CALCULATIONS FOR

Job: Foundation Design

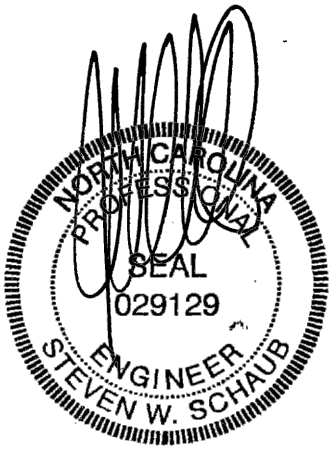
Address : Joe Creech

Benson, NC 27504

(These calculations apply to the job at this address only.)

Client: Olympia Steel

Index to Calculations



JUN 08 2023

Project Engineer G Starks

Job # 0958-23

S.E. CONSULTANTS, INC.

5800 East Thomas Road, Suite 104
Scottsdale, Arizona 85251
Phone: (480) 946-2010 Fax: (480) 946-1909

BASIS FOR DESIGN

DEAD LOADS

LIVE LOADS See metal building manufacture for design loads.

LATERAL

CODE: 2018 North Carolina Building Code

STRESSES OF MATERIALS

CONCRETE

Footings	f'c =	3000	psi.
Retaining Wall	f'c =	N/A	psi.

STEEL

Reinforcing	fy =	60000	psi. A-615, Grade 60
Weldable Reinforcing	fy =	60000	psi. A-706, Grade 60
Structural Steel	fy =	36000	psi. A-36, Grade 36

SOIL

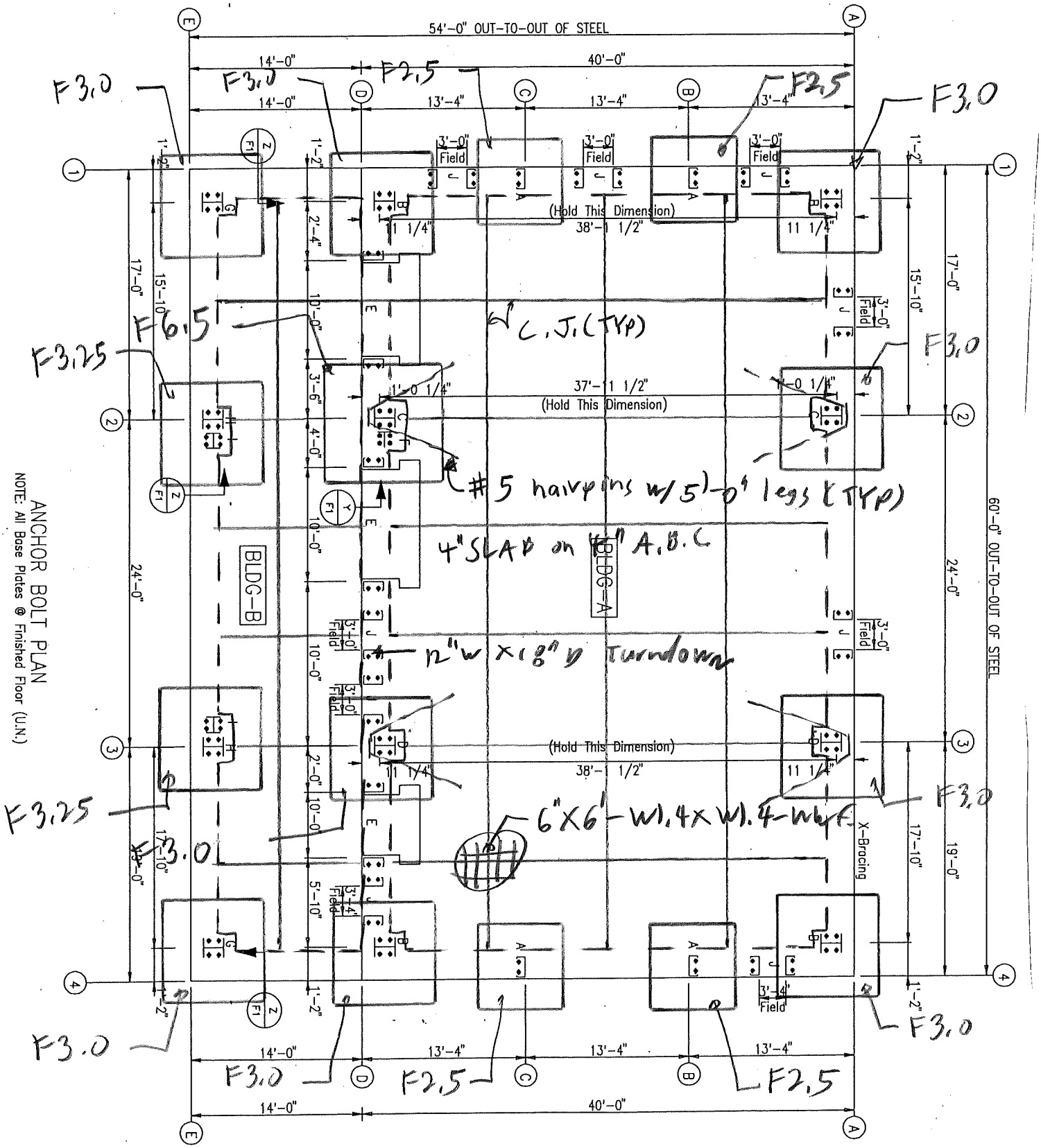
Allow. Soil Bearing =	1500 psf
Allow. Lateral Bearing =	150 psf/ft
Soil Site Class =	D

Soil Report: N/A

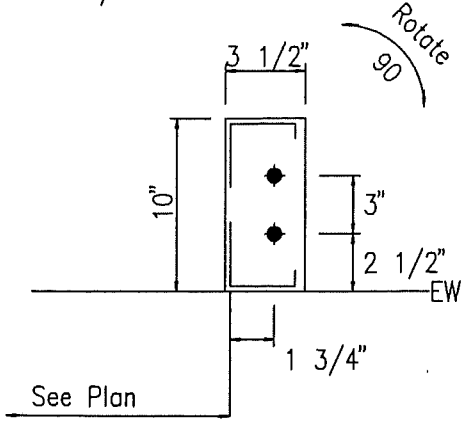
PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Job: 11017 Date: 6/23 By: GCS Job No.: 0958-23 SH.: 1

S.E. CONSULTANTS, INC.

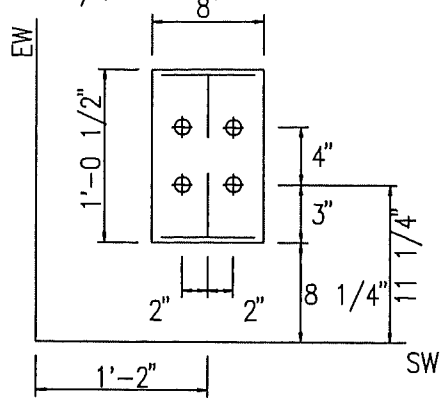

54'-0" OUT-TO-OUT OF STEEL
14'-0"
40'-0"
13'-4"
(Hold This Dimension)
38'-1 1/2"
37'-11 1/2"
11 1/4"
3'-0" Field
3'-4" Field
17'-0"
15'-10"
24'-0"
19'-0"
17'-10"
10'-0"
4'-0"
2'-4"
2'-0"
5'-10"
3'-6"
1'-2"
1'-0 1/4"
BLDG-A
BLDG-B
X-Bracing
60'-0" OUT-TO-OUT OF STEEL
F3.0
F2.5
F6.5
F3.25
C, J, (TYP)
#5 hairpins w/ 5'-0" legs (TYP)
4" SLAB on 6" A.B.C
12"w x 18"d turndown
6"x6'-W1.4xW1.4-WWF
ANCHOR BOLT PLAN
NOTE: All Base Plates @ Finished Floor (U.N.)

