City of Puyallup
Building
ACCEPTED

JMontgomery
08/16/2022
10:06:21 AM

THE APPROVED CONSTRUCTION PLANS, DOCUMENTS AND ALL ENGINEERING MUST BE POSTED ON THE JOB AT ALL INSPECTIONS IN A VISIBLE AND READILY ACCESSIBLE LOCATION.

FULL SIZED LEDGIBLE COLOR PLANS ARE REQUIRED TO BE PROVIDED BY THE PERMITEE ON SITE FOR INSPECTION

Approval of submitted plans is not an approval of omissions or oversights by this office or noncompliance with any applicable regulations of local government. The contractor is responsible for making sure that the building complies with all applicable codes and regulations of the local government.

AHBL

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Structural Calculations

PREPARED FOR:

Nelson
1200 Fifth Avenue
Suite 1300
Seattle, WA 98101

Mark Evans

PROJECT:

East Main
Red Dot Office TI

2220189.20

PREPARED BY:

Daniel Booth, PE, SE
President

DATE:

April, 2022

PRCTI20220873

Structural Calculations

For

East Main – Red Dot Office TI

Puyallup, WA

Project # 2220189.20

Project Principal Dan Booth, PE, SE

Design Criteria

Design Codes and Standards

Codes and Standards: Structural design and construction shall be in accordance with the applicable sections of the following codes and standards as adopted and amended by the local building authority: International Building Code, 2018 Edition.

Structural Design Criteria:

Live Load Criteria:

Office	50 psf
	+ 15 psf (Partitions)
Slab on Grade (Existing)	350 psf

Wind Load Criteria:

Ultimate Wind Speed	98 mph
Risk Category	II
Wind Exposure	B
Topographic Factor	1.0 (Flat)

Seismic Criteria:

Risk Category			II
Seismic Importance Factor			1.0
S_s	= 1.258	S_1	= 0.433
S_{ds}	= 1.006	S_{d1}	= 0.539
Site Class			= D-Default
Seismic Design Category			= D
Response Modification Coeff. (R):			5
Seismic Response Coeff. (C_s):			0.2012

DANIEL L. BOOTH
STATE OF WASHINGTON
28466
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER
04/19/2022

PRCTI20220873

Soil Criteria:

Based on Geotechnical Engineering Report by: Terra Associates, dated September 2019.

Allowable Soil Bearing Capacity: 2500 psf allow 33% increase for loads from wind or seismic origin.

Project Description

The project consists of the construction of a new wood framed mezzanine in the northeast office node of the existing East Main concrete tilt-up warehouse building. The lateral system of the mezzanine uses the existing concrete tilt-up walls are bearing/shearwalls.

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Date _____ By _____ ☐ Meeting Minutes

☐ Telephone Memo

AHBL

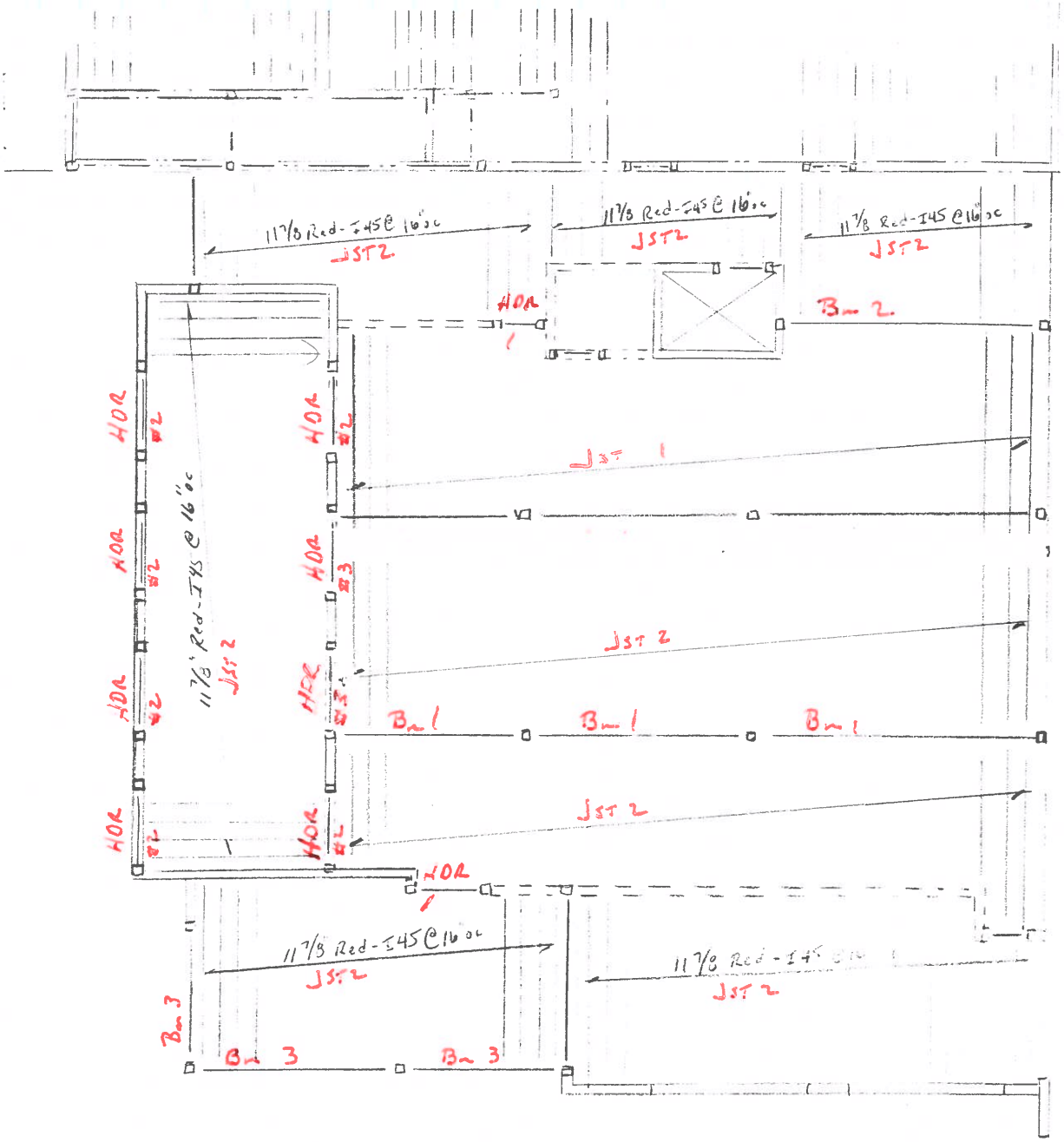
Civil Engineers

Structural Engineers

Landscape Architects

Community Planners

Land Surveyors



JST 1 & JST 2

15'-6" MAX

w_{DL} = 15psf

$w_{partition}$ = 15psf

w_{LL} = 50psf

Use 11 7/8" Red-I45 @ 16" o.c.

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

PRCTI20220873

RedSpec™ by RedBuilt™
v7.1.14

Project: Project
Location: Red Dot TI
Folder: Folder
Date: 4/13/22 8:25 AM
Designer: DB
Comment: Mezzanine Floor Joists

Type: 15.0 ft joist

11.875" Red-I45™ @ 16" o.c.

This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS	%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail
Shear (lb)	60%	1074	1785	Floor(100%)	Concentrated Load	Left End Span 1	PASS
Positive Moment (ft-lb)	96%	4476	4685	Floor(100%)	Concentrated Load	Middle Span 1	PASS

DEFLECTIONS (in)	%	Design	Allow.	Design	Allow.	Combination	Pattern	Pass/Fail
Span Live	92%	0.358	0.388	L / 520	L / 480	1.0D+1.0L	All Spans	PASS
Span Total	57%	0.440	0.775	L / 423	L / 240	1.0D+1.0L	All Spans	PASS

FloorChoice™ Rating: 5.6

Performance rating is based on: 24 oc (23/32", 3/4") sheathing, nailed only, simple span, flexible support. RedSpec has not performed a structural analysis of the sheathing.

SUPPORTS	Support 1	Support 2
Live Reaction, Critical (lb) (DOL%)	919 (100)	919 (100)
Dead Reaction (lb)	155	155
Total Reaction (lb) (DOL%)	1074 (100)	1074 (100)
Bearing	Flush	Flush
Support	Beam	Beam
Req'd Bearing, No Stiffeners (in)	1.94	1.94
Req'd Bearing, Stiffeners (in)	1.75	1.75

HANGERS	Model	Top	Face	Member	Header	Size
Left	None Selected					
Right	None Selected					

SPANS AND LOADS

Dimensions represent horizontal design spans.

15'- 6.0"

APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Floor(100%)	50	15	15	16"	Floor Joist

NOTES

- Building code and design methodology: 2018 IBC ASD (US).
- Product Acceptance: ICC-ES ESR-2994 and LABC/LARC Supplement.
- Deflection analysis is based on composite action with 24 oc (23/32", 3/4") sheathing, nailed only.
- Continuous lateral support required at top edge. Lateral support at bottom edge shall be per RedBuilt recommendations.
- Joist design includes consideration for a 2000 lb load distributed over a 30" square area and all live loads removed.

