ZFA STRUCTURAL ENGINEERS

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890 N Bush St. Porch Rot Repair
Structural Calculations

Ukiah, California

ZFA Project Number: 24153

Permit Submittal

September 18, 2024

Prepared For:

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Sacramento, California

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STRUCTURAL
STATE OF CALIFORNIA

09/18/2024

STRUCTURAL NARRATIVE

Scope includes the repair of rotting porch columns and arches for the Mendo County Buildings at 890 N Bush St., Ukiah, CA. The existing stick built lath and plaster built up columns and arches are being replaced with typical post and beam construction with non-structural column wraps. The Existing guardrail is being replaced with an anchorage calculation provided. Seismic upgrade is not required or provided for the repair of gravity framing.

DESIGN CRITERIA

Materials (unless noted otherwise)

Concrete: f'c = 2500 psi @ 28 days (Foundation)

Reinforcing: fy = 60 ksi, ASTM A615, Grade 60

Lumber: Joists & Plates.............................. Fb = 900 psi Douglas Fir #2

Studs... Fb = 900 psi Douglas Fir #2

Beams & Headers......................... Fb = 1350 psi Douglas Fir #1

Plywood / OSB.............................. PS1 / PS2

DESIGN LOADING

			FLAT ROOF*			SEOR	
LIVE LOADS (PSF)			20				
Partitions (Office Building)?	NO			0.0	0.0		
DEAD LOADS (PSF)							
Roofing**	Cap Sheet		3.0				
Solar	Future Solar		3.0				
Sheathing	1x Sheathing + 1/2 OSB		3.9				
Joists/Truss	2 layers of 2x8 @ 24"oc		3.0				
Beams			0.0				
Ceiling	1X Wood		2.2				
Insulation	4" Loose Fill		1.0				
MEP	Lights		1.5				
Sprinklers	Typical		1.5				
Misc.			1.9				
DEAD LOADS (PSF)		**0.0**	**21.0**	**T0.0**	**0.0**		
Partition Mass (Include in Seismic)				0.0	0.0		
TOTAL LOADS (PSF)		**0.0**	**41.0**	**0.0**	**0.0**		

General Design Criteria:

Design Code: 2022 California Building Code   Risk Category = II

Wind Design Criteria

Wind Exposure = C   Basic Wind Speed = 92 mph

Wood Beam

Project File: 24153.ec6

LIC# : KW-06015331, Build:20.24.08.01 ZFA STRUCTURAL ENGINEERS

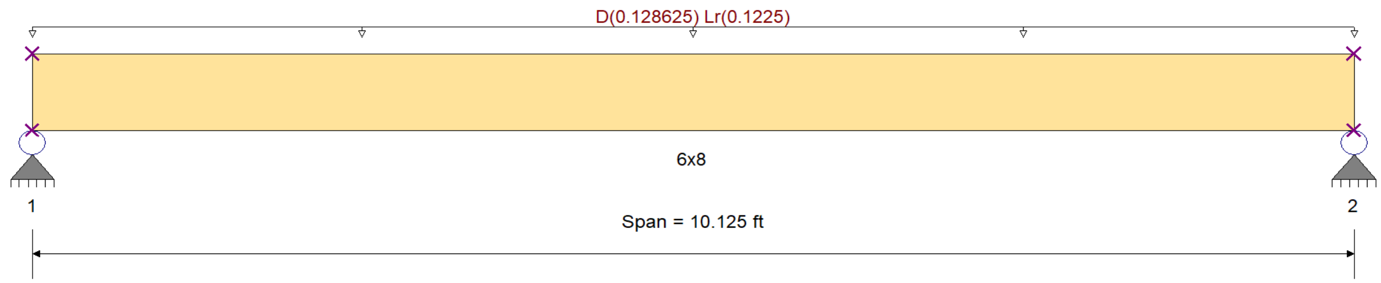
DESCRIPTION: NEW BEAM, Column to Column Span