Dia= 5/8"



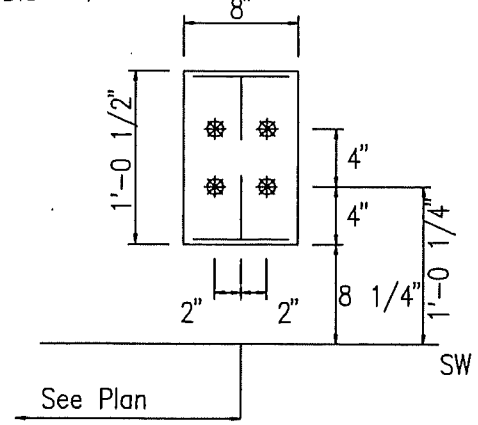
DETAIL A

Dia= 3/4"



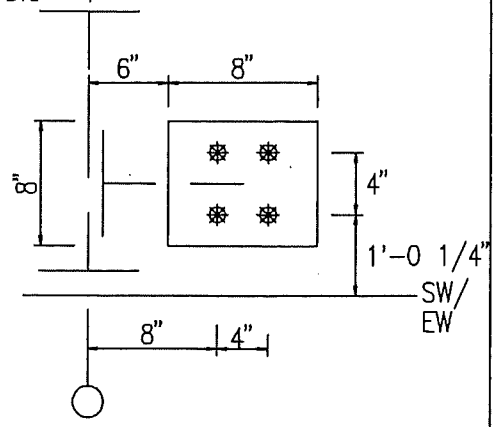
DETAIL B

Dia= 1"



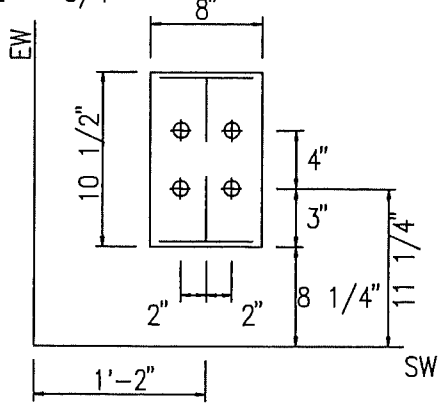
DETAIL C

Dia= 1"



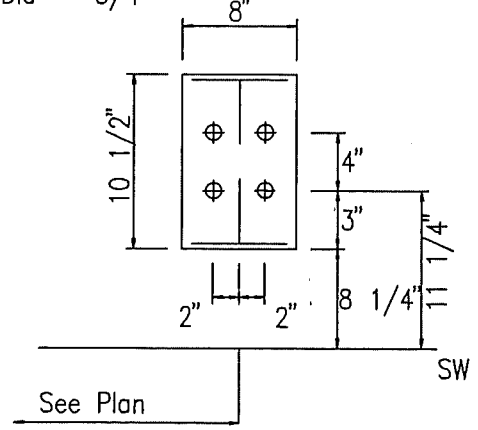
DETAIL F

Dia= 3/4"



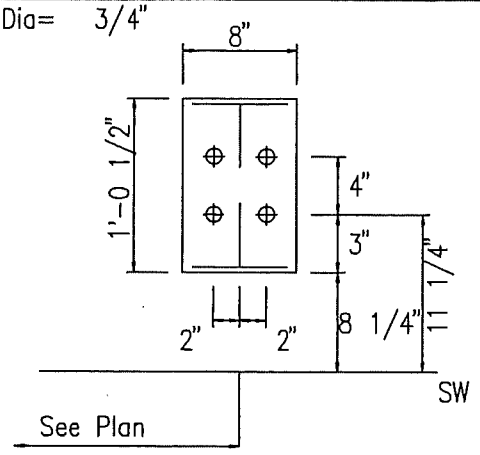
DETAIL G

Dia= 3/4"



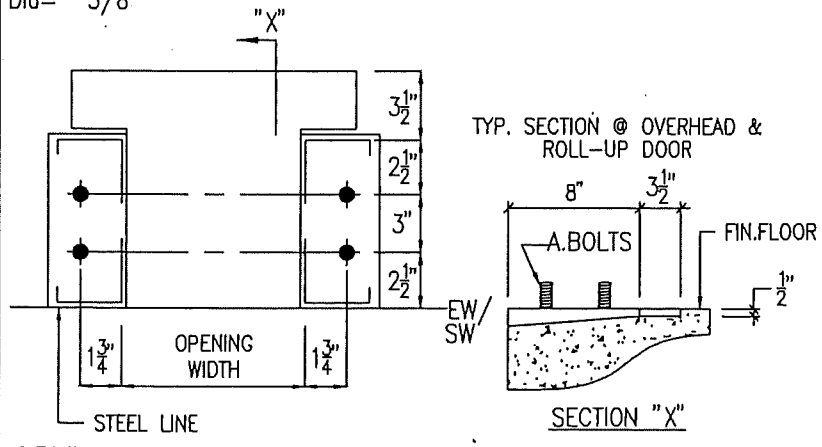
DETAIL H

Dia= 3/4"



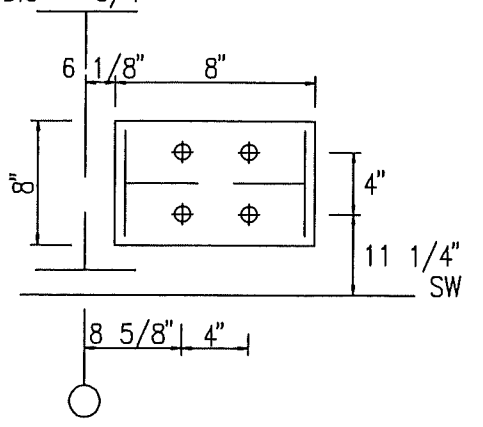
DETAIL D

Dia= 5/8"



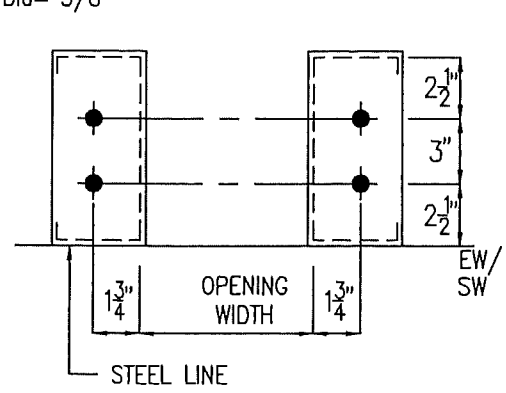
DETAIL E

Dia= 3/4"



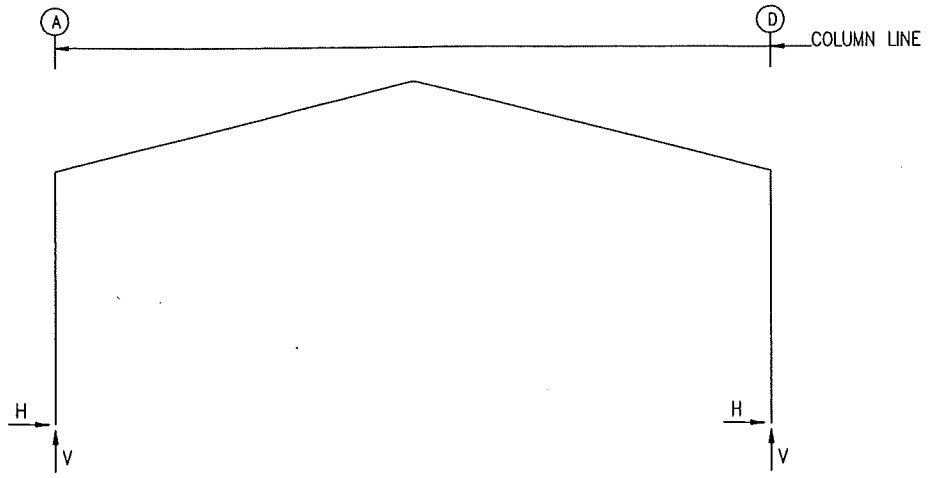
DETAIL I

Dia= 5/8"



DETAIL J

FRAME LINES: 1 2 3 4



RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Bolt(in) Dia	Base_Plate(in) Width	Base_Plate(in) Length	Base_Plate(in) Thick	Elev. (in)
1*	A	4	1.5	3.0	5	−2.1	−2.9	4	0.750	8.000	12.50	0.375	0.0
		1	1.4	4.3	8	−0.5	−3.6						
1*	D	7	1.9	−2.2	3	−1.8	3.2	4	0.750	8.000	12.50	0.375	0.0
		1	−1.4	5.9	6	1.1	−3.3						

1* Frame lines: 1 4

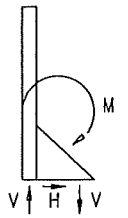
RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Bolt(in) Dia	Base_Plate(in) Width	Base_Plate(in) Length	Base_Plate(in) Thick	Elev. (in)
2	A	4	2.6	4.8	5	−3.4	−4.8	4	1.000	8.000	12.50	1.000	0.0
		1	2.2	6.4									
2	D	7	3.3	−3.0	3	−3.1	5.1	4	1.000	8.000	12.50	1.000	0.0
		2	−1.6	30.9	9	−1.9	−36.8						

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Bolt(in) Dia	Base_Plate(in) Width	Base_Plate(in) Length	Base_Plate(in) Thick	Elev. (in)
3	A	4	2.7	5.1	5	−3.7	−5.1	4	0.750	8.000	12.50	0.375	0.0
		1	2.3	6.9	8	−0.8	−5.5						
3	D	7	3.6	−3.2	3	−3.3	5.4	4	0.750	8.000	12.50	0.375	0.0
		1	−2.3	10.1	6	1.8	−5.6						

FIXED BASE REACTIONS



Wall Loc	Wall Line	Col Line	R/L	Load_ID	± Reactions Horz (k)	± Reactions Vert (k)	Moment (f-k)	Anc_Bolt Qty	Anc_Bolt Dia	Base_Plate(in) Width	Base_Plate(in) Length	Base_Plate(in) Thick
F_SW	D	2	R	Wind	3.5	55.4	46.2	4	1.00	8.000	8.000	0.625
				Seismic	1.7	27.4	22.9					

BUILDING BRACING REACTIONS

Wall Loc	Wall Line	Col Line	± Reactions(k) Wind Horz	± Reactions(k) Wind Vert	± Reactions(k) Seismic Horz	± Reactions(k) Seismic Vert	Panel_Shear (lb/ft) Wind	Panel_Shear (lb/ft) Seis	Note
L_EW	1								(h)
F_SW	D	2							(g)
R_EW	4								(h)
B_SW	A	4,3	2.7	1.8	0.5	0.3			