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PRCTI20220873

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☐ Telephone Memo

AHBL

Civil Engineers

Structural Engineers

Landscape Architects

Community Planners

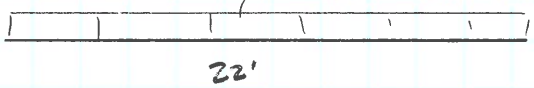
Land Surveyors

Bm 1

$W_{DL} = 15 psf (30.5'/2) = 229.0 plf$

$W_{PAR} = " " = 229.0 plf$

$W_{LL} = 50 plf (30.5'/2) = 763 plf$



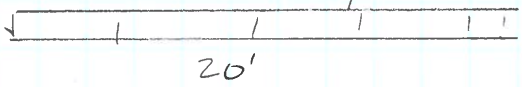
See Enercalc Output, use GL 6¾ x 19.5" (24F-V4)

Bm 2

$W_{DL} = 15 (28.5'/2) = 214 plf$

$W_{PAR} = " " = 214 plf$

$W_{LL} = 50 psf (28.5'/2) = 712.5 plf$



See Enclosed Enercalc Output, use GL 6¾ x 18" (24F-V4)

Bm 3

$W_{DL} = 15 psf (15'/2) + 10 psf (23.5) = 348$

$W_{PAR} = 15 (15'/2) = 112.5 plf$

$W_{LL} = 50 (15'/2) = 375 plf$

See Enercalc Output, use GL 5.5 x 13½ (24F-V4)

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

DESCRIPTION: Mezzanine Beam - 22 ft span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

Material Properties

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

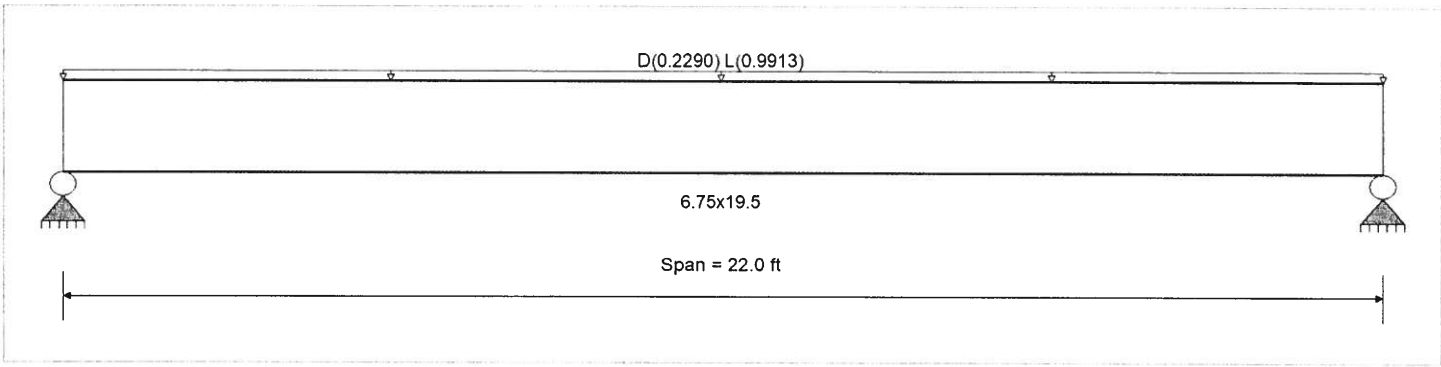
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.2290, L = 0.9913 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.935 : 1	Maximum Shear Stress Ratio	=	0.493 : 1
Section used for this span		6.75x19.5	Section used for this span		6.75x19.5
fb: Actual	=	2,071.01 psi	fv: Actual	=	130.64 psi
Fb: Allowable	=	2,213.83 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	11.000 ft	Location of maximum on span	=	20.394 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.700 in	Ratio =	377 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.862 in	Ratio =	306 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.195	0.103	0.90	0.922	1.00	1.00	1.00	1.00	1.00	13.85	388.64	1992.45	2.15	24.52	238.50
+D+L					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.935	0.493	1.00	0.922	1.00	1.00	1.00	1.00	1.00	73.83	2,071.01	2213.83	11.46	130.64	265.00
+D+0.750L					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.596	0.314	1.25	0.922	1.00	1.00	1.00	1.00	1.00	58.83	1,650.42	2767.29	9.14	104.11	331.25
+0.60D					0.922	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.066	0.035	1.60	0.922	1.00	1.00	1.00	1.00	1.00	8.31	233.19	3542.13	1.29	14.71	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.8617	11.080		0.0000	0.000

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

DESCRIPTION: Mezzanine Beam - 22 ft span

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	13.423	13.423
Overall MINimum	10.904	10.904
D Only	2.519	2.519
+D+L	13.423	13.423
+D+0.750L	10.697	10.697
+0.60D	1.511	1.511
L Only	10.904	10.904

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

LIC# : KW-06014847, Build:20.22.2.9 AHBL, INC (c) ENERCALC INC 1983-2022

DESCRIPTION: Bm #2 - Mezzanine Beam - 20 ft span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

Material Properties

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

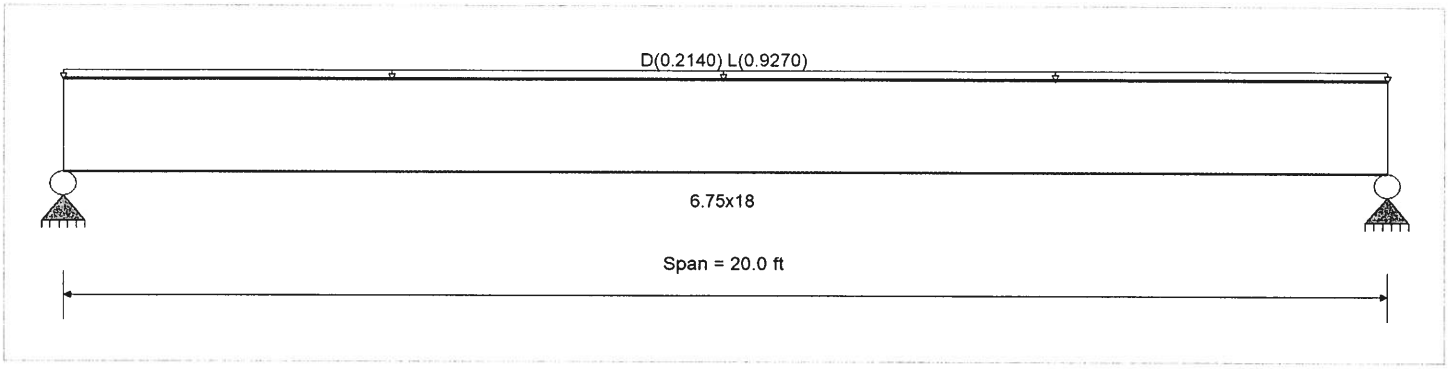
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.2140, L = 0.9270 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.834** : 1	Maximum Shear Stress Ratio	=	**0.454** : 1
Section used for this span		**6.75x18**	Section used for this span		**6.75x18**
fb: Actual	=	1,878.19 psi	fv: Actual	=	120.30 psi
Fb: Allowable	=	2,252.99 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	10.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.568 in	Ratio =	422 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.700 in	Ratio =	343 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.174	0.095	0.90	0.939	1.00	1.00	1.00	1.00	1.00	10.70	352.26	2027.69	1.83	22.56	238.50
+D+L					0.939	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.834	0.454	1.00	0.939	1.00	1.00	1.00	1.00	1.00	57.05	1,878.19	2252.99	9.74	120.30	265.00
+D+0.750L					0.939	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.531	0.289	1.25	0.939	1.00	1.00	1.00	1.00	1.00	45.46	1,496.71	2816.24	7.77	95.87	331.25
+0.60D					0.939	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.059	0.032	1.60	0.939	1.00	1.00	1.00	1.00	1.00	6.42	211.36	3604.79	1.10	13.54	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.6997	10.073		0.0000	0.000

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

DESCRIPTION: Bm #2 - Mezzanine Beam - 20 ft span

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	11.410	11.410
Overall MINimum	9.270	9.270
D Only	2.140	2.140
+D+L	11.410	11.410
+D+0.750L	9.093	9.093
+0.60D	1.284	1.284
L Only	9.270	9.270

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

DESCRIPTION: Bm #3 - Mezzanine Beam - 16 ft span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

Material Properties

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

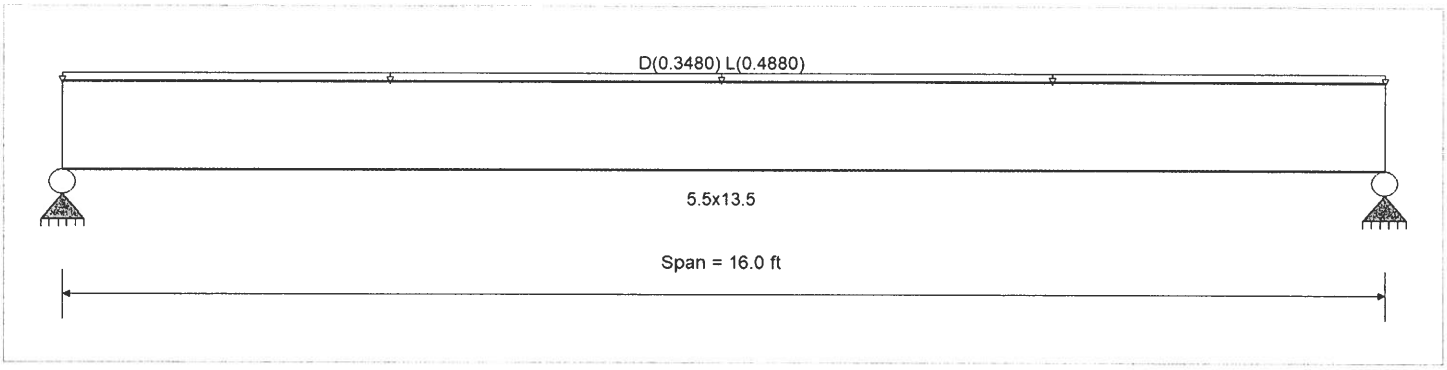
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.3480, L = 0.4880 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.801**: 1	Maximum Shear Stress Ratio	=	**0.439** : 1
Section used for this span		**5.5x13.5**	Section used for this span		**5.5x13.5**
fb: Actual	=	1,921.58 psi	fv: Actual	=	116.37 psi
Fb: Allowable	=	2,400.00 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	8.000 ft	Location of maximum on span	=	14.891 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.357 in	Ratio =	538 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.611 in	Ratio =	314 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.370	0.203	0.90	1.000	1.00	1.00	1.00	1.00	1.00	11.14	799.89	2160.00	2.40	48.44	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.801	0.439	1.00	1.000	1.00	1.00	1.00	1.00	1.00	26.75	1,921.58	2400.00	5.76	116.37	265.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.547	0.300	1.25	1.000	1.00	1.00	1.00	1.00	1.00	22.85	1,641.16	3000.00	4.92	99.39	331.25
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.125	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.68	479.94	3840.00	1.44	29.07	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.6109	8.058		0.0000	0.000

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

DESCRIPTION: Bm #3 - Mezzanine Beam - 16 ft span

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.688	6.688
Overall MINimum	3.904	3.904
D Only	2.784	2.784
+D+L	6.688	6.688
+D+0.750L	5.712	5.712
+0.60D	1.670	1.670
L Only	3.904	3.904

PRCTI20220873

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Subject _____ Phone _____ ☐ Calculations

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☐ Telephone Memo

AHBL

Civil Engineers

Structural Engineers

Landscape Architects

Community Planners

Land Surveyors

HDR 1

$W_{DL} = 15\,(25'/2) = 187.5$ plf

W_{par} " " $= 137.5$ plf

$W_{LL} = 50\,(25'/2) = 625$ plf

5'