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1200 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2021	Fb -	1200 psi	Ebend- xx	1600 ksi
		Fc - Prll	1000 psi	Eminbend - xx	580 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade :	No.1	Fv	170 psi		
		Ft	825 psi	Density	31.21 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0210, Lr = 0.020 ksf, Tributary Width = 6.125 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.521**: 1	Maximum Shear Stress Ratio	=	**0.199** : 1
Section used for this span		**6x8**	Section used for this span		**6x8**
fb: Actual	=	775.59 psi	fv: Actual	=	42.28 psi
F'b	=	1,489.97 psi	F'v	=	212.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.063 ft	Location of maximum on span	=	9.534 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.094 in	Ratio =	1290 >=360	Span: 1 : Lr Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.200 in	Ratio =	607 >=180	Span: 1 : +D+Lr
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	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.125 ft	1	0.382	0.146	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.76	410.3	1,075.0	0.62	22.4	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.125 ft	1	0.521	0.199	1.25	1.00	1.00	0.99	1.000	1.00	1.00	1.00	3.33	775.6	1,490.0	1.16	42.3	212.5
+D+0.750Lr					1.00	1.00	0.99	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.125 ft	1	0.459	0.176	1.25	1.00	1.00	0.99	1.000	1.00	1.00	1.00	2.94	684.3	1,490.0	1.03	37.3	212.5
+0.60D					1.00	1.00	0.99	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.125 ft	1	0.129	0.049	1.60	1.00	1.00	0.99	1.000	1.00	1.00	1.00	1.06	246.2	1,903.0	0.37	13.4	272.0

Wood Beam

Project File: 24153.ec6

DESCRIPTION: NEW BEAM, Column to Column Span

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1999	5.099		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	1.317	1.317
Max Upward from Load Combinations	1.317	1.317
Max Upward from Load Cases	0.696	0.696
D Only	0.696	0.696
+D+Lr	1.317	1.317
+D+0.750Lr	1.162	1.162
+0.60D	0.418	0.418
Lr Only	0.620	0.620

Wood Column

Project File: 24153.ec6

LIC# : KW-06015331, Build:20.24.08.01 ZFA STRUCTURAL ENGINEERS (c) ENERCALC INC 1983-2023

DESCRIPTION: COL COMPRESSION

Code References

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height		12.33 ft	
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.1		
Fb +	1,200.0 psi	Fv	170.0 psi
Fb -	1,200.0 psi	Ft	825.0 psi
Fc - Prll	1,000.0 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	**6x6**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn
Exact Width	**5.50** in
Exact Depth	**5.50** in
Area	30.250 in^2
Ix	76.255 in^4
Iy	76.255 in^4

Allow Stress Modification Factors	
Cf or Cv for Bending	1.0
Cf or Cv for Compressio	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 12.33 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 12.33 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 80.839 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 12.330 ft, Xecc = 3.250 in, D = 2.30, Lr = 1.150, W = 1.040 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	**0.3680 : 1**
Load Combination	+D+Lr
Governing NDS Forumla	Comp + Myy, NDS Eq. 3.9-3
Location of max.above base	12.247 ft
At maximum location values are .	
Applied Axial	3.531 k
Applied Mx	0.0 k-ft
Applied My	-0.9281 k-ft
Fc : Allowable	565.39 psi
PASS Maximum Shear Stress Ratio =	**0.01768 : 1**
Load Combination	+D+Lr
Location of max.above base	12.330 ft
Applied Design Shear	5.637 psi
Allowable Shear	212.50 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.07975 k	Bottom along X-X	0.07975 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 -0.1370 in at 7.199 ft above base
for load combination : +D+0.750Lr+0.450W

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	0.576	0.3046	PASS	12.247 ft	0.01637	PASS	12.330 ft
+D+Lr	1.250	0.452	0.3680	PASS	12.247 ft	0.01768	PASS	12.330 ft
+D+0.750Lr	1.250	0.452	0.3291	PASS	12.247 ft	0.01621	PASS	12.330 ft
+D+0.60W	1.600	0.369	0.2371	PASS	12.247 ft	0.01171	PASS	12.330 ft
+D+0.750Lr+0.450W	1.600	0.369	0.3138	PASS	12.247 ft	0.01454	PASS	12.330 ft
+D+0.450W	1.600	0.369	0.2213	PASS	12.247 ft	0.01108	PASS	12.330 ft
+0.60D+0.60W	1.600	0.369	0.1487	PASS	12.247 ft	0.008025	PASS	12.330 ft
+0.60D	1.600	0.369	0.09655	PASS	12.247 ft	0.005526	PASS	12.330 ft

