$$

$$\text{C.G. of Concrete, } X_{\text{barConc}} = \frac{(W_{\text{stem}} \times H_{\text{conc}})(W_{\text{stem}}/2 + X_{\text{toe}}) + (W_{\text{base}} \times T_{\text{base}})(W_{\text{base}}/2)}{(W_{\text{stem}} \times H_{\text{conc}}) + (W_{\text{base}} \times T_{\text{base}})} = 3.20 \text{ Ft}$$

$$\text{C.G. of Soil, } X_{\text{barSoil}} = (X_{\text{heel}}/2) + W_{\text{stem}} + X_{\text{toe}} = 4.00 \text{ Ft.}$$

Lateral Pressure:

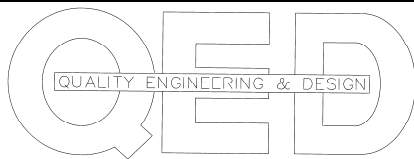
$$\text{For equivalent fluid pressure, } D_{\text{fluid}}, \text{ of } 0 \text{ Lb. per cubic foot (pcf)}$$

$$\text{Surcharge Pressure, } P_{\text{surch}} = 84 \text{ 7H lb. per Sq.Ft. (seismic surcharge, uniform)}$$

$$E_a = \frac{D_{\text{fluid}} \times H_{\text{soil}}^2}{2} + P_{\text{surch}} \times H = 1008 \text{ Soil Force, Lb per Lin Ft}$$

Considering pressure as fluid pressure:

$$E_h = E_a = 1008 \text{ Horizontal component of pressure}$$



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Foundation Wall F1

Overturning Moment:

$$\text{Moment in Stem Wall, } M_{ot} = E_n \times (H_{wall} / 2) = 6048 \text{ Ft. Lb.}$$

$$\text{Resisting Moment, } M_{resist} = (W_{wall})(X_{barConc}) + (W_{soil})(X_{barSoil}) = 6932.24 \text{ Ft. Lb.}$$

$$\frac{M_{resist}}{M_{OT}} = 1.15 > 1.1 ; \text{OK per IBC 1807.2.3}$$

Vertical Reinforcing Steel:

$$f'_c = 2500 \text{ psi, compressive strength}$$

$$E_c = 57000vf'_c = 2850000 \text{ psi, Elastic Modulus for concrete}$$

$$F_{ySteel} = 60,000 \text{ psi, yield strength for steel (A615 Gr. 60)}$$

$$F_{aSteel} = 20,000 \text{ psi, allowable stress for steel}$$

$$d = w_{stem} - 3 = 7 \text{ in.}$$

$$b = 12 \text{ in., Unit length of wall}$$

Ultimate Strength Design for Cantilever Wall:

$$\text{Design Moment} = 1.6 \times M_{ot} = 1.6 \times 6048 = 9676.8 \text{ Ft.Lb.}$$

$$\beta_1 = 0.85 \text{ for } f'_c < 4000$$

$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{ySteel}} \times \frac{87000}{87000 + f_{ySteel}} = 0.01782$$

$$\text{Min Value for } \rho_b = 200 / F_{ySteel} = 0.00333$$

$$\text{Max Value for } \rho_b = 0.75\rho_b = 0.013$$

$$\text{Max Reinforcing Steel, } A_{sMax} = (0.75)(\rho_b)(b)(d) = 1.122 \text{ in}^2$$

$$\text{Rebar Size} = \#5 \quad \text{Cross Section} = 0.31 \text{ in}^2$$

$$\text{Rebar Spacing} = 9 \text{ in.}$$

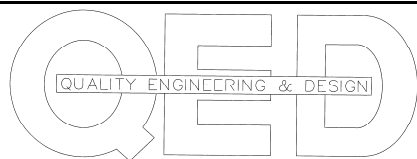
$$\text{Rebar Area per Foot} = 0.41333 \text{ in}^2 \text{ per Foot}$$

$$a = \frac{(A_s)(f_{ySteel})}{(0.85)(f'_c)(b)} = 0.973$$

Moment capability for Stem Wall:

$$M_u = 0.9[(A_s)(f_{ySteel})(d - a/2)] = 145,386 \text{ in.Lb.} \quad (= 12115.5 \text{ Ft.Lb.})$$

OK. Larger than Required Moment



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Foundation Wall F1

Reinforcing Steel in Base:

$$d = w_{\text{stem}} - 3 = 7 \text{ in.}$$
$$b = 12 \text{ in., Unit length of base}$$

Ultimate Strength Design for Base:

$$\beta_1 = 0.85 \text{ for } f'_c < 4000$$
$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{y\text{Steel}}} \times \frac{87000}{87000 + f_{y\text{Steel}}} = 0.01782$$

$$\text{Min Value for } \rho_b = 200 / F_{y\text{Steel}} = 0.00333$$

$$\text{Max Value for } \rho_b = 0.75\rho_b = 0.013$$

$$\text{Max Reinforcing Steel, } A_{s\text{Max}} = (0.75)(\rho_b)(b)(d) = 1.122 \text{ in}^2$$

$$\text{Rebar Size} = \#5 \quad \text{Cross Section} = 0.31 \text{ in}^2$$
$$\text{Rebar Spacing} = 9 \text{ in.}$$

$$\text{Rebar Area per Foot} = 0.41333 \text{ in}^2 \text{ per Foot}$$

$$a = \frac{(A_s)(f_{y\text{Steel}})}{(0.85)(f'_c)(b)} = 0.973$$

Moment capability for Base:

$$M_u = 0.9[(A_s)(f_{y\text{Steel}})(d - a/2)] = 145,386 \text{ in.lb.} \quad (= 12115.5 \text{ Ft.Lb.})$$

OK. Larger than Required Moment

Shear Capability at footing/wall shear plane per ACI 318 Section 11.6:

$$\text{Unit Shear Force} = 1.6 \times V_u = 1612.8 \text{ Lb. per Ft.} \quad (= 1.6 \times E_n \text{ from previous pages})$$

$$\text{For vertical bars: } V_n = (A_{vf})(f_y)(\mu) = 14880 \text{ lb. per Ft.}$$

Where:

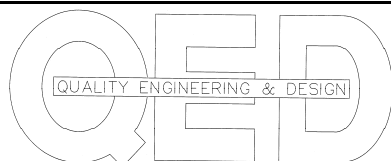
$$A_{vf} = 0.41333 \text{ in}^2 \text{ per Foot}$$
$$f_y = 60,000$$
$$\mu = 0.6 \times \lambda = 0.6$$
$$\lambda = 1 \text{ for normal weight concrete}$$

$$\text{Max } V_n \text{ shall not exceed: } 0.2f'_c A_c = 60000 \quad \text{OR} \quad 800 A_c = 96000$$

$$\Phi V_n = (0.75)(14880) = 11160 \quad \text{OK, Larger than Required Shear Force, } V_u$$

Where: $\Phi = 0.75$ (Section 9.3.2.3)

$$V_n = 14880 \text{ Min of } (A_{vf})(f_y)(\mu) \text{ OR } (0.2f'_c A_c) \text{ OR } (800 A_c)$$



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Foundation Wall F1

Sliding Resistance:

$R_{\text{passive}} = 300$ Passive Soil Resistance is equivalent to a fluid of density 300 pcf

$\mu_f = 0.35$ Friction Factor against soil

Per Geotech report, these values

$E_h = 1008$ Lb. per Ft. Horizontal Load (see previous pages)

$W_{\text{wall}} = 2166.67$ Lb. per Ft. Wall Weight (see previous pages)

Friction Force, $F_f = \mu_f \times W_{\text{wall}} = 758.333$ Lb. per Foot of wall

Net force to be resisted by wall embedment = $E_{h\text{Net}} = E_h - F_f = 249.667$ Lb. per Lineal Foot

Passive Resistance:

Resisting pressure at bottom of footing embed = $R_{\text{passive}} \times D$ (where D = embed depth)

Average pressure from top to bottom of embed = $(R_{\text{passive}} \times D) / 2$

Resistive force per foot of wall length = $[(R_{\text{passive}} \times D) / 2] \times D$

Solving for "D" required to equal the applied force:

$$D = \text{SQRT} \left[\frac{(2)(E_{h\text{Net}})}{R_{\text{passive}}} \right] = 1.3 \text{ Ft., Minimum embed depth to resist sliding}$$

Foundation Wall F1

Overturning Soil Pressure:

O.T. Moment = 6048 Ft. Lb. per Lineal Foot
Resisting Moment = -6932.2 Ft. Lb. per Lineal Foot
Net Moment, M_{net} = -884.24 Ft. Lb. per Lineal Foot

$$P_{vert} = W_{conc} + W_{soil} + (P_{surch} \times W_{heel}) = 2166.67 \text{ Lb. per Lineal Foot}$$

Ref [6], Page 8-78

$$L_{net} = \frac{|M_{net}|}{P_{vert}} = 0.41 \text{ Ft.}$$

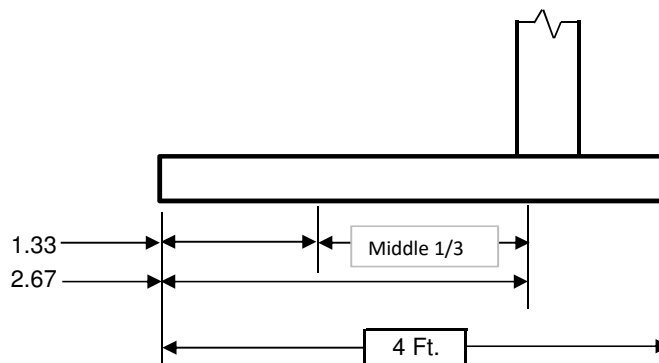
$$\text{Bearing Pressure} = \frac{P_{vert}}{A} \left(1 \pm 6e/L \right) = 1835.08 \text{ psf}$$