(g)Wind column at column line
(h)Rigid frome at endwall

Reactions for seismic represent shear force, Eh

RIGID FRAME: BASIC COLUMN REACTIONS (k)

Frame Line	Column Line	Dead Horiz	Dead Vert	Collaterol Horiz	Collaterol Vert	Live Horiz	Live Vert	Snow Horiz	Snow Vert	Wind_Left1 Horiz	Wind_Left1 Vert	Wind_Right1 Horiz	Wind_Right1 Vert
1*	A	0.2	0.9	0.1	0.2	1.1	3.2	0.5	1.4	−3.7	−5.8	−0.1	−3.5
1*	D	−0.2	1.1	−0.1	0.3	−1.1	4.6	−0.5	2.0	−1.6	−3.5	2.1	−6.6

Frame Line	Column Line	Wind_Left2 Horiz	Wind_Left2 Vert	Wind_Right2 Horiz	Wind_Right2 Vert	Wind_Long1 Horiz	Wind_Long1 Vert	Wind_Long2 Horiz	Wind_Long2 Vert	Seismic_Left Horiz	Seismic_Left Vert	Seismic_Right Horiz	Seismic_Right Vert
1*	A	−2.8	−3.4	0.8	−1.1	−1.1	−6.9	−1.6	−6.3	−0.1	−0.1	0.1	0.1
1*	D	−0.2	−1.7	3.4	−4.7	−0.8	−4.3	−1.3	−5.0	−0.2	0.1	0.2	−0.1

Frame Line	Column Line	Seismic_Long Horiz	Seismic_Long Vert	MIN_SNOW Horiz	MIN_SNOW Vert	F1UNB_SL_L Horiz	F1UNB_SL_L Vert	F1UNB_SL_R Horiz	F1UNB_SL_R Vert
1*	A	0.0	−0.3	0.7	2.0	0.6	1.7	0.4	0.8
1*	D	0.0	0.0	−0.7	2.0	−0.6	1.0	−0.4	1.4

Frame Line	Column Line	Dead Horiz	Dead Vert	Collaterol Horiz	Collaterol Vert	Live Horiz	Live Vert	Snow Horiz	Snow Vert	Wind_Left1 Horiz	Wind_Left1 Vert	Wind_Right1 Horiz	Wind_Right1 Vert
3	A	0.4	1.3	0.2	0.4	1.8	5.1	1.0	3.0	−6.5	−9.9	0.1	−6.1
3	D	−0.4	1.7	−0.2	0.6	−1.7	7.7	−1.0	4.2	−3.4	−6.0	3.4	−11.1

Frame Line	Column Line	Wind_Left2 Horiz	Wind_Left2 Vert	Wind_Right2 Horiz	Wind_Right2 Vert	Wind_Long1 Horiz	Wind_Long1 Vert	Wind_Long2 Horiz	Wind_Long2 Vert	Seismic_Left Horiz	Seismic_Left Vert	Seismic_Right Horiz	Seismic_Right Vert
3	A	−4.7	−4.8	1.9	−1.0	−1.8	−10.5	−2.5	−9.6	−0.2	−0.2	0.2	0.2
3	D	−0.4	−2.0	6.3	−7.1	−2.2	−7.2	−3.0	−8.2	−0.2	0.2	0.2	−0.1

Frame Line	Column Line	Seismic_Long Horiz	Seismic_Long Vert	MIN_SNOW Horiz	MIN_SNOW Vert	F2UNB_SL_L Horiz	F2UNB_SL_L Vert	F2UNB_SL_R Horiz	F2UNB_SL_R Vert
3	A	0.0	−0.3	1.5	4.3	1.2	3.6	0.9	1.8
3	D	0.0	0.0	−1.5	4.3	−1.2	2.2	−0.9	3.0

Frame Line	Column Line	Dead Horiz	Dead Vert	Collaterol Horiz	Collaterol Vert	Live Horiz	Live Vert	Snow Horiz	Snow Vert	Wind_Left1 Horiz	Wind_Left1 Vert	Wind_Right1 Horiz	Wind_Right1 Vert
2	A	0.4	1.3	0.1	0.4	1.7	4.7	1.0	2.8	−6.0	−9.2	0.1	−5.7
2	D	−0.4	1.7	−0.1	0.5	−1.6	7.2	−0.9	3.9	−3.1	−5.6	3.1	−10.3

Frame Line	Column Line	Wind_Left2 Horiz	Wind_Left2 Vert	Wind_Right2 Horiz	Wind_Right2 Vert	Wind_Long1 Horiz	Wind_Long1 Vert	Wind_Long2 Horiz	Wind_Long2 Vert	Seismic_Left Horiz	Seismic_Left Vert	Seismic_Right Horiz	Seismic_Right Vert
2	A	−4.3	−4.5	1.8	−1.0	−1.7	−8.1	−2.4	−7.3	−0.2	−0.1	0.2	0.1
2	D	−0.4	−1.9	5.9	−6.6	−2.1	−62.1	−2.8	−63.0	−0.2	0.2	0.2	−0.1

Frame Line	Column Line	Seismic_Long Horiz	Seismic_Long Vert	MIN_SNOW Horiz	MIN_SNOW Vert	F3UNB_SL_L Horiz	F3UNB_SL_L Vert	F3UNB_SL_R Horiz	F3UNB_SL_R Vert
2	A	0.0	0.0	1.4	4.0	1.1	3.3	0.9	1.7
2	D	0.0	−27.4	−1.4	4.0	−1.1	2.0	−0.9	2.8

1* Frame lines: 1 4

ENDWALL COLUMN: BASIC COLUMN REACTIONS (k)

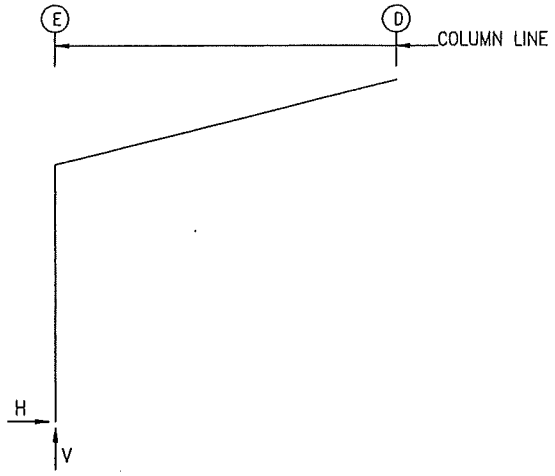
Frm Line	Col Line	Dead Vert	Wind Press Horz	Wind Suct Horz	Seis Long Vert
1	B	0.1	−2.2	2.5	0.0
1	C	0.1	−2.2	2.5	0.0
4	C	0.1	−2.2	2.5	0.0
4	B	0.1	−2.2	2.5	0.0

Col	Wind Press Horz.	Wind Suct Horz.
1D	−0.92	1.02
4D	−0.92	1.02

ENDWALL COLUMN: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Lood Id	Hmax H	V Vmax	Lood Id	Hmin H	V Vmin	Bolt(in) Qty	Bolt(in) Dia	Base_Plate(in) Width	Base_Plate(in) Length	Base_Plate(in) Thick	Elev. (in)
1	B	10	1.5	0.0	11	−1.3	0.0	2	0.625	3.500	10.00	0.250	0.0
		12	1.5	0.1									
1	C	10	1.5	0.0	11	−1.3	0.0	2	0.625	3.500	10.00	0.250	0.0
		12	1.5	0.1									
4	C	10	1.5	0.0	11	−1.3	0.0	2	0.625	3.500	10.00	0.250	0.0
		12	1.5	0.1									
4	B	10	1.5	0.0	11	−1.3	0.0	2	0.625	3.500	10.00	0.250	0.0
		12	1.5	0.1									

FRAME LINES: 4 3 2 1



RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Elev. (in)
4*	E	4	0.6	−1.1	5	−0.7	0.1	4	0.750	8.000	10.50	0.375	0.0
		1	0.0	2.0	6	0.6	−1.5						

4* Frame lines: 4 1

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Elev. (in)
3	E	7	1.3	−2.1	5	−1.4	0.4	4	0.750	8.000	10.50	0.375	0.0
		1	0.1	3.6	6	1.3	−2.8						

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Elev. (in)
2	E	7	1.2	−2.0	5	−1.3	0.4	4	0.750	8.000	10.50	0.375	0.0
		1	0.1	3.4	6	1.2	−2.6						

RIGID FRAME: BASIC COLUMN REACTIONS (k)

Frame Line	Column Line	Dead Horiz	Dead Vert	Collateral Horiz	Collateral Vert	Live Horiz	Live Vert	Snow Horiz	Snow Vert	Wind_Left1 Horiz	Wind_Left1 Vert	Wind_Right1 Horiz	Wind_Right1 Vert
4*	E	0.0	0.4	0.0	0.1	0.0	1.5	0.0	0.5	−0.1	−2.5	1.0	−2.2