Wood Column

Project File: 24153.ec6

LIC# : KW-06015331, Build:20.24.08.01 ZFA STRUCTURAL ENGINEERS

DESCRIPTION: COL COMPRESSION

Maximum Reactions

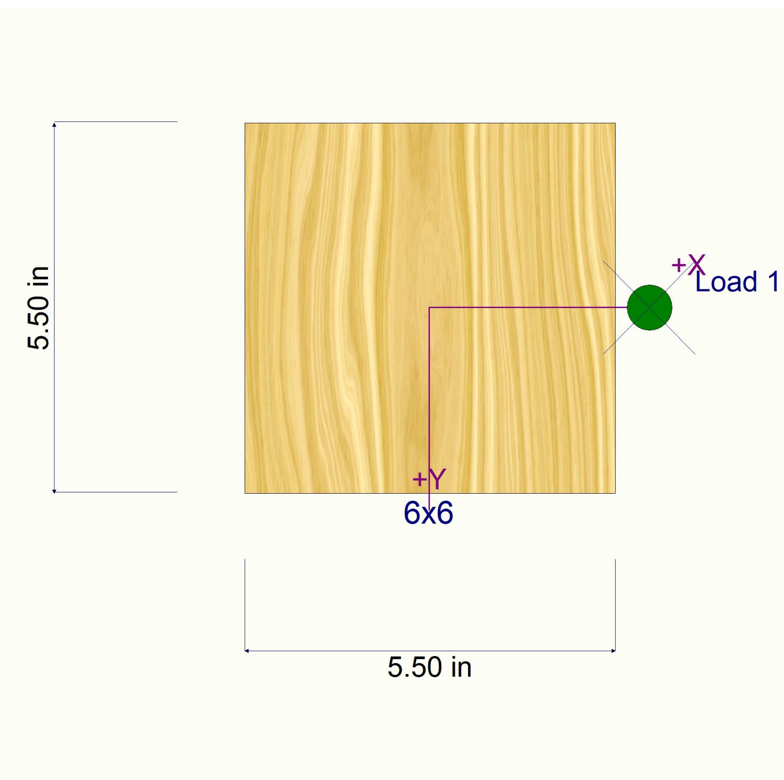
Note: Only non-zero reactions are listed.

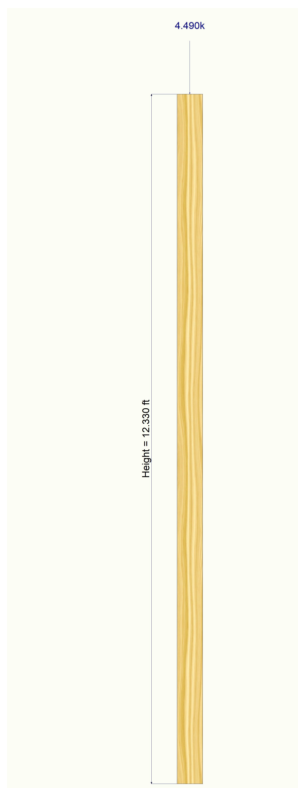
Load Combination	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments (k-ft) @ Base	My - End Moments (k-ft) @ Top	Mx - End Moments @ Base	Mx - End Moments @ Top
D Only	-0.051	0.051			2.381				
+D+Lr	-0.076	0.076			3.531				
+D+0.750Lr	-0.069	0.069			3.243				
+D+0.60W	-0.064	0.064			3.005				
+D+0.750Lr+0.450W	-0.080	0.080			3.711				
+D+0.450W	-0.061	0.061			2.849				
+0.60D+0.60W	-0.044	0.044			2.053				
+0.60D	-0.030	0.030			1.429				
Lr Only	-0.025	0.025			1.150				
W Only	-0.023	0.023			1.040				

