

**DB ENGINEERING**  
2021 The Alameda, Suite 360  
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## **STRUCTURAL CALCULATIONS**

**PROJECT No.:** 24031

**PROJECT:** Remodel  
1535 Alisal Avenue  
San Jose, CA

**CLIENT:** ---

**OWNER:** ---

**DESIGNED BY:** Dung Bui, PE

**REFERENCES:**

- 2022 California Building Code

**DATE:** 4/2024



**Wood Beam**

Project File: alisal.ec6

LIC#: KW-06017872, Build:20.23.10.02

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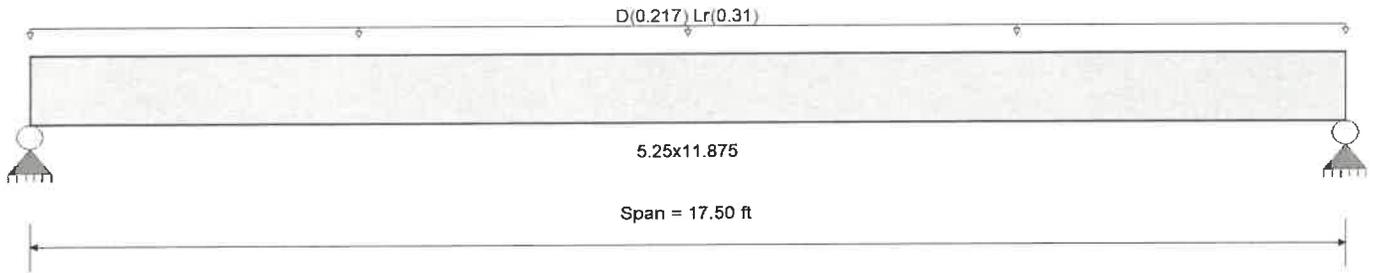
**DESCRIPTION:** CEILING BEAM (1)

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
 Load Combination Set : ASCE 7-16

**Material Properties**

Analysis Method : Allowable Stress Design	Fb +	2900 psi	E : Modulus of Elasticity	
Load Combination : ASCE 7-16	Fb -	2900 psi	Ebend- xx	2200ksi
	Fc - Prll	2900 psi	Eminbend - xx	1118.19ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade : Parallam PSL 2.2E	Fv	290 psi		
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Ft	2025 psi	Density	45.07 pcf



**Applied Loads**

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

Beam self weight calculated and added to loading  
 Uniform Load : D = 0.0140, Lr = 0.020 ksf, Tributary Width = 15.50 ft, (ROOF & CEILING)

**DESIGN SUMMARY**

Maximum Bending Stress Ratio	=	0.561: 1	Maximum Shear Stress Ratio	=	0.283 : 1
Section used for this span		<b>5.25x11.875</b>	Section used for this span		<b>5.25x11.875</b>
fb: Actual	=	2,034.66psi	fv: Actual	=	102.46 psi
F'b	=	3,629.22psi	F'v	=	362.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	8.750ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.408 in	Ratio = 514 >=360	Span: 1 : Lr Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.720 in	Ratio = 291 >=180	Span: 1 : +D+Lr		
Max Upward Total Deflection	0 in	Ratio = 0 <180	n/a		

**Design OK**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values					
			M	V	CD	CM	Ct	CLx	Cf	Cfu	Ci	Cr	M	fb	F'b	V	fv	F'v			
D Only																					
Length = 17.50 ft	1	0.337	0.170	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	9.05	880.5	2,613.0	0.0	1.84	44.3	261.0			
+D+Lr																					
Length = 17.50 ft	1	0.561	0.283	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	20.92	2,034.7	3,629.2	0.0	4.26	102.5	362.5			
+D+0.750Lr																					
Length = 17.50 ft	1	0.481	0.243	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	17.95	1,746.1	3,629.2	0.0	3.65	87.9	362.5			
+0.60D																					
Length = 17.50 ft	1	0.114	0.057	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	5.43	528.3	4,645.4	0.0	1.11	26.6	464.0			

**Wood Beam**

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**DESCRIPTION: CEILING BEAM (1)**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.7197	8.814		0.0000	0.000