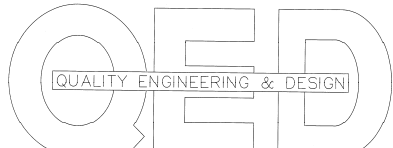
$$P_{vert} = 2166.67 \text{ Lb.}$$

$$A = 4 \text{ Ft}^2 \text{ (Area of Base at 1' Wide)}$$

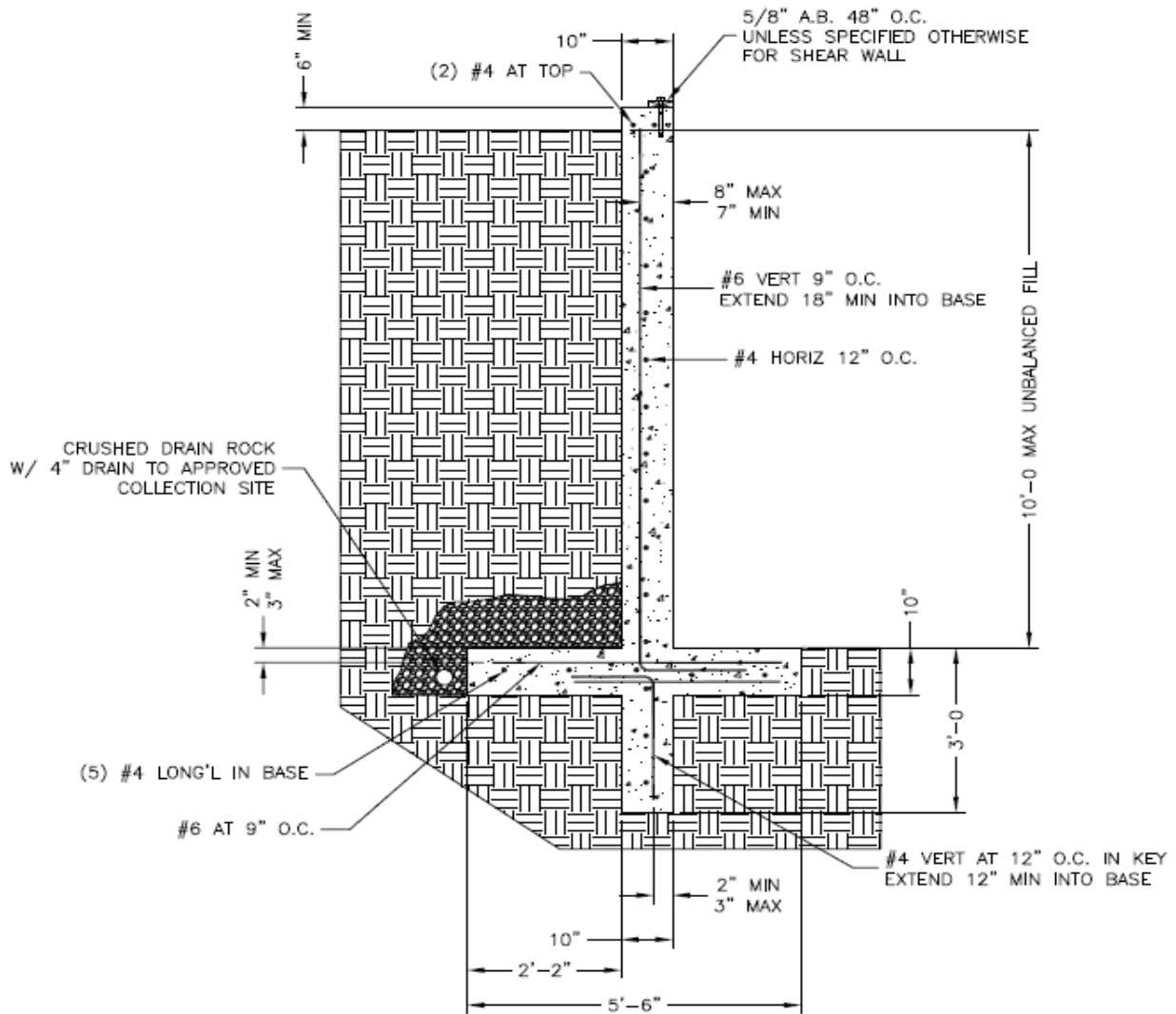
$$L = 4 \text{ Ft. Length of Base}$$

$$e = 1.59 \text{ Ft.}$$



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Foundation Wall F2



SECTION F2

USE FOR UP TO 10'-0" RETAINED EARTH
WITH NO BACKSLOPE
SCALE: NONE

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Foundation Wall F2

Retained Soil Height, $H_{soil} = 10$ Ft.

Stem Wall Height, $H_{wall} = 10.5$ Ft.

Stem Wall Width, $w_{stem} = 10$ in.

$W_{stem} = 0.83$ Ft.

Width of Base, $W_{base} = 5.5$ Ft.

Base thickness, $t_{base} = 10$ in.

$T_{base} = 0.83333$ Ft.

Dist Toe to Face, $x_{toe} = 30$ in.

$X_{toe} = 2.5$ Ft.

Heel width, $X_{heel} = 2.17$ Ft. 26 in.

Unit Weight of Soil, $D_{soil} = 90$ Lb./Ft³

Unit Weight of Concrete, $D_{conc} = 150$ Lb./Ft³

Wall Embed, $H_{embed} = 1.17$ Ft (not including key)

Weight / C.G.

Concrete Wall Weight = $[(W_{stem} \times (H_{wall} + H_{embed})) + (W_{base} \times T_{base})] \times D_{conc} = 2145.83$ Lb. per Lineal Foot

Weight of Soil over Heel = $(X_{heel} \times [H_{soil} + H_{embed}]) \times D_{soil} = 2177.5$ Lb. per Lineal Foot

$$\text{C.G. of Concrete, } X_{barConc} = \frac{(W_{stem} \times H_{conc})(W_{stem}/2 + X_{toe}) + (W_{base} \times T_{base})(W_{base}/2)}{(W_{stem} \times H_{conc}) + (W_{base} \times T_{base})} = 2.86 \text{ Ft}$$

$$\text{C.G. of Soil, } X_{barSoil} = (X_{heel}/2) + W_{stem} + X_{toe} = 4.42 \text{ Ft.}$$

Lateral Pressure:

For equivalent fluid pressure, D_{fluid} , of 40 Lb. per cubic foot (pcf)

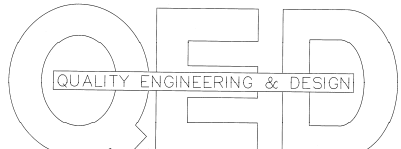
Seismic Surcharge Pressure, $P_{seis} = 0$ x H PSF (see following pages for seismic)

Surcharge Pressure, $P_{surch} = 0$ lb. per Sq.Ft. (level, or terraced back fill)

$$E_a = \frac{D_{fluid} \times H_{soil}^2}{2} + P_{surch} = 2000 \text{ Soil Force, Lb per Lin Ft}$$

Considering pressure as fluid pressure:

$$E_n = E_a + (P_{seis} \times H^2) / 2 = 2000 \text{ Horizontal component of pressure (including seismic surcharge)}$$

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Foundation Wall F2

Overturning Moment:

$$\text{Moment in Stem Wall, } M_{ot} = E_H \times [(H_{soil} / 3) + H_{embed}] = 9000 \text{ Ft. Lb.}$$

$$\text{Resisting Moment, } M_{resist} = (W_{wall})(X_{barConc}) + (W_{soil})(X_{barSoil}) = 15753 \text{ Ft. Lb.}$$

$$\frac{M_{resist}}{M_{OT}} = 1.75 > 1.5 ; \text{OK}$$

Vertical Reinforcing Steel:

$$f'_c = 2500 \text{ psi, compressive strength}$$

$$E_c = 57000vf'_c = 2.9E+06 \text{ psi, Elastic Modulus for concrete}$$

$$F_{ySteel} = 60,000 \text{ psi, yield strength for steel (A615 Gr. 60)}$$

$$F_{aSteel} = 20,000 \text{ psi, allowable stress for steel}$$

$$d = w_{stem} - 3 = 7 \text{ in.}$$

$$b = 12 \text{ in., Unit length of wall}$$

Ultimate Strength Design for Cantilever Wall:

$$\text{Design Moment} = 1.6 \times M_{ot} = 1.6 \times 9000 = 14400 \text{ Ft.Lb.}$$

$$\beta_1 = 0.85 \text{ for } f'_c < 4000$$

$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{ySteel}} \times \frac{87000}{87000 + f_{ySteel}} = 0.01782$$

$$\text{Min Value for } \rho_b = 200 / F_{ySteel} = 0.00333$$

$$\text{Max Value for } \rho_b = 0.75\rho_b = 0.013$$

$$\text{Max Reinforcing Steel, } A_{sMax} = (0.75)(\rho_b)(b)(d) = 1.122 \text{ in}^2$$

$$\text{Rebar Size} = \#6 \quad \text{Cross Section} = 0.44 \text{ in}^2$$

$$\text{Rebar Spacing} = 9 \text{ in.}$$

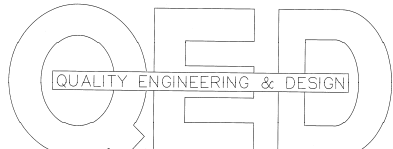
$$\text{Rebar Area per Foot} = 0.58667 \text{ in}^2 \text{ per Foot}$$

$$a = \frac{(A_s)(f_{ySteel})}{(0.85)(f'_c)(b)} = 1.380$$

Moment capability for Stem Wall:

$$M_u = 0.9[(A_s)(f_{ySteel})(d - a/2)] = 199,895 \text{ in.lb.} \quad (= 16657.9 \text{ Ft.Lb.})$$

OK. Larger than Required Moment

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Foundation Wall F2

Reinforcing Steel in Base:

$$d = w_{\text{stem}} - 3 = 7 \text{ in.}$$
$$b = 12 \text{ in., Unit length of base}$$

Ultimate Strength Design for Base:

$$\beta_1 = 0.85 \text{ for } f'_c < 4000$$
$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{y\text{Steel}}} \times \frac{87000}{87000 + f_{y\text{Steel}}} = 0.01782$$

$$\text{Min Value for } \rho_b = 200 / F_{y\text{Steel}} = 0.00333$$

$$\text{Max Value for } \rho_b = 0.75\rho_b = 0.013$$

$$\text{Max Reinforcing Steel, } A_{s\text{Max}} = (0.75)(\rho_b)(b)(d) = 1.122 \text{ in}^2$$

$$\text{Rebar Size} = \#6 \quad \text{Cross Section} = 0.44 \text{ in}^2$$
$$\text{Rebar Spacing} = 9 \text{ in.}$$

$$\text{Rebar Area per Foot} = 0.58667 \text{ in}^2 \text{ per Foot}$$

$$a = \frac{(A_s)(f_{y\text{Steel}})}{(0.85)(f'_c)(b)} = 1.380$$

Moment capability for Base:

$$M_u = 0.9[(A_s)(f_{y\text{Steel}})(d - a/2)] = 199,895 \text{ in.lb.} \quad (= 16657.9 \text{ Ft.Lb.})$$

OK. Larger than Required Moment

Shear Capability at footing/wall shear plane per ACI 318 Section 11.6:

$$\text{Unit Shear Force} = 1.6 \times V_u = 3200 \text{ Lb. per Ft.} \quad (= 1.6 \times E_n \text{ from previous pages})$$

$$\text{For vertical bars: } V_n = (A_{vf})(f_y)(\mu) = 21120 \text{ lb. per Ft.}$$

Where:

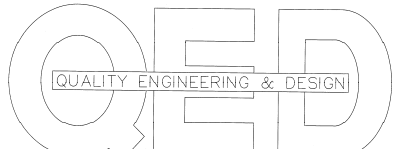
$$A_{vf} = 0.58667 \text{ in}^2 \text{ per Foot}$$
$$f_y = 60,000$$
$$\mu = 0.6 \times \lambda = 0.6$$
$$\lambda = 1 \text{ for normal weight concrete}$$

$$\text{Max } V_n \text{ shall not exceed: } 0.2f'_c A_c = 60000 \quad \text{OR} \quad 800 A_c = 96000$$

$$\Phi V_n = (0.75)(21120) = 15840 \quad \text{OK, Larger than Required Shear Force, } V_u$$

Where: $\Phi = 0.75$ (Section 9.3.2.3)

$$V_n = 21120 \text{ Min of } (A_{vf})(f_y)(\mu) \text{ OR } (0.2f'_c A_c) \text{ OR } (800 A_c)$$

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Foundation Wall F2

Bending in Footing Key

Force at Base = Eh = 2000 Lb. per lineal ft.