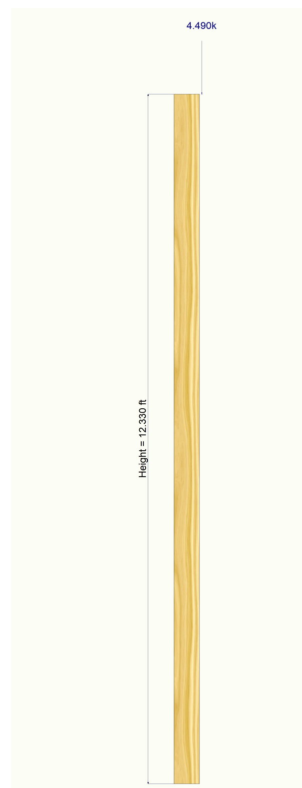
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	-0.0868 in	7.199 ft	0.000 in	0.000 ft
+D+Lr	-0.1302 in	7.199 ft	0.000 in	0.000 ft
+D+0.750Lr	-0.1193 in	7.199 ft	0.000 in	0.000 ft
+D+0.60W	-0.1103 in	7.199 ft	0.000 in	0.000 ft
+D+0.750Lr+0.450W	-0.1370 in	7.199 ft	0.000 in	0.000 ft
+D+0.450W	-0.1044 in	7.199 ft	0.000 in	0.000 ft
+0.60D+0.60W	-0.0756 in	7.199 ft	0.000 in	0.000 ft
+0.60D	-0.0521 in	7.199 ft	0.000 in	0.000 ft
Lr Only	-0.0434 in	7.199 ft	0.000 in	0.000 ft
W Only	-0.0392 in	7.199 ft	0.000 in	0.000 ft

Sketches







1.Project information

Project description:
Location:
Fastening description:

Comment:

2. Input Data & Anchor Parameters

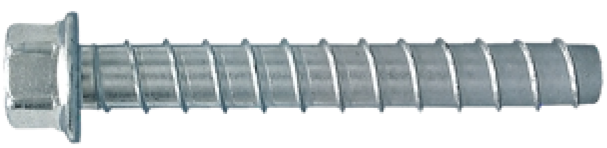
General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Concrete screw
Material: Carbon Steel
Diameter (inch): 0.375
Nominal Embedment depth (inch): 2.500
Effective Embedment depth, h_{ef} (inch): 1.770
Code report: ICC-ES ESR-2713
Anchor category: 1
Anchor ductility: No
h_{min} (inch): 4.00
c_{ac} (inch): 2.69
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 4.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: Supplementary reinforcement not present
Supplemental edge 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: No

Base Plate
Length x Width x Thickness (inch): 6.50 x 6.50 x 0.25

Recommended Anchor
Anchor Name: Titen HD® - 3/8"Ø THD, hnom:2.5" (64mm)
Code Report: ICC-ES ESR-2713