**Vertical Reactions**

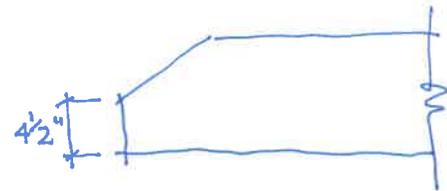
Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.782	4.782
Max Upward from Load Combinations	4.782	4.782
Max Upward from Load Cases	2.713	2.713
D Only	2.069	2.069
+D+Lr	4.782	4.782
+D+0.750Lr	4.104	4.104
+0.60D	1.242	1.242
Lr Only	2.713	2.713

$$A_{req'd} = \frac{1.5V_u}{F'_v} = \frac{1.5(4.782 \text{ k})}{362.50 \text{ psi}} = 19.8 \text{ in}^2$$

$$b = 5.25 \text{ in} \rightarrow h = \frac{19.8 \text{ in}^2}{5.25 \text{ in}} = 3.76 \text{ in}$$



**Wood Beam**

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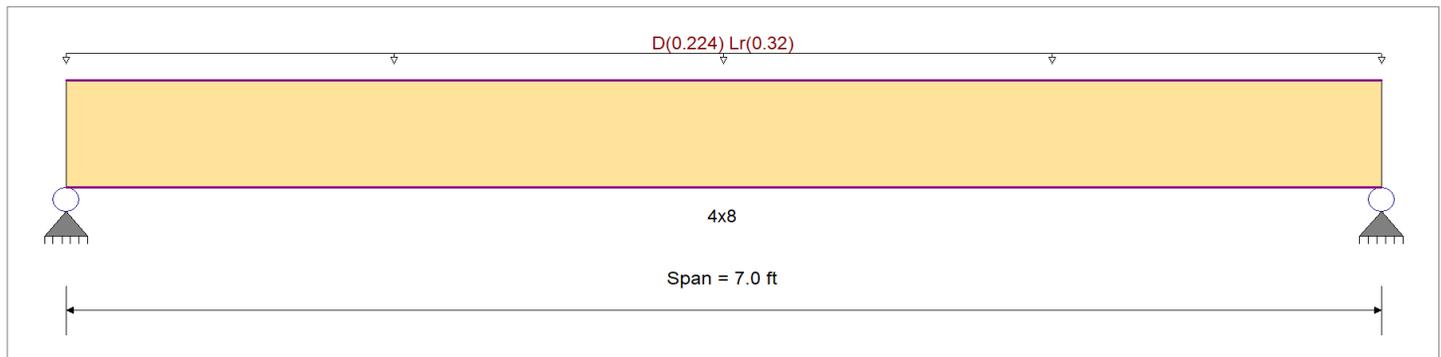
**DESCRIPTION: HEADER BEAM**

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
 Load Combination Set : ASCE 7-16

**Material Properties**

Analysis Method : Allowable Stress Design	Fb +	1000 psi	E : Modulus of Elasticity	
Load Combination : ASCE 7-16	Fb -	1000 psi	Ebend- xx	1700ksi
	Fc - Prll	1500 psi	Eminbend - xx	620ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade : No.1	Fv	180 psi		
	Ft	675 psi	Density	31.21 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



**Applied Loads**

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

Beam self weight calculated and added to loading  
 Uniform Load : D = 0.0140, Lr = 0.020 ksf, Tributary Width = 16.0 ft, (ROOF & CEILING)

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.811</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.420</b> : 1
Section used for this span		<b>4x8</b>	Section used for this span		<b>4x8</b>
fb: Actual	=	1,317.23psi	fv: Actual	=	94.60 psi
F'b	=	1,625.00psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	3.500ft	Location of maximum on span	=	6.412 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.092 in	Ratio =	<b>912</b> >=360	Span: 1 : Lr Only	
Max Upward Transient Deflection	0 in	Ratio =	<b>0</b> <360	n/a	
Max Downward Total Deflection	0.158 in	Ratio =	<b>531</b> >=180	Span: 1 : +D+Lr	
Max Upward Total Deflection	0 in	Ratio =	<b>0</b> <180	n/a	

