STRUCTURAL

7700 SHAWNEE MISSION PARKWAY SUITE 104

OVERLAND PARK, KANSAS 66202

913.735.7006

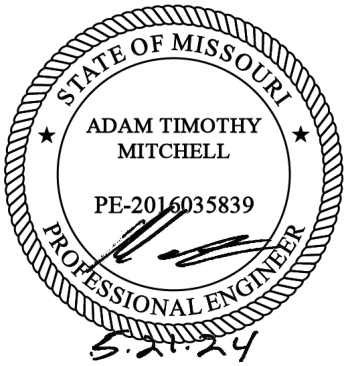
LSMO Water Utilities Canopies

STRUCTURAL CALCULATIONS

1200 SE HAMBLEN ROAD

LEE'S SUMMIT, MISSOURI

PROJECT # 124-040



Project Information

Project Title : LSMO Water Utilities Canopies

Description : Foundation for PEMB Canopites

I.D. : S1 124-040

Address : 1200 SE Hamblen Road, Lee's Summit, MO 64081

Project Leader :

Phone : Fax : eMail :

Project Notes

Building Code Information

Governing Code : IBC 2018, ASCE 7-16, CBC 2019, AISC 360-16, NDS 2018, ACI 318-14, TMS 402-16

Project Title: LSMO Water Utilities Canopies
Engineer:
Project ID: S1 124-040
Project Descr: Foundation for PEMB Canopites

General Footing

DESCRIPTION: FRAME FOOTING VERTICAL + HORIZONTAL (FOR SOIL BEARING)

Code References

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

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	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.50	ksf
Soil Density	=	120.0	pcf
Increase Bearing By Footing Weight	=	Yes	
Soil Passive Resistance (for Sliding)	=		pcf
Soil/Concrete Friction Coeff.	=	0.40	

Increases based on footing Depth

Footing base depth below soil surface	=	3.0	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

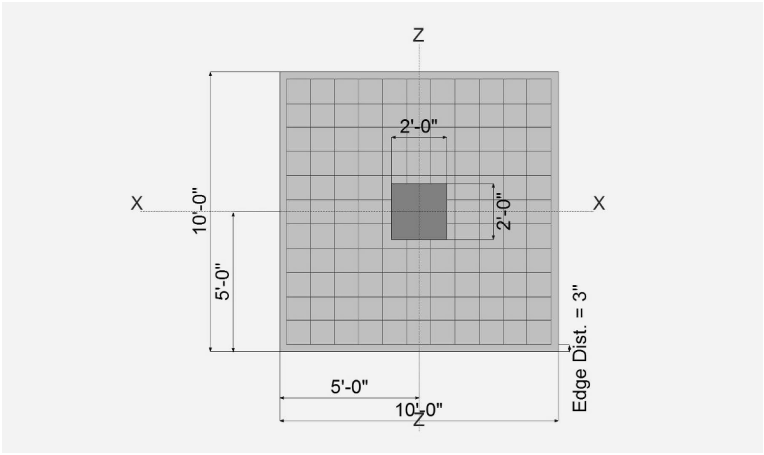
Width parallel to X-X Axis	=	10.0 ft
Length parallel to Z-Z Axis	=	10.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	24.0 in
pz : parallel to Z-Z Axis	=	24.0 in
Height	=	60.0 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

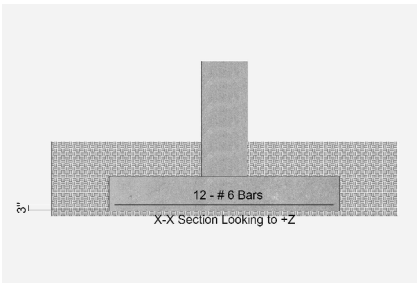


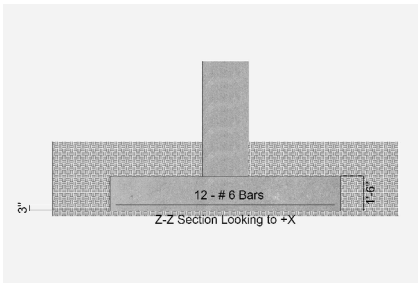
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		12.0
Reinforcing Bar Size	=	#	6
Bars parallel to Z-Z Axis			
Number of Bars	=		12.0
Reinforcing Bar Size	=	#	6

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	=	16.030	18.510		23.140	1.520			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	10.630	12.50		15.690				k
V-z	=								k

Project Title: LSMO Water Utilities Canopies
Engineer:
Project ID: S1 124-040
Project Descr: Foundation for PEMB Canopites

General Footing

LIC# : KW-06012349, Build:20.24.03.01 S1 Structural, LLC (c) ENERCALC INC 1983-2023

DESCRIPTION: FRAME FOOTING VERTICAL + HORIZONTAL (FOR SOIL BEARING)

DESIGN SUMMARY

Design N.G.

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9310	Soil Bearing	2.530 ksf	2.718 ksf	S Only about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.134	Overturning - Z-Z	101.985 k-ft	115.70 k-ft	S Only
FAIL	0.5899	Sliding - X-X	15.690 k	9.256 k	S Only
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	0.0	Z Flexure (+X)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	Z Flexure (-X)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	X Flexure (+Z)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	X Flexure (-Z)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	1-way Shear (+X)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (+Z)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (-Z)	0.0 psi	0.0 psi	0.0
PASS	0.0	2-way Punching	0.0 psi	0.0 psi	0.0

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	2.718	n/a	0.0	0.5796	0.5796	n/a	n/a	0.213
X-X, Lr Only	2.718	n/a	0.0	0.1851	0.1851	n/a	n/a	0.068
X-X, S Only	2.718	n/a	0.0	0.2314	0.2314	n/a	n/a	0.085
X-X, W Only	2.718	n/a	0.0	0.01520	0.01520	n/a	n/a	0.006
Z-Z, D Only	2.718	14.305	n/a	n/a	n/a	0.1692	0.990	0.364
Z-Z, Lr Only	2.718	52.674	n/a	n/a	n/a	0.0	1.966	0.724
Z-Z, S Only	2.718	52.888	n/a	n/a	n/a	0.0	2.530	0.931
Z-Z, W Only	2.718	0.0	n/a	n/a	n/a	0.01520	0.01520	0.006

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, Lr Only	None	0.0 k-ft	Infinity	OK
X-X, S Only	None	0.0 k-ft	Infinity	OK
X-X, W Only	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	69.095 k-ft	289.80 k-ft	4.194	OK
Z-Z, Lr Only	81.250 k-ft	92.550 k-ft	1.139	OK
Z-Z, S Only	101.985 k-ft	115.70 k-ft	1.134	OK
Z-Z, W Only	None	0.0 k-ft	Infinity	OK

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	10.630 k	23.184 k	2.181	OK
X-X, Lr Only	12.50 k	7.404 k	0.5923	No Good!
X-X, S Only	15.690 k	9.256 k	0.5899	No Good!
X-X, W Only	0.0 k	0.6080 k	No Sliding	OK
Z-Z, D Only	0.0 k	23.184 k	No Sliding	OK
Z-Z, Lr Only	0.0 k	7.404 k	No Sliding	OK
Z-Z, S Only	0.0 k	9.256 k	No Sliding	OK
Z-Z, W Only	0.0 k	0.6080 k	No Sliding	OK

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

Project Title: LSMO Water Utilities Canopies
Engineer:
Project ID: S1 124-040
Project Descr: Foundation for PEMB Canopites

General Footing

DESCRIPTION: FRAME FOOTING VERTICAL + HORIZONTAL (FOR SOIL BEARING)

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status

Two-Way "Punching" Shear All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status

Project Title: LSMO Water Utilities Canopies
Engineer:
Project ID: S1 124-040
Project Descr: Foundation for PEMB Canopites

General Footing

DESCRIPTION: FRAME FOOTING HORIZONTAL

Code References

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

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	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.50	ksf
Soil Density	=	120.0	pcf
Increase Bearing By Footing Weight	=	Yes	
Soil Passive Resistance (for Sliding)	=		pcf
Soil/Concrete Friction Coeff.	=	0.40	

Increases based on footing Depth

Footing base depth below soil surface	=	3.0	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

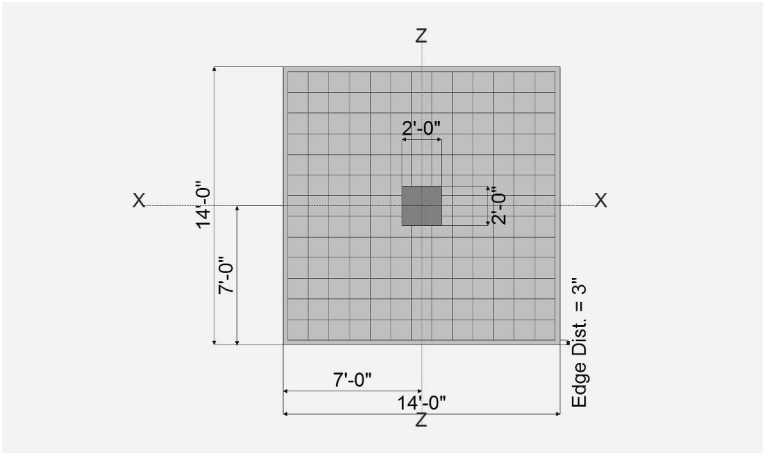
Width parallel to X-X Axis	=	14.0 ft
Length parallel to Z-Z Axis	=	14.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	24.0 in
pz : parallel to Z-Z Axis	=	24.0 in
Height	=	60.0 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