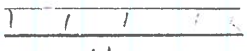
See Encercle Output, Use 6 x 8 DF#2

HDR 2

$W_{DL} = 15\,(15'/2) + 10$ psf $(23.5') = 348$ plf

$W_{par} = 15\,(15'/2) = 112.5$ plf

$W_{LL} = 25\,(15'/2) = 188$ plf



6'

See Encercle Output, Use 6 x 8 DF#2

HDR 3

$P_{DL} = 1.72k$

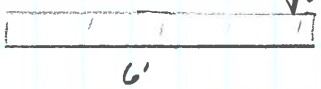
$P_{par} = 1.72k$

$P_{LL} = 5.72k$

$W_{DL} = 15\,(14'/2) = 105$ plf

$W_{par} = 15\,(14'/2) = 105$ plf

$W_{LL} = 25\,(14'/2) = 175$ plf



6'

See Encercle Output, Use GL 5.5 x 10.5 (24F-V4)

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

LIC# : KW-06014847, Build:20.22.2.9 AHBL, INC (c) ENERCALC INC 1983-2022

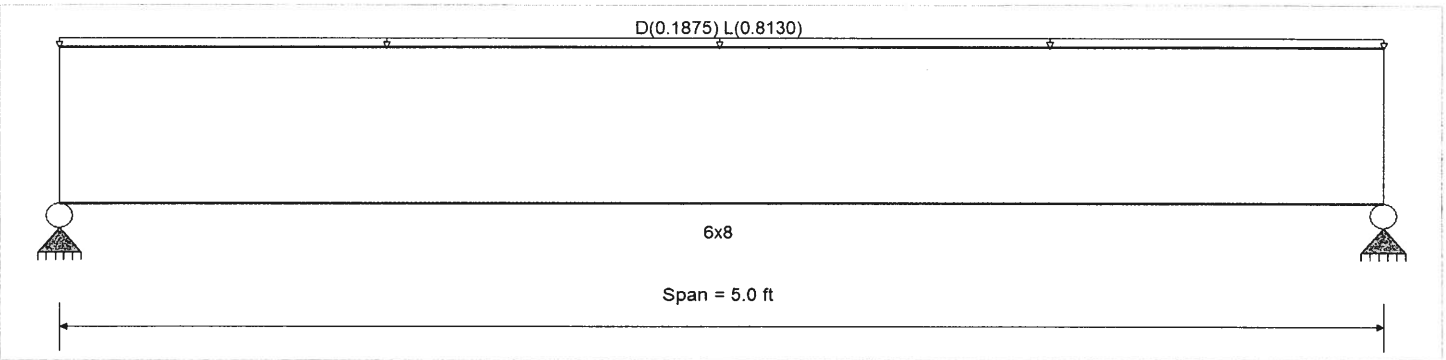
DESCRIPTION: Hdr #1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	875 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-10	Fb -	875 psi	Ebend- xx	1300 ksi
		Fc - Prll	600 psi	Eminbend - xx	470 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade :	No.2	Fv	170 psi		
		Ft	425 psi	Density	31.21 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.1875, L = 0.8130 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.832** : 1	Maximum Shear Stress Ratio	=	**0.402** : 1
Section used for this span		**6x8**	Section used for this span		**6x8**
fb: Actual	=	727.64 psi	fv: Actual	=	68.38 psi
Fb: Allowable	=	875.00 psi	Fv: Allowable	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.046 in	Ratio =	1311 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.056 in	Ratio =	1065 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 5.0 ft	1	0.173	0.084	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.59	136.36	787.50	0.35	12.82	153.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1	0.832	0.402	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.13	727.64	875.00	1.88	68.38	170.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1	0.530	0.256	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.49	579.82	1093.75	1.50	54.49	212.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1	0.058	0.028	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.35	81.82	1400.00	0.21	7.69	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0563	2.518		0.0000	0.000

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

LIC# : KW-06014847, Build:20.22.2.9 AHBL, INC (c) ENERCALC INC 1983-2022

DESCRIPTION: Hdr #1

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.501	2.501
Overall MINimum	2.033	2.033
D Only	0.469	0.469
+D+L	2.501	2.501
+D+0.750L	1.993	1.993
+0.60D	0.281	0.281
L Only	2.033	2.033

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

LIC# : KW-06014847, Build:20.22.3.31 AHBL, INC (c) ENERCALC INC 1983-2022

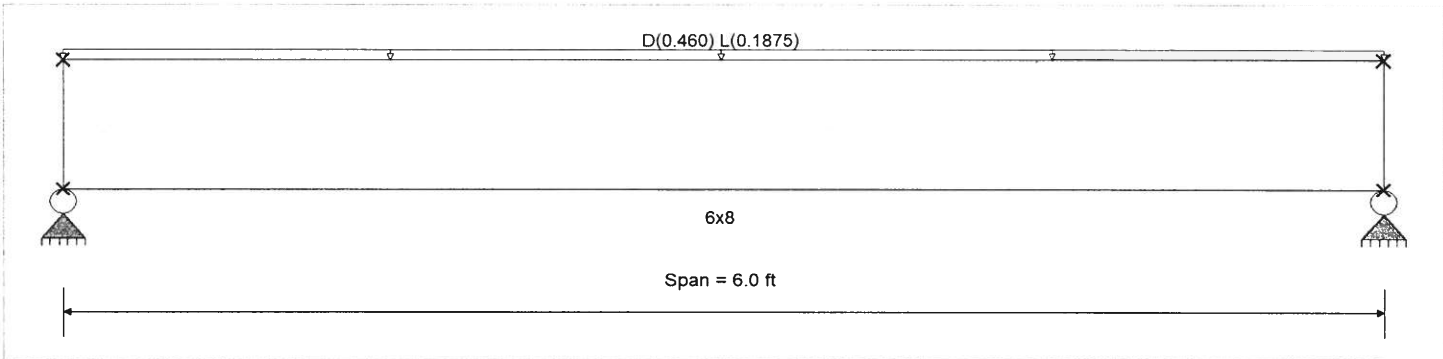
DESCRIPTION: Hdr #2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	875.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-10	Fb -	875.0 psi	Ebend- xx	1,300.0 ksi
		Fc - Prll	600.0 psi	Eminbend - xx	470.0 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.2	Fv	170.0 psi		
		Ft	425.0 psi	Density	31.210 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.460, L = 0.1875 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.777 : 1	Maximum Shear Stress Ratio	=	0.331 : 1
Section used for this span		6x8	Section used for this span		6x8
fb: Actual	=	678.11 psi	fv: Actual	=	56.20 psi
Fb: Allowable	=	872.53 psi	Fv: Allowable	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.022 in	Ratio =	3290 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.076 in	Ratio =	952 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.613	0.261	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.07	481.75	785.51	1.10	39.93	153.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.777	0.331	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.91	678.11	872.53	1.55	56.20	170.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.577	0.245	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.70	629.02	1089.84	1.43	52.13	212.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.207	0.088	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	289.05	1393.47	0.66	23.96	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0756	3.022		0.0000	0.000

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

DESCRIPTION: Hdr #2

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.943	1.943
Overall MINimum	0.563	0.563
D Only	1.380	1.380
+D+L	1.943	1.943
+D+0.750L	1.802	1.802
+0.60D	0.828	0.828
L Only	0.563	0.563

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

DESCRIPTION: Hdr #3 - Flr Bm Moved

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

Material Properties

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

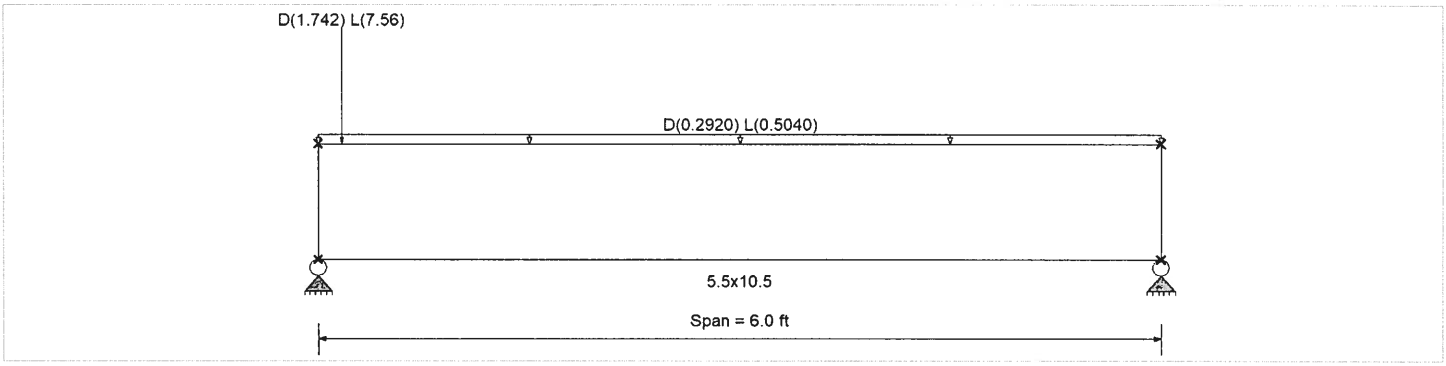
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Completely Unbraced

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

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.2920, L = 0.5040 k/ft
Point Load : D = 1.742, L = 7.560 k @ 0.1670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.219 : 1	Maximum Shear Stress Ratio	=	0.193 : 1
Section used for this span		5.5x10.5	Section used for this span		5.5x10.5
fb: Actual	=	522.55 psi	fv: Actual	=	51.09 psi
Fb: Allowable	=	2,385.60 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.672 ft	Location of maximum on span	=	5.146 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.021 in	Ratio =	3479 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.031 in	Ratio =	2333 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.081	0.074	0.90	1.000	1.00	1.00	1.00	1.00	0.99	1.46	173.77	2148.46	0.68	17.54	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.219	0.193	1.00	1.000	1.00	1.00	1.00	1.00	0.99	4.40	522.55	2385.60	1.97	51.09	265.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.146	0.129	1.25	1.000	1.00	1.00	1.00	1.00	0.99	3.67	435.25	2976.88	1.64	42.70	331.25
+0.60D					1.000	1.00	1.00	1.00	1.00	0.99			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.027	0.025	1.60	1.000	1.00	1.00	1.00	1.00	0.99	0.88	104.26	3800.63	0.41	10.52	424.00

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: Mezz.ec6

DESCRIPTION: Hdr #3 - Flr Bm Moved

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0309	2.912		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	11.431	2.647
Overall MINimum	8.862	1.722
D Only	2.570	0.924
+D+L	11.431	2.647
+D+0.750L	9.216	2.216
+0.60D	1.542	0.555
L Only	8.862	1.722