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 7.0 ft	1	0.470	0.244	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.41	550.1	1,170.0	0.0	0.00	0.0	0.0
+D+Lr	Length = 7.0 ft	1	0.811	0.420	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	3.37	1,317.2	1,625.0	1.60	94.6	225.0	0.0
+D+0.750Lr	Length = 7.0 ft	1	0.693	0.359	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.88	1,125.5	1,625.0	1.37	80.8	225.0	0.0
+0.60D	Length = 7.0 ft	1	0.159	0.082	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.84	330.1	2,080.0	0.40	23.7	288.0	0.0

**Wood Beam**

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**DESCRIPTION: HEADER BEAM**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1580	3.526		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.923	1.923
Max Upward from Load Combinations	1.923	1.923
Max Upward from Load Cases	1.120	1.120
D Only	0.803	0.803
+D+Lr	1.923	1.923
+D+0.750Lr	1.643	1.643
+0.60D	0.482	0.482
Lr Only	1.120	1.120

**Wood Beam**

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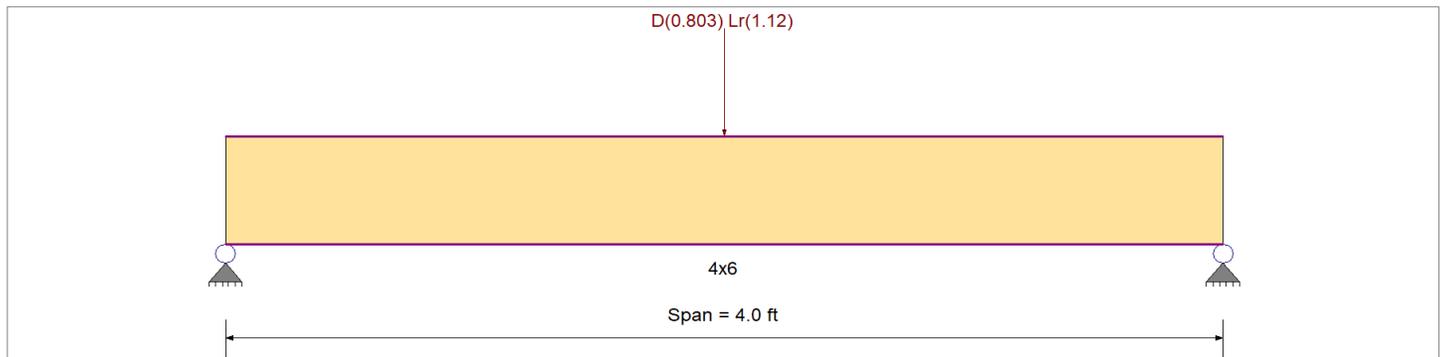
**DESCRIPTION: FLOOR BEAM**

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
Load Combination Set : ASCE 7-16

**Material Properties**

Analysis Method : Allowable Stress Design	Fb +	1,000.0 psi	E : Modulus of Elasticity	
Load Combination : ASCE 7-16	Fb -	1,000.0 psi	Ebend- xx	1,700.0ksi
	Fc - Prll	1,500.0 psi	Eminbend - xx	620.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade : No.1	Fv	180.0 psi		
	Ft	675.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



**Applied Loads**

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

Beam self weight calculated and added to loading  
Point Load : D = 0.8030, Lr = 1.120 k @ 2.0 ft, (HEADER BEAM)

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.808</b> < 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.335</b> < 1
Section used for this span		<b>4x6</b>	Section used for this span		<b>4x6</b>
fb: Actual	=	1,313.41 psi	fv: Actual	=	75.43 psi
F'b	=	1,625.00psi	F'v	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	2.000ft	Location of maximum on span	=	3.547 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.031 in	Ratio = 1526 >=360	Span: 1 : Lr Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.054 in	Ratio = 884 >=180	Span: 1 : +D+Lr		
Max Upward Total Deflection	0 in	Ratio = 0 <180	n/a		