Frame Line	Column Line	Wind_Left2 Horiz	Wind_Left2 Vert	Wind_Right2 Horiz	Wind_Right2 Vert	Wind_Long1 Horiz	Wind_Long1 Vert	Wind_Long2 Horiz	Wind_Long2 Vert	MIN_SNOW Horiz	MIN_SNOW Vert
4*	E	−1.2	−0.3	−0.1	0.0	1.0	−2.8	1.0	−2.1	0.0	0.8

Frame Line	Column Line	Dead Horiz	Dead Vert	Collateral Horiz	Collateral Vert	Live Horiz	Live Vert	Snow Horiz	Snow Vert	Wind_Left1 Horiz	Wind_Left1 Vert	Wind_Right1 Horiz	Wind_Right1 Vert
3	E	0.0	0.6	0.0	0.2	0.1	2.9	0.0	1.1	0.0	−4.6	2.0	−4.3

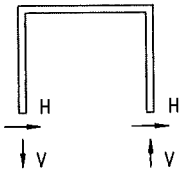
Frame Line	Column Line	Wind_Left2 Horiz	Wind_Left2 Vert	Wind_Right2 Horiz	Wind_Right2 Vert	Wind_Long1 Horiz	Wind_Long1 Vert	Wind_Long2 Horiz	Wind_Long2 Vert	MIN_SNOW Horiz	MIN_SNOW Vert
3	E	−2.3	0.2	−0.4	0.5	2.1	−5.3	2.1	−4.1	0.0	1.6

Frame Line	Column Line	Dead Horiz	Dead Vert	Collateral Horiz	Collateral Vert	Live Horiz	Live Vert	Snow Horiz	Snow Vert	Wind_Left1 Horiz	Wind_Left1 Vert	Wind_Right1 Horiz	Wind_Right1 Vert
2	E	0.0	0.5	0.0	0.2	0.1	2.7	0.0	1.0	0.0	−4.3	1.8	−4.0

Frame Line	Column Line	Wind_Left2 Horiz	Wind_Left2 Vert	Wind_Right2 Horiz	Wind_Right2 Vert	Wind_Long1 Horiz	Wind_Long1 Vert	Wind_Long2 Horiz	Wind_Long2 Vert	MIN_SNOW Horiz	MIN_SNOW Vert
2	E	−2.1	0.2	−0.4	0.5	2.0	−4.9	2.0	−3.8	0.0	1.5

4* Frame lines: 4 1

PORTAL FRAME REACTIONS



Wall Loc	Wall Line	Col Line	± Reactions Wind(k) Horz	Wind Vert	Seismic(k) Horz	Seismic Vert	Bolt(in) Qty	Bolt Dia	Base_Plate(in) Width	Base_Plate Length	Base_Plate Thick
B_SW	E	2	0.4	0.3	0.1	0.1	4	0.750	8.000	8.000	0.375
B_SW	E	3	0.4	0.3	0.1	0.1	4	0.750	8.000	8.000	0.375

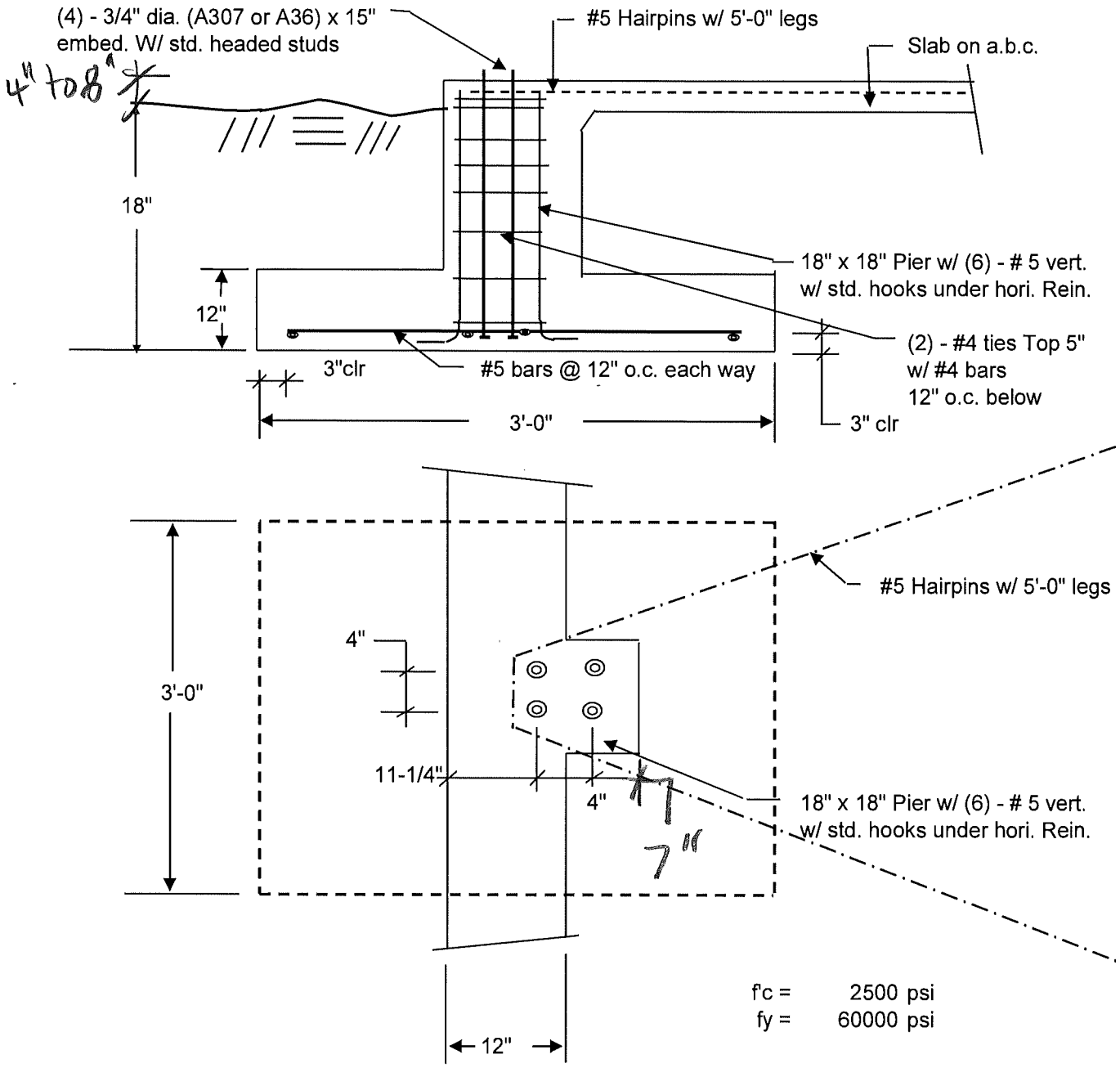
BUILDING BRACING REACTIONS

Wall Loc	Wall Line	Col Line	± Reactions(k) Wind Horz	Wind Vert	Seismic Horz	Seismic Vert	Panel_Shear (lb/ft) Wind	Panel_Shear Seis	Note
L_EW	4								(h)
F_SW	D								(f)
R_EW	1								(h)
B_SW	E	3,2							(a)

(a)Wind bent in bay
(f)Bracing loads are applied to adjacent building
(h)Rigid frame at endwall