Moment in Key = 2000 x (3 / 2) = 3000 Ft.Lb.

Design Moment = 1.6 x 3000 = 4800 Ft.Lb. (LRFD equivalent)

Key Thickness, t = 10 in.

d = t-3 = 7 in.

b = 12 in.

unit length

$\beta_1 = 0.85$ for $f'_c < 4000$

$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{y\text{Steel}}} \times \frac{87000}{87000 + f_{y\text{Steel}}} = 0.01782$$

Min Value for $\rho_b = 200 / F_{y\text{Steel}} = 0.00333$

Max Value for $\rho_b = 0.75\rho_b = 0.013$

Max Reinforcing Steel, $A_{s\text{Max}} = (0.75)(\rho_b)(b)(d) = 1.122 \text{ in}^2$

Rebar Size = #4 Cross Section = 0.2 in²

Rebar Spacing = 12 in.

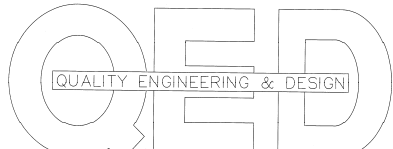
Rebar Area per Foot = 0.2 in² per Foot

$$a = \frac{(A_s)(f_{y\text{Steel}})}{(0.85)(f'_c)(b)} = 0.471$$

Moment capability for Stem Wall:

$$M_u = 0.9[(A_s)(f_{y\text{Steel}})(d - a/2)] = 73,059 \text{ in.lb.} \quad (= 6088.2 \text{ Ft.Lb.})$$

OK. Larger than Required Moment

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Foundation Wall F2

Sliding Resistance:

$R_{\text{passive}} = 300$ Passive Soil Resistance is equivalent to a fluid of density 300 pcf

$\mu_f = 0.35$ Friction Factor against soil

Per Geotech report, these values

$E_h = 2000$ Lb. per Ft. Horizontal Load (see previous pages)

$W_{\text{wall}} = 2145.83$ Lb. per Ft. Wall Weight (see previous pages)

Friction Force, $F_f = \mu_f \times W_{\text{wall}} = 751.042$ Lb. per Foot of wall

Net force to be resisted by wall embedment = $E_{h\text{Net}} = (E_h) - F_f = 1248.96$ Lb. per Lineal Foot

Passive Resistance:

Resisting pressure at bottom of footing embed = $R_{\text{passive}} \times D$ (where D = embed depth)

Average pressure from top to bottom of embed = $(R_{\text{passive}} \times D) / 2$

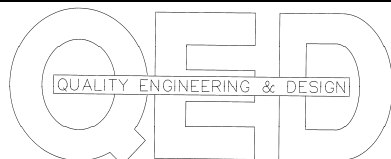
Resistive force per foot of wall length = $[(R_{\text{passive}} \times D) / 2] \times D$

Solving for "D" required to equal the applied force:

$$D = \text{SQRT} \left[\frac{(2)(E_{h\text{Net}})}{R_{\text{passive}}} \right] = 2.9 \text{ Ft., Minimum embed depth to resist sliding}$$
$$= 34.6 \text{ in., Minimum}$$

Actual Embed = 3 Ft.

= 36.0 in.



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Foundation Wall F2

Overturning Soil Pressure:

O.T. Moment = 9000 Ft. Lb. per Lineal Foot
Resisting Moment = -15753 Ft. Lb. per Lineal Foot
Net Moment, M_{net} = -6753 Ft. Lb. per Lineal Foot

$$P_{vert} = W_{conc} + W_{soil} + (P_{surch} \times W_{heel}) = 4323.33 \text{ Lb. per Lineal Foot}$$

Ref [6], Page 8-78

$$L_{net} = \frac{|M_{net}|}{P_{vert}} = 2.00 \text{ Ft.}$$

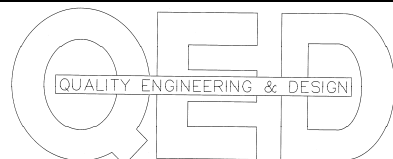
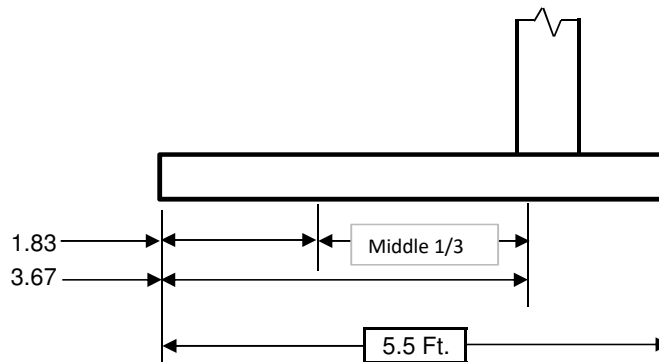
$$\text{Bearing Pressure} = \frac{P_{vert}}{A} \left(1 \pm \frac{6e}{L} \right) = 1429.2 \text{ psf}$$

$$P_{vert} = 4323.33 \text{ Lb.}$$

$$A = 5.5 \text{ Ft}^2 \text{ (Area of Base at 1' Wide)}$$

$$L = 5.5 \text{ Ft. Length of Base}$$

$$e = 0.75 \text{ Ft.}$$



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Foundation Wall F2

Check Overturning and sliding with additional seismic load = 7H uniform
Per IBC Section 1807.2.3, safety factor can be reduced to 1.1 for seismic loading

Lateral Pressure including Seismic:

Lateral Sol Pressure = 2000 psf, triangular load distribution (see previous pages)

Earthquake Lateral pressure = $7 \times H = 7 \times 10 = 70$ psf, uniform load distribution
Force on Unit width = $P \times 1 \times H = (70)(10) = 700$ Lb.

Overturning:

Moment due to Seismic = $F_{\text{seismic}} \times H/2 = (700)(10/2) = 3500$ Ft.Lb.

Total Overturning Moment = $M_{\text{soil}} + M_{\text{EQ}} = 9000 + 3500 = 12500$ Ft.Lb.

Resisting moment = 15753 Ft.Lb. (see previous pages)

Safety Factor on Overturning = $\frac{\text{Resisting Moment}}{\text{Overturning Mom}} = 1.26$ **OK. Greater than 1.1**

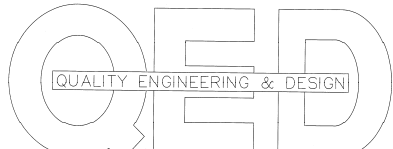
Sliding

Total Sliding Force = $2000 + 700 = 2700$ lb.

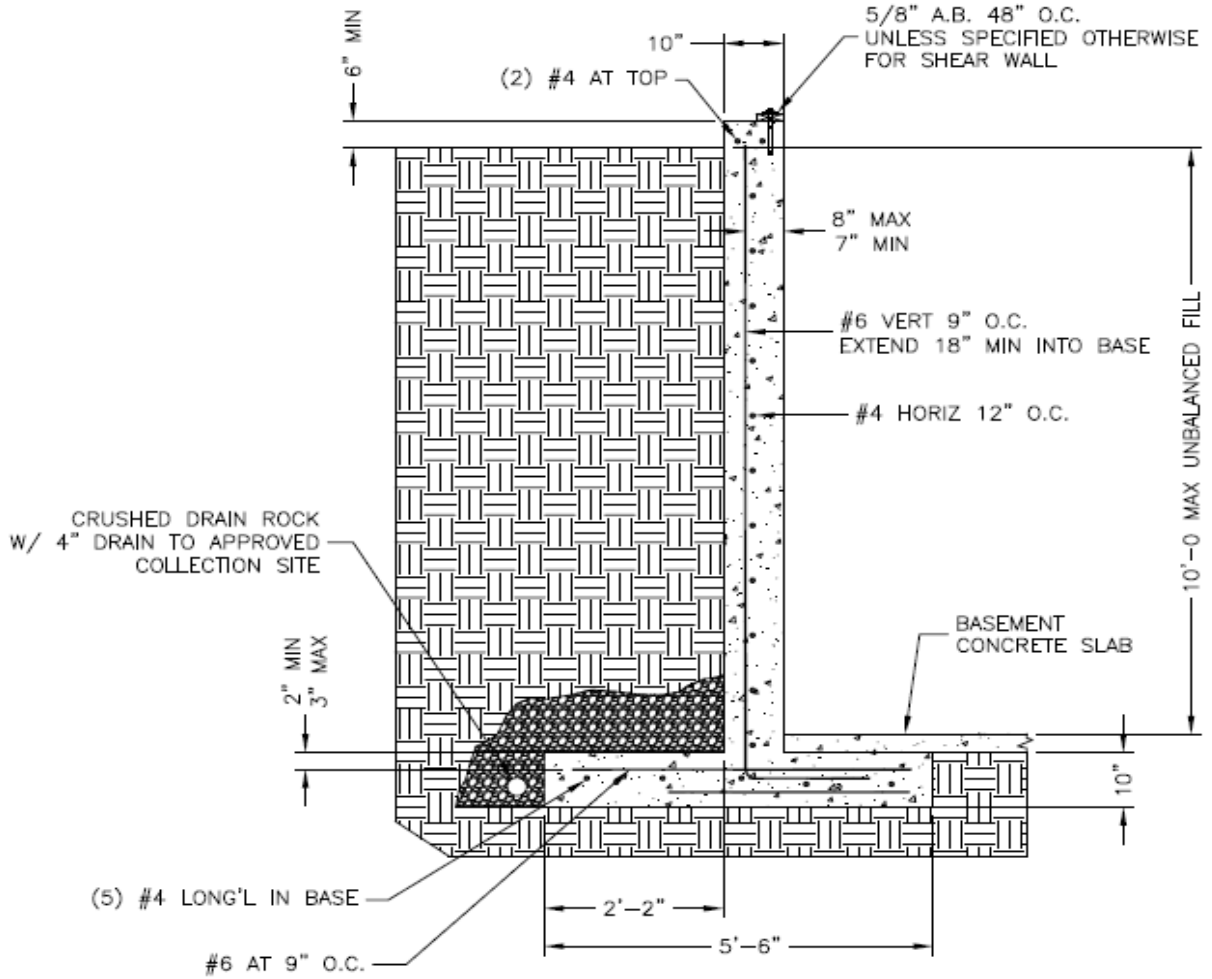
Total Resisting Force = Friction + Embed = $\mu_f \times W_{\text{wall}} + [(R_{\text{passive}} \times D) / 2] \times D \times 1.5 = 3151.56$ lb.

multiplied resisting force by 1.5 since values on previous page include SF = 1.5

Safety Factor on Sliding = $\frac{F_{\text{resist}}}{F_{\text{sliding}}} = 1.17$ **OK. Greater than 1.1**

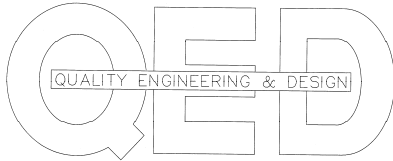
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Foundation Wall F3



SECTION F3

USE FOR UP TO 10'-0" RETAINED EARTH WITH NO BACKSLOPE
SCALE: NONE

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Foundation Wall F3

Retained Soil Height, $H_{soil} = 10$ Ft.
 Stem Wall Height, $H_{wall} = 10.5$ Ft.
 Stem Wall Width, $w_{stem} = 10$ in.
 $W_{stem} = 0.83$ Ft.
 Width of Base, $W_{base} = 5.5$ Ft.
 Base thickness, $t_{base} = 10$ in.
 $T_{base} = 0.83333$ Ft.