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: Mezz.ec6

DESCRIPTION: Typ Stud

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	14.69 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.2		
Fb +	900.0 psi	Fv	180.0 psi
Fb -	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	31.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Wood Section Name	**2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**1.50** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	8.250 in^2	Cf or Cv for Compressio	1.10
Ix	20.797 in^4	Cf or Cv for Tension	1.30
Iy	1.547 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 1

Applied Loads

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

Column self weight included : 26.267 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 14.690 ft, D = 0.5830, L = 1.470 k
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, L = 0.00670 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8812 : 1**
Load Combination +D+L
Governing NDS Formula Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 7.296 ft
At maximum location values are .
Applied Axial 2.079 k
Applied Mx 0.1807 k-ft
Applied My 0.0 k-ft
Fc : Allowable 429.211 psi

PASS Maximum Shear Stress Ratio = **0.04971 : 1**
Load Combination +D+L
Location of max.above base 14.690 ft
Applied Design Shear 8.948 psi
Allowable Shear 180.0 psi

Maximum SERVICE Lateral Load Reactions . .
Top along Y-Y 0.04921 k Bottom along Y-Y 0.04921 k
Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.2132 in at 7.394 ft above base
for load combination : +D+L
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.318	0.1739	PASS	0.0 ft	0.0	PASS	14.690 ft
+D+L	1.000	0.289	0.8812	PASS	7.296 ft	0.04971	PASS	14.690 ft
+D+0.750L	1.250	0.236	0.4912	PASS	7.296 ft	0.02983	PASS	14.690 ft
+0.60D	1.600	0.187	0.09986	PASS	0.0 ft	0.0	PASS	14.690 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					0.609				

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: Mezz.ec6

DESCRIPTION: Typ Stud

Maximum Reactions

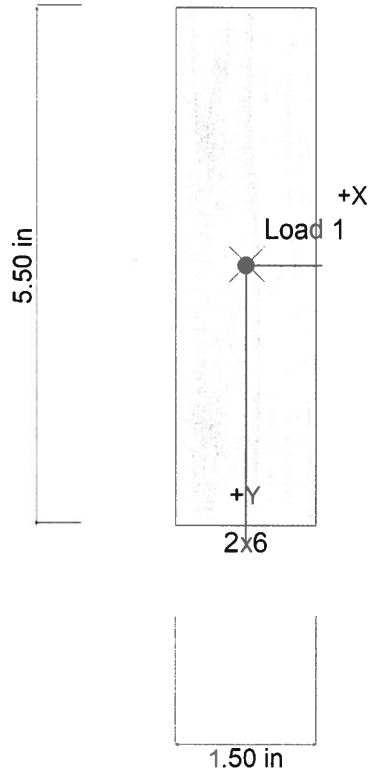
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+L				0.049	0.049	2.079					
+D+0.750L				0.037	0.037	1.712					
+0.60D						0.366					
L Only				0.049	0.049	1.470					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000ft	0.213 in	7.394 ft
+D+0.750L	0.0000 in	0.000ft	0.160 in	7.394 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000ft	0.213 in	7.394 ft

Sketches



PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Project File: Mezz.ec6

DESCRIPTION: --None--

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

General Information

Steel Section Name : **HSS5x5x1/4**

Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	14.5 ft
Top & Bottom Fixity	Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT X-X Axis

Applied Loads

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

Column self weight included : 226.490 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 14.50 ft, D = 4.460, L = 19.330 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2028** : 1

Load Combination	+D+L
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pa : Axial	24.016 k
Pn / Omega : Allowabl	118.443 k
Ma-x : Applied	0.0 k-ft
Mn-x / Omega : Allowable	17.468 k-ft
Ma-y : Applied	0.0 k-ft
Mn-y / Omega : Allowable	17.468 k-ft

PASS Maximum Shear Stress Rati **0.0** : 1

Load Combination	0.0
Location of max.above base	0.0 ft
At maximum location values are . . .	
Va : Applied	0.0 k
Vn / Omega : Allowable	0.0 k

Maximum Load Reactions . .

Top along X-X	0.0 k
Bottom along X-X	0.0 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination :

Along X-X 0.0 in at 0.0 ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Ry	KyLy/Rx	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.040	PASS	0.00 ft	1.00	1.00	0.00	0.00	0.000	PASS	0.00 ft
+D+L	0.203	PASS	0.00 ft	1.00	1.00	0.00	0.00	0.000	PASS	0.00 ft
+D+0.750L	0.162	PASS	0.00 ft	1.00	1.00	0.00	0.00	0.000	PASS	0.00 ft
+0.60D	0.024	PASS	0.00 ft	1.00	1.00	0.00	0.00	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
D Only	4.686								
+D+L	24.016								
+D+0.750L	19.184								
+0.60D	2.812								
L Only	19.330								

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
Axial @ Base	Maximum	24.016								
"	Minimum	2.812								

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Project File: Mezz.ec6

DESCRIPTION: --None--

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
Reaction, X-X Axis Base	Maximum	4.686									
"	Minimum	4.686									
Reaction, Y-Y Axis Base	Maximum	4.686									
"	Minimum	4.686									
Reaction, X-X Axis Top	Maximum	4.686									
"	Minimum	4.686									
Reaction, Y-Y Axis Top	Maximum	4.686									
"	Minimum	4.686									
Moment, X-X Axis Base	Maximum	4.686									
"	Minimum	4.686									
Moment, Y-Y Axis Base	Maximum	4.686									
"	Minimum	4.686									
Moment, X-X Axis Top	Maximum	4.686									
"	Minimum	4.686									
Moment, Y-Y Axis Top	Maximum	4.686									
"	Minimum	4.686									

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : HSS5x5x1/4

Depth	=	5.000 in	I xx	=	16.00 in^4	J	=	25.800 in^4
Design Thick	=	0.233 in	S xx	=	6.41 in^3			
Width	=	5.000 in	R xx	=	1.930 in			
Wall Thick	=	0.250 in	Zx	=	7.610 in^3			
Area	=	4.300 in^2	I yy	=	16.000 in^4	C	=	10.500 in^3
Weight	=	15.620 plf	S yy	=	6.410 in^3			
			R yy	=	1.930 in			
Ycg	=	0.000 in						

PRCTI20220873

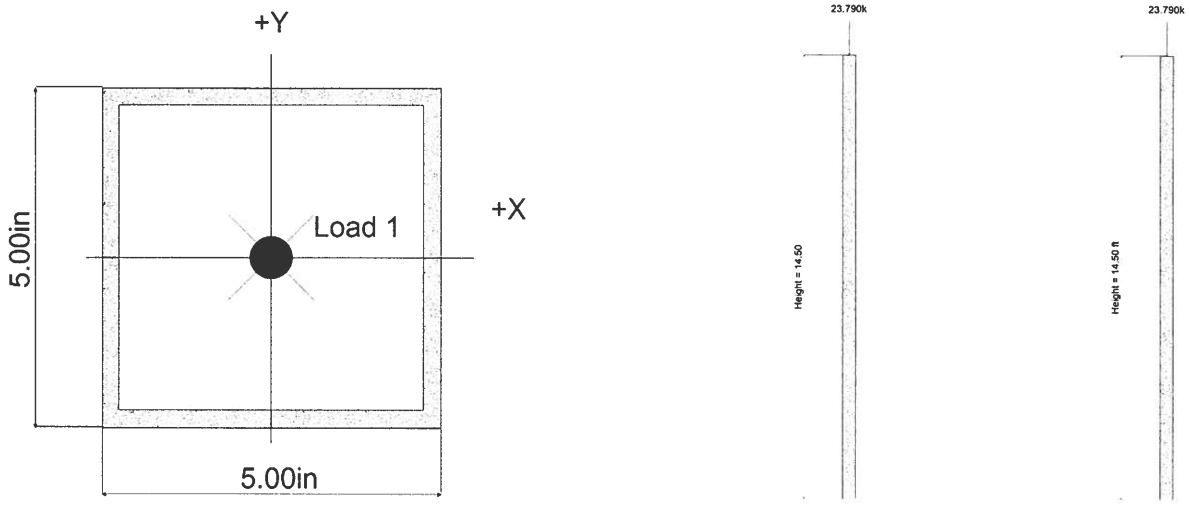
Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Project File: Mezz.ec6

DESCRIPTION: --None--

Sketches



PRCTI20220873

Project EAST MAIN · Project No. 2190390.20 ☐ Page ____ of ____

Subject ____ Phone ____ ☐ Calculations

With/To ____ Fax # ____ ☐ Fax

Address ____ # Faxed Pages ____ ☐ Memorandum

Date ____ By ____ ☐ Meeting Minutes

☐ Telephone Memo

AHBL

Civil Engineers

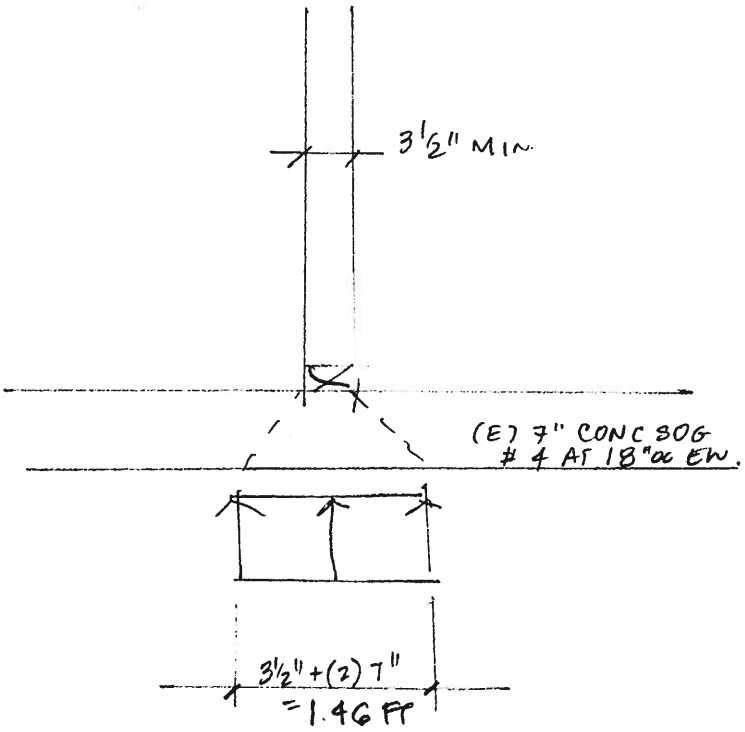
Structural Engineers

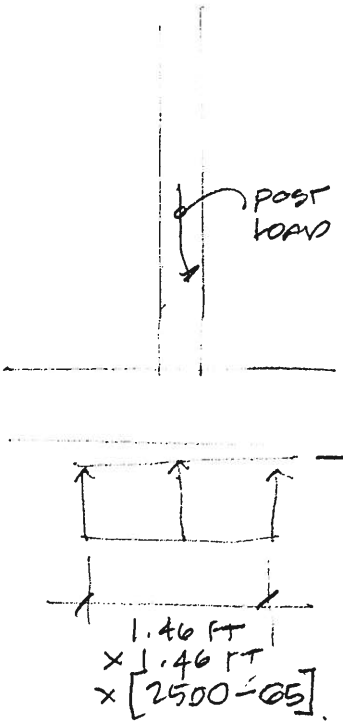
Landscape Architects

Community Planners

Land Surveyors

FOUNDATION DESIGN:





MAX POST LOAD ON SOG:

4x4 = 5190#

6x6 = 6430#

MAX UNIFORM LOAD = 1.46 × 2500 PSF

= 3650 PLF @ 2x4 STUD WALL = 43-FT.