Reactions for seismic represent shear force, Eh

Rigid Frame Footing @ F.L. 3A, 3D



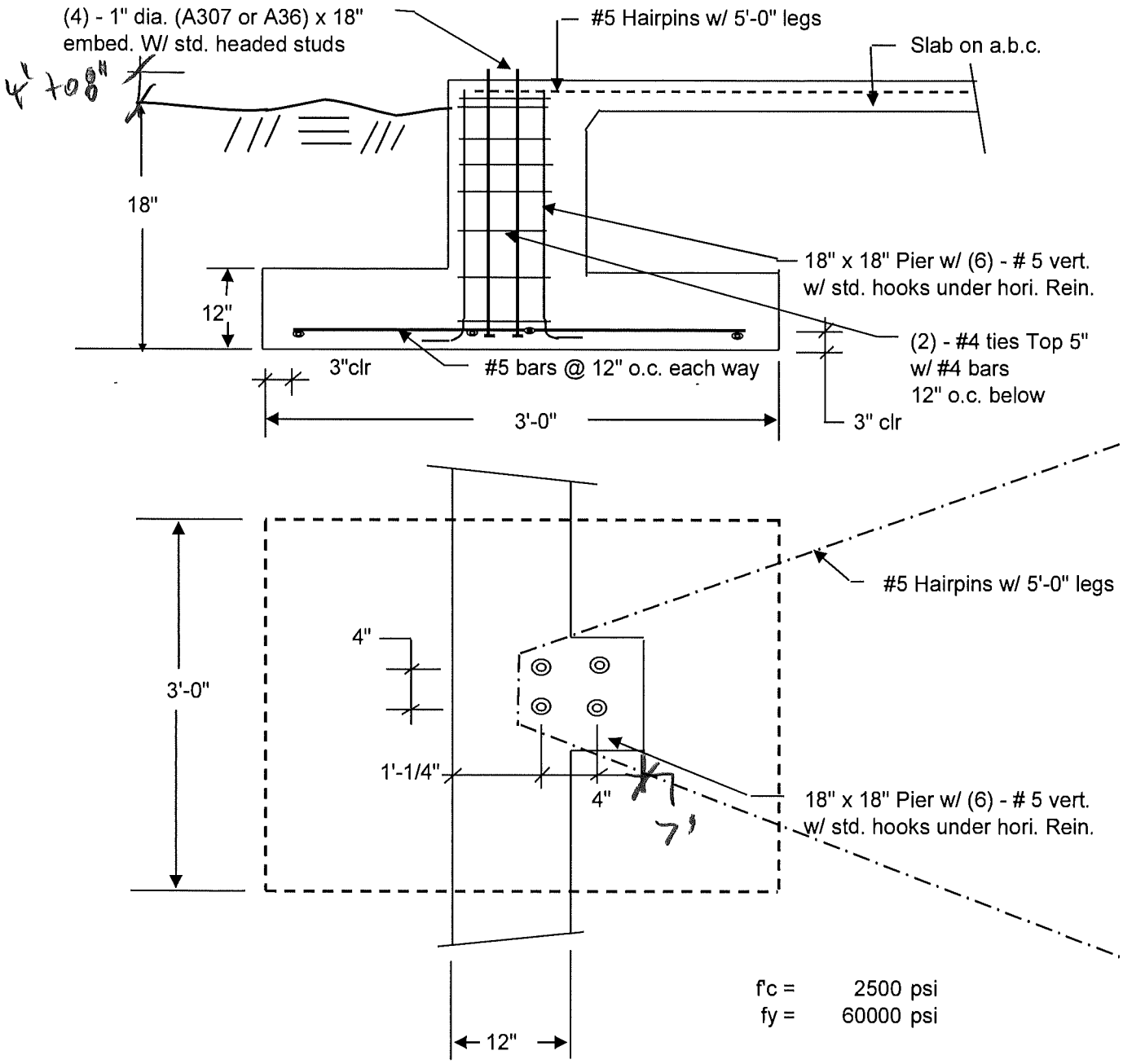
f'c = 2500 psi
fy = 60000 psi

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Jbb: 11017 Date: 6/23 By: GCS Jbb No.: 0958-23 SH.: 8

S.E. CONSULTANTS, INC.

Rigid Frame Footing @ F.L. 2A



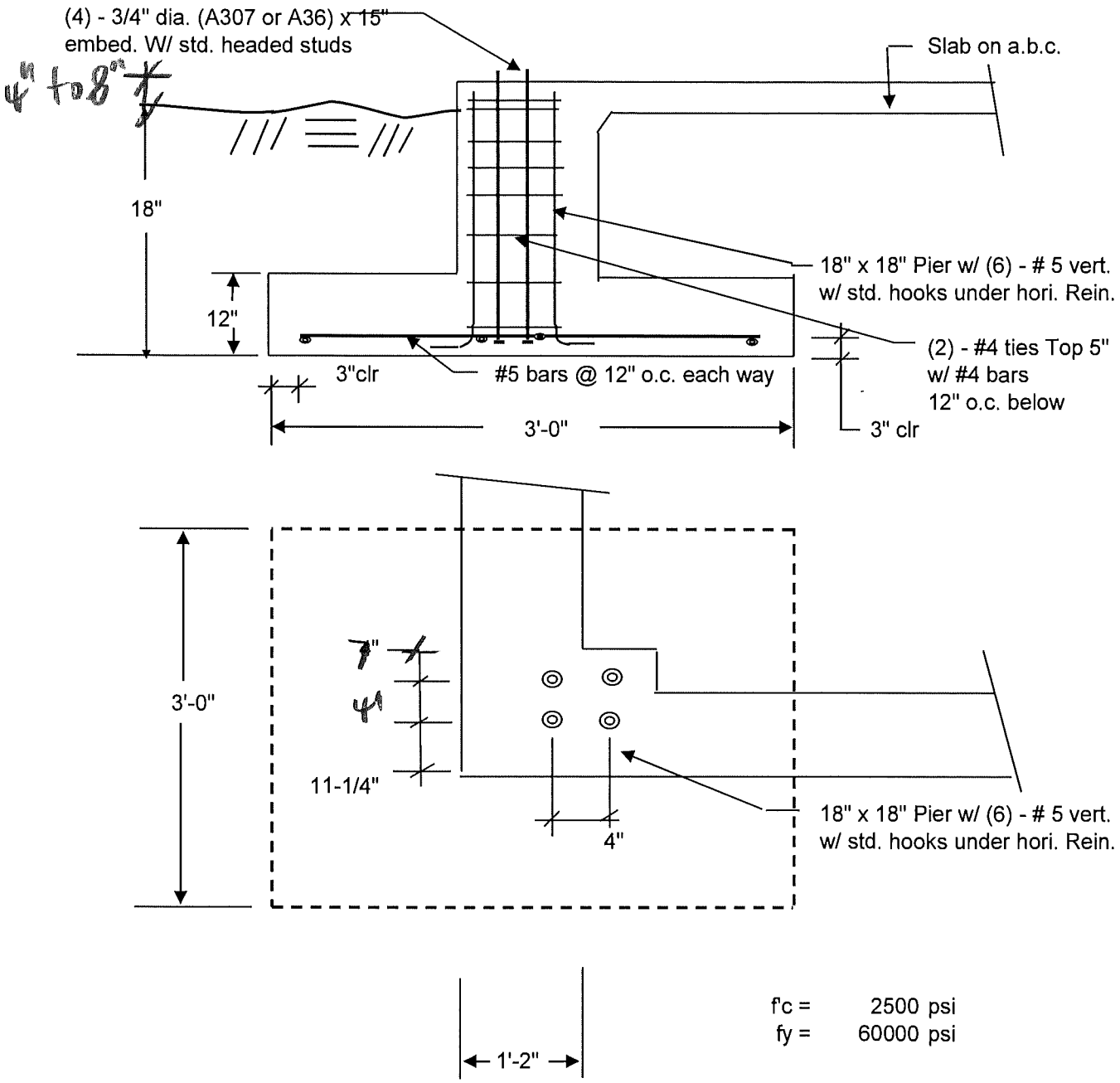
f'c = 2500 psi
fy = 60000 psi

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Jbb: 11017 Date: 6/23 By: GCS Jbb No.: 0958-23 SH.: 9

S.E. CONSULTANTS, INC.

Rigid Frame Footing @ F.L. 1A, 1D, 1E, 4A, 4D, 4E



f'c = 2500 psi
fy = 60000 psi

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Jbb: 11017 Date: 6/23 By: GCS Jbb No.: 0958-23 SH.: 10

S.E. CONSULTANTS, INC.

General Footing Analysis & Design

Description Frame Footing - 18x18 - Pier

General Information

Allowable Soil Bearing	1,500.0	psf	**Dimensions...**		
Short Term Increase	1.000		Width along X-X Axis	3.000	ft
Seismic Zone	4		Length along Y-Y Axis	3.000	ft
			Footing Thickness	12.00	in
Live & Short Term Combined			Col Dim. Along X-X Axis	18.00	in
f'c	2,500.0	psi	Col Dim. Along Y-Y Axis	18.00	in
Fy	60,000.0	psi	Base Pedestal Height	6.000	in
Concrete Weight	145.00	pcf			
Overburden Weight	0.00	psf	Min Steel %	0.0014	
			Rebar Center To Edge Distance	3.50	in

Loads

Applied Vertical Load...				
Dead Load	10.100	k	...ecc along X-X Axis	0.000 in
Live Load		k	...ecc along Y-Y Axis	0.000 in
Short Term Load		k		

	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Applied Moments...		
Dead Load	k-ft	k-ft
Live Load	k-ft	k-ft
Short Term	k-ft	k-ft

	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Applied Shears...		
Dead Load	k	k
Live Load	k	k
Short Term	k	k

Summary

Footing Design OK

3.00ft x 3.00ft Footing, 12.0in Thick, w/ Column Support 18.00 x 18.00in x 6.0in high

	DL+LL	DL+LL+ST		Actual	Allowable
Max Soil Pressure	1,285.3	1,285.3 psf	Max Mu	0.448 k-ft per ft	
Allowable	1,500.0	1,500.0 psf	Required Steel Area		0.259 in2 per ft
"X' Ecc, of Resultant	0.000 in	0.000 in			
"Y' Ecc, of Resultant	0.000 in	0.000 in	Shear Stresses....	Vu	Vn * Phi
			1-Way	1.177	85.000 psi
X-X Min. Stability Ratio	No Overturning	1.500 :1	2-Way	7.540	170.000 psi
Y-Y Min. Stability Ratio	No Overturning				

Footing Design

Shear Forces	ACI C-1	ACI C-2	ACI C-3	Vn * Phi
Two-Way Shear	7.54 psi	7.42 psi	4.77 psi	170.00 psi
One-Way Shears...				
Vu @ Left	1.18 psi	1.16 psi	0.75 psi	85.00 psi
Vu @ Right	1.18 psi	1.16 psi	0.75 psi	85.00 psi
Vu @ Top	1.18 psi	1.16 psi	0.75 psi	85.00 psi
Vu @ Bottom	1.18 psi	1.16 psi	0.75 psi	85.00 psi