Dist Toe to Face, $x_{toe} = 30$ in.
 $X_{toe} = 2.5$ Ft.
 Heel width, $X_{heel} = 2.17$ Ft. 26 in.

Unit Weight of Soil, $D_{soil} = 90$ Lb./Ft³
 Unit Weight of Concrete, $D_{conc} = 150$ Lb./Ft³

Wall Embed, $H_{embed} = 1.17$ Ft (not including key)

Weight / C.G.

Concrete Wall Weight = $[(W_{stem} \times (H_{wall} + H_{embed})) + (W_{base} \times T_{base})] \times D_{conc} = 2145.83$ Lb. per Lineal Foot
 Weight of Soil over Heel = $(X_{heel} \times [H_{soil} + H_{embed}]) \times D_{soil} = 2177.5$ Lb. per Lineal Foot

$$\text{C.G. of Concrete, } X_{barConc} = \frac{(W_{stem} \times H_{conc})(W_{stem}/2 + X_{toe}) + (W_{base} \times T_{base})(W_{base}/2)}{(W_{stem} \times H_{conc}) + (W_{base} \times T_{base})} = 2.86 \text{ Ft}$$

$$\text{C.G. of Soil, } X_{barSoil} = (X_{heel}/2) + W_{stem} + X_{toe} = 4.42 \text{ Ft.}$$

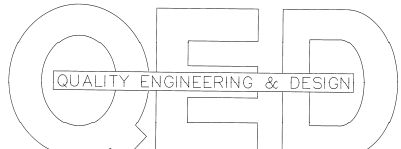
Lateral Pressure:

For equivalent fluid pressure, D_{fluid} , of 40 Lb. per cubic foot (pcf)
 Seismic Surcharge Pressure, $P_{seis} = 0$ x H PSF (see following pages for seismic)
 Surcharge Pressure, $P_{surch} = 0$ lb. per Sq.Ft. (level, or terraced back fill)

$$E_a = \frac{D_{fluid} \times H_{soil}^2}{2} + P_{surch} = 2000 \text{ Soil Force, Lb per Lin Ft}$$

Considering pressure as fluid pressure:

$$E_n = E_a + (P_{seis} \times H^2) / 2 = 2000 \text{ Horizontal component of pressure (including seismic surcharge)}$$

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Foundation Wall F3

Overturning Moment:

$$\text{Moment in Stem Wall, } M_{ot} = E_H \times [(H_{soil} / 3) + H_{embed}] = 9000 \text{ Ft. Lb.}$$

$$\text{Resisting Moment, } M_{resist} = (W_{wall})(X_{barConc}) + (W_{soil})(X_{barSoil}) = 15753 \text{ Ft. Lb.}$$

$$\frac{M_{resist}}{M_{OT}} = 1.75 > 1.5 ; \text{OK}$$

Vertical Reinforcing Steel:

$$f'_c = 2500 \text{ psi, compressive strength}$$

$$E_c = 57000vf'_c = 2.9E+06 \text{ psi, Elastic Modulus for concrete}$$

$$F_{ySteel} = 60,000 \text{ psi, yield strength for steel (A615 Gr. 60)}$$

$$F_{aSteel} = 20,000 \text{ psi, allowable stress for steel}$$

$$d = w_{stem} - 3 = 7 \text{ in.}$$

$$b = 12 \text{ in., Unit length of wall}$$

Ultimate Strength Design for Cantilever Wall:

$$\text{Design Moment} = 1.6 \times M_{ot} = 1.6 \times 9000 = 14400 \text{ Ft.Lb.}$$

$$\beta_1 = 0.85 \text{ for } f'_c < 4000$$

$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{ySteel}} \times \frac{87000}{87000 + f_{ySteel}} = 0.01782$$

$$\text{Min Value for } \rho_b = 200 / F_{ySteel} = 0.00333$$

$$\text{Max Value for } \rho_b = 0.75\rho_b = 0.013$$

$$\text{Max Reinforcing Steel, } A_{sMax} = (0.75)(\rho_b)(b)(d) = 1.122 \text{ in}^2$$

$$\text{Rebar Size} = \#6 \text{ Cross Section} = 0.44 \text{ in}^2$$

$$\text{Rebar Spacing} = 9 \text{ in.}$$

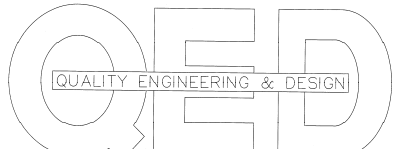
$$\text{Rebar Area per Foot} = 0.58667 \text{ in}^2 \text{ per Foot}$$

$$a = \frac{(A_s)(f_{ySteel})}{(0.85)(f'_c)(b)} = 1.380$$

Moment capability for Stem Wall:

$$M_u = 0.9[(A_s)(f_{ySteel})(d - a/2)] = 199,895 \text{ in.lb. } (= 16657.9 \text{ Ft.Lb.})$$

OK. Larger than Required Moment

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Foundation Wall F3

Reinforcing Steel in Base:

$$d = w_{\text{stem}} - 3 = 7 \text{ in.}$$
$$b = 12 \text{ in., Unit length of base}$$

Ultimate Strength Design for Base:

$$\beta_1 = 0.85 \text{ for } f'_c < 4000$$
$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{y\text{Steel}}} \times \frac{87000}{87000 + f_{y\text{Steel}}} = 0.01782$$

$$\text{Min Value for } \rho_b = 200 / F_{y\text{Steel}} = 0.00333$$

$$\text{Max Value for } \rho_b = 0.75\rho_b = 0.013$$

$$\text{Max Reinforcing Steel, } A_{s\text{Max}} = (0.75)(\rho_b)(b)(d) = 1.122 \text{ in}^2$$

$$\text{Rebar Size} = \#6 \quad \text{Cross Section} = 0.44 \text{ in}^2$$
$$\text{Rebar Spacing} = 9 \text{ in.}$$

$$\text{Rebar Area per Foot} = 0.58667 \text{ in}^2 \text{ per Foot}$$

$$a = \frac{(A_s)(f_{y\text{Steel}})}{(0.85)(f'_c)(b)} = 1.380$$

Moment capability for Base:

$$M_u = 0.9[(A_s)(f_{y\text{Steel}})(d - a/2)] = 199,895 \text{ in.lb.} \quad (= 16657.9 \text{ Ft.Lb.})$$

OK. Larger than Required Moment

Shear Capability at footing/wall shear plane per ACI 318 Section 11.6:

$$\text{Unit Shear Force} = 1.6 \times V_u = 3200 \text{ Lb. per Ft.} \quad (= 1.6 \times E_n \text{ from previous pages})$$

$$\text{For vertical bars: } V_n = (A_{vf})(f_y)(\mu) = 21120 \text{ lb. per Ft.}$$

Where:

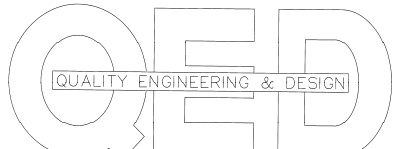
$$A_{vf} = 0.58667 \text{ in}^2 \text{ per Foot}$$
$$f_y = 60,000$$
$$\mu = 0.6 \times \lambda = 0.6$$
$$\lambda = 1 \text{ for normal weight concrete}$$

$$\text{Max } V_n \text{ shall not exceed: } 0.2f'_c A_c = 60000 \quad \text{OR} \quad 800 A_c = 96000$$

$$\Phi V_n = (0.75)(21120) = 15840 \quad \text{OK, Larger than Required Shear Force, } V_u$$

Where:

$$\Phi = 0.75 \quad (\text{Section 9.3.2.3})$$
$$V_n = 21120 \quad \text{Min of } (A_{vf})(f_y)(\mu) \text{ OR } (0.2f'_c A_c) \text{ OR } (800 A_c)$$

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Foundation Wall F3

Sliding Resistance:

Sliding resistance is provided by basement slab

Overturning Soil Pressure:

O.T. Moment = 9000 Ft. Lb. per Lineal Foot
Resisting Moment = -15753 Ft. Lb. per Lineal Foot
Net Moment, M_{net} = -6753 Ft. Lb. per Lineal Foot

$$P_{vert} = W_{conc} + W_{soil} + (P_{surch} \times W_{heel}) = 4323.33 \text{ Lb. per Lineal Foot}$$

Ref [6], Page 8-78

$$L_{net} = \frac{|M_{net}|}{P_{vert}} = 2.00 \text{ Ft.}$$

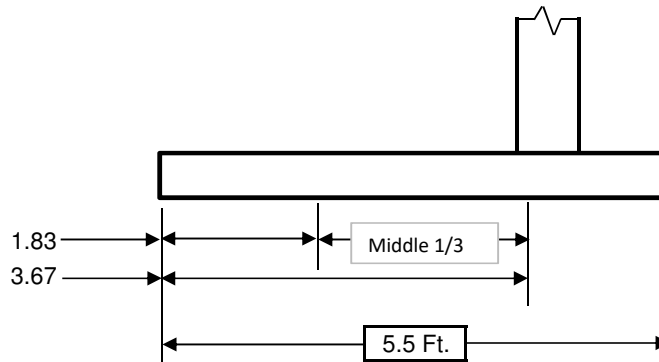
$$\text{Bearing Pressure} = \frac{P_{vert}}{A} \left[1 \pm 6e/L \right] = 1429.2 \text{ psf}$$

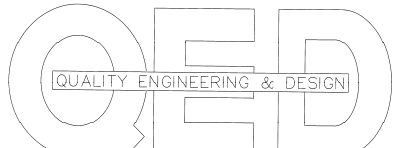
$$P_{vert} = 4323.33 \text{ Lb.}$$

$$A = 5.5 \text{ Ft}^2 \text{ (Area of Base at 1' Wide)}$$

$$L = 5.5 \text{ Ft. Length of Base}$$

$$e = 0.75 \text{ Ft.}$$



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Foundation Wall F3

Check Overturning with additional seismic load = 7H uniform

Per IBC Section 1807.2.3, safety factor can be reduced to 1.1 for seismic loading

Lateral Pressure including Seismic:

Lateral Soil Pressure = 2000 psf, triangular load distribution (see previous pages)

Earthquake Lateral pressure = $7 \times H = 7 \times 10 = 70$ psf, uniform load distribution

Force on Unit width = $P \times 1 \times H = (70)(10) = 700$ Lb.

Overturning:

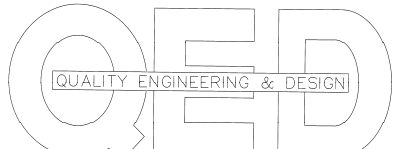
Moment due to Seismic = $F_{\text{seismic}} \times H/2 = (700)(10/2) = 3500$ Ft.Lb.

Total Overturning Moment = $M_{\text{soil}} + M_{\text{EQ}} = 9000 + 3500 = 12500$ Ft.Lb.