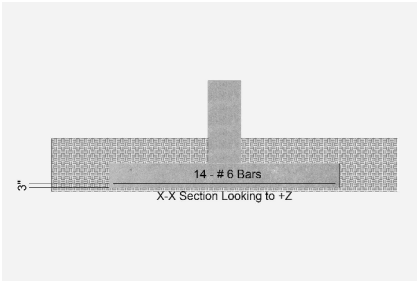


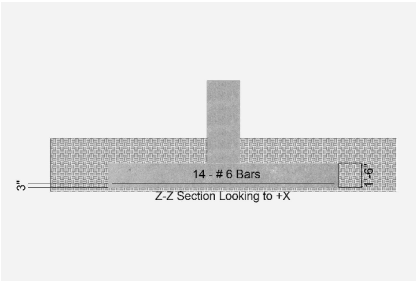
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		14.0
Reinforcing Bar Size	=	#	6
Bars parallel to Z-Z Axis			
Number of Bars	=		14.0
Reinforcing Bar Size	=	#	6

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	=	4.460							k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	10.630			15.690				k
V-z	=								k

Project Title: LSMO Water Utilities Canopies
Engineer:
Project ID: S1 124-040
Project Descr: Foundation for PEMB Canopites

General Footing

DESCRIPTION: FRAME FOOTING HORIZONTAL

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.2138	Soil Bearing	0.5809 ksf	2.718 ksf	D Only about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	8.566	Overturning - Z-Z	69.095 k-ft	591.85 k-ft	D Only
PASS	3.182	Sliding - X-X	10.630 k	33.820 k	D Only
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	0.0	Z Flexure (+X)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	Z Flexure (-X)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	X Flexure (+Z)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	X Flexure (-Z)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	1-way Shear (+X)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (+Z)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (-Z)	0.0 psi	0.0 psi	0.0
PASS	0.0	2-way Punching	0.0 psi	0.0 psi	0.0

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	2.718	n/a	0.0	0.4314	0.4314	n/a	n/a	0.159
X-X, S Only	2.718	n/a	0.0	0.0	0.0	n/a	n/a	0.000
Z-Z, D Only	2.718	9.807	n/a	n/a	n/a	0.2818	0.5809	0.214
Z-Z, S Only	2.718	9.807	n/a	n/a	n/a	0.0	0.0	0.000

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, S Only	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	69.095 k-ft	591.85 k-ft	8.566	OK
Z-Z, S Only	None	0.0 k-ft	Infinity	OK

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	10.630 k	33.820 k	3.182	OK
X-X, S Only	15.690 k	0.0 k	No Sliding	OK
Z-Z, D Only	0.0 k	33.820 k	No Sliding	OK
Z-Z, S Only	0.0 k	0.0 k	No Sliding	OK

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

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status

Project Title: LSMO Water Utilities Canopies
Engineer:
Project ID: S1 124-040
Project Descr: Foundation for PEMB Canopites

General Footing

LIC# : KW-06012349, Build:20.24.03.01 S1 Structural, LLC (c) ENERCALC INC 1983-2023

DESCRIPTION: FRAME FOOTING UPLIFT

Code References

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

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	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.50	ksf
Soil Density	=	120.0	pcf
Increase Bearing By Footing Weight	=	Yes	
Soil Passive Resistance (for Sliding)	=		pcf
Soil/Concrete Friction Coeff.	=	0.40	

Increases based on footing Depth

Footing base depth below soil surface	=	3.0	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

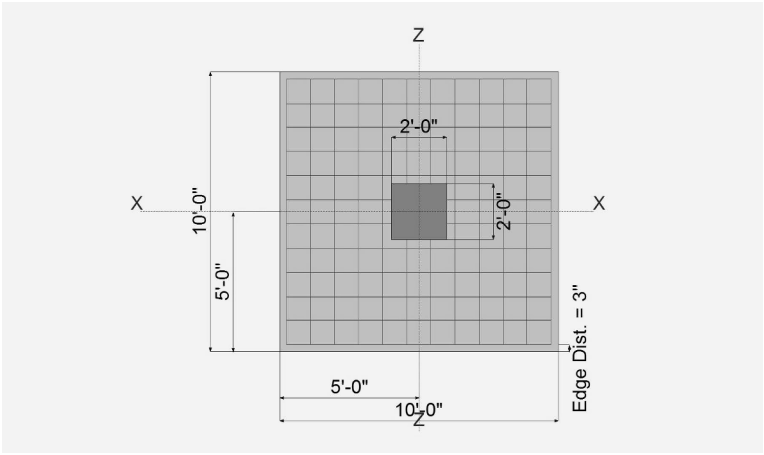
Width parallel to X-X Axis	=	10.0 ft
Length parallel to Z-Z Axis	=	10.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	24.0 in
pz : parallel to Z-Z Axis	=	24.0 in
Height	=	60.0 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

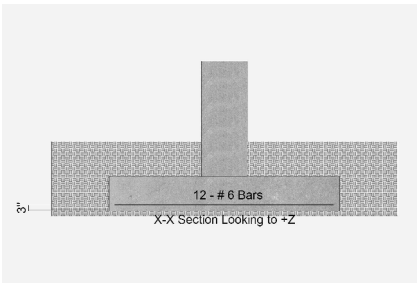


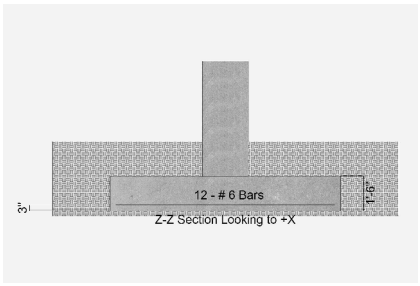
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		12.0
Reinforcing Bar Size	=	#	6
Bars parallel to Z-Z Axis			
Number of Bars	=		12.0
Reinforcing Bar Size	=	#	6

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	=					-20.190			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

Project Title: LSMO Water Utilities Canopies
Engineer:
Project ID: S1 124-040
Project Descr: Foundation for PEMB Canopites

General Footing

LIC# : KW-06012349, Build:20.24.03.01 S1 Structural, LLC (c) ENERCALC INC 1983-2023

DESCRIPTION: FRAME FOOTING UPLIFT

DESIGN SUMMARY

Design N.G.

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.1543	Soil Bearing	0.4193 ksf	2.718 ksf	D Only 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
FAIL	0.0	Uplift	-20.190 k	0.0 k	W Only
PASS	0.0	Z Flexure (+X)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	Z Flexure (-X)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	X Flexure (+Z)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	X Flexure (-Z)	0.0 k-ft/ft	0.0 k-ft/ft	0.0
PASS	0.0	1-way Shear (+X)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (+Z)	0.0 psi	0.0 psi	0.0
PASS	0.0	1-way Shear (-Z)	0.0 psi	0.0 psi	0.0
PASS	0.0	2-way Punching	0.0 psi	0.0 psi	0.0

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	2.718	n/a	0.0	0.4193	0.4193	n/a	n/a	0.154
X-X, W Only	2.718	n/a	0.0	-0.2019	-0.2019	n/a	n/a	0.074
Z-Z, D Only	2.718	0.0	n/a	n/a	n/a	0.4193	0.4193	0.154
Z-Z, W Only	2.718	0.0	n/a	n/a	n/a	-0.2019	-0.2019	0.074

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

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status

SIMPSON Strong-Tie®

Anchor Designer™ Software
Version 3.0.7947.0

Company:	S1 STRUCTURAL	Date:	5/21/2024
Engineer:		Page:	1/5
Project:	LSMO 124-040		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description: EAST PARKING CANOP HORISONTAL
Location: EXPOXY ANCHOR IN PILASTER
Fastening description: 1.2D +1.6 S = 37.86 KIPS

2. Input Data & Anchor Parameters

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

Anchor Information:
Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 12.000
Code report: ICC-ES ESR-4057
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 14.25
c_{ac} (inch): 18.63
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.0
Reinforcement condition: A tension, A shear
Supplemental reinforcement: Yes
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Hole condition: Dry concrete
Inspection: Continuous
Temperature range, Short/Long: 150/110°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 13.00 x 9.00 x 0.25