= 4063 PLF @ 2x6 STUD WALL = 48-FT

FIND MAX TRIBUTARY WIDTH OFFICE FLOOR:

- 65 PSF LIVE LOAD

MAX TRIB = MAX UNIFORM LOAD - 150 PLF WALL SELF WT / (15 PSF DL + 65 PSF LL).

∴ EXISTING SLAB ON GRADE IS OK AS WALL FOOTING

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: Mezz.ec6

LIC# : KW-06014847, Build:20.22.3.31 AHBL, INC (c) ENERCALC INC 1983-2022

DESCRIPTION: Column Footing

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.50 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

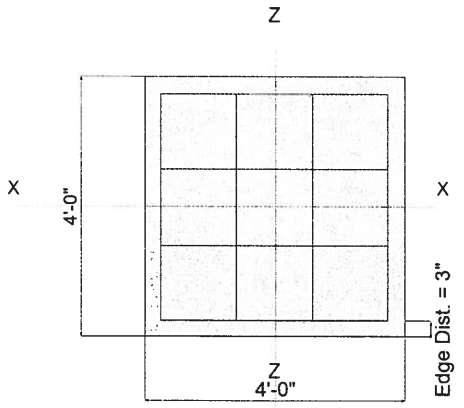
Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



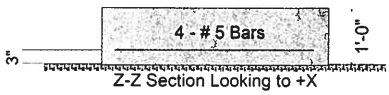
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	5
Bars parallel to Z-Z Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

X-X Section Looking to +Z



Z-Z Section Looking to +X

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	4.460		19.330					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: Mezz.ec6

LIC# : KW-06014847, Build:20.22.3.31 AHBL, INC

DESCRIPTION: Column Footing

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6528	Soil Bearing	1.632 ksf	2.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3738	Z Flexure (+X)	4.535 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS	0.3738	Z Flexure (-X)	4.535 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS	0.3738	X Flexure (+Z)	4.535 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS	0.3738	X Flexure (-Z)	4.535 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS	0.3169	1-way Shear (+X)	26.034 psi	82.158 psi	+1.20D+1.60L
PASS	0.3169	1-way Shear (-X)	26.034 psi	82.158 psi	+1.20D+1.60L
PASS	0.3169	1-way Shear (+Z)	26.034 psi	82.158 psi	+1.20D+1.60L
PASS	0.3169	1-way Shear (-Z)	26.034 psi	82.158 psi	+1.20D+1.60L
PASS	0.6594	2-way Punching	108.347 psi	164.317 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	2.50	n/a	0.0	0.4238	0.4238	n/a	n/a	0.170
X-X, +D+L	2.50	n/a	0.0	1.632	1.632	n/a	n/a	0.653
X-X, +D+0.750L	2.50	n/a	0.0	1.330	1.330	n/a	n/a	0.532
X-X, +0.60D	2.50	n/a	0.0	0.2543	0.2543	n/a	n/a	0.102
Z-Z, D Only	2.50	0.0	n/a	n/a	n/a	0.4238	0.4238	0.170
Z-Z, +D+L	2.50	0.0	n/a	n/a	n/a	1.632	1.632	0.653
Z-Z, +D+0.750L	2.50	0.0	n/a	n/a	n/a	1.330	1.330	0.532
Z-Z, +0.60D	2.50	0.0	n/a	n/a	n/a	0.2543	0.2543	0.102

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.7805	+Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +1.40D	0.7805	-Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +1.20D+1.60L	4.535	+Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +1.20D+1.60L	4.535	-Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +1.20D+0.50L	1.877	+Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +1.20D+0.50L	1.877	-Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +1.20D	0.6690	+Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +1.20D	0.6690	-Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +0.90D	0.5018	+Z	Bottom	0.2592	AsMin	0.310	12.131	OK
X-X, +0.90D	0.5018	-Z	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.40D	0.7805	-X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.40D	0.7805	+X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D+1.60L	4.535	-X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D+1.60L	4.535	+X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D+0.50L	1.877	-X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D+0.50L	1.877	+X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D	0.6690	-X	Bottom	0.2592	AsMin	0.310	12.131	OK

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: Mezz.ec6

DESCRIPTION: Column Footing

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D	0.6690	+X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +0.90D	0.5018	-X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +0.90D	0.5018	+X	Bottom	0.2592	AsMin	0.310	12.131	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	4.48 psi	4.48 psi	4.48 psi	4.48 psi	4.48 psi	82.16 psi	0.05	OK
+1.20D+1.60L	26.03 psi	26.03 psi	26.03 psi	26.03 psi	26.03 psi	82.16 psi	0.32	OK
+1.20D+0.50L	10.78 psi	10.78 psi	10.78 psi	10.78 psi	10.78 psi	82.16 psi	0.13	OK
+1.20D	3.84 psi	3.84 psi	3.84 psi	3.84 psi	3.84 psi	82.16 psi	0.05	OK
+0.90D	2.88 psi	2.88 psi	2.88 psi	2.88 psi	2.88 psi	82.16 psi	0.04	OK

Two-Way "Punching" Shear All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	18.65 psi	164.32 psi	0.1135	OK
+1.20D+1.60L	108.35 psi	164.32 psi	0.6594	OK
+1.20D+0.50L	44.85 psi	164.32 psi	0.2729	OK
+1.20D	15.98 psi	164.32 psi	0.09727	OK
+0.90D	11.99 psi	164.32 psi	0.07295	OK

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: Mezz.ec6

DESCRIPTION: End Column Footing

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.50 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

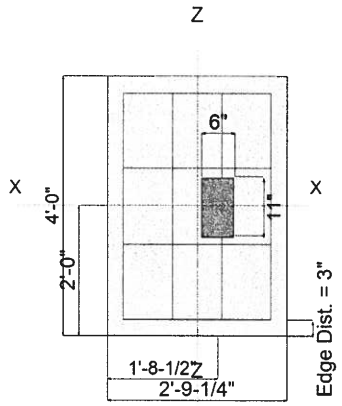
Footing base depth below soil surface	=	ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

Width parallel to X-X Axis	=	2.770 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	12.0 in
Load location offset from footing center...		
ex : Prll to X-X Axis	=	3.875 in
	=	in
Pedestal dimensions...		
px : parallel to X-X Axis	=	6.0 in
pz : parallel to Z-Z Axis	=	11.0 in
Height	=	1.0 in
Rebar Centerline to Edge of Concrete...		
at Bottom of footing	=	3.0 in



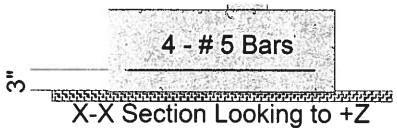
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	5
Bars parallel to Z-Z Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	5

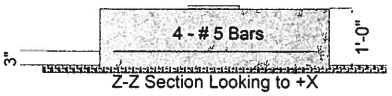
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	Bars along X-X Axis
# Bars required within zone	81.8 %
# Bars required on each side of zone	18.2 %



X-X Section Looking to +Z



Z-Z Section Looking to +X

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	2.520		10.90					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: Mezz.ec6

LIC# : KW-06014847, Build:20.22.2.9 AHBL, INC (c) ENERCALC INC 1983-2022

DESCRIPTION: End Column Footing

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.8780	Soil Bearing	2.195 ksf	2.50 ksf	+D+L about Z-Z axis
PASS n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS 0.07844	Z Flexure (+X)	0.9516 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS 0.08834	Z Flexure (-X)	1.072 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS 0.1272	X Flexure (+Z)	2.195 k-ft/ft	17.246 k-ft/ft	+1.20D+1.60L
PASS 0.1272	X Flexure (-Z)	2.195 k-ft/ft	17.246 k-ft/ft	+1.20D+1.60L
PASS 0.01944	1-way Shear (+X)	1.597 psi	82.158 psi	+1.20D+1.60L
PASS 0.07232	1-way Shear (-X)	5.941 psi	82.158 psi	+1.20D+1.60L
PASS 0.1665	1-way Shear (+Z)	13.681 psi	82.158 psi	+1.20D+1.60L
PASS 0.1665	1-way Shear (-Z)	13.681 psi	82.158 psi	+1.20D+1.60L
PASS 0.1603	2-way Punching	26.343 psi	164.317 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	2.50	n/a	0.0	0.3724	0.3724	n/a	n/a	0.149
X-X, +D+L	2.50	n/a	0.0	1.356	1.356	n/a	n/a	0.542
X-X, +D+0.750L	2.50	n/a	0.0	1.110	1.110	n/a	n/a	0.444
X-X, +0.60D	2.50	n/a	0.0	0.2235	0.2235	n/a	n/a	0.089
Z-Z, D Only	2.50	2.366	n/a	n/a	n/a	0.2149	0.5299	0.212
Z-Z, +D+L	2.50	3.461	n/a	n/a	n/a	0.5175	2.195	0.878
Z-Z, +D+0.750L	2.50	3.369	n/a	n/a	n/a	0.4419	1.779	0.712
Z-Z, +0.60D	2.50	2.366	n/a	n/a	n/a	0.1290	0.3180	0.127