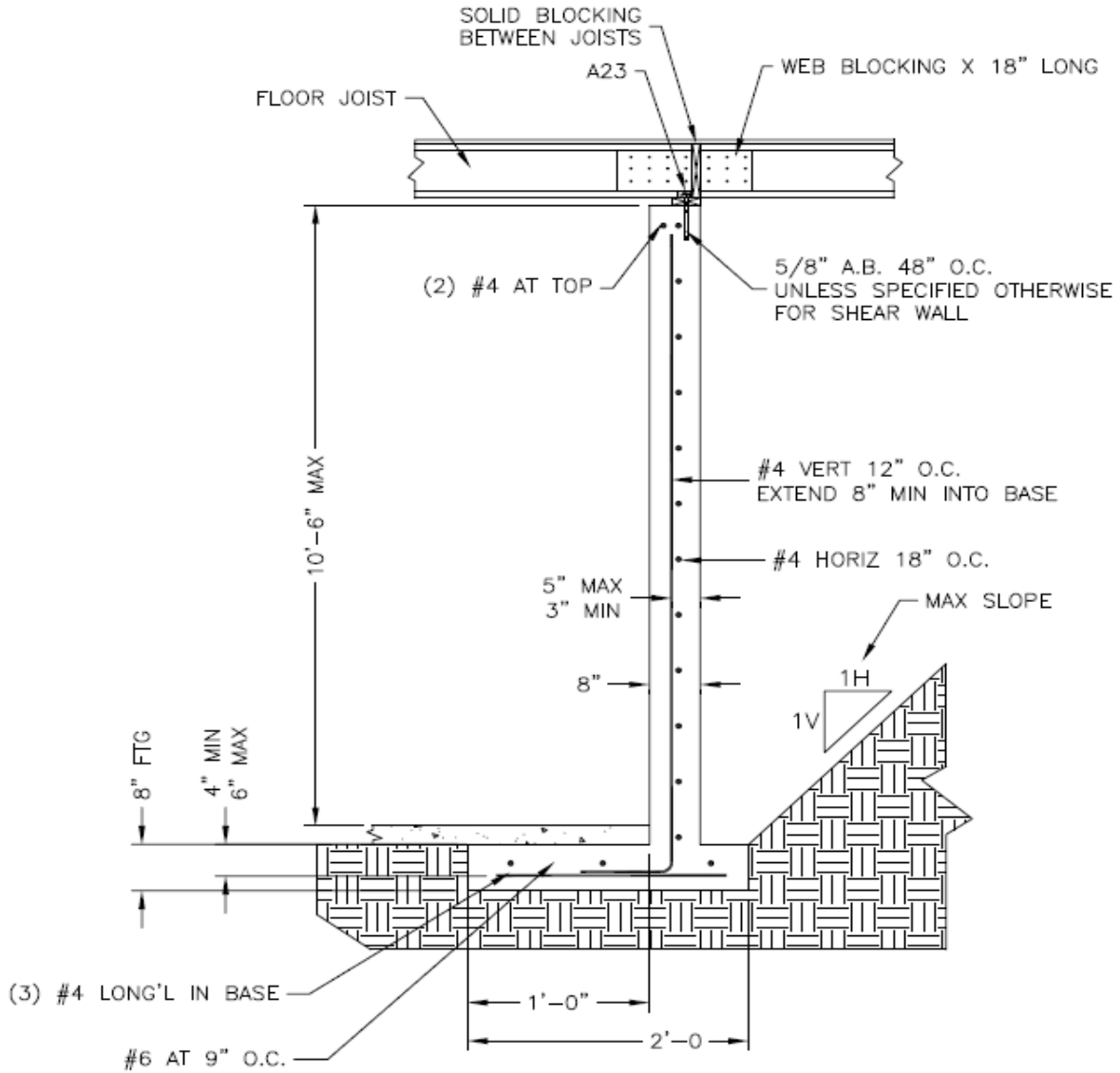
Resisting moment = 15753 Ft.Lb. (see previous pages)

Safety Factor on Overturning = $\frac{\text{Resisting Moment}}{\text{Overturning Mom}} = 1.26$ **OK. Greater than 1.1**

Sliding: N/A. Sliding resistance provided by basement slab

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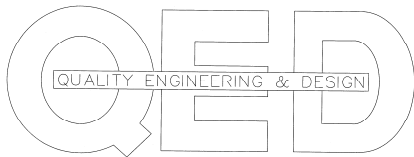
Foundation Wall F4



SECTION F4

USE FOR UP TO 10'-0" RETAINED EARTH WITH NO BACKSLOPE
SCALE: NONE

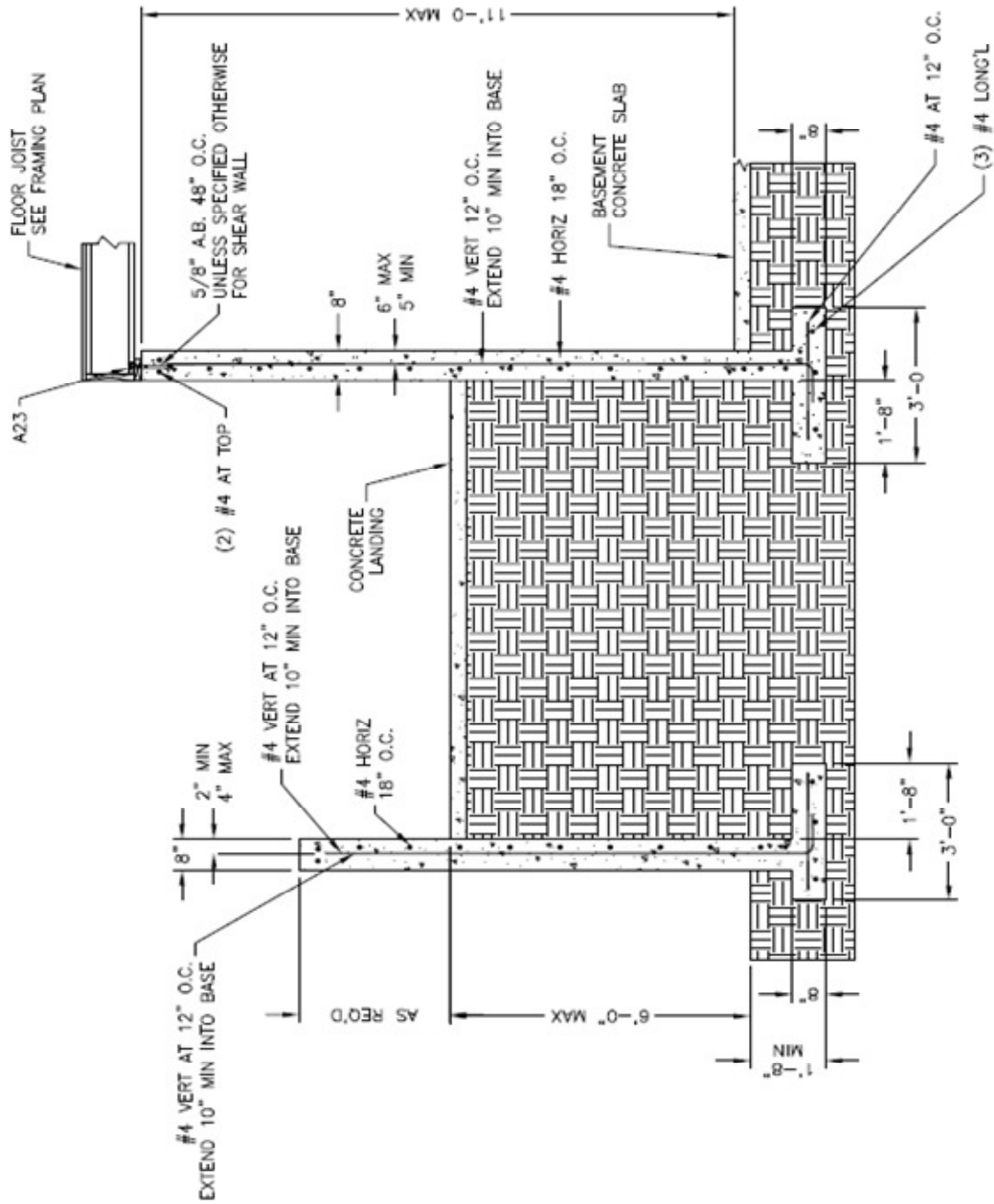
NOTE:
In this area all lateral soil pressure is resisted by exterior foundation walls



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Foundation Wall F5



SECTION **F5**
SCALE: NONE

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Foundation Wall F5

Retained Soil Height, $H_{soil} = 6$ Ft.

Stem Wall Height, $H_{wall} = 5.5$ Ft.

Stem Wall Width, $w_{stem} = 8$ in.

$W_{stem} = 0.67$ Ft.

Width of Base, $W_{base} = 3$ Ft.

Base thickness, $t_{base} = 8$ in.

$T_{base} = 0.66667$ Ft.

Dist Toe to Face, $x_{toe} = 8$ in.

$X_{toe} = 0.66667$ Ft.

Heel width, $X_{heel} = 1.67$ Ft. 20 in.

Unit Weight of Soil, $D_{soil} = 90$ Lb./Ft³

Unit Weight of Concrete, $D_{conc} = 150$ Lb./Ft³

Wall Embed, $H_{embed} = 1.00$ Ft (not including key)

Weight / C.G.

Concrete Wall Weight = $[(W_{stem} \times (H_{wall} + H_{embed})) + (W_{base} \times T_{base})] \times D_{conc} = 950$ Lb. per Lineal Foot

Weight of Soil over Heel = $(X_{heel} \times [H_{soil} + H_{embed}]) \times D_{soil} = 1050$ Lb. per Lineal Foot

$$\text{C.G. of Concrete, } X_{barConc} = \frac{(W_{stem} \times H_{conc})(W_{stem}/2 + X_{toe}) + (W_{base} \times T_{base})(W_{base}/2)}{(W_{stem} \times H_{conc}) + (W_{base} \times T_{base})} = 1.18 \text{ Ft}$$

$$\text{C.G. of Soil, } X_{barSoil} = (X_{heel}/2) + W_{stem} + X_{toe} = 2.17 \text{ Ft.}$$

Lateral Pressure:

For equivalent fluid pressure, D_{fluid} , of 40 Lb. per cubic foot (pcf)

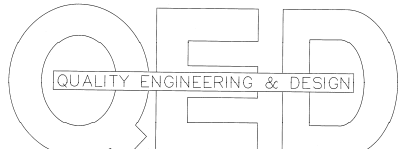
Seismic Surcharge Pressure, $P_{seis} = 0$ x H PSF (see following pages for seismic)

Surcharge Pressure, $P_{surch} = 0$ lb. per Sq.Ft. (level, or terraced back fill)

$$E_a = \frac{D_{fluid} \times H_{soil}^2}{2} + P_{surch} = 720 \text{ Soil Force, Lb per Lin Ft}$$

Considering pressure as fluid pressure:

$$E_n = E_a + (P_{seis} \times H^2) / 2 = 720 \text{ Horizontal component of pressure (including seismic surcharge)}$$