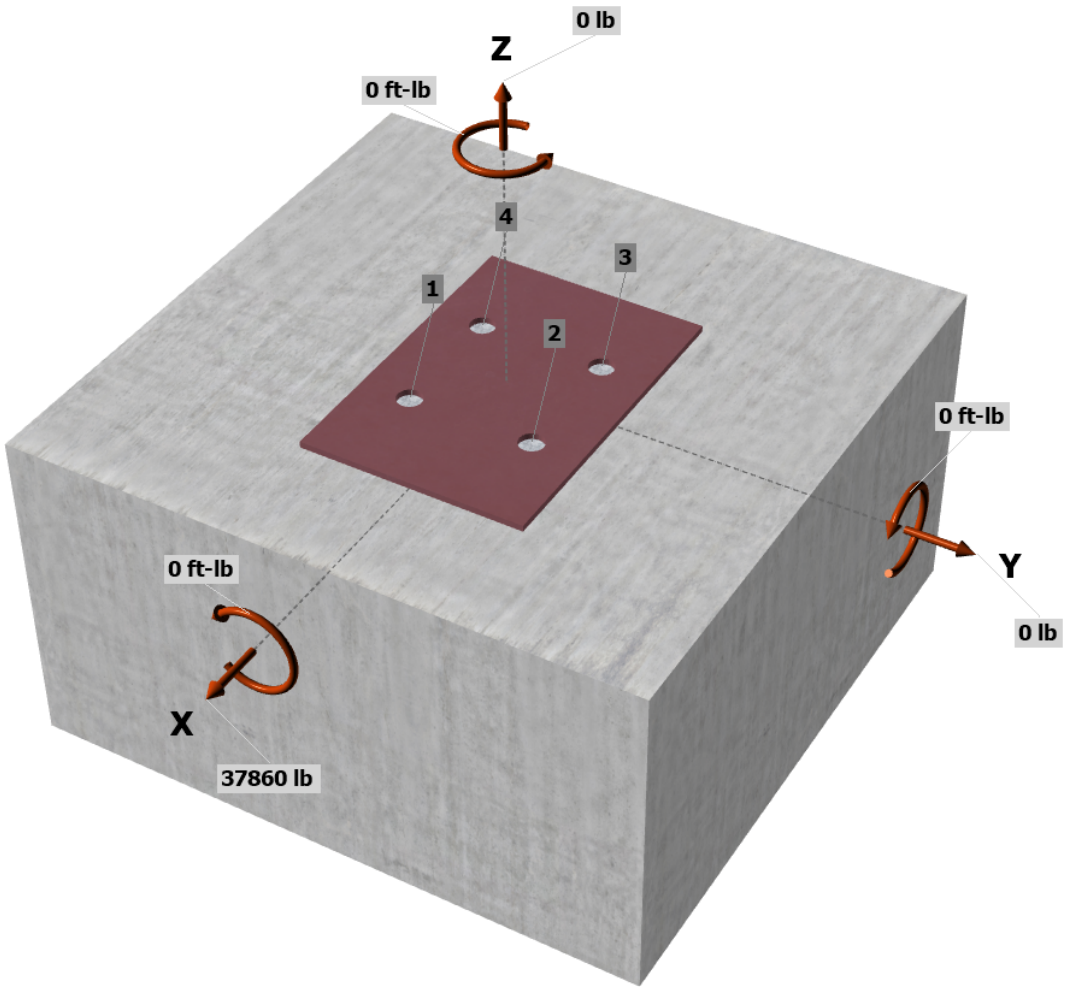
Recommended Anchor
Anchor Name: SET-3G - SET-3G w/ 1"Ø F1554 Gr. 36
Code Report: ICC-ES ESR-4057

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: U = 1.2D + 1.6(Lr or S or R) + 1.0L
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

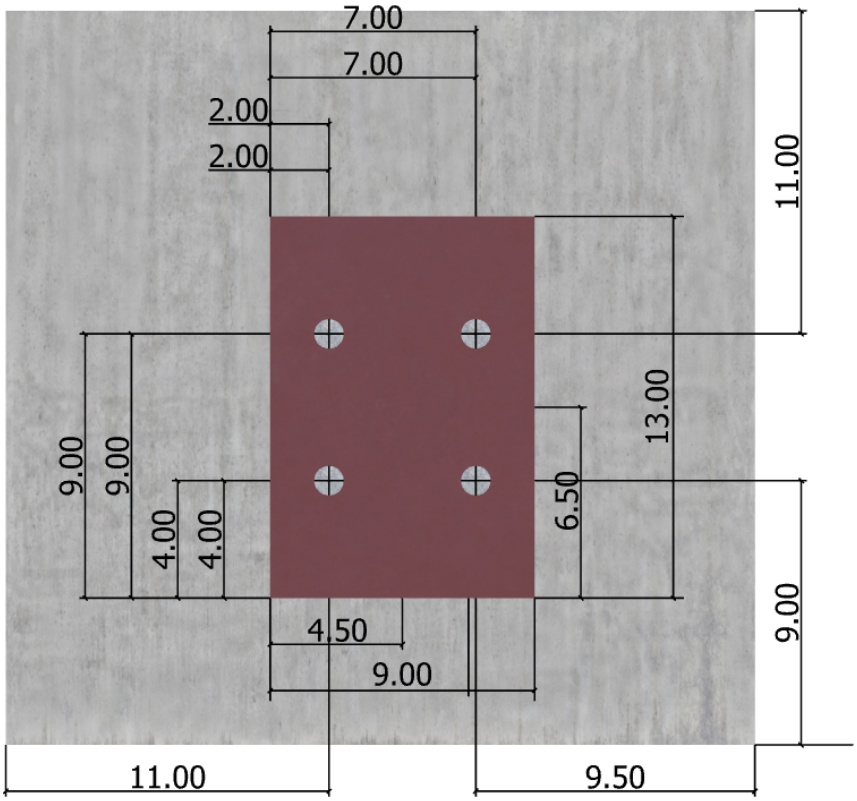
Service level loads:

	D	Lr/S/R	L	*Strength level loads*
N_a [lb]:	0	0	0	*0*
V_{ax} [lb]:	10630	15690	0	*37860*
V_{ay} [lb]:	0	0	0	*0*
M_x [ft-lb]:	0	0	0	*0*
M_y [ft-lb]:	0	0	0	*0*
M_z [ft-lb]:	0	0	0	*0*

<Figure 1>



<Figure 2>

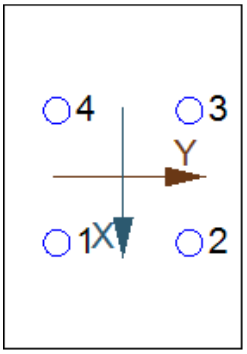

7.00
7.00
2.00
2.00
11.00
13.00
9.00
9.00
4.00
4.00
6.50
9.00
4.50
9.00
11.00
9.50

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	9465.0	0.0	9465.0
2	0.0	9465.0	0.0	9465.0
3	0.0	9465.0	0.0	9465.0
4	0.0	9465.0	0.0	9465.0
Sum	0.0	37860.0	0.0	37860.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 0
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>



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

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
21090	1.0	0.65	13709

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

$\phi V_{cpg} = \phi \min|k_{cp}N_{ag}\ ;\ k_{cp}N_{cbg}| = \phi \min|k_{cp}(A_{Na}/A_{Na0})\Psi_{ec,Na}\Psi_{ed,Na}\Psi_{cp,Na}N_{ba}\ ;\ k_{cp}(A_{Nc}/A_{Nco})\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

k_{cp}	A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{ec,Na}$	$\Psi_{cp,Na}$	N_{ba} (lb)	N_a (lb)
2.0	637.50	679.27	0.907	1.000	1.000	75062	63908

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
637.50	484.00	1.000	0.945	1.000	1.000	26105	32509	0.70

ϕV_{cpg} (lb)
45512

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	9465	13709	0.69	Pass
Pryout	**37860**	**45512**	**0.83**	**Pass (Governs)**

SET-3G w/ 1"Ø F1554 Gr. 36 with hef = 12.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.3.2.1 for conditions where calculations of the concrete breakout strength may not be required.

- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.3.2.1 for conditions where calculations of the concrete breakout strength may not be required.

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

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

DESIGN FAILED IN CONCRETE BREAKOUT THERESORE USE CENTER SITIRRUPS OF PILASTER REINF AS ANCHOR REINF. (2) #4 TIES REQUIRED SEE HAND CALC.

SIMPSON Strong-Tie®

Anchor Designer™ Software
Version 3.0.7947.0

Company:	S1 STRUCTURAL	Date:	5/21/2024
Engineer:		Page:	1/5
Project:	LSMO 124-040		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description: EAST PARKING CANOPY
Location: EXPOXY ANCHOR IN PILASTER
Fastening description:

2. Input Data & Anchor Parameters

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

Anchor Information:
Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 10.000
Code report: ICC-ES ESR-4057
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 12.25
c_{ac} (inch): 14.97
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.0
Reinforcement condition: A tension, A shear
Supplemental reinforcement: No
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Continuous
Temperature range, Short/Long: 150/110°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 13.00 x 9.00 x 0.25