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only	Length = 4.0 ft	1	0.472	0.196	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.81	551.8	1,170.0	0.00	0.00	0.0	0.0	162.0
+D+Lr	Length = 4.0 ft	1	0.808	0.335	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.93	1,313.4	1,625.0	0.00	0.00	0.0	0.0	225.0
+D+0.750Lr	Length = 4.0 ft	1	0.691	0.287	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.65	1,123.0	1,625.0	0.00	0.00	0.0	0.0	225.0
+0.60D	Length = 4.0 ft	1	0.159	0.066	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.49	331.1	2,080.0	0.00	0.00	0.0	0.0	288.0

**Wood Beam**

Project File: alisal.ec6

LIC# : KW-06017872, Build:20.23.10.02

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**DESCRIPTION: FLOOR BEAM**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0543	2.015		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.970	0.970
Max Upward from Load Combinations	0.970	0.970
Max Upward from Load Cases	0.560	0.560
D Only	0.410	0.410
+D+Lr	0.970	0.970
+D+0.750Lr	0.830	0.830
+0.60D	0.246	0.246
Lr Only	0.560	0.560

## General Footing

Project File: alisal.ec6

LIC# : KW-06017872, Build:20.23.10.02

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### DESCRIPTION: CEILING BEAM

### Code References

Calculations per ACI 318-19, IBC 2021, ASCE 7-16  
Load Combinations Used : ASCE 7-16

### General Information

#### Material Properties

f'c : Concrete 28 day strength	=	2.50 ksi
fy : Rebar Yield	=	40.0 ksi
Ec : Concrete Elastic Modulus	=	2,850.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

#### Soil Design Values

Allowable Soil Bearing	=	1.50 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

#### 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

#### Increases based on footing depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	ksf ft

#### Increases based on footing plan dimension

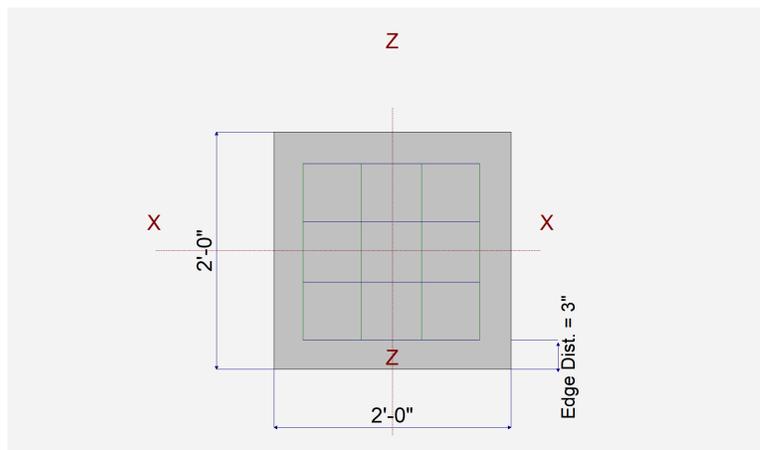
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.0 ft
Footing Thickness	=	18.0 in

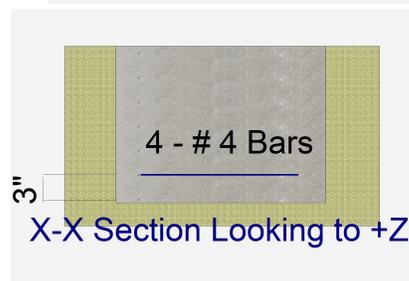
#### Pedestal dimensions...

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	=	# 4
Bars parallel to Z-Z Axis		
Number of Bars	=	4
Reinforcing Bar Size	=	# 4
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



### Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	2.069	2.713				k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

**General Footing**

Project File: alisal.ec6

LIC# : KW-06017872, Build:20.23.10.02

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**DESCRIPTION: CEILING BEAM**

**DESIGN SUMMARY**

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9420	Soil Bearing	1.413 ksf	1.50 ksf	+D+Lr 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	0.04840	Z Flexure (+X)	0.8530 k-ft/ft	17.624 k-ft/ft	+1.20D+1.60Lr
PASS	0.04840	Z Flexure (-X)	0.8530 k-ft/ft	17.624 k-ft/ft	+1.20D+1.60Lr
PASS	0.04840	X Flexure (+Z)	0.8530 k-ft/ft	17.624 k-ft/ft	+1.20D+1.60Lr
PASS	0.04840	X Flexure (-Z)	0.8530 k-ft/ft	17.624 k-ft/ft	+1.20D+1.60Lr
PASS	n/a	1-way Shear (+X)	0.0 psi	75.0 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	75.0 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	75.0 psi	n/a
PASS	n/a	2-way Punching	4.667 psi	75.0 psi	+1.20D+1.60Lr