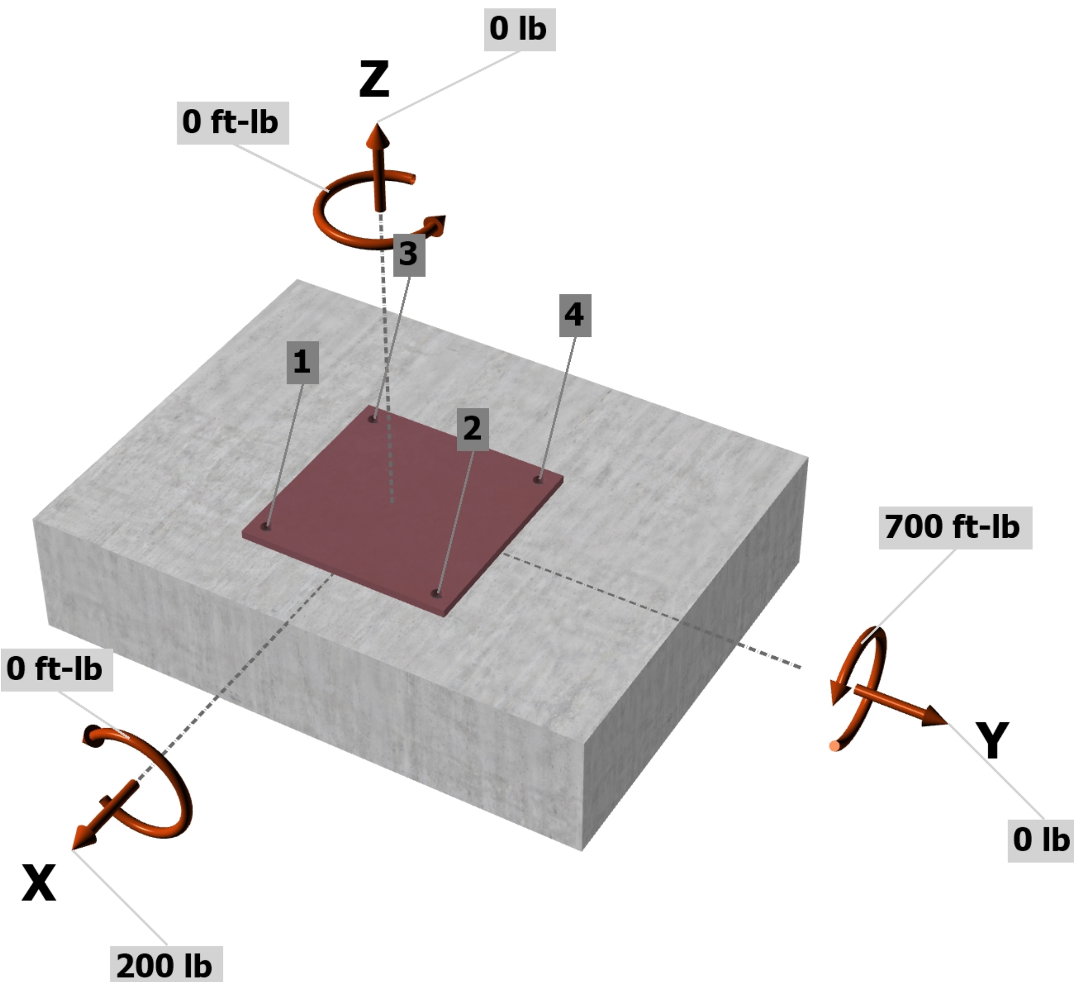


Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: Not applicable
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 0
V_{uax} [lb]: 200
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 700
M_{uz} [ft-lb]: 0

<Figure 1>



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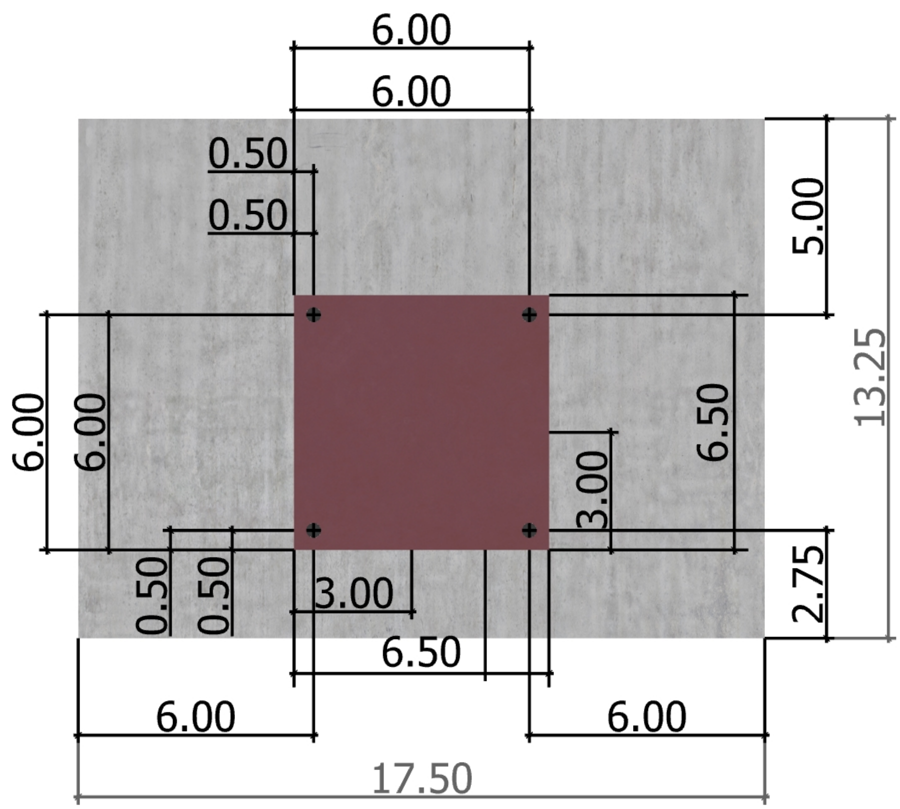
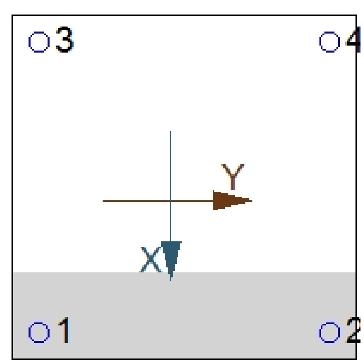