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.3783	+Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +1.40D	0.3783	-Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +1.20D+1.60L	2.195	+Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +1.20D+1.60L	2.195	-Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +1.20D+0.50L	0.9087	+Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +1.20D+0.50L	0.9087	-Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +1.20D	0.3243	+Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +1.20D	0.3243	-Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +0.90D	0.2432	+Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
X-X, +0.90D	0.2432	-Z	Bottom	0.2592	AsMin	0.4477	17.246	OK
Z-Z, +1.40D	0.1848	-X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.40D	0.1641	+X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D+1.60L	1.072	-X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D+1.60L	0.9516	+X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D+0.50L	0.4438	-X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D+0.50L	0.3940	+X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +1.20D	0.1584	-X	Bottom	0.2592	AsMin	0.310	12.131	OK

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: Mezz.ec6

DESCRIPTION: End Column Footing

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D	0.1406	+X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +0.90D	0.1188	-X	Bottom	0.2592	AsMin	0.310	12.131	OK
Z-Z, +0.90D	0.1055	+X	Bottom	0.2592	AsMin	0.310	12.131	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.02 psi	0.28 psi	2.36 psi	2.36 psi	2.36 psi	82.16 psi	0.03	OK
+1.20D+1.60L	5.94 psi	1.60 psi	13.68 psi	13.68 psi	13.68 psi	82.16 psi	0.17	OK
+1.20D+0.50L	2.46 psi	0.66 psi	5.67 psi	5.67 psi	5.67 psi	82.16 psi	0.07	OK
+1.20D	0.88 psi	0.24 psi	2.02 psi	2.02 psi	2.02 psi	82.16 psi	0.02	OK
+0.90D	0.66 psi	0.18 psi	1.52 psi	1.52 psi	1.52 psi	82.16 psi	0.02	OK

Two-Way "Punching" Shear All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	4.54 psi	164.32 psi	0.02764	OK
+1.20D+1.60L	26.34 psi	164.32 psi	0.1603	OK
+1.20D+0.50L	10.91 psi	164.32 psi	0.06639	OK
+1.20D	3.89 psi	164.32 psi	0.02369	OK
+0.90D	2.92 psi	164.32 psi	0.01777	OK

ATC Hazards by Location

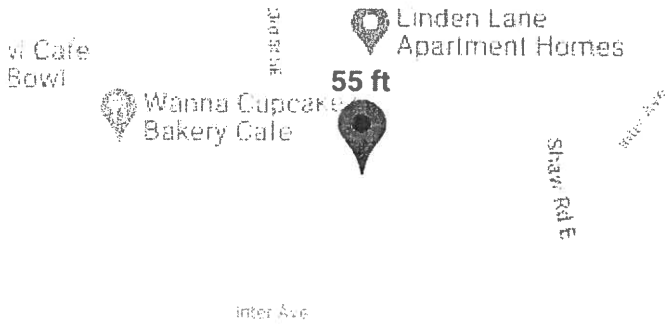
Search Information

Coordinates: 47.191046, -122.261843

Elevation: 55 ft

Timestamp: 2021-03-26T01:46:18.697Z

Hazard Type: Wind



ASCE 7-16		ASCE 7-10		ASCE 7-05	
MRI 10-Year	67 mph	MRI 10-Year	72 mph	ASCE 7-05 Wind Speed	85 mph
MRI 25-Year	73 mph	MRI 25-Year	79 mph		
MRI 50-Year	78 mph	MRI 50-Year	85 mph		
MRI 100-Year	82 mph	MRI 100-Year	91 mph		
Risk Category I	92 mph	Risk Category I	100 mph		
Risk Category II	97 mph	Risk Category II	110 mph		
Risk Category III	104 mph	Risk Category III-IV	115 mph		
Risk Category IV	108 mph				

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

Disclaimer

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

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

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ATC Hazards by Location

Search Information

Coordinates:	47.191046, -122.261843
Elevation:	55 ft
Timestamp:	2021-03-26T01:47:15.641Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D-default

Basic Parameters

Name	Value	Description
S_S	1.258	MCE_R ground motion (period=0.2s)
S_1	0.433	MCE_R ground motion (period=1.0s)
S_{MS}	1.51	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.007	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.914	Coefficient of risk (0.2s)
CR_1	0.898	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)

SsRT	1.258	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.376	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.433	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.482	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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Disclaimer

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

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Lateral Design (E-W)

Wind

$q_z = .00256\,(0.742)(1.0)(.85)/(1.0)(97)^2 = 15.2$ psf

Horiz pressure Transferred Thru Ext wall to mezz

← mezz out of corner 2a (29.6') zone

$p = q_z G C_p = 15.2(0.58) = 8.82$ psf

$V = 8.82$ psf $(35.42/2)(69.5') = 10,856\#$

Seismic

$C_s = \dfrac{\frac{S_{DS}}{R/I_e}}{} = \dfrac{\frac{1.106}{6.5}}{1} = .17$ $\qquad V = .17\,W$

Mezz Wt = 15 psf (4596.5 sf) = 68,947.5#

Tilt Panels = 1415 plf (69') = 97,635#

Framed Walls = 10 psf (109')(14½) + 10 (109')(23½/2) = 20,437.50

$W = 187,020\#$

$V = .17\,(187,020\#) = 31,793.4$ governs

$v_{ASD} = 31,793.4\#/69'(.7) = 322.5$ plf

Diaphragm Shear = 322.5 plf $\dfrac{42/2}{60'} = 99.6$ plf

Use 3/4" APA RATED Sheathing w/ 10d @ 6" o.c. @ Edges and 10d @ 12" o.c. field Capacity = 430 plf/2 = 215 plf (ASD) O.K.

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

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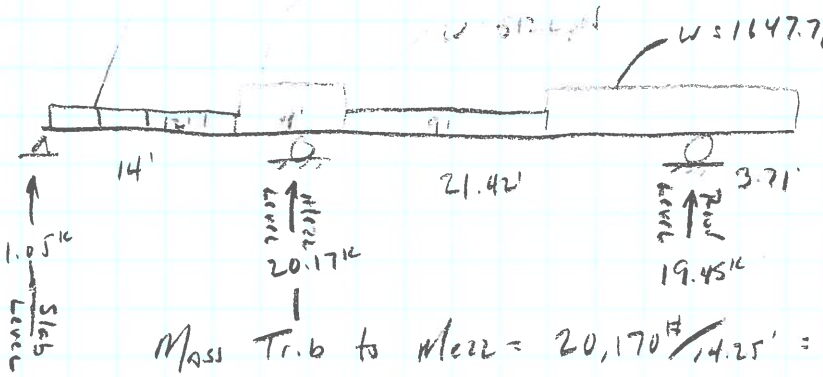
Panel Anchorage – Calc PNL Mass Trib to Mezz

$W = 150(9.25/12)(3.5) + 10\,pf(21.5/2) = 512.2\,plf$

$W = 150\left(\frac{9.25}{12}\right)\left(\frac{28.5}{2}\right) = 1647.7\,plf$



Mass Trib to Mezz = 20,170#/14.25' = 1415 plf

$F_p = 0.4 S_{DS} K_a I_e W_p = 0.4(1.106)\left(1+\frac{56}{100}\right)(1.0)W_p = .690 W_p$

$F_p = .690(1415\,plf) = 976\,plf$

5/8" ϕ TITEN HD w/ 5½" Embed – Max Tension = 3425#

3425#/976 plf = 3.5' Use Simp HTT4 @ 32" o.c.

Check Diaphragm for Anchorage Force

Diaphragm $v = \frac{976\,plf(42'/2)}{69'} = 301\,plf$

3/4" APA RATED Sheathing w/10d @6" o.c. @ Edges and 10d@12" o.c. Field Allowable Cap = 430(.8) = 344 plf O.K.

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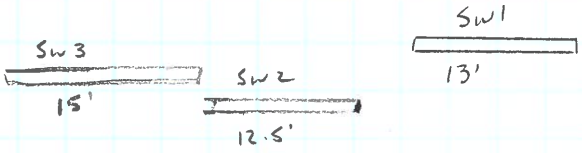
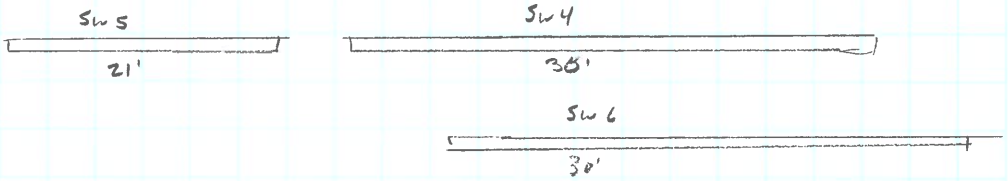
Shear walls





Sw 1 thru 3

$$\text{Shear} = \frac{322.5\text{plf}\,(54'/2)}{(15'+12.5'+13')} = 215\text{plf (ASD)}$$

15/32" Sheathing w/ 10d @ 6" o.c. Edges / 12" o.c. field

Capacity = 620/2 = 310 plf O.K. 15/32" Sheathing w/ 10d @ 6" o.c. Edges / 12" o.c. field

Overturning Sw 1 (Worse Case)

$OT_m = 215\text{plf}\,(13.0')(14') = 39{,}130$ ft-lb

$R_m = (15\text{psf}(7/2) + 10\text{psf}(14'))(13')\frac{1}{2}(0.6) = 9760$ ft-lb

Hold Down = (39,130 − 9760)/13' = 2259 lb use Simp HDU2

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

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Overturning - Sw2 # 3

Sw 2

OTm = 215.1#(12.5')(14') = 37,625 ft-#

Rm = (15(29'/2) + 10(14')(12.5')²/2 (.6) = 16,758 ft-#

Hold Down = (37,625 - 16,758)/12.5' = 1670#

use Simp HDU2

Sw 3

OTm = 215 (15')(14') = 45,150 ft-#

Rm = (15(7'/2) + 10(14')(15')²/2 (.6) = 10,463 ft-#

Hold Down = (45,150 - 10,463)/15 = 2312#

use Simp HDU2

Sw 4 & 5

Shear = 322.5 plf (57'/2) / (38' + 21') = 155.8 plf

O.K. Shearwall Type (W1/2)

Overturning

Sw 5

OTm = 155.8 (21')(14') = 45,805 ft-#

Rm = (15(15'/2) + 10(14'))(21')²/2 (.6) = 33,405

Hold Down = 45,805 - 33,405 / 21 = 590.5# use Simp HDU2

Overturning Sw 4

OTm = 155.8 (38)(14) = 82,805 ft-#

Rm = (15(38'/2) + 10(14'))(38')²/2 (.6) = 187,360 ft-# No overturning

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

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Existing Mezz wall

Existing Shear 101.64 plf (from March 2021 Calcs) for original mezz

Addl Shear = 3225 plf (15%) = 1532 #

Addl Shear = 1532 #/67' = 22.9 plf

Total Shear = 101.64 + 22.9 = 124.5 plf

Wall is sheathed w/ 15/32" APA Rated Sheathing w/ 10d @ 6" o.c. Edges & 12" o.c. field

Capacity = 620 plf/2 = 310 plf O.K.