Moments	ACI C-1	ACI C-2	ACI C-3	Ru / Phi	As Req'd	
Mu @ Left	0.45 k-ft	0.44 k-ft	0.28 k-ft	6.9 psi	0.26 in2	per ft
Mu @ Right	0.45 k-ft	0.44 k-ft	0.28 k-ft	6.9 psi	0.26 in2	per ft
Mu @ Top	0.45 k-ft	0.44 k-ft	0.28 k-ft	6.9 psi	0.26 in2	per ft
Mu @ Bottom	0.45 k-ft	0.44 k-ft	0.28 k-ft	6.9 psi	0.26 in2	per ft

Description Frame Footing - 18x18 - Pier

Soil Pressure Summary

Service Load Soil Pressures	Left	Right	Top	Bottom
DL + LL	1,285.35	1,285.35	1,285.35	1,285.35 psf
DL + LL + ST	1,285.35	1,285.35	1,285.35	1,285.35 psf
Factored Load Soil Pressures				
ACI Eq. C-1	1,799.49	1,799.49	1,799.49	1,799.49 psf
ACI Eq. C-2	1,774.11	1,774.11	1,774.11	1,774.11 psf
ACI Eq. C-3	1,140.50	1,140.50	1,140.50	1,140.50 psf

ACI Factors (per ACI 318-02, applied internally to entered loads)

ACI C-1 & C-2 DL	1.400	ACI C-2 Group Factor	0.750	Add"l "1.4" Factor for Seismic	1.400
ACI C-1 & C-2 LL	1.700	ACI C-3 Dead Load Factor	0.900	Add"l "0.9" Factor for Seismic	0.900
ACI C-1 & C-2 ST	1.700	ACI C-3 Short Term Factor	1.300		
....seismic = ST * :	1.100 Used in ACI C-2 & C-3				

S.E. CONSULTANTS, INC.
FOOTING UPLIFT & SHEAR CHECK
5800 East Thomas Road, Suite 104 Scottsdale, AZ 85251
(480) 946-2010 Fax (480) 946-1909

PROJECT: Rigid Frames

Uplift Check

(0.6WL+.6DL)	5.6	Uplift Reaction (kips)
	Y	Due to Wind?

Verify Adequate Uplift Resistance

20.50	Grade Beam Length (feet)		
3	Footing Size (feet)	Footing Area =	9
1	Footing Thickness (feet)		
3	Depth Below Grade (feet)		
1.5	Pier Size (feet)	Pier Area =	2.25
y	Include Slab Wt. ?		
4	Width of Slab to be included		
4	Slab Thickness (inches)		
1.5	Grade Beam Depth (feet)		
1	Grade Beam Width (feet)		

Interior Grade Beam

54.00	Width of building (feet)
0	Interior Grade Beam Depth (feet)
0	Interior Grade Beam Width (feet)
1.4	FOOTING WEIGHT (kips)
0.8	PIER WEIGHT (kips)
1.5	SOIL WEIGHT (kips)
2.1	SLAB WEIGHT (kips)
5.6	GRADE BEAM WEIGHT (kips)
0.0	INTERIOR GRADE BEAM WEIGHT (kips)
11.3	TOTAL RESISTANCE = TR
6.8	(TR*0.6)
5.6	MINIMUM RESISTANCE
O.K.	
0.83	Uplift Ratio

Lateral Load Check

3.7	Total Lateral Load (kips)
Y	Due to Wind?
3.25	Lateral Load Resistance (Concrete, kips)

N.G. - Hairpin Rebar Required

1	Number of Hairpins
0.625	Diameter of Hairpin (inches)
60	Length of Hairpin Leg (inches)
14.73	ACI Req'd Hairpin Development Length

Hairpin Length O.K.

23.56	Allowable Tensile Capacity
19.63	Allowable Shear Capacity

Hairpin O.K.

Verify Adequate Anchorbolt & Concrete Resistance to Uplift

4	# of Anchor Bolts
0.75	Anchor Bolt Diameter
10	# threads/inch (n)
6.39	Tensile A.B. Resistance (kips)
4.42	A.B. Shear Resistance (kips)
2.25	Concrete Uplift Resistance (kips) for 1 bolt
3.25	Concrete Shear Resistance (kips) for 1 bolt
6	Total Concrete Resistance (kips)

Results: **Concrete has adequate uplift resistance**

A.B. Dia	n
0.5	13
0.625	11
0.75	10
0.875	9
1	8
1.25	7
1.5	6

0.625	
18	
2500	Concrete Compressive Resistance (f'c, psi)
60000	Fy of Rebar (psi)
13.13	Concrete Bearing Resistance
0.43	Ratio

S.E. CONSULTANTS, INC.
FOOTING UPLIFT & SHEAR CHECK
5800 East Thomas Road, Suite 104 Scottsdale, AZ 85251
(480) 946-2010 Fax (480) 946-1909

PROJECT: Lean-To

Uplift Check

(0.6WL+.6DL)	2.8	Uplift Reaction (kips)
	Y	Due to Wind?

Verify Adequate Uplift Resistance

20.50	Grade Beam Length (feet)		
3	Footing Size (feet)	Footing Area =	9
1	Footing Thickness (feet)		
3	Depth Below Grade (feet)		
1.5	Pier Size (feet)	Pier Area =	2.25
y	Include Slab Wt. ?		
4	Width of Slab to be included		
4	Slab Thickness (inches)		
1.5	Grade Beam Depth (feet)		
1	Grade Beam Width (feet)		

Interior Grade Beam

14.00	Width of building (feet)
0	Interior Grade Beam Depth (feet)
0	Interior Grade Beam Width (feet)
1.4	FOOTING WEIGHT (kips)
0.8	PIER WEIGHT (kips)
1.5	SOIL WEIGHT (kips)
2.1	SLAB WEIGHT (kips)
5.6	GRADE BEAM WEIGHT (kips)
0.0	INTERIOR GRADE BEAM WEIGHT (kips)
11.3	TOTAL RESISTANCE = TR
6.8	(TR*0.6)
2.8	MINIMUM RESISTANCE
O.K.	
0.41	Uplift Ratio

Lateral Load Check

1.3	Total Lateral Load (kips)
Y	Due to Wind?
3.25	Lateral Load Resistance (Concrete, kips)

Concrete provides adequate lateral resistance

0	Number of Hairpins
0	Diameter of Hairpin (inches)
0	Length of Hairpin Leg (inches)
0.00	ACI Req'd Hairpin Development Length

Hairpin Length O.K.

0.00	Allowable Tensile Capacity
0.00	Allowable Shear Capacity

Hairpin not required

Verify Adequate Anchorbolt & Concrete Resistance to Uplift

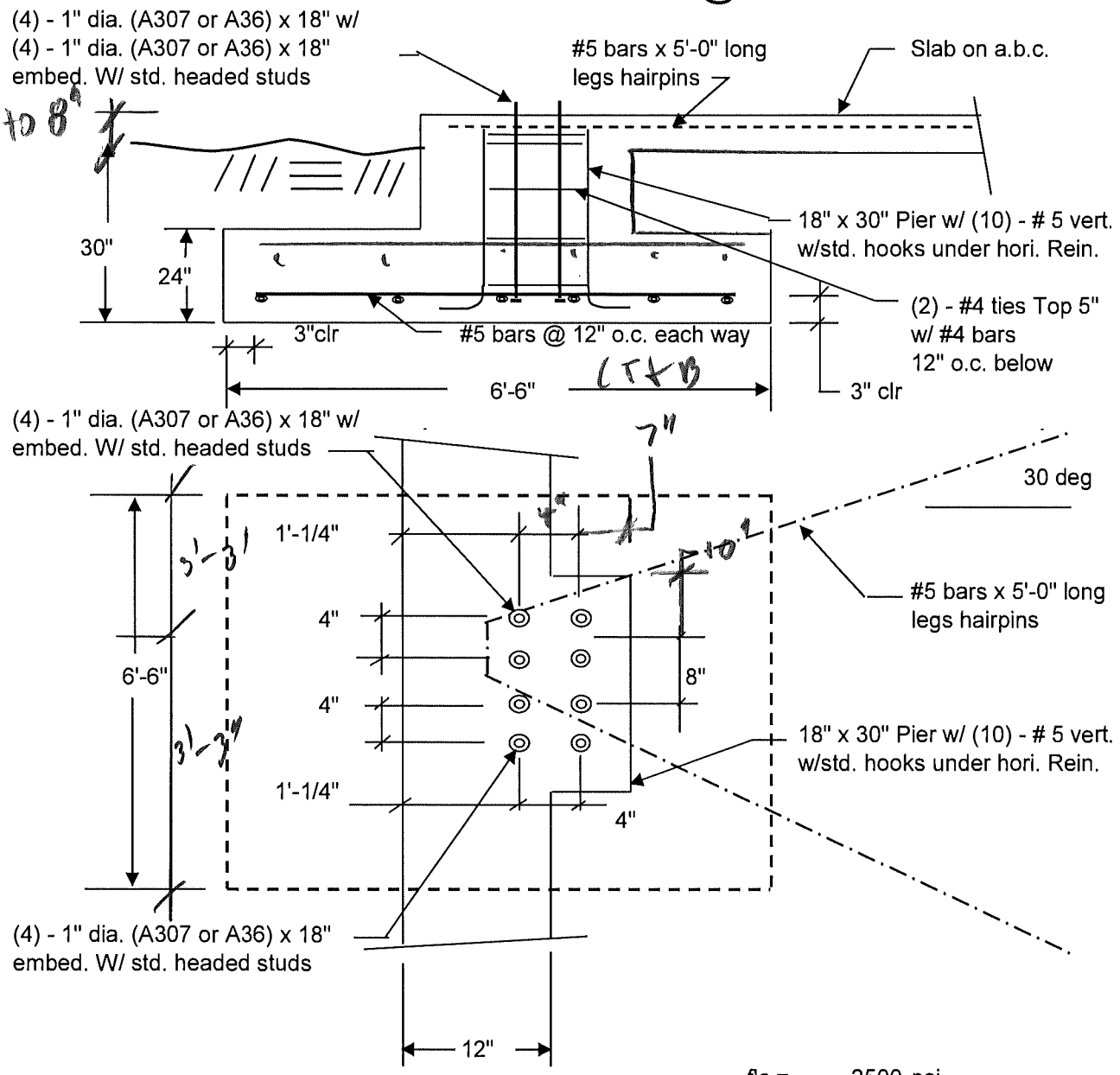
4	# of Anchor Bolts
0.75	Anchor Bolt Diameter
10	# threads/inch (n)
6.39	Tensile A.B. Resistance (kips)
4.42	A.B. Shear Resistance (kips)
2.25	Concrete Uplift Resistance (kips) for 1 bolt
3.25	Concrete Shear Resistance (kips) for 1 bolt
6	Total Concrete Resistance (kips)