3. Resulting Anchor Forces

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	0.0	52.3	2.3	52.3
2	0.0	47.7	2.3	47.8
3	770.2	52.3	-2.3	52.3
4	770.2	47.7	-2.3	47.8
Sum	1540.4	200.0	0.0	200.2

Maximum concrete compression strain (‰): 0.07
Maximum concrete compression stress (psi): 288
Resultant tension force (lb): 1540
Resultant compression force (lb): 1540
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. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
10890	0.65	7079

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	1.770	2002

$\phi N_{cbg} = \phi\ (A_{Nc} / A_{Nco})\ \Psi_{ec,N}\ \Psi_{ed,N}\ \Psi_{c,N}\ \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
56.39	28.20	5.00	1.000	1.000	1.00	1.000	2002	0.65	2602

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \Psi_{c,P} \lambda_a N_p (f'_c / 2{,}500)^n$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	ϕN_{pn} (lb)
1.0	1.00	1235	2500	0.50	0.65	803

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
4460	1.0	0.60	2676

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.7.2)

Shear perpendicular to edge in y-direction:

$V_{by} = \min|7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.7.2.2.1a & Eq. 17.7.2.2.1b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
1.77	0.375	1.00	2500	7.00	5414

$\phi V_{cbgy} = \phi\,(A_{Vc}/A_{Vco})\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.5.1.2 & Eq. 17.7.2.1b)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgy} (lb)
53.00	220.50	1.000	0.779	1.000	1.620	5414	0.70	1149

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.7.2.2.1a & Eq. 17.7.2.2.1b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
1.77	0.375	1.00	2500	4.00	2339

$\phi V_{cbgx} = \phi\,(A_{Vc}/A_{Vco})\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.5.1.2 & Eq. 17.7.2.1b)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
70.00	72.00	0.980	1.000	1.000	1.225	2339	0.70	1909

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.7.2.2.1a & Eq. 17.7.2.2.1b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
1.77	0.375	1.00	2500	2.75	1333

$\phi V_{cbgx} = \phi\,(2)(A_{Vc}/A_{Vco})\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.5.1.2, 17.7.2.1(c) & Eq. 17.7.2.1b)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
55.00	34.03	1.000	1.000	1.000	1.016	1333	0.70	3063

Shear parallel to edge in y-direction:

$V_{bx} = \min|7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.7.2.2.1a & Eq. 17.7.2.2.1b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
1.77	0.375	1.00	2500	3.33	1779

$\phi V_{cbgy} = \phi\,(2)(A_{Vc}/A_{Vco})\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.5.1.2, 17.7.2.1(c) & Eq. 17.7.2.1b)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgy} (lb)
53.00	50.00	1.000	1.000	1.000	1.118	1779	0.70	2952

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp}N_{cb} = \phi k_{cp}(A_{Nc}/A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1a)

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)
1.0	28.20	28.20	1.000	1.000	1.000	2002	0.70	1401

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	770	7079	0.11	Pass

Concrete breakout	1540	2602	0.59	Pass
Pullout	**770**	**803**	**0.96**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	52	2676	0.02	Pass
T Concrete breakout y+	5	1149	0.00	Pass
T Concrete breakout x+	200	1909	0.10	Pass
|| Concrete breakout x+	5	3063	0.00	Pass
|| Concrete breakout y-	105	2952	0.04	Pass
Concrete breakout, combined	**-**	**-**	**0.10**	**Pass (Governs)**
Pryout	52	1401	0.04	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.8.1	0.96	0.00	95.9%	1.0	Pass

3/8"Ø THD, hnom:2.5" (64mm) 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.