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

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LATERAL DESIGN (N-S)

No Ext Wall in NS direction, ∴ No Wind

Seismic

$$C_s = \frac{S_{DS}}{R/I_e} = \frac{1.106}{5/1} = .221\,W$$

Mezz Wt = 15 psf (45945 SF) = 68,947.5#

Partition Walls = 10 psf (250 ft (14'/2) + 193.5 (23.5')) = 40,236#

W = 109,183.5#

V = .221 (109,183.5) = 24,130#

$$V_{ASD} = \frac{24{,}130^{\#}}{69'}(.7) = 245\ plf$$

$$\text{Diaphragm Shear} = \frac{245\ plf\ (55'/2)}{67'} = 100.6\ plf$$

3/4" APA RATED Sheathing w/ 10d @ 6" o.c. Edges @ 12" o.c. Field

Capacity = 430 plf/2 = 215 plf O.K.

$$\text{Chord} = \frac{245\ plf\ (55'/2)^2}{69'} = 1343^{\#}$$

Typical Lapped dble 2x6 Top Chord will be adequate.

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

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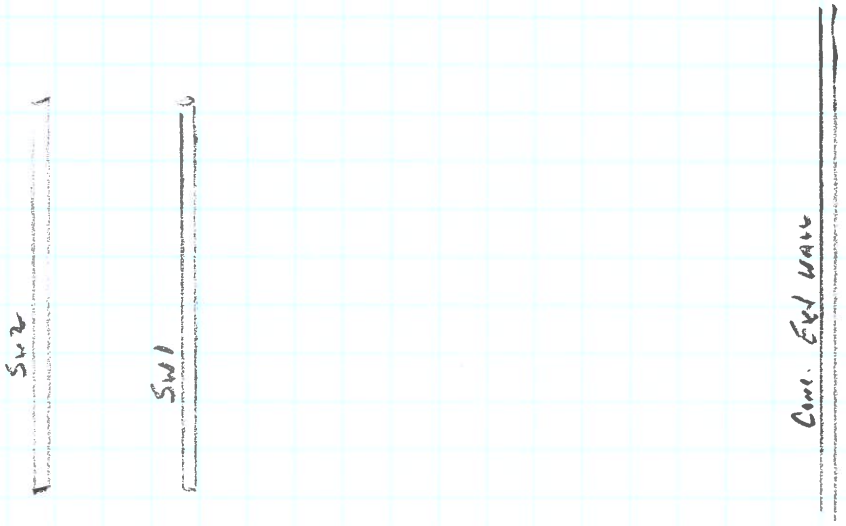
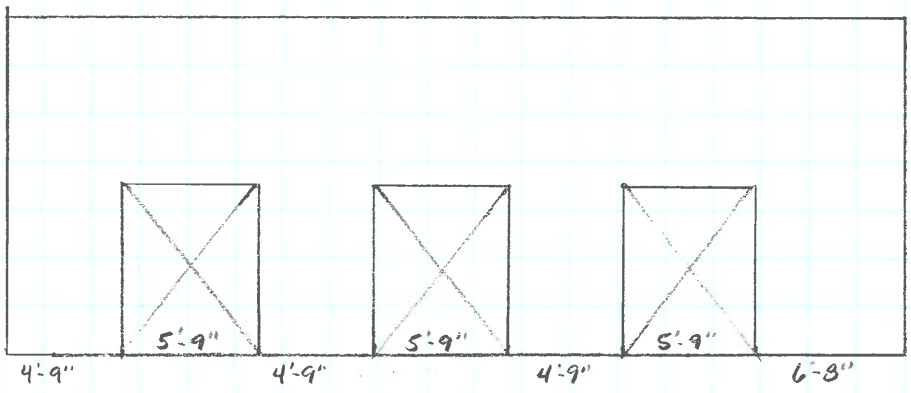


SW1 & 2



Length of full Ht Sheathing = 4.75'(8) + 6.67' = 20.92'

% full Ht Sheathing = 20.92'/38.17' = 54.8%

Opening Ht = 7' Max Unrestrained Ht = H/2

C_a = 0.8 1.5 TABLE 4.3.3.5 2015 SDPWS

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

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Try 15/32" Sheathing w/ 10d @ 6" o.c. Edge & @ 12" o.c. field

$v = 624 \text{ plf} / 2 = 312 \text{ plf}$

$V_{perforated} = C_o v \Sigma L = 0.815(310.11)\left(4.75\left(\frac{2(4.75)}{14}\right)3 + 6.67\left(\frac{2(6.67)}{14}\right)\right)$

$= 4,049\#$

$V_{applied} = 244.8 \text{ plf}\left(\frac{69'}{2}\right) = 8445\# > V_{perforated}$ N.G.

Try 15/32 Sht'g w/ 10d @ 2" o.c. Edges and @ 12" o.c. field

$v = 770 \text{ plf}$

$V_{perforated} = 0.815(770)\left(\left(4.75(3)\right)\left(\frac{2(4.75)}{14}\right) + 6.17\left(\frac{2(6.67)}{14}\right)\right) = 10,056\# > V_{applied}$

Hold Down

$$T = \frac{8445\#(.4')}{.815\left(4.75(3)\left(\frac{2(4.75)}{14}\right) + 6.67\left(\frac{2(6.67)}{14}\right)\right)} = 9052\#$$

$OTM = 9052\#(30.17') = 345,515 \text{ ft-}\#$

$$Rm = \left(10_{psf}\left((413.63 \text{ sf}) + 856.7 \text{ sf}\right)\left(\frac{30.17'}{2}\right) + 15_{psf}\left(\frac{16.33'}{2}\right)\left(\frac{30.17'^2}{2}\right)\right)$$

$$+ 10_{psf}(7')\left(\frac{5.75'}{2}\right)(30.17') + 15_{psf}\left(\frac{16.33'}{2}\right)\left(\frac{5.75'}{2}\right)(30.17') = 211,670 \text{ ft-}\#$$

$$\text{HoldDown} = \frac{345,515 \text{ ft-}\# - 211,670 \text{ ft-}\#}{30.17'} = 3506\#$$

Use HDU4 w/ F4.0 flg

Tension / Compression Chord

$$T = C = \frac{8445(14)}{.815\left(4.75(3)\left(\frac{2(4.75)}{14}\right) + 6.67\left(\frac{2(6.67)}{14}\right)\right)} = 9052\#$$

See Enercalc Analysis, Use (3) 2x6 Fa. End of Wall

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: Mezz.ec6

LIC# : KW-06014847, Build:20.22.2.9 AHBL, INC (c) ENERCALC INC 1983-2022

DESCRIPTION: Perf shearwall chords

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	14 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.2		
Fb +	900 psi	Fv	180 psi
Fb -	900 psi	Ft	575 psi
Fc - Prll	1350 psi	Density	31.21 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name	**4-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**6.0** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	33.0 in^2	Cf or Cv for Compressio	1.10
Ix	83.188 in^4	Cf or Cv for Tension	1.30
Iy	99.0 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14

Applied Loads

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

AXIAL LOADS . . .
Axial Load at 14.0 ft, E = 21.433 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9355 : 1**

Load Combination	E Only * 0.70
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	14.0 ft
At maximum location values are .	
Applied Axial	15.003 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	485.990 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	E Only * 0.5250
Location of max.above base	14.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	288.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
	1.600	0.205	0.0	PASS	0.0 ft	0.0	PASS	14.0 ft
E Only * 0.70	1.600	0.205	0.9355	PASS	14.0 ft	0.0	PASS	14.0 ft
E Only * 0.5250	1.600	0.205	0.7016	PASS	14.0 ft	0.0	PASS	14.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
E Only * 0.70					15.003				
E Only * 0.5250					11.252				
E Only					21.433				

PRCTI20220873

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: Mezz.ec6

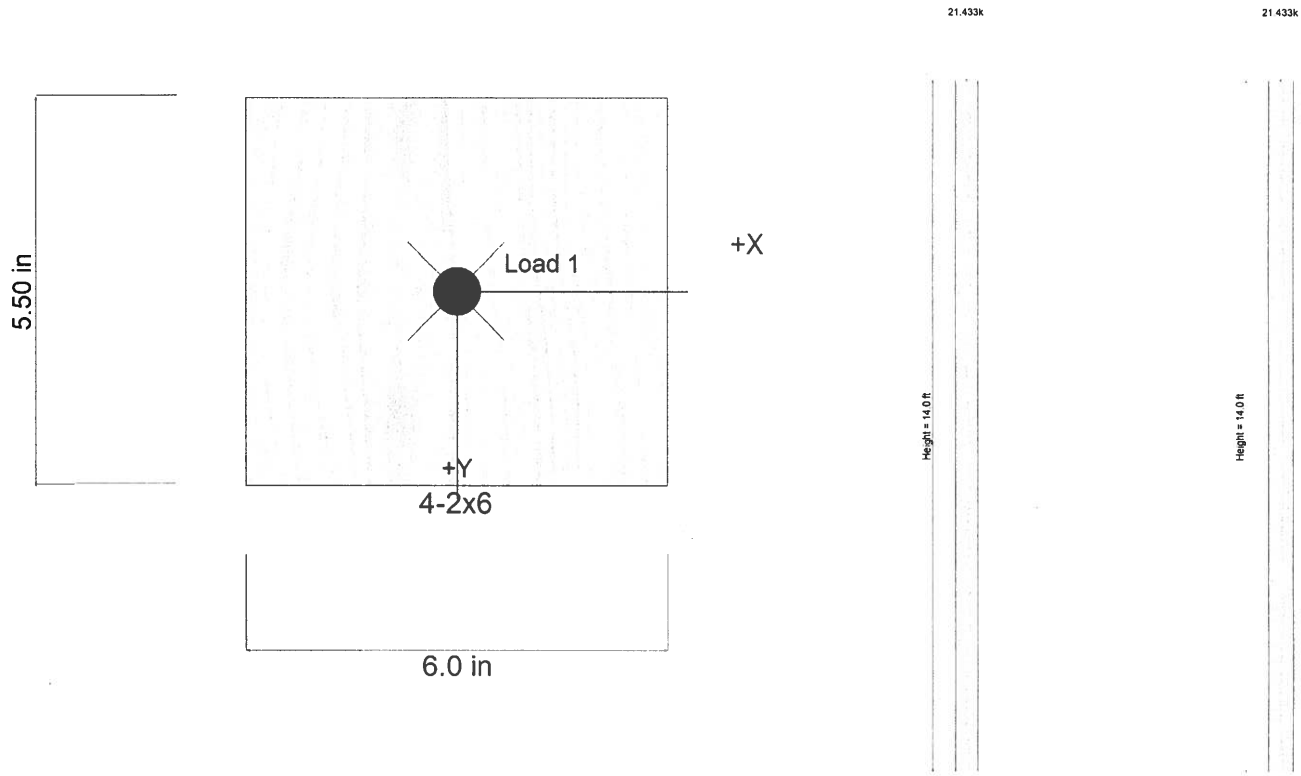
LIC# : KW-06014847, Build:20.22.2.9 AHBL, INC (c) ENERCALC INC 1983-2022