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Foundation Wall F5

Overturning Moment:

$$\text{Moment in Stem Wall, } M_{ot} = E_h \times [(H_{soil} / 3) + H_{embed}] = 2160 \text{ Ft. Lb.}$$

$$\text{Resisting Moment, } M_{resist} = (W_{wall})(X_{barConc}) + (W_{soil})(X_{barSoil}) = 3392.65 \text{ Ft. Lb.}$$

$$\frac{M_{resist}}{M_{OT}} = 1.57 > 1.5 ; \text{OK}$$

Vertical Reinforcing Steel:

$$f'_c = 2500 \text{ psi, compressive strength}$$

$$E_c = 57000vf'_c = 2.9E+06 \text{ psi, Elastic Modulus for concrete}$$

$$F_{ySteel} = 60,000 \text{ psi, yield strength for steel (A615 Gr. 60)}$$

$$F_{aSteel} = 20,000 \text{ psi, allowable stress for steel}$$

$$d = w_{stem} - 3 = 5 \text{ in.}$$

$$b = 12 \text{ in., Unit length of wall}$$

Ultimate Strength Design for Cantilever Wall:

$$\text{Design Moment} = 1.6 \times M_{ot} = 1.6 \times 2160 = 3456 \text{ Ft.Lb.}$$

$$\beta_1 = 0.85 \text{ for } f'_c < 4000$$

$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{ySteel}} \times \frac{87000}{87000 + f_{ySteel}} = 0.01782$$

$$\text{Min Value for } \rho_b = 200 / F_{ySteel} = 0.00333$$

$$\text{Max Value for } \rho_b = 0.75\rho_b = 0.013$$

$$\text{Max Reinforcing Steel, } A_{sMax} = (0.75)(\rho_b)(b)(d) = 0.802 \text{ in}^2$$

$$\text{Rebar Size} = \#4 \text{ Cross Section} = 0.2 \text{ in}^2$$

$$\text{Rebar Spacing} = 12 \text{ in.}$$

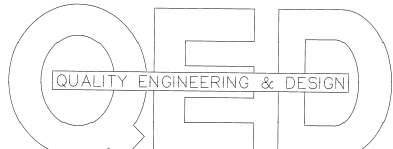
$$\text{Rebar Area per Foot} = 0.2 \text{ in}^2 \text{ per Foot}$$

$$a = \frac{(A_s)(f_{ySteel})}{(0.85)(f'_c)(b)} = 0.471$$

Moment capability for Stem Wall:

$$M_u = 0.9[(A_s)(f_{ySteel})(d - a/2)] = 51,459 \text{ in.lb. } (= 4288.2 \text{ Ft.Lb.})$$

OK. Larger than Required Moment

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Foundation Wall F5

Reinforcing Steel in Base:

$$d = w_{\text{stem}} - 3 = 5 \text{ in.}$$
$$b = 12 \text{ in., Unit length of base}$$

Ultimate Strength Design for Base:

$$\beta_1 = 0.85 \text{ for } f'_c < 4000$$
$$\rho_b = \frac{0.85 \beta_1 f'_c}{f_{y\text{Steel}}} \times \frac{87000}{87000 + f_{y\text{Steel}}} = 0.01782$$

$$\text{Min Value for } \rho_b = 200 / F_{y\text{Steel}} = 0.00333$$

$$\text{Max Value for } \rho_b = 0.75\rho_b = 0.013$$

$$\text{Max Reinforcing Steel, } A_{s\text{Max}} = (0.75)(\rho_b)(b)(d) = 0.802 \text{ in}^2$$

$$\text{Rebar Size} = \#4 \quad \text{Cross Section} = 0.2 \text{ in}^2$$
$$\text{Rebar Spacing} = 12 \text{ in.}$$

$$\text{Rebar Area per Foot} = 0.2 \text{ in}^2 \text{ per Foot}$$

$$a = \frac{(A_s)(f_{y\text{Steel}})}{(0.85)(f'_c)(b)} = 0.471$$

Moment capability for Base:

$$M_u = 0.9[(A_s)(f_{y\text{Steel}})(d - a/2)] = 51,459 \text{ in.lb.} \quad (= 4288.2 \text{ Ft.Lb.})$$

OK. Larger than Required Moment

Shear Capability at footing/wall shear plane per ACI 318 Section 11.6:

$$\text{Unit Shear Force} = 1.6 \times V_u = 1152 \text{ Lb. per Ft.} \quad (= 1.6 \times E_n \text{ from previous pages})$$

$$\text{For vertical bars: } V_n = (A_{vf})(f_y)(\mu) = 7200 \text{ lb. per Ft.}$$

Where:

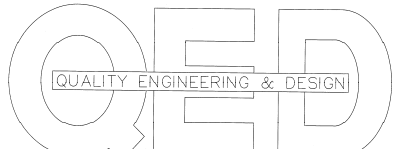
$$A_{vf} = 0.2 \text{ in}^2 \text{ per Foot}$$
$$f_y = 60,000$$
$$\mu = 0.6 \times \lambda = 0.6$$
$$\lambda = 1 \text{ for normal weight concrete}$$

$$\text{Max } V_n \text{ shall not exceed: } 0.2f'_c A_c = 48000 \quad \text{OR} \quad 800 A_c = 76800$$

$$\Phi V_n = (0.75)(7200) = 5400 \quad \text{OK, Larger than Required Shear Force, } V_u$$

Where: $\Phi = 0.75$ (Section 9.3.2.3)

$$V_n = 7200 \text{ Min of } (A_{vf})(f_y)(\mu) \text{ OR } (0.2f'_c A_c) \text{ OR } (800 A_c)$$

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Foundation Wall F5

Sliding Resistance:

$R_{\text{passive}} = 300$ Passive Soil Resistance is equivalent to a fluid of density 300 pcf

$\mu_f = 0.35$ Friction Factor against soil

Per Geotech report, these values

$E_h = 720$ Lb. per Ft. Horizontal Load (see previous pages)

$W_{\text{wall}} = 950$ Lb. per Ft. Wall Weight (see previous pages)

Friction Force, $F_f = \mu_f \times W_{\text{wall}} = 332.5$ Lb. per Foot of wall

Net force to be resisted by wall embedment = $E_{h\text{Net}} = (E_h) - F_f = 387.5$ Lb. per Lineal Foot

Passive Resistance:

Resisting pressure at bottom of footing embed = $R_{\text{passive}} \times D$ (where D = embed depth)

Average pressure from top to bottom of embed = $(R_{\text{passive}} \times D) / 2$

Resistive force per foot of wall length = $[(R_{\text{passive}} \times D) / 2] \times D$

Solving for "D" required to equal the applied force:

$$D = \text{SQRT} \left[\frac{(2)(E_{h\text{Net}})}{R_{\text{passive}}} \right] = 1.6 \text{ Ft., Minimum embed depth to resist sliding}$$

$$= 19.3 \text{ in., Minimum}$$

Actual Embed = 1.66667 Ft.

= 20.0 in.

Foundation Wall F5

Overturning Soil Pressure:

O.T. Moment = 2160 Ft. Lb. per Lineal Foot
Resisting Moment = -3392.6 Ft. Lb. per Lineal Foot
Net Moment, M_{net} = -1232.6 Ft. Lb. per Lineal Foot

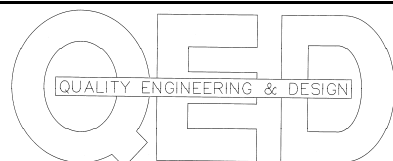
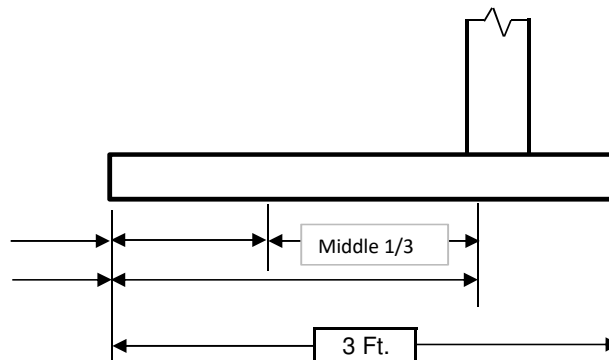
$$P_{vert} = W_{conc} + W_{soil} + (P_{surch} \times W_{heel}) = 2000 \text{ Lb. per Lineal Foot}$$

Ref [6], Page 8-78

$$L_{net} = \frac{|M_{net}|}{P_{vert}} = 1.00 \text{ Ft.}$$

$$\text{Bearing Pressure} = \frac{P_{vert}}{A} \left(1 \pm 6e/L \right) = 1333.33 \text{ psf}$$

$P_{vert} = 2000 \text{ Lb.}$
 $A = 3 \text{ Ft}^2 \text{ (Area of Base at 1' Wide)}$
 $L = 3 \text{ Ft. Length of Base}$
 $e = 0.50 \text{ Ft.}$



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Foundation Wall F5

Check Overturning and sliding with additional seismic load = 7H uniform
Per IBC Section 1807.2.3, safety factor can be reduced to 1.1 for seismic loading

Lateral Pressure including Seismic:

Lateral Sol Pressure = 720 psf, triangular load distribution (see previous pages)

Earthquake Lateral pressure = $7 \times H = 7 \times 6 = 42$ psf, uniform load distribution
Force on Unit width = $P \times 1 \times H = (42)(6) = 252$ Lb.

Overturning:

Moment due to Seismic = $F_{\text{seismic}} \times H/2 = (252)(6/2) = 756$ Ft.Lb.

Total Overturning Moment = $M_{\text{soil}} + M_{\text{EQ}} = 2160 + 756 = 2916$ Ft.Lb.

Resisting moment = 3392.65 Ft.Lb. (see previous pages)

Safety Factor on Overturning = $\frac{\text{Resisting Moment}}{\text{Overturning Mom}} = 1.16$ **OK. Greater than 1.1**

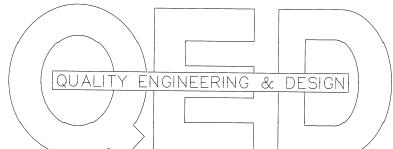
Sliding

Total Sliding Force = $720 + 252 = 972$ lb.