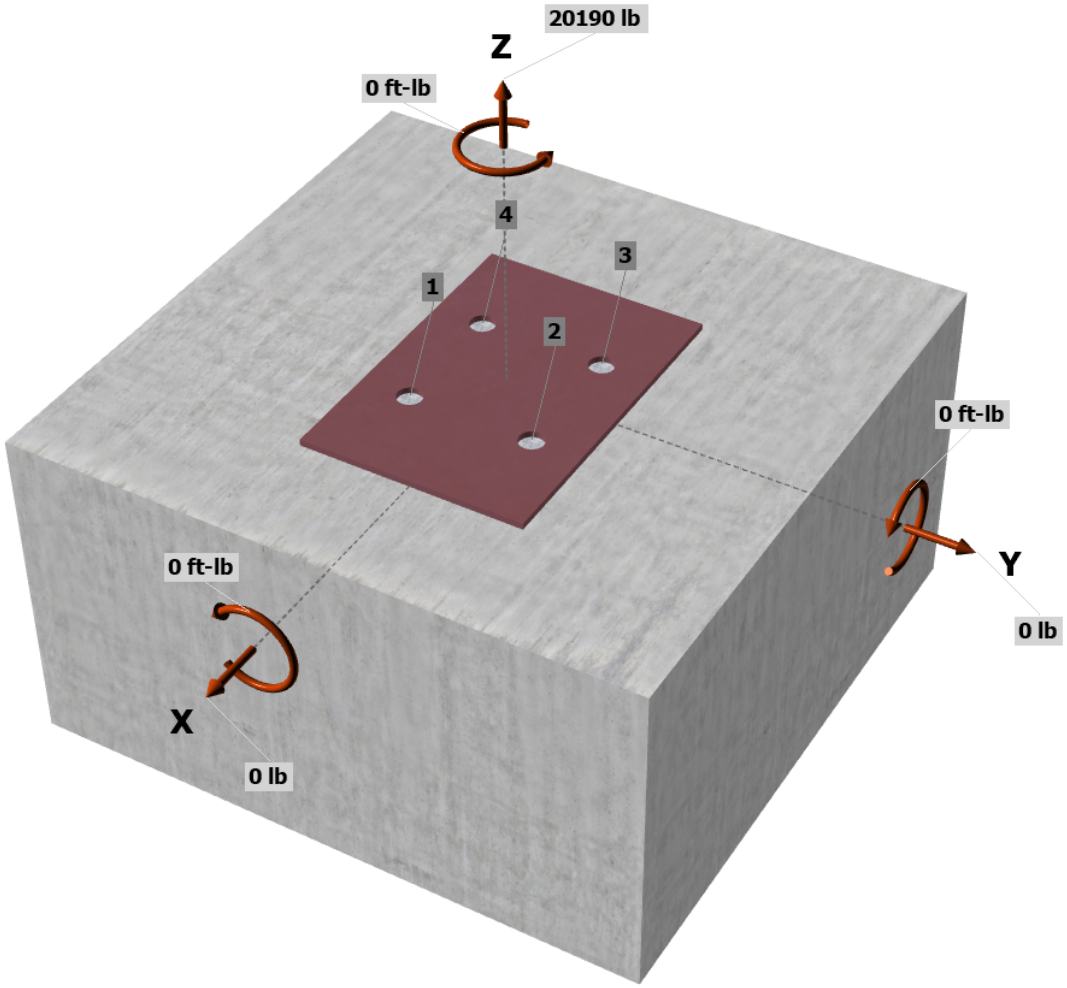
Recommended Anchor
Anchor Name: SET-3G - SET-3G w/ 1"Ø F1554 Gr. 36
Code Report: ICC-ES ESR-4057

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

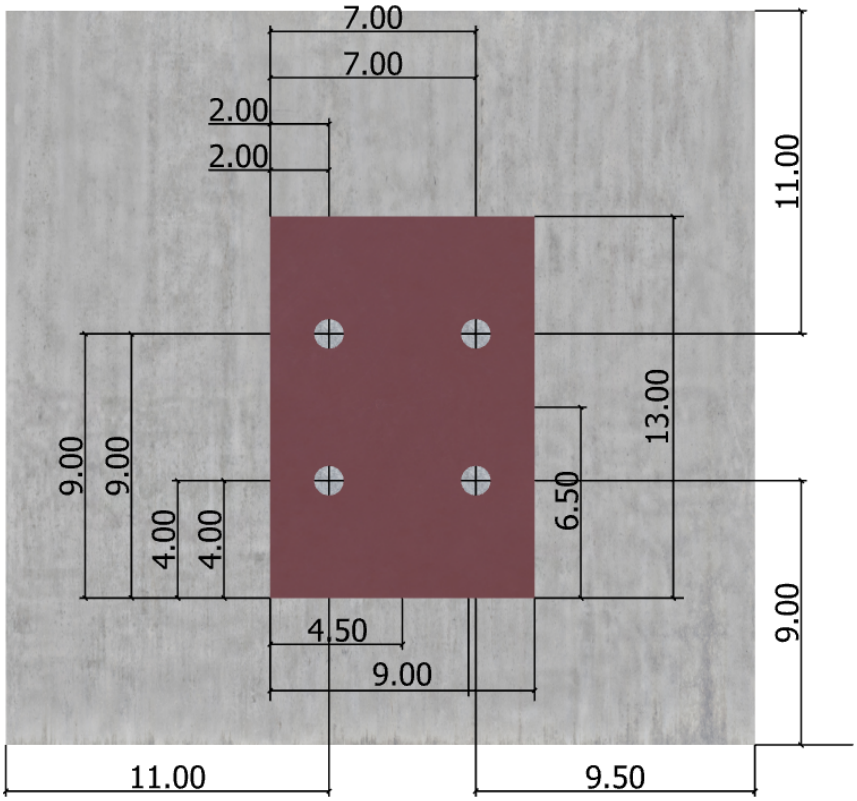
Strength level loads:

N_{ua} [lb]: 20190
V_{uax} [lb]: 0
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



<Figure 2>

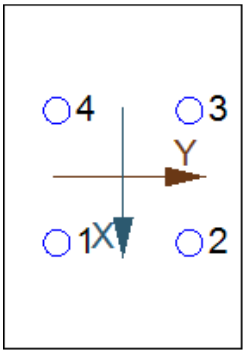

7.00
7.00
2.00
2.00
11.00
13.00
9.00
9.00
4.00
4.00
6.50
9.00
4.50
9.00
11.00
9.50

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	5047.5	0.0	0.0	0.0
2	5047.5	0.0	0.0	0.0
3	5047.5	0.0	0.0	0.0
4	5047.5	0.0	0.0	0.0
Sum	20190.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 20190
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

<Figure 3>



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

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
35150	0.75	26363

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)
24.0	1.00	3000	7.333	26105

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

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)
637.50	484.00	9.00	1.000	0.945	1.00	1.000	26105	0.75	24382

6. Adhesive Strength of Anchor in Tension (Sec. 17.4.5)

$\tau_{k,uncr} = \tau_{k,uncr} f_{short\text{-}term} K_{sat} (f'_c / 2{,}500)^n$

$\tau_{k,uncr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	f'_c (psi)	n	$\tau_{k,uncr}$ (psi)
1868	1.00	1.00	3000	0.35	1991

$N_{ba} = \lambda_a \tau_{uncr} \pi d_a h_{ef}$ (Eq. 17.4.5.2)

λ_a	τ_{uncr} (psi)	d_a (in)	h_{ef} (in)	N_{ba} (lb)
1.00	1991	1.00	10.000	62552

$\phi N_{ag} = \phi (A_{Na} / A_{Na0}) \Psi_{ec,Na} \Psi_{ed,Na} \Psi_{cp,Na} N_{ba}$ (Sec. 17.3.1 & Eq. 17.4.5.1b)

A_{Na} (in^2)	A_{Na0} (in^2)	c_{Na} (in)	$c_{a,min}$ (in)	$\Psi_{ec,Na}$	$\Psi_{ed,Na}$	$\Psi_{cp,Na}$	N_{ba}(lb)	ϕ	ϕN_{ag} (lb)
637.50	679.27	13.03	9.00	1.000	0.907	0.871	62552	0.65	30139

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	5048	26363	0.19	Pass
Concrete breakout	**20190**	**24382**	**0.83**	**Pass (Governs)**
Adhesive	20190	30139	0.67	Pass

SET-3G w/ 1"Ø F1554 Gr. 36 with hef = 10.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

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

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

STRUCTURAL

PROJECT:	LSM 0 CARPORT
PROJECT #	24-040
SUBJECT:	ANCHOR 2
DATE:	5/1 PAGE: 1

Consider P/O in Shear Failure @ Pedestal:

USE Anchor Ref 1

Use Anchor Ref 1 Embed

$\phi V_n = .75(1)(60) = 60$ k

Pilaster Stirrups @ #3 ties top 5"