Results: **Concrete has adequate uplift resistance**

A.B. Dia	n
0.5	13
0.625	11
0.75	10
0.875	9
1	8
1.25	7
1.5	6

0.625	
18	
2500	Concrete Compressive Resistance (f'c, psi)
60000	Fy of Rebar (psi)
13.13	Concrete Bearing Resistance
0.21	Ratio

RIGID FRAME FOOTING @ F.L. 2D



f'c = 2500 psi
fy = 60000 psi

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Jbb: 11017 Date: 6/23 By: GCS Jbb No.: 0958-23 SH.: 15

S.E. CONSULTANTS, INC.

Description Frame Footing - 18x18 - Pier FL. 2D - 24 thick

General Information

Allowable Soil Bearing	1,500.0 psf	**Dimensions...**	
Short Term Increase	1.000	Width along X-X Axis	6.500 ft
Seismic Zone	4	Length along Y-Y Axis	6.500 ft
		Footing Thickness	24.00 in
Live & Short Term Combined		Col Dim. Along X-X Axis	30.00 in
f'c	2,500.0 psi	Col Dim. Along Y-Y Axis	18.00 in
Fy	60,000.0 psi	Base Pedestal Height	6.000 in
Concrete Weight	145.00 pcf		
Overburden Weight	0.00 psf	Min Steel %	0.0014
		Rebar Center To Edge Distance	3.50 in

Loads

Applied Vertical Load...			
Dead Load	1.020 k	...ecc along X-X Axis	0.000 in
Live Load	k	...ecc along Y-Y Axis	0.000 in
Short Term Load	k		

	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Applied Moments...		
Dead Load	k-ft	k-ft
Live Load	k-ft	k-ft
Short Term	27.720 k-ft	k-ft

	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Applied Shears...		
Dead Load	k	k
Live Load	k	k
Short Term	k	k

Summary

6.50ft x 6.50ft Footing, 24.0in Thick, w/ Column Support 30.00 x 18.00in x 6.0in high

	DL+LL	DL+LL+ST		Actual	Allowable
Max Soil Pressure	320.6	1,154.4 psf	Max Mu	1.824 k-ft per ft	
Allowable	1,500.0	1,500.0 psf	Required Steel Area		0.518 in2 per ft
"X' Ecc, of Resultant	0.000 in	24.559 in			
"Y' Ecc, of Resultant	0.000 in	0.000 in	Shear Stresses....	Vu	Vn * Phi
			1-Way	1.468	85.000 psi
X-X Min. Stability Ratio	No Overturning	1.500 :1	2-Way	0.932	170.000 psi
Y-Y Min. Stability Ratio	1.588				

Footing Design

Shear Forces	ACI C-1	ACI C-2	ACI C-3	Vn * Phi
Two-Way Shear	0.33 psi	0.93 psi	0.60 psi	170.00 psi
One-Way Shears...				
Vu @ Left	0.08 psi	1.47 psi	0.94 psi	85.00 psi
Vu @ Right	0.08 psi	-0.48 psi	-0.31 psi	85.00 psi
Vu @ Top	0.11 psi	0.08 psi	0.05 psi	85.00 psi
Vu @ Bottom	0.11 psi	0.08 psi	0.05 psi	85.00 psi

Moments	ACI C-1	ACI C-2	ACI C-3	Ru / Phi	As Req'd	
Mu @ Left	0.09 k-ft	-0.81 k-ft	-0.52 k-ft	2.1 psi	-0.52 in2	per ft
Mu @ Right	0.09 k-ft	1.82 k-ft	1.17 k-ft	4.8 psi	0.52 in2	per ft
Mu @ Top	0.13 k-ft	0.11 k-ft	0.07 k-ft	0.4 psi	0.52 in2	per ft
Mu @ Bottom	0.13 k-ft	0.11 k-ft	0.07 k-ft	0.4 psi	0.52 in2	per ft

Description Frame Footing - 18x18 - Pier FL. 2D - 24 thick

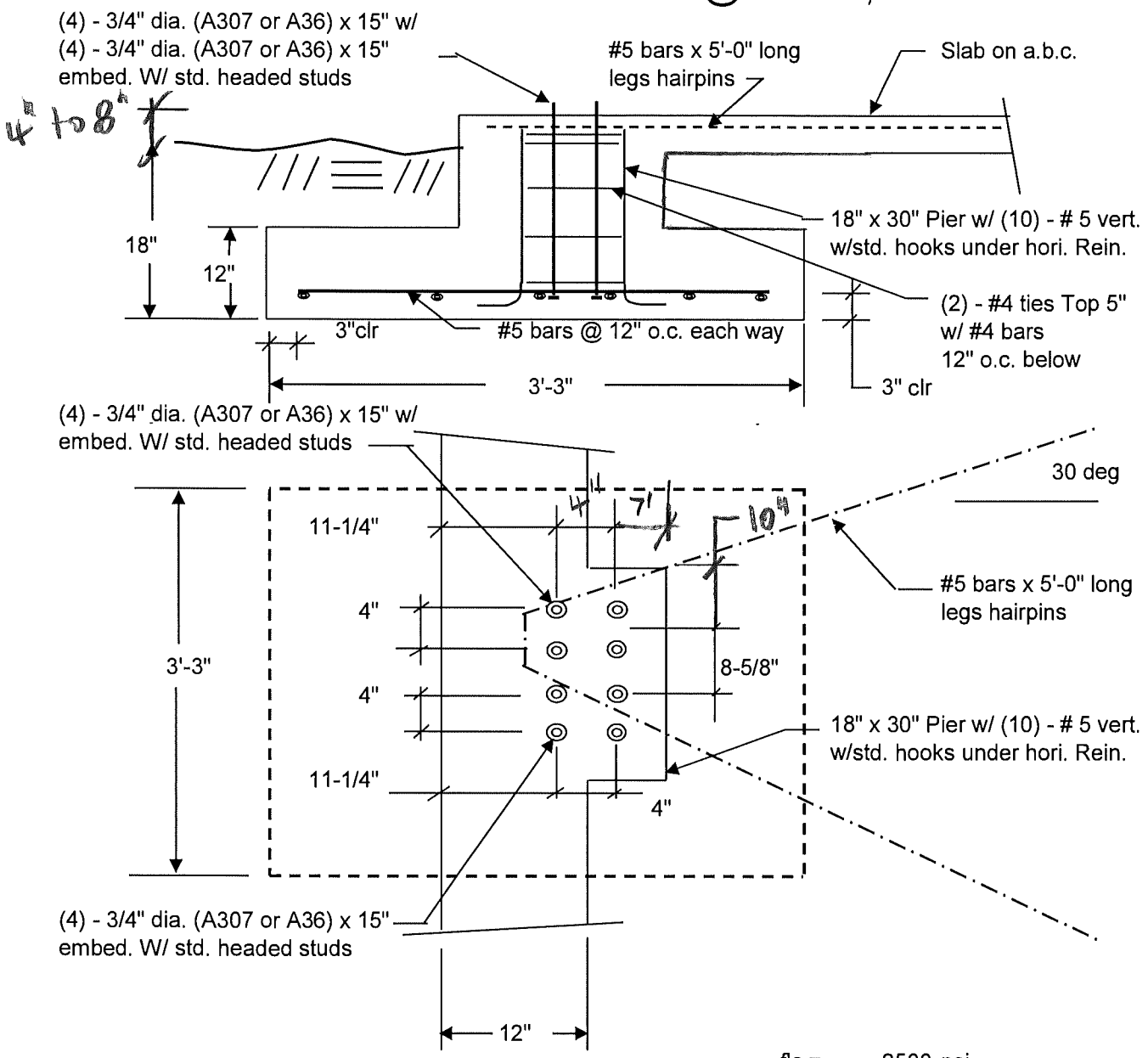
Soil Pressure Summary

Service Load Soil Pressures	Left	Right	Top	Bottom
DL + LL	320.58	320.58	320.58	320.58 psf
DL + LL + ST	0.00	1,154.37	320.58	320.58 psf
Factored Load Soil Pressures				
ACI Eq. C-1	448.81	448.81	448.81	448.81 psf
ACI Eq. C-2	0.00	1,583.68	439.80	439.80 psf
ACI Eq. C-3	0.00	1,018.08	282.73	282.73 psf