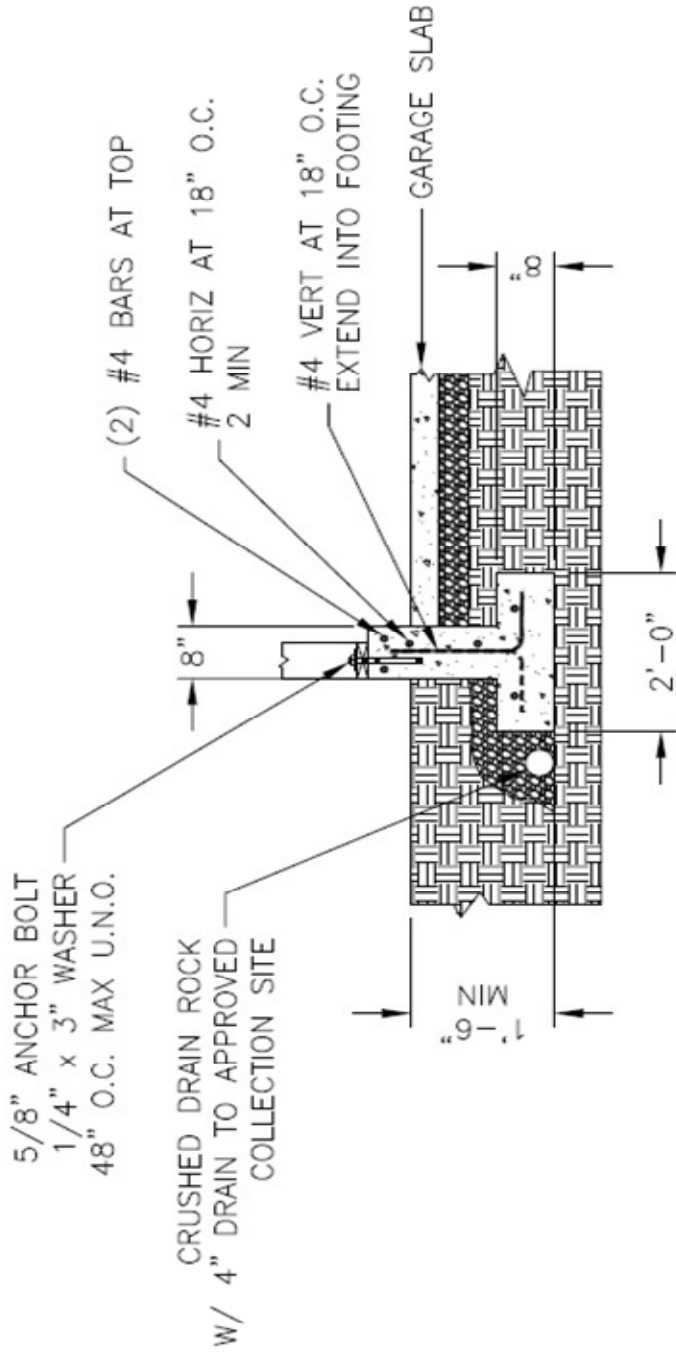
Total Resisting Force = Friction + Embed = $\mu_f \times W_{\text{wall}} + [(R_{\text{passive}} \times D) / 2] \times D \times 1.5 = 1123.75$ lb.

multiplied resisting force by 1.5 since values on previous page include SF = 1.5

Safety Factor on Sliding = $\frac{F_{\text{resist}}}{F_{\text{sliding}}} = 1.16$ **OK. Greater than 1.1**

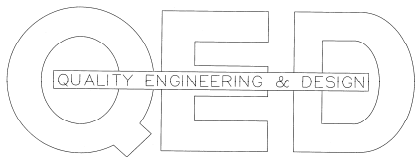
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Foundation Wall F6



SECTION **F6**

SCALE: NONE



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Appendix 1

City of Mercer Island *washington*

HOME CITY COUNCIL DEPARTMENTS BOARDS & COMMISSIONS CONTACT US

Find it Quickly

Back to Development Services - Building & Planning

Land Use / Planning
 Building and Permitting
 City Code
 Parking, Traffic, Pedestrians, Bicycles
 Small Works and Consultant Roster
 Weekly Bulletin
 Demographics
 Design Commission
 Planning Commission
 PEAK Agreements
 Target Times
 Ombudsman

Agendas & Minutes
 Calendar Events
 FAQs

City of Mercer Island / Development Services - Building & Planning / Building and Permitting / Building Permits / Codes, Design Criteria, & Research / Climatic and Geographic Design Criteria

Climatic and Geographic Design Criteria

IRC TABLE R301.2 (1) Climatic and Geographic Design Criteria

Roof Snow Load ^a	Wind Design ^b		Seismic Design Category ^c	Subject to Damage From:			Outside Design Temp - Heat/Cool	Ice Barrier Underlayment Required	Flood Hazards ^e	Air Freezing Index	Mean Annual Temp
	Speed	Topographic Effects		Weathering ^d	Frost Line Depth	Termite Decay					
25 psf	110 mph	See footnote ^b	D2	Moderate	12"	Slight to Moderate	24°F/83°F	No	NA	113	53°F

^a When using this roof 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 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).

^c From IRC Table 301.2(1).

^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.

Studs

Concrete Anchors

NELSON STUD WELDING SPECIFICATION

H4L Headed Concrete Anchors

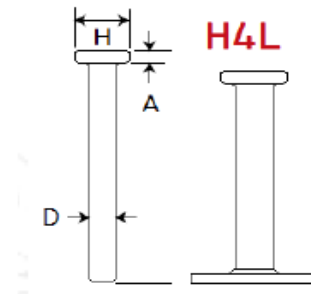
Nelson headed concrete anchors deliver code specified embedded tension and shear strength values between steel and concrete. These anchors meet requirements of the following codes:

- AWS D1.1 Structural Welding Code – Steel, Type B
- AWS D1.6 Structural Welding Code – Stainless Steel, Type A
- AASHTO/AWS D1.5 Bridge Welding Code
- ISO-13918 Welding – Studs for Arc Stud Welding
- Canadian Standards Association, W59 – Welded Steel Construction, Type B
- International Building Code Section 19

See also: ICC-ES Evaluation Report ESR-2856 Nelson Shear Connectors

Headed anchors are widely used in precast, cast-in-place or composite steel construction for miscellaneous embedded plates, frames, curbing, attachments and connections.

For similar function studs, see Nelson [S3L Shear Connectors](#) and [D2L Deformed Bar Anchors](#).



When ordering, specify: Type, Diameter, Before Weld Length, Material, Quantity, and Part Number

Example: H4L 1/2 x 4-1/8"; Mild Steel; 5000 pieces; #101053003

Stud Diameter D	Burn Off	A	H	Ferrule to Flat	Required Standard Accessories		
					Chuck	Foot*	Grip for Flat
1/4 / 6 mm	0.125 3 mm	0.187	0.500	100101067	500001014	502002001	501003007
3/8 / 10 mm	0.125 3 mm	0.281	0.750	100101099	500001018	502002001	501003009
1/2 / 13 mm	0.125 3 mm	0.312	1.000	100101114	500001085	502002002	501003010
5/8 / 16 mm	0.187 4 mm	0.312	1.250	100101187	500001088	502002002	501003014

*Feet 502002001 and 502002002 are used with Nelson's heavy duty gun. Feet 502002045 and 502002046 are used with Nelson's standard duty gun.

MATERIALS: Studs are available in Low Carbon Mild Steel and 316L Stainless Steel. For specific grade information and physical and chemical properties, and conforming standards, please see [General Material Specifications](#). Certified Material Test Reports (CMTR) and Certificates of Compliance (COC) are available and must be requested at time of order.

For ferrules and grips used in welding at an angle to plate, welding to angles, and welding to a vertical base plate, see the [Special Applications](#) section of the [Ferrule Specifications](#).

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ALLOWABLE LOADS FOR PSL COLUMNS

Allowable Axial Loads (lbs) for 1.3E TimberStrand® LSL

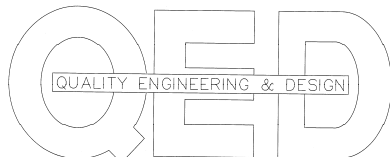
Column Bearing Type	Effective Column Length	Column Size															
		3 1/2" x 3 1/2"			3 1/2" x 4 1/4"			3 1/2" x 5 1/4"			3 1/2" x 7 1/4"			3 1/2" x 8 5/8"			
		100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	
On Column Base	3'	12,165	13,665	14,625	15,210	17,085	18,280	19,120	21,475	22,980	25,205	28,310	30,290	29,985	33,680	36,035	
	4'	10,745	11,830	12,490	13,435	14,790	15,610	16,885	18,590	19,625	22,260	24,505	25,870	26,480	29,155	30,780	
	5'	9,120	9,810	10,215	11,400	12,265	12,765	14,335	15,420	16,050	18,895	20,325	21,155	22,480	24,180	25,170	
	6'	7,550	7,985	8,235	9,440	9,980	10,295	11,865	12,550	12,945	15,640	16,540	17,060	18,610	19,680	20,300	
	7'	6,235	6,525	6,695	7,795	8,160	8,370	9,800	10,255	10,520	12,915	13,520	13,870	15,365	16,085	16,500	
	8'	5,195	5,400	5,515	6,490	6,750	6,895	8,160	8,485	8,670	10,755	11,185	11,430	12,795	13,305	13,595	
	9'	4,375	4,525	4,610	5,465	5,655	5,765	6,870	7,110	7,245	9,060	9,370	9,550	10,775	11,150	11,360	
	10'	3,725	3,840	3,905	4,655	4,795	4,880	5,850	6,030	6,135	7,715	7,950	8,085	9,175	9,460	9,620	
	12'	2,785	2,855	2,895	3,480	3,565	3,615	4,375	4,485	4,545	5,770	5,910	5,995	6,860	7,030	7,130	
	14'	2,155	2,200	2,225	2,695	2,750	2,780	3,385	3,455	3,495	4,465	4,555	4,610	5,310	5,420	5,485	
	On Wood Plate ⁽¹⁾⁽²⁾	3'-7"	5,765	5,765	5,765	7,065	7,065	7,065	8,740	8,740	8,740	10,785	10,785	10,785	12,830	12,830	12,830
		8'	5,195	5,400	5,515	6,490	6,750	6,895	8,160	8,485	8,670	10,755	10,785	10,785	12,795	12,830	12,830
9'		4,375	4,525	4,610	5,465	5,655	5,765	6,870	7,110	7,245	9,060	9,370	9,550	10,775	11,150	11,360	
10'		3,725	3,840	3,905	4,655	4,795	4,880	5,850	6,030	6,135	7,715	7,950	8,085	9,175	9,460	9,620	
12'		2,785	2,855	2,895	3,480	3,565	3,615	4,375	4,485	4,545	5,770	5,910	5,995	6,860	7,030	7,130	
14'		2,155	2,200	2,225	2,695	2,750	2,780	3,385	3,455	3,495	4,465	4,555	4,610	5,310	5,420	5,485	

(1) Wood plate bearing is based on compression perpendicular-to-grain stress of 425 psi adjusted per the NDS®, 3.10.4.

(2) See connection details below.

Allowable Axial Loads (lbs) for 1.8E Parallam® PSL

Column Bearing Type	Effective Column Length	Column Size																										
		3 1/2" x 3 1/2"			3 1/2" x 5 1/4"			3 1/2" x 7"			5 1/4" x 7"			7" x 7"														
		100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%												
On Column Base	6'	10,595	11,200	11,545	15,890	16,800	17,320	21,190	22,395	23,095	33,295	36,675	38,735	40,000	40,000	40,000												
	7'	8,735	9,140	9,370	13,105	13,710	14,060	17,475	18,280	18,745	30,010	32,545	34,030	40,000	40,000	40,000												
	8'	7,265	7,550	7,715	10,900	11,325	11,570	14,535	15,100	15,425	26,650	28,490	29,555	35,530	37,985	39,410												
	9'	6,115	6,320	6,440	9,170	9,480	9,660	12,225	12,640	12,880	23,475	24,835	25,620	31,300	33,115	34,165												
	10'	5,200	5,355	5,445	7,800	8,035	8,170	10,400	10,715	10,895	20,660	21,695	22,290	27,545	28,925	29,725												
	12'	3,885	3,980	4,030	5,825	5,965	6,050	7,765	7,955	8,065	16,160	16,805	17,175	21,545	22,405	22,900												
	14'	3,000	3,065	3,100	4,500	4,595	4,645	6,005	6,125	6,195	12,890	13,315	13,560	17,185	17,755	18,080												
	16'	Slenderness ratio exceeds 50																										
	18'																10,480	10,775	10,950	14,880	15,595	16,125	21,545	22,405	22,900	34,155	35,785	36,720
	20'																8,670	8,885	9,010	11,560	11,850	12,010	15,560	15,925	16,050	20,475	21,110	21,475
	22'																7,285	7,445	7,535	9,710	9,925	10,050	12,630	12,830	12,830	16,630	17,115	17,405
	24'	Slenderness ratio exceeds 50																										



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Appendix 1

ALLOWABLE LOADS FOR 4x4 COLUMNS

Allowable Column Compression = **4090** lb.