Each tie has 2 legs in N-S and E-W

$A_v = 2(.11)(.1) = .66$ in²

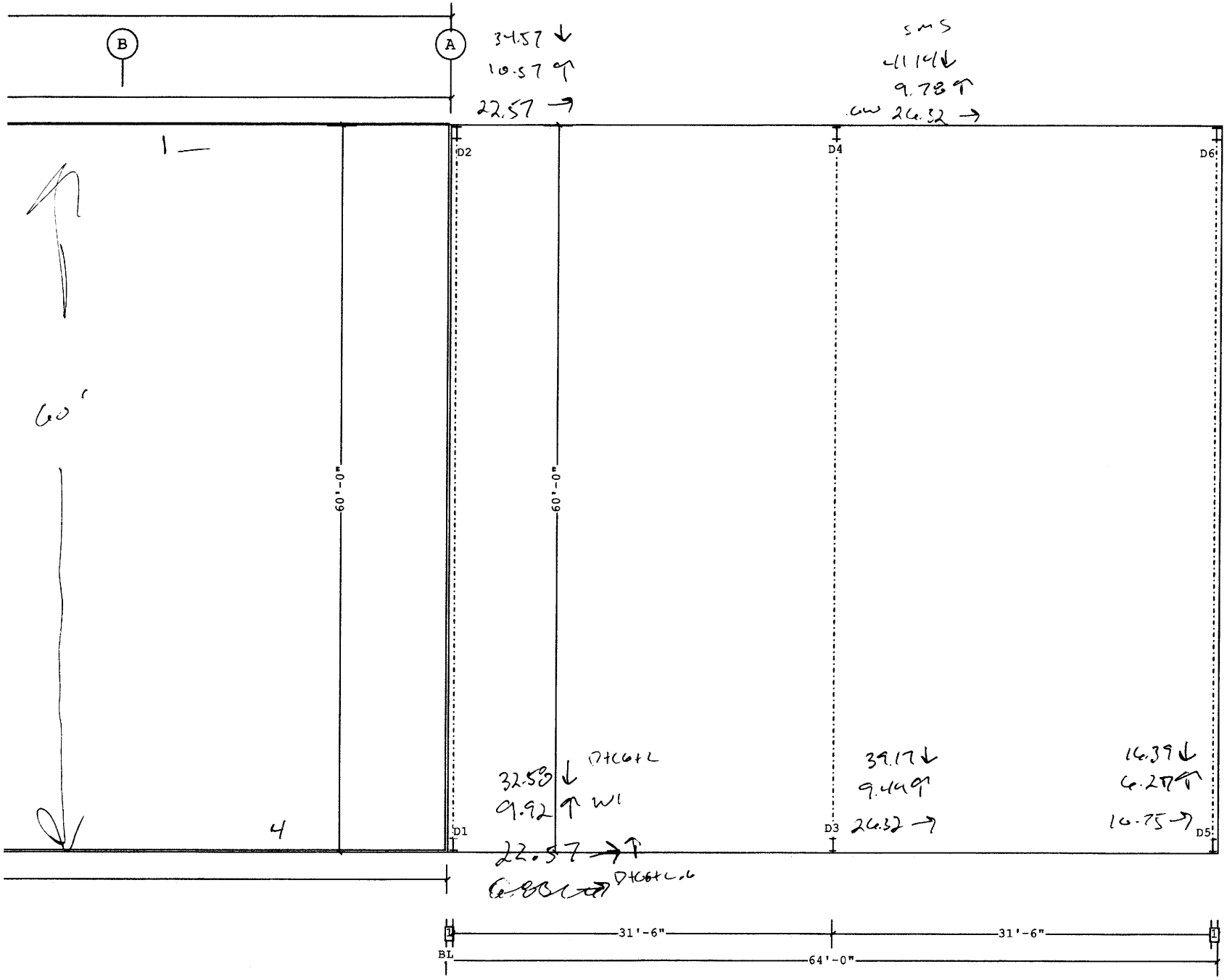
$\phi V_n = .75(.66)(60) = 29.7$ K/ft > 37.800 kip-ft

Try this A_v = 2 legs = 1.14 in²

$\phi V_n = .75(1.14)(60) = 51.3$ K/ft >>> ∴ use this for Retaining Wall

124-040
LSMO Council Parking

East



RDENED WASHERS AND ANY OTHER
BE FURNISHED BY CONTRACTOR.

WERE DETERMINED BY ALLOWABLE
AISC SPECIFICATIONS (FY=36KSI).
ANCHOR ROD LENGTH, EFFECTS
OD EDGE DIMENSIONS AND METHOD
S FROM ANCHOR RODS TO
TERMINED BY OTHERS.

IFIED, ANCHOR RODS ARE DESIGNED
-IN-PLACE" ANCHOR RODS WITH
NS.

VEL, SQUARE AND SMOOTH.
ACCURATELY PLACED AS SHOWN
EL WILL NOT FIT. THE BUILDER
URATE SETTING OF ANCHOR RODS
DARD PRACTICE, SEC 7.5
IZED BELOW:
D AR'S WITHIN A COLUMN BASE

T AR GROUPS; +-1/4"
2"
TWEEN CENTERS OF AR GROUPS
+-1/4" PER 100FT., NOT TO

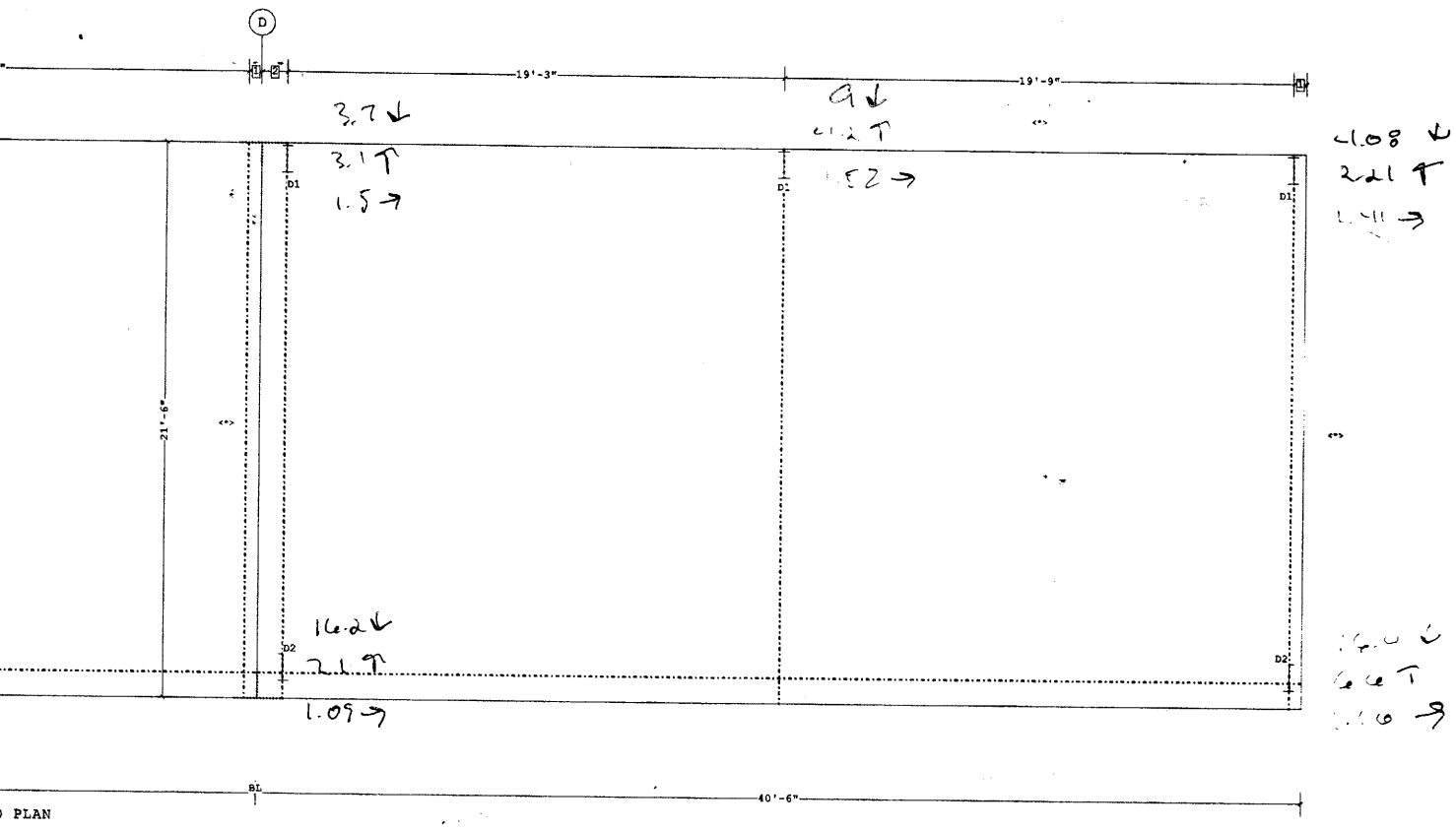
ANY AR GROUP FROM COLUMN

TIONS ARE FURNISHED IN THE

Existg Fnd Wall Ftg is 8' wide x 1'-0" Deep
using 4 LF of Existg 8' wide Footing
Good Allowable Value 0.F

48 K ↓
7.5K ↑
3.0K →

Existg Footg Acceptable For Canopy Loads



PLAN

= 100'-0" (Unless Noted Otherwise)

INS THE PROPERTY OF
LDING DESCRIBED IN THE
NLY FOR THAT PURPOSE. IT
THER PURPOSE WITHOUT

SPONSIBLE FOR ACCURATE
ACCORDANCE WITH THIS
CABLE BUTLER MFG.
O PROPER ERECTION,

FOR CONSTRUCTION

D	BUTLER MANUFACTURING 1540 GENESSEE ST. KANSAS CITY, MO 64102			ANCHOR ROD PLAN	
REV:	DATE:	BY:	DESCRIPTION:	BUILDER: MAR Building Solutions	JOB #: 24-087756-01
				CUSTOMER:	DATE: 1/19/2024
				LOCATION: Lees Summit, Missouri	DRAWN/CHECK: ETH / JRM
				PROJECT: LSMO Water Utilites	PAGE: 4
DRAWING SCALE: NTS				BUILDER'S PO#:	VPC VERSION: 24.1.1

5/1/2024 13:12:14

BUTLER
Butler Manufacturing

a division of BlueScope Buildings North America, Inc.