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio		
		Xecc	Zecc	Bottom, -Z	Top, +Z		Left, -X	Right, +X
X-X, D Only	1.50	n/a	0.0	0.7348	0.7348	n/a	n/a	0.490
X-X, +D+Lr	1.50	n/a	0.0	1.413	1.413	n/a	n/a	0.942
X-X, +D+0.750Lr	1.50	n/a	0.0	1.243	1.243	n/a	n/a	0.829
X-X, +0.60D	1.50	n/a	0.0	0.4409	0.4409	n/a	n/a	0.294
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.7348	0.7348	0.490
Z-Z, +D+Lr	1.50	0.0	n/a	n/a	n/a	1.413	1.413	0.942
Z-Z, +D+0.750Lr	1.50	0.0	n/a	n/a	n/a	1.243	1.243	0.829
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.4409	0.4409	0.294

**Overturning Stability**

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

All units k

**Sliding Stability**

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, +1.20D+0.50Lr	0.4799	+Z	Bottom	0.3888	AsMin	0.40	17.624	OK
X-X, +1.20D+0.50Lr	0.4799	-Z	Bottom	0.3888	AsMin	0.40	17.624	OK
X-X, +1.20D	0.3104	+Z	Bottom	0.3888	AsMin	0.40	17.624	OK
X-X, +1.20D	0.3104	-Z	Bottom	0.3888	AsMin	0.40	17.624	OK
X-X, +1.20D+1.60Lr	0.8530	+Z	Bottom	0.3888	AsMin	0.40	17.624	OK
X-X, +1.20D+1.60Lr	0.8530	-Z	Bottom	0.3888	AsMin	0.40	17.624	OK
X-X, +0.90D	0.2328	+Z	Bottom	0.3888	AsMin	0.40	17.624	OK
X-X, +0.90D	0.2328	-Z	Bottom	0.3888	AsMin	0.40	17.624	OK
Z-Z, +1.20D+0.50Lr	0.4799	-X	Bottom	0.3888	AsMin	0.40	17.624	OK
Z-Z, +1.20D+0.50Lr	0.4799	+X	Bottom	0.3888	AsMin	0.40	17.624	OK
Z-Z, +1.20D	0.3104	-X	Bottom	0.3888	AsMin	0.40	17.624	OK
Z-Z, +1.20D	0.3104	+X	Bottom	0.3888	AsMin	0.40	17.624	OK
Z-Z, +1.20D+1.60Lr	0.8530	-X	Bottom	0.3888	AsMin	0.40	17.624	OK
Z-Z, +1.20D+1.60Lr	0.8530	+X	Bottom	0.3888	AsMin	0.40	17.624	OK
Z-Z, +0.90D	0.2328	-X	Bottom	0.3888	AsMin	0.40	17.624	OK
Z-Z, +0.90D	0.2328	+X	Bottom	0.3888	AsMin	0.40	17.624	OK

**General Footing**

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LIC# : KW-06017872, Build:20.23.10.02

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**DESCRIPTION: CEILING BEAM**

**One Way Shear**

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.20D+0.50Lr	0.00 psi	75.00 psi	0.00	OK				
+1.20D	0.00 psi	75.00 psi	0.00	OK				
+1.20D+1.60Lr	0.00 psi	75.00 psi	0.00	OK				
+0.90D	0.00 psi	75.00 psi	0.00	OK				

**Two-Way "Punching" Shear**

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.20D+0.50Lr	2.63 psi	150.00psi	0.01751	OK
+1.20D	1.70 psi	150.00psi	0.01132	OK
+1.20D+1.60Lr	4.67 psi	150.00psi	0.03112	OK
+0.90D	1.27 psi	150.00psi	0.008491	OK