DESCRIPTION: Perf shearwall chords

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
	0.0000 in	0.000ft	0.000 in	0.000 ft
E Only * 0.70	0.0000 in	0.000ft	0.000 in	0.000 ft
E Only * 0.5250	0.0000 in	0.000ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000ft	0.000 in	0.000 ft

Sketches



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SIMPSON Strong-Tie®

Anchor Designer™ Software

Version 2.9.7376.10

Company:		Date:	3/29/2022
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Anchroage of columns into footing. (Wind ColumnI)
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Torque controlled expansion anchor
Material: Carbon Steel
Diameter (inch): 0.750
Nominal Embedment depth (inch): 4.250
Effective Embedment depth, h_{ef} (inch): 3.500
Code report: ICC-ES ESR-3037
Anchor category: 1
Anchor ductility: Yes
h_{min} (inch): 6.90
c_{ac} (inch): 8.92
C_{min} (inch): 6.50
S_{min} (inch): 7.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 7.00
State: Cracked
Compressive strength, f'_c (psi): 4000
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: Yes

Base Plate
Length x Width x Thickness (inch): 16.00 x 5.50 x 0.75

Recommended Anchor
Anchor Name: Strong-Bolt® 2 - 3/4"Ø CS Strong-Bolt 2, hnom:4.25" (108mm)
Code Report: ICC-ES ESR-3037

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Company:		Date:	3/29/2022
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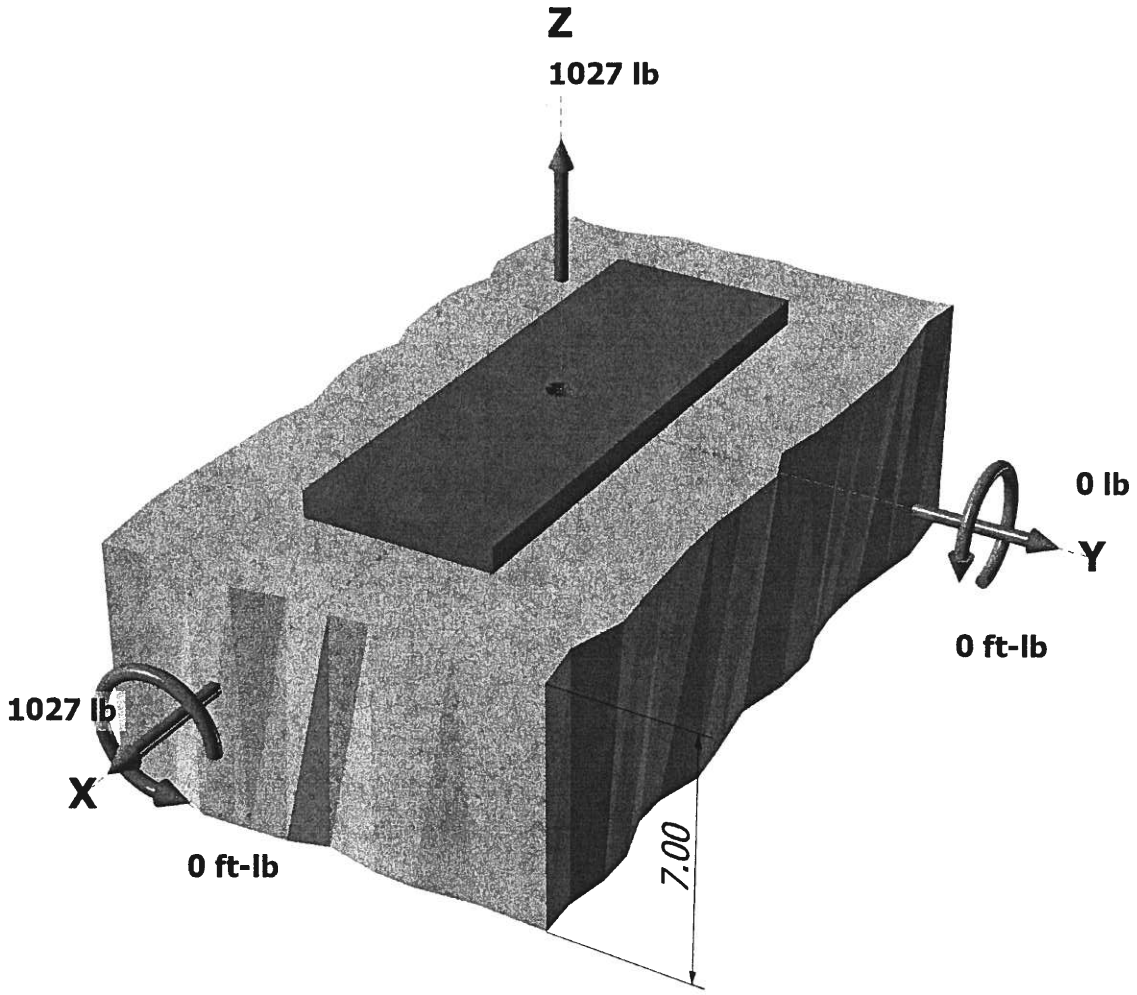
Project:			
Address:			
Phone:			
E-mail:			

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: Not applicable
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

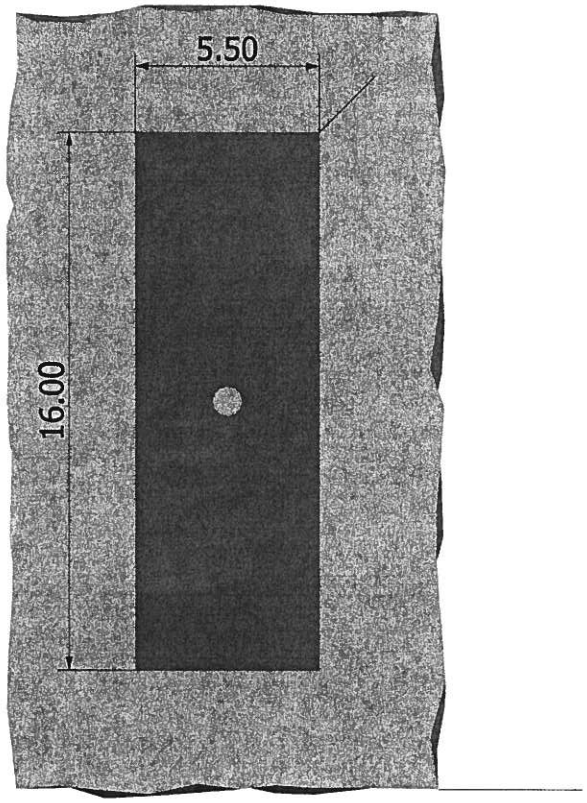
Strength level loads:

N_{ua} [lb]: 1027
V_{uax} [lb]: 1027
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0

<Figure 1>



<Figure 2>

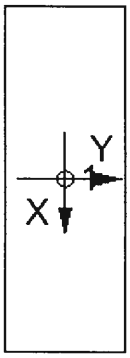


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1027.0	1027.0	0.0	1027.0
Sum	1027.0	1027.0	0.0	1027.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1027
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
29700	0.75	22275

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.4.2.2a)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	4000	3.500	7040

$\phi N_{cb} = \phi \, (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1a)

A_{Nc} (in²)	A_{Nco} (in²)	$c_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
110.25	110.25	-	1.000	1.00	1.000	7040	0.65	4576

6. Pullout Strength of Anchor in Tension (Sec. 17.4.3)

$\phi N_{pn} = \phi \Psi_{c,P} \lambda_a N_p (f'_c / 2{,}500)^n$ (Sec. 17.3.1, Eq. 17.4.3.1 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	ϕN_{pn} (lb)
1.0	1.00	5519	4000	0.50	0.65	4538

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
14480	0.8	0.65	7530

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp}(A_{Nc} / A_{Nco})\, \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1a)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	110.25	110.25	1.000	1.000	1.000	7040	0.70	9856

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.6.)

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	1027	22275	0.05	Pass
Concrete breakout	1027	4576	0.22	Pass
Pullout	**1027**	**4538**	**0.23**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**1027**	**7530**	**0.14**	**Pass (Governs)**
Pryout	1027	9856	0.10	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.6..1	0.23	0.00	22.6%	1.0	Pass

3/4"Ø CS Strong-Bolt 2, hnom:4.25" (108mm) meets the selected design criteria.

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

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Project _____ Project No. _____ ☐ Page ____ of ____

Subject _____ Phone _____ ☐ Calculations

With/To _____ Fax # _____ ☐ Fax

Address _____ # Faxed Pages _____ ☐ Memorandum

Date _____ By _____ ☐ Meeting Minutes

☐ Telephone Memo

AHBL

Civil Engineers

Structural Engineers

Landscape Architects

Community Planners

Land Surveyors

Neighbors

SW 2

$V_{applied} = 244.8\ plf\ (15\frac{1}{2}') = 1836^{\#} < V_{permitted} = 4049^{\#}$

Use 15/32 sthg w/ 10d @ 6" o.c. Edge & 12" o.c. field

Hold Down

$$T = \frac{1836^{\#}(14')}{.515\left(475(3)\left(\frac{3(4.25)}{14}\right) + 6.67\left(\frac{(3)6.67}{14}\right)\right)} = 1968^{\#}$$

$OTM = 1968^{\#}(30.17') = 75,119\ ft\text{-}\#$

$RM = \left(10\ plf\left((413.63\ plf) + 858.70\ plf\right)\left(\frac{30.17}{2}\right) + 15\ plf\left(\frac{15'}{2}\right)\left(\frac{30.17^2}{2}\right)\right).6 = 194,635\ ft\text{-}\#$

$RM > OTM$ No Hold Down

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

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