Date: 5/20/2024
Project Name: 124-040
Project No.: LSMO Water Parking
Subject: West Storage
Computed by: ATM

Frost Depth (ft)	3
Allowable Bearing Pressure (ksf)	1.5
Soil Unit Weight (kcf)	0.12
Coefficient of Sliding Friction	0.40
Ultimate Base Adhesion (ksf)	0.13
Ultimate Passive Pressure (ksf)	0.25
Concrete Weight (pcf)	150
Concrete Strength (psi)	3000
Slab Thickness	0

Minimum Dimensions		
	Ext	Int
Width (ft)	2	2
Length (ft)	2	2
Thickness (in)	12	12

Footings		
	Exterior	Interior
Width (in)	18	0
Depth (in)	36	0
Weight (klf)	0.68	0.00
Dock Ht (ft)	2.00	

Min Steel Ratios	
$\rho_{MIN\ FLEXURE}$	0.0033
$\rho_{T\&S}$	0.0018

ALLOWABLE VALUES

	Ratios	FS
Bearing	1	1
Uplift	1	1
Sliding	1	1
DL	0.6	1.7

.6D+.6W CONTROLS FTG STABILITY

Footing Dims	Location		Existing West Wall Fnd						
	Length/Dia	(ft)	8						
	Width	(ft)	4						
	Thickness	(in)	12						
	Perimeter	(ft)	24	0	0	0	0	0	0
Bearning Capacity	Area	(ft^2)	32	0	0	0	0	0	0
	Bearing Capacity	(kips)	48	0	0	0	0	0	0
	Allowable Bearing	(kips)	48.00	0.00	0.00	0.00	0.00	0.00	0.00
Uplift Capacity	Total Weight of FTG	(kips)	4.80	0.00	0.00	0.00	0.00	0.00	0.00
	Weight of Dock Wall	(klf)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	Slab Available	(ft)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Weight of Slab	(kips)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weight of Soil Over Ftg	(kips)	7.68	0.00	0.00	0.00	0.00	0.00	0.00
	Type of CONT FTG Available	-	Ext	Ext	None	Ext	Ext	Ext	Ext
	LF CF Available	(ft)	0.00	10.00	0.00	15.00			10.00
	Total Weight of CF	(kips)	0.00	6.75	0.00	10.13	0.00	0.00	6.75
	Total Dead Load	(kips)	12.48	6.75	0.00	10.13	0.00	0.00	6.75
	Reduced DL	(kips)	7.49	4.05	0.00	6.08	0.00	0.00	4.05
	Uplift Capacity	(kips)	7.49	4.05	0.00	6.08	0.00	0.00	4.05
Sliding Capacity	DL Column Load on Footing	(kips)							
	Weight of Footing	(kips)	4.80	0.00	0.00	0.00	0.00	0.00	0.00
	Weight of Slab	(kips)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weight of Soil on Footing	(kips)	7.68	0.00	0.00	0.00	0.00	0.00	0.00
	Weight of Cont Footing	(kips)	0.00	6.75	0.00	10.13	0.00	0.00	6.75
	Total DL on Footing	(kips)	12.48	6.75	0.00	10.13	0.00	0.00	6.75
	Reduced DL	(kips)	7.49	4.05	0.00	6.08	0.00	0.00	4.05
	Frictional Resistance	(kips)	3.00	1.62	0.00	2.43	0.00	0.00	1.62
	FTG Passive Pressure Capacity	(kips)			0.00				
	LF CF Available	(ft)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CF Passive Pressure Capacity	(kips)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Hairpin Capacity	(kips)	0.00	0.00	0.00		0.00		
	Total Sliding Resistance	(kips)	3.00	1.62	0.00	2.43	0.00	0.00	1.62
	Sliding Capacity	(kips)	3.00	1.62	0.00	2.43	0.00	0.00	1.62
Footing & Column Dimensions	Baseplate Dim in Direction of Footing Length	(in)	8	8	8				
	Baseplate Dim in Direction of Footing Width	(in)	11	11					
	d	(in)	7.5	-4.5	-4.5	-4.5	-4.5	-4.5	-4.5
	$q_{u\ (Allowable\ Bearing)}$	(ksf)	1.50	1.50	1.50	1.50	1.50	1.50	1.50
	$q_{u\ (Allowable\ Uplift)}$	(ksf)	0.23	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Controlling Moment	-	BEARING	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1-Way Shear (L)	x	(ft)	3.04	0.04	0.04	0.38	0.38	0.38	0.38
	V_{u1}	(k)	36.50	0.00	0.00	0.00	0.00	0.00	0.00
	ϕV_c	(k)	59.15	0.00	0.00	0.00	0.00	0.00	0.00
	Ratio	-	0.62	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1-Way Shear (W)	x	(ft)	0.92	-0.08	0.38	0.38	0.38	0.38	0.38
	V_{u1}	(k)	18.25	0.00	0.00	0.00	0.00	0.00	0.00
	ϕV_c	(k)	29.58	0.00	0.00	0.00	0.00	0.00	0.00
	Ratio	-	0.62	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Punching Shear (L)	V_{u2}	(k)	45.50	-0.13	-0.13	-0.21	-0.21	-0.21	-0.21
	bo	(in)	62	14	14	-18	-18	-18	-18
	ϕV_{c2}	(k)	76.41	-10.35	-10.35	13.31	13.31	13.31	13.31
	Ratio	-	0.60	0.01	0.01	0.02	0.02	0.02	0.02
Punching Shear (W)	V_{u2}	(k)	44.43	-0.44	-0.21	-0.21	-0.21	-0.21	-0.21
	bo	(in)	74.00	26.00	-18.00	-18.00	-18.00	-18.00	-18.00
	ϕV_{c2}	(k)	91.20	-19.23	13.31	13.31	13.31	13.31	13.31
	Ratio	-	0.49	0.02	0.02	0.02	0.02	0.02	0.02
Reinforcement	Size of Bar	-	#5	#5	#5	#5	#5	#5	#5
	m	-	23.53	23.53	23.53	23.53	23.53	23.53	23.53
	x'_{Length}	(ft)	3.67	-0.33	-0.33	0.00	0.00	0.00	0.00
	$A_{s\ T\&S\ Length}$	(in^2)	2.07	0.00	0.00	0.00	0.00	0.00	0.00
	Number of Bars For T&S	-	7	0	0	0	0	0	0
	x'_{Width}	(ft)	1.54	-0.46	0.00	0.00	0.00	0.00	0.00
	$A_{s\ T\&S\ Width}$	(in^2)	0.52	0.00	0.00	0.00	0.00	0.00	0.00
	Number of Bars For T&S	-	2	0	0	0	0	0	0
Reinforcement For Bearing (Longitudinal - L)	M_u	(k-ft)	10.08	0.08	0.08	0.00	0.00	0.00	0.00
	Rn	(psi)	24.90	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$\rho_{REQ'D}$	-	0.000417	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ REQ'D}$	(in^2)	0.300	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Number of Bars Required	-	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ Provided}$	(in^2)	0.31	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ FLEXURE\ Req'd}$	(in^2)	0.399	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Number of Bars Provided	-	2	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ USED}$	(in^2)	0.62	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Reinforcement For Bearing (Transverse - W)	M_u	(k-ft)	1.78	0.16	0.00	0.00	0.00	0.00	0.00
	R_u	(psi)	4.40	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$\rho_{REQ'D}$	-	0.000073	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ REQ'D}$	(in^2)	0.03	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Number of Bars Required	-	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ Provided}$	(in^2)	0.31	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ FLEXURE\ Req'd}$	(in^2)	0.035	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Number of Bars Provided	-	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ USED}$	(in^2)	0.31	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Reinforcement For Uplift (Longitudinal - L)	M_u	(k-ft)	1.57	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	R_u	(psi)	7.77	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$\rho_{REQ'D}$	-	0.0001297	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ REQ'D}$	(in^2)	0.0934	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Number of Bars Required	-	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ Provided}$	(in^2)	0.31	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ FLEXURE\ Req'd}$	(in^2)	0.124165111	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Number of Bars Provided	-	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ USED}$	(in^2)	0.31	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Reinforcement For Uplift (Transverse - W)	M_u	(k-ft)	0.28	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	R_u	(psi)	1.37	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$\rho_{REQ'D}$	-	0.0000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ REQ'D}$	(in^2)	0.0082	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Number of Bars Required	-	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ Provided}$	(in^2)	0.31	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ FLEXURE\ Req'd}$	(in^2)	0.01096129	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Number of Bars Provided	-	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	$A_{s\ USED}$	(in^2)	0.31	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Summary	Bar Size	-	#5	#5	#5	#5	#5	#5	#5
	No. of Long. Bars @ Bott	-	2	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	No. of Trans Bars @ Bott	-	2	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	No. of Long. Bars @ Top	-	2	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	No. of Trans Bars @ Top	-	2	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	LF of GB Used	(ft)	0.00	10.00	0.00	15.00	0.00	0.00	10.00
	Thickness	(in)	12	0	0	0	0	0	0
	Width	(ft)	8	0	0	0	0	0	0
	Length	(ft)	4	0	0	0	0	0	0
	Allowable Vertical Load	(kips)	48.00	0.00	0.00	0.00	0.00	0.00	0.00

Date: 5/20/2024
Project Name: 124-040
Project No.: LSMO Water Parking
Subject: West Storage
Computed by: ATM

Frost Depth (ft)	3
Allowable Bearing Pressure (ksf)	1.5
Soil Unit Weight (kcf)	0.12
Coefficient of Sliding Friction	0.40
Ultimate Base Adhesion (ksf)	0.13
Ultimate Passive Pressure (ksf)	0.25
Concrete Weight (pcf)	150
Concrete Strength (psi)	3000
Slab Thickness	0

Minimum Dimensions		
	Ext	Int
Width (ft)	2	2
Length (ft)	2	2
Thickness (in)	12	12

Footings		
	Exterior	Interior
Width (in)	18	0
Depth (in)	36	0
Weight (klf)	0.68	0.00
Dock Ht (ft)	2.00	

Min Steel Ratios	
$\rho_{MIN\ FLEXURE}$	0.0033
$\rho_{T\&S}$	0.0018

ALLOWABLE VALUES

	Ratios	FS
Bearing	1	1
Uplift	1	1
Sliding	1	1
DL	0.6	1.7

.6D+.6W CONTROLS FTG STABILITY

	Allowable Uplift Load	(kips)	7.49	4.05	0.00	6.08	0.00	0.00	4.05
	Allowable Horizontal Load	(kips)	3.00	1.62	0.00	2.43	0.00	0.00	1.62
	Location		Existing West Wall Fr	0	0	0	0	0	0