Column Type: sawn lumber

Material: Hem-Fir

Modulus of Elasticity: 1400000

Basic allowable compression $F_c = 1300$

Actual Length, $L = 120$ in.

$K = 1$ From NDS, Appendix G for pin/pin connection

Effective Column Length, $KL = 120$ in.

Column width, $w = 3.5$ in.

Column depth, $d = 3.5$ in.

Slenderness Ratio, $R_c/d = 34.2857$ max ratio of KL/w or KL/d OK < 50

Adjusted Compressive Stress = **333.897** psi

$K_{ce} = 0.3$ for visually graded

$F_{ce} = 357.292$

$c = 0.8$

$F^*c = 1287$

$c_t = 1$

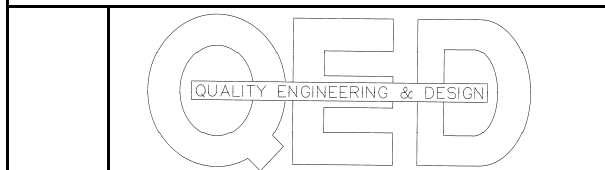
$c_D = 0.9$

$c_M = 1$ Wet service, See Table 4A

$c_F = 1.1$

$c_i = 1$ incising factor (= 0.8 if incised)

$C_p = 0.25944$



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Appendix 1

ALLOWABLE LOADS FOR 4x6 COLUMNS

Allowable Column Compression = **6428** lb.

Column Type: sawn lumber

Material: Hem-Fir

Modulus of Elasticity: 1400000

Basic allowable compression $F_c = 1300$

Actual Length, $L = 120$ in.

$K = 1$ From NDS, Appendix G for pin/pin connection

Effective Column Length, $KL = 120$ in.

Column width, $w = 3.5$ in.

Column depth, $d = 5.5$ in.

Slenderness Ratio, $R_c/d = 34.2857$ max ratio of KL/w or KL/d OK < 50

Adjusted Compressive Stress = **333.897** psi

$K_{ce} = 0.3$ for visually graded

$F_{ce} = 357.292$

$c = 0.8$

$F^*c = 1287$

$c_t = 1$

$c_D = 0.9$

$c_M = 1$ Wet service, See Table 4A

$c_F = 1.1$

$c_i = 1$ incising factor (= 0.8 if incised)

$C_p = 0.25944$

Appendix 1

ALLOWABLE LOADS FOR 6x6 COLUMNS

Allowable Column Compression = **21436** lb.

Column Type: sawn lumber

Material: Hem-Fir

Modulus of Elasticity: 1400000

Basic allowable compression $F_c = 1300$

Actual Length, $L = 120$ in.

$K = 1$ From NDS, Appendix G for pin/pin connection

Effective Column Length, $KL = 120$ in.

Column width, $w = 5.5$ in.

Column depth, $d = 5.5$ in.

Slenderness Ratio, $R_c/d = 21.8182$ max ratio of KL/w or KL/d OK < 50

Adjusted Compressive Stress = **708.639** psi

$K_{ce} = 0.3$ for visually graded

$F_{ce} = 882.292$

$c = 0.8$

$F^*c = 1287$

$c_t = 1$

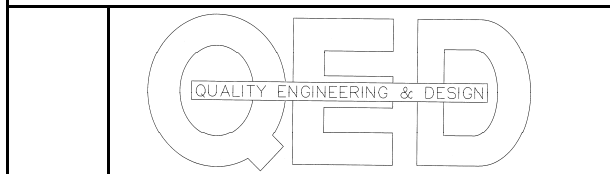
$c_D = 0.9$

$c_M = 1$ Wet service, See Table 4A

$c_F = 1.1$

$c_i = 1$ incising factor (= 0.8 if incised)

$C_p = 0.55061$



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Appendix 2-Hold-Down Embed

ANCHOR EMBED FOR HDU14 HOLD-DOWN



Profis Anchor 2.7.3

www.hilti.us			
Company:	Quality Engineering & Design	Page:	1
Specifier:	T. Wolfe	Project:	Mercer Island Res
Address:		Sub-Project / Pos. No.:	
Phone / Fax:		Date:	10/18/2017
E-Mail:			

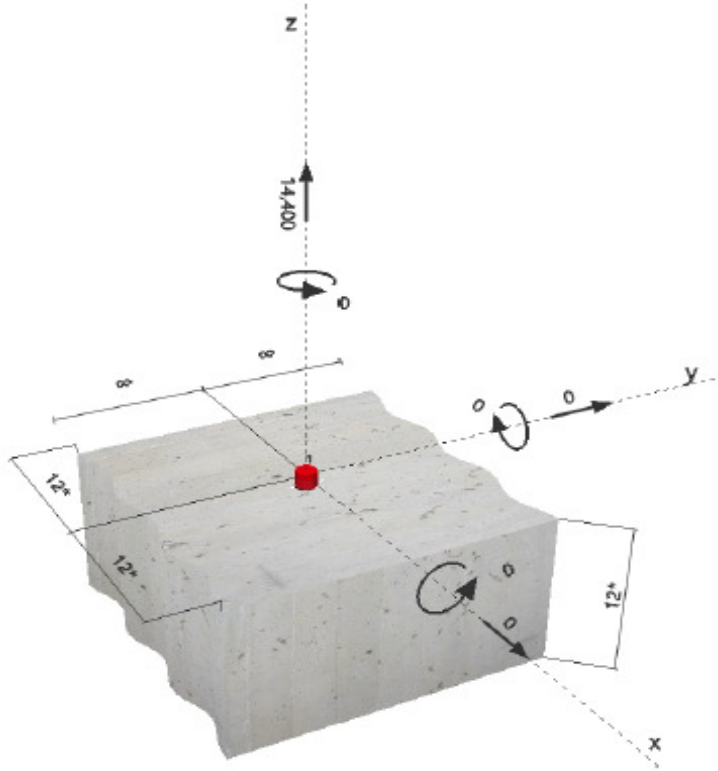
Specifier's comments: Anchor embed for HDU14 Hold-Down

1 Input data

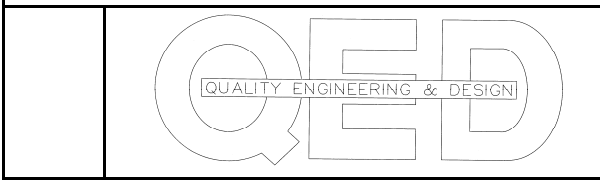
Anchor type and diameter:	Heavy Square Head ASTM F 1554 GR. 36 1
Effective embedment depth:	$h_{ef} = 10.000$ in.
Material:	ASTM F 1554
Proof:	Design method ACI 318-14 / CIP
Stand-off Installation:	- (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 2500, $f'_c = 2500$ psi; $h = 12.000$ in.
Reinforcement:	tension: condition B, shear: condition B; edge reinforcement: none or - No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (b)) Shear load: yes (17.2.3.5.3 (a))



Geometry [in.] & Loading [lb, in.lb]



Input data and results must be checked for agreement with the existing conditions and for plausibility!
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Appendix 2-Hold-Down Embed



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 Specifier: T. Wolfe
 Address:
 Phone | Fax: |
 E-Mail:

Page: 2
 Project: Mercer Island Res
 Sub-Project | Pos. No.:
 Date: 10/18/2017

2 Proof | Utilization (Governing Cases)

Loading	Proof	Design values [lb]		Utilization β_N / β_V [%]	Status
		Load	Capacity		
Tension	Concrete Breakout Strength	14400	14962	97 / -	OK
Shear	-	-	-	- / -	-

Loading	β_N	β_V	ζ	Utilization $\beta_{N/V}$ [%]	Status
Combined tension and shear loads	-	-	-	-	-

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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ANCHOR EMBED FOR HDU11 HOLD-DOWN



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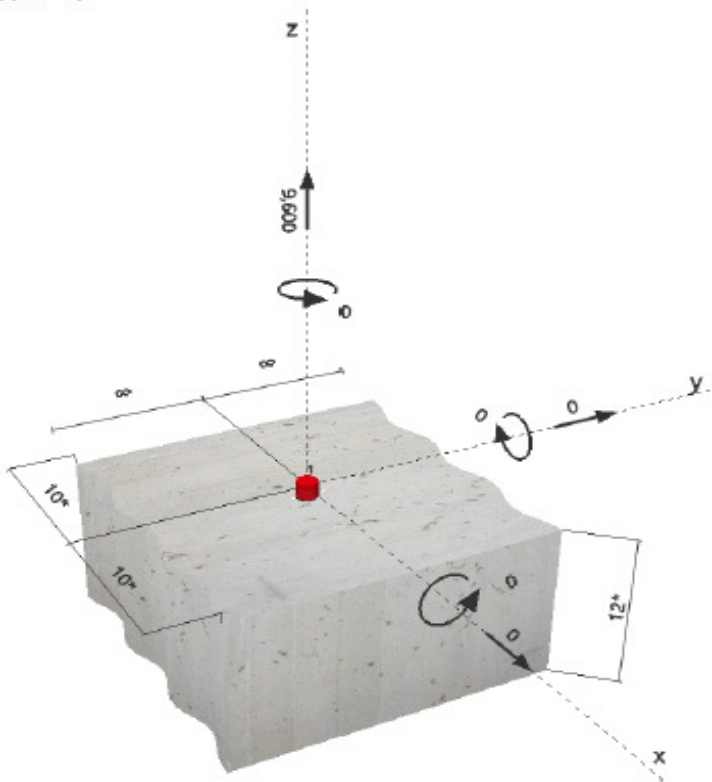
Specifier's comments: Anchor embed for HDU11 Hold-Down

1 Input data

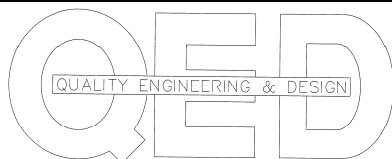
Anchor type and diameter: Heavy Square Head ASTM F 1554 GR. 36 1
Effective embedment depth: $h_{ef} = 10.000$ in.
Material: ASTM F 1554
Proof: Design method ACI 318-14 / CIP
Stand-off Installation: - (Recommended plate thickness: not calculated)
Profile: no profile
Base material: cracked concrete, 2500, $f'_c = 2500$ psi; $h = 12.000$ in.
Reinforcement: tension: condition B, shear: condition B;
 edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F) Tension load: yes (17.2.3.4.3 (b))
 Shear load: yes (17.2.3.5.3 (a))



Geometry [in.] & Loading [lb, in.lb]



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Specifier:	T. Wolfe	Project:	Mercer Island Res
Address:		Sub-Project Pos. No.:	
Phone Fax:		Date:	10/18/2017
E-Mail:			

2 Proof | Utilization (Governing Cases)

Loading	Proof	Design values [lb]		Utilization	Status
		Load	Capacity	β_N / β_V [%]	
Tension	Concrete Breakout Strength	9600	11953	81 / -	OK
Shear	-	-	-	- / -	-

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	-	-	-	-	-

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

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