Company:	S1 STRUCTURAL	Date:	5/21/2024
Engineer:		Page:	1/5
Project:	LSMO 124-040		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description: STORAGE BINS UPLIFT
Location: EXPOXY ANCHOR IN WALL/PILASTER HORIZ
Fastening description: UPLIFT MAX AT OUTSIDE COL 1.0 WIND ONLY -13.9 K

2. Input Data & Anchor Parameters

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

Anchor Information:
Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 0.750
Effective Embedment depth, h_{ef} (inch): 10.000
Code report: ICC-ES ESR-4057
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 11.75
c_{ac} (inch): 16.79
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Cracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.0
Reinforcement condition: A tension, A shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Continuous
Temperature range, Short/Long: 150/110°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 13.00 x 9.00 x 0.25

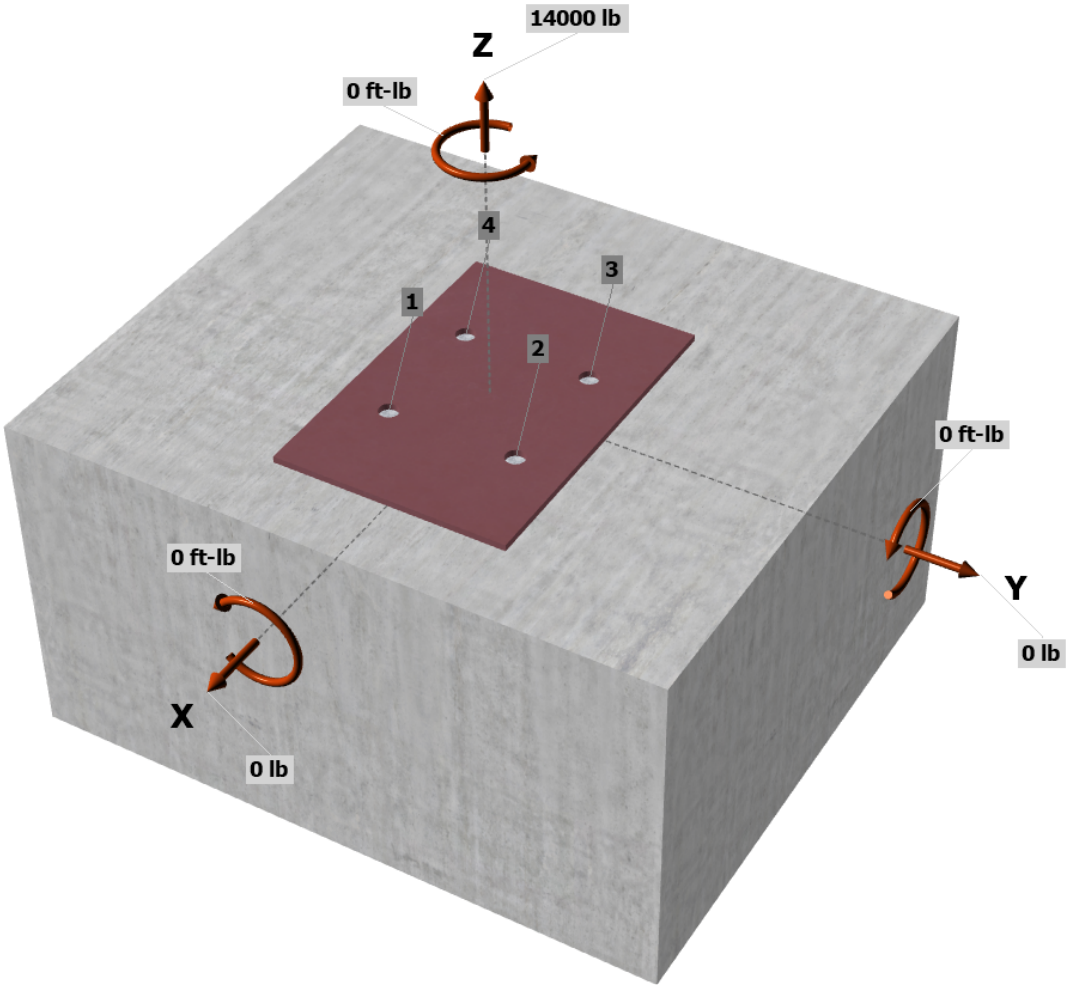
Recommended Anchor
Anchor Name: SET-3G - SET-3G w/ 3/4"Ø F1554 Gr. 36
Code Report: ICC-ES ESR-4057

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

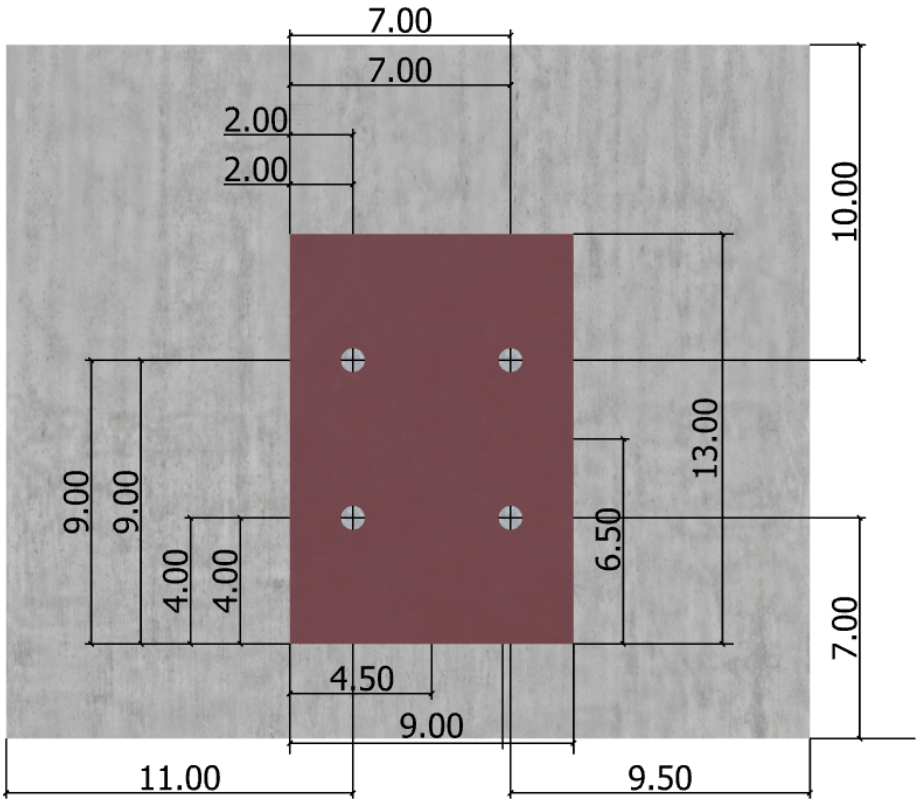
Strength level loads:

N_{ua} [lb]: 14000
V_{uax} [lb]: 0
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



<Figure 2>

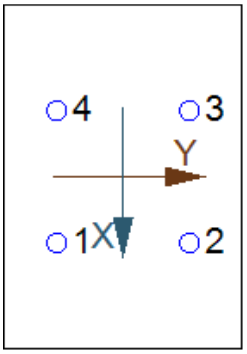

7.00
7.00
2.00
2.00
10.00
13.00
9.00
9.00
4.00
4.00
6.50
7.00
4.50
9.00
11.00
9.50

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	3500.0	0.0	0.0	0.0
2	3500.0	0.0	0.0	0.0
3	3500.0	0.0	0.0	0.0
4	3500.0	0.0	0.0	0.0
Sum	14000.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 14000
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

<Figure 3>



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

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
19370	0.75	14528

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	3000	7.333	18491

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

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)
561.00	484.00	7.00	1.000	0.891	1.00	1.000	18491	0.75	14321

6. Adhesive Strength of Anchor in Tension (Sec. 17.4.5)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat} (f'_c / 2{,}500)^n$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	f'_c (psi)	n	$\tau_{k,cr}$ (psi)
1310	1.00	1.00	3000	0.24	1369

$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef}$ (Eq. 17.4.5.2)

λ_a	τ_{cr} (psi)	d_a (in)	h_{ef} (in)	N_{ba} (lb)
1.00	1369	0.75	10.000	32247

$\phi N_{ag} = \phi (A_{Na} / A_{Na0}) \Psi_{ec,Na} \Psi_{ed,Na} \Psi_{cp,Na} N_{ba}$ (Sec. 17.3.1 & Eq. 17.4.5.1b)

A_{Na} (in^2)	A_{Na0} (in^2)	c_{Na} (in)	$c_{a,min}$ (in)	$\Psi_{ec,Na}$	$\Psi_{ed,Na}$	$\Psi_{cp,Na}$	N_{ba}(lb)	ϕ	ϕN_{ag} (lb)
545.02	422.18	10.27	7.00	1.000	0.904	1.000	32247	0.65	24472

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	3500	14528	0.24	Pass
Concrete breakout	**14000**	**14321**	**0.98**	**Pass (Governs)**
Adhesive	14000	24472	0.57	Pass

SET-3G w/ 3/4"Ø F1554 Gr. 36 with hef = 10.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

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

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

DESIGN IGNORES ALL EXISTING AND NEW REINFORCMENT IN PILASTERS/WALLS TO BE CONSERVATIVE.

Company:	S1 STRUCTURAL	Date:	5/21/2024
Engineer:		Page:	1/5
Project:	LSMO 124-040		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description: STORAGE BINS
Location: EXPOXY ANCHOR IN WALL/PILASTER HORIZ
Fastening description: 1.57/.6 = 2.61 = 1.0 W

2. Input Data & Anchor Parameters

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

Anchor Information:
Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 0.750
Effective Embedment depth, h_{ef} (inch): 10.000
Code report: ICC-ES ESR-4057
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 11.75
c_{ac} (inch): 16.79
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.4
Reinforcement condition: A tension, A shear
Supplemental reinforcement: No
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Continuous
Temperature range, Short/Long: 150/110°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 13.00 x 9.00 x 0.25

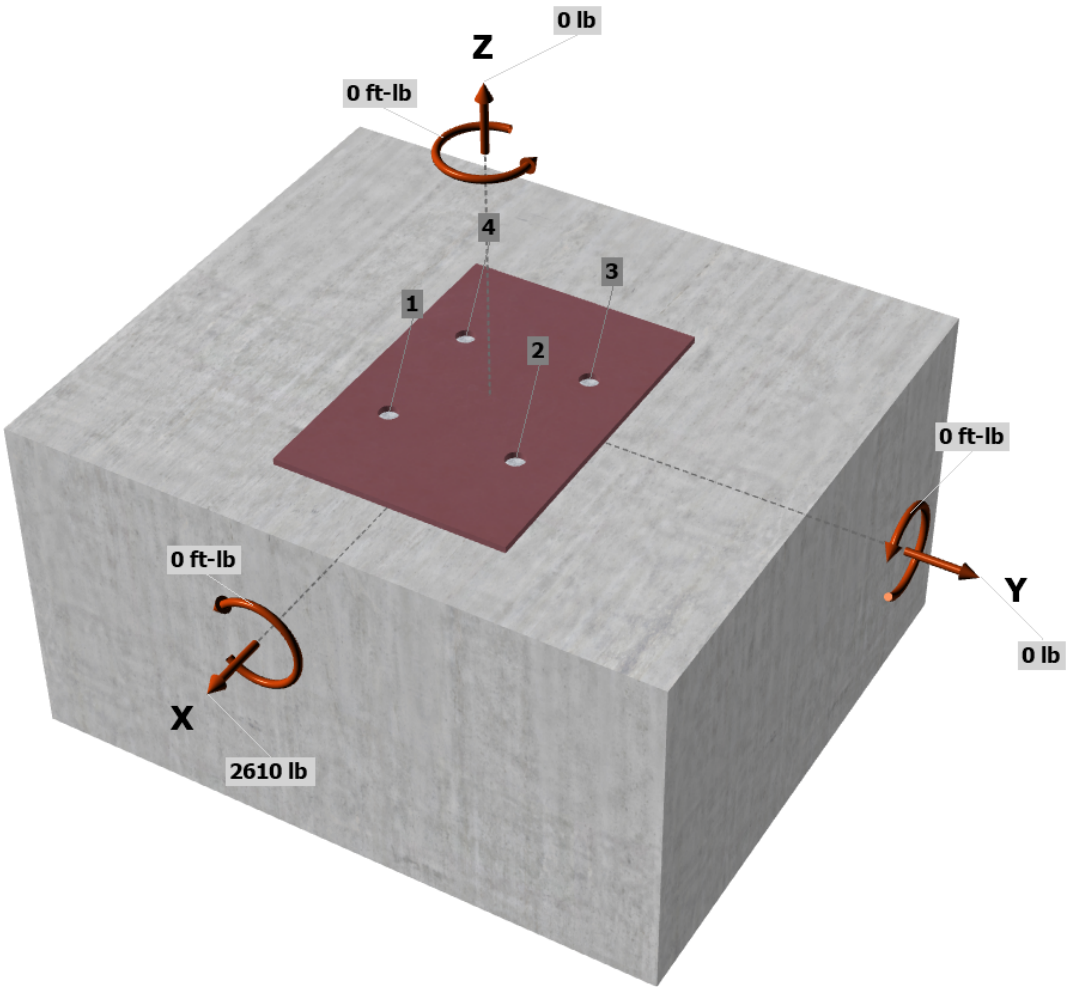
Recommended Anchor
Anchor Name: SET-3G - SET-3G w/ 3/4"Ø F1554 Gr. 36
Code Report: ICC-ES ESR-4057

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

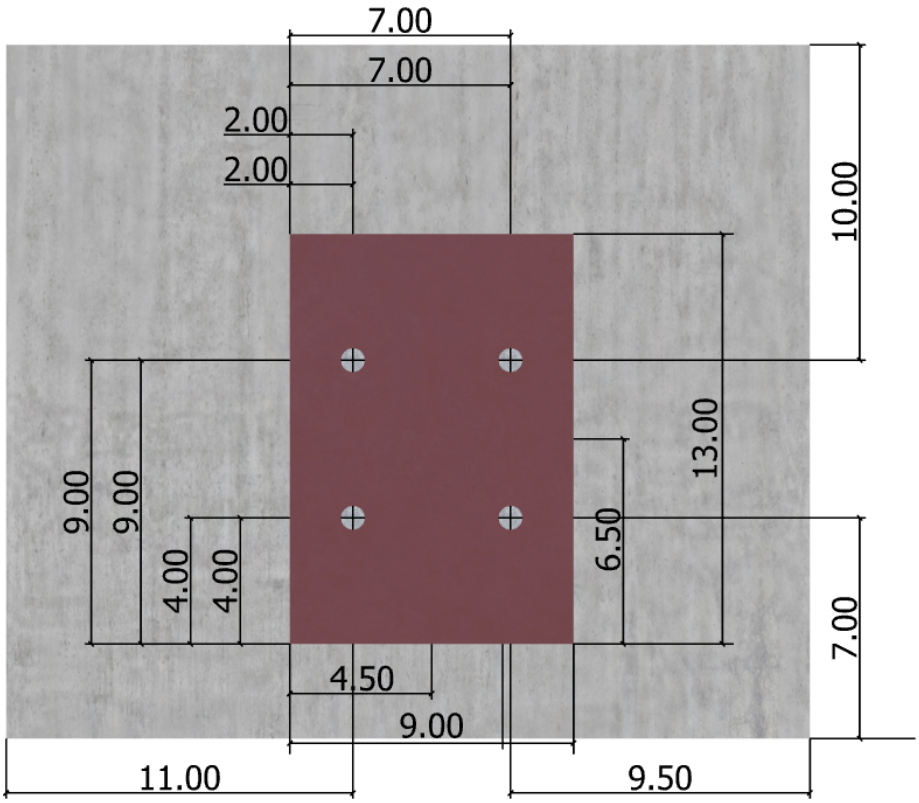
Strength level loads:

N_{ua} [lb]: 0
V_{uax} [lb]: 2610
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



<Figure 2>

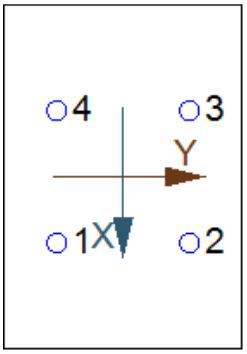

7.00
7.00
2.00
2.00
10.00
13.00
9.00
9.00
4.00
4.00
6.50
7.00
4.50
9.00
11.00
9.50

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	652.5	0.0	652.5
2	0.0	652.5	0.0	652.5
3	0.0	652.5	0.0	652.5
4	0.0	652.5	0.0	652.5
Sum	0.0	2610.0	0.0	2610.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 0
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>



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

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
11625	1.0	0.65	7556

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

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. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
6.00	0.750	1.00	3000	7.00	9130

$\phi V_{cbgx} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1b)

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)
262.50	220.50	1.000	0.971	1.400	1.000	9130	0.75	11086

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. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
6.00	0.750	1.00	3000	9.50	14434

$\phi V_{cbgy} = \phi\ (2)(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1b)

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)
313.50	406.13	1.000	1.000	1.400	1.000	14434	0.75	23398

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

$\phi V_{cpg} = \phi \min|k_{cp}N_{ag}\ ;\ k_{cp}N_{cbg}| = \phi \min|k_{cp}(A_{Na}/A_{Na0})\Psi_{ec,Na}\Psi_{ed,Na}\Psi_{cp,Na}N_{ba}\ ;\ k_{cp}(A_{Nc}/A_{Nco})\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{ec,Na}$	$\Psi_{cp,Na}$	N_{ba} (lb)	N_a (lb)
2.0	545.02	422.18	0.904	1.000	0.612	51836	37025

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
561.00	484.00	1.000	0.891	1.000	0.893	26105	24079	0.70

ϕV_{cpg} (lb)
33710

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	653	7556	0.09	Pass
T Concrete breakout x+	**2610**	**11086**	**0.24**	**Pass (Governs)**
|| Concrete breakout y+	**1305**	**23398**	**0.06**	**Pass (Governs)**
Pryout	2610	33710	0.08	Pass

SET-3G w/ 3/4"Ø F1554 Gr. 36 with hef = 10.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

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

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

DESIGN IGNORES ALL EXISTING AND NEW REINFORCMENT IN PILASTERS/WALLS TO BE CONSERVATIVE.