ACI Factors (per ACI 318-02, applied internally to entered loads)

ACI C-1 & C-2 DL	1.400	ACI C-2 Group Factor	0.750	Add"l "1.4" Factor for Seismic	1.400
ACI C-1 & C-2 LL	1.700	ACI C-3 Dead Load Factor	0.900	Add"l "0.9" Factor for Seismic	0.900
ACI C-1 & C-2 ST	1.700	ACI C-3 Short Term Factor	1.300		
....seismic = ST * :	1.100 Used in ACI C-2 & C-3				

RIGID FRAME FOOTING @ F.L. 2E, 3E



f'c = 2500 psi
fy = 60000 psi

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Jbb: 11017 Date: 6/23 By: GCS Jbb No.: 0958-23 SH.: 18

S.E. CONSULTANTS, INC.

General Footing Analysis & Design

Description Lean Too Footing-offset - 18x30 - FL. 2E, 3E

General Information

Allowable Soil Bearing	1,500.0 psf	**Dimensions...**	
Short Term Increase	1.000	Width along X-X Axis	3.250 ft
Seismic Zone	4	Length along Y-Y Axis	3.250 ft
		Footing Thickness	12.00 in
Live & Short Term Combined		Col Dim. Along X-X Axis	30.00 in
f'c	2,500.0 psi	Col Dim. Along Y-Y Axis	18.00 in
Fy	60,000.0 psi	Base Pedestal Height	6.000 in
Concrete Weight	145.00 pcf		
Overburden Weight	0.00 psf	Min Steel %	0.0014
		Rebar Center To Edge Distance	3.50 in

Loads

Applied Vertical Load...			
Dead Load	3.600 k	...ecc along X-X Axis	5.313 in
Live Load	k	...ecc along Y-Y Axis	0.000 in
Short Term Load	k		

	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Applied Moments...		
Dead Load	k-ft	k-ft
Live Load	k-ft	k-ft
Short Term	k-ft	k-ft
	Creates Rotation about Y-Y Axis (pressures @ left & right)	**Creates Rotation about X-X Axis (pressures @ top & bot)**
Applied Shears...		
Dead Load	k	k
Live Load	k	k
Short Term	k	k

Summary

Footing Design OK

3.25ft x 3.25ft Footing, 12.0in Thick, w/ Column Support 30.00 x 18.00in x 6.0in high

	DL+LL	DL+LL+ST		Actual	Allowable
Max Soil Pressure	790.2	790.2 psf	Max Mu	0.196 k-ft per ft	
Allowable	1,500.0	1,500.0 psf	Required Steel Area		0.259 in2 per ft
"X' Ecc, of Resultant	3.540 in	3.540 in			
"Y' Ecc, of Resultant	0.000 in	0.000 in	Shear Stresses....	Vu	Vn * Phi
			1-Way	0.755	85.000 psi
X-X Min. Stability Ratio	No Overturning	1.500 :1	2-Way	2.002	170.000 psi
Y-Y Min. Stability Ratio	No Overturning				

Footing Design

Shear Forces	ACI C-1	ACI C-2	ACI C-3	Vn * Phi
Two-Way Shear	2.00 psi	1.86 psi	1.20 psi	170.00 psi
One-Way Shears...				
Vu @ Left	0.00 psi	0.00 psi	0.00 psi	85.00 psi
Vu @ Right	0.03 psi	0.02 psi	0.01 psi	85.00 psi
Vu @ Top	0.75 psi	0.70 psi	0.45 psi	85.00 psi
Vu @ Bottom	0.75 psi	0.70 psi	0.45 psi	85.00 psi

Moments	ACI C-1	ACI C-2	ACI C-3	Ru / Phi	As Req'd
Mu @ Left	0.06 k-ft	0.05 k-ft	0.03 k-ft	0.9 psi	0.26 in2 per ft
Mu @ Right	0.00 k-ft	0.00 k-ft	0.00 k-ft	0.0 psi	0.02 in2 per ft
Mu @ Top	0.20 k-ft	0.18 k-ft	0.12 k-ft	3.0 psi	0.26 in2 per ft
Mu @ Bottom	0.20 k-ft	0.18 k-ft	0.12 k-ft	3.0 psi	0.26 in2 per ft

Description Lean Too Footing-offset - 18x30 - FL. 2E, 3E

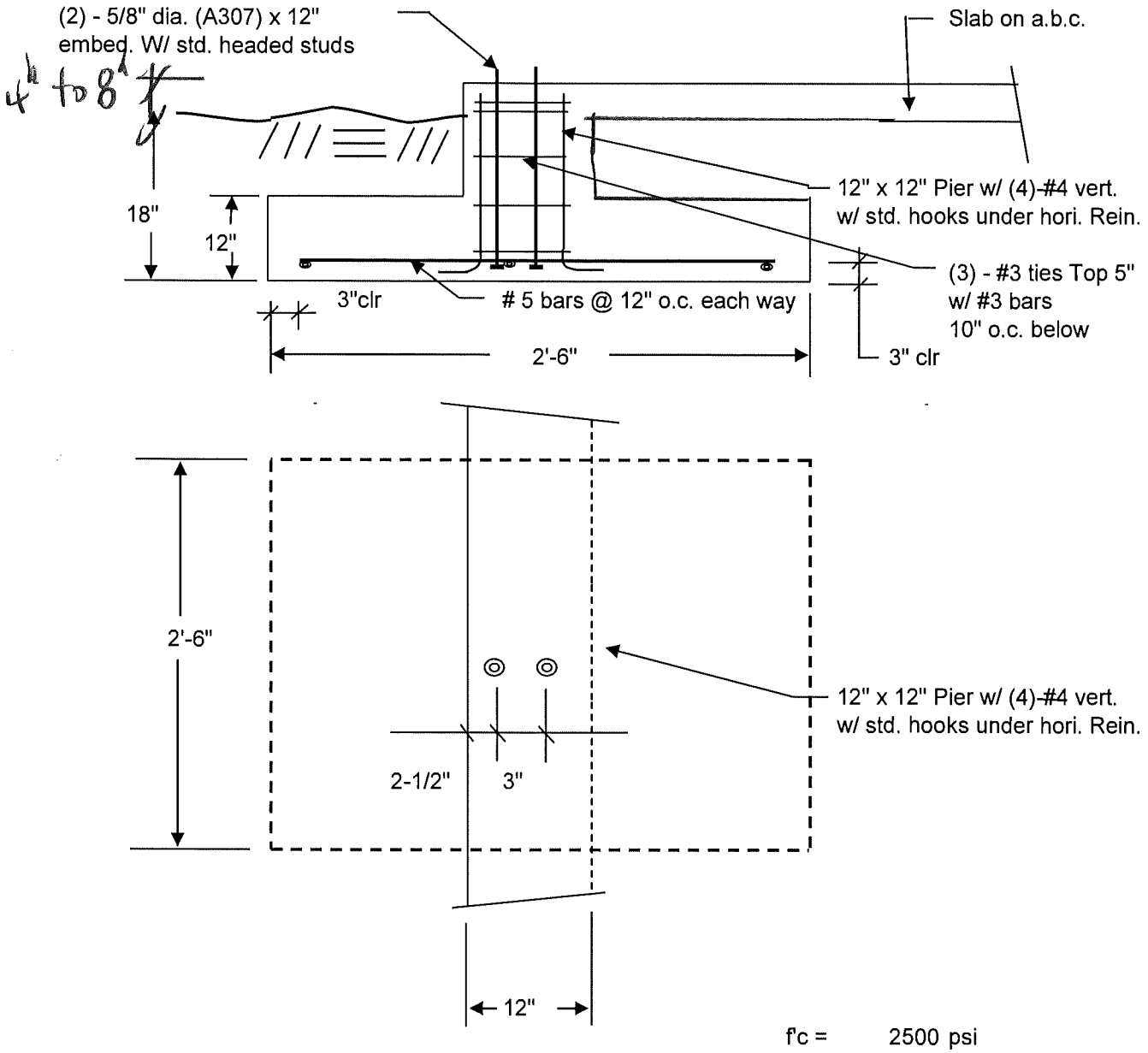
Soil Pressure Summary

Service Load Soil Pressures	Left	Right	Top	Bottom
DL + LL	232.98	790.16	511.57	511.57 psf
DL + LL + ST	232.98	790.16	511.57	511.57 psf
Factored Load Soil Pressures				
ACI Eq. C-1	326.17	1,106.22	716.20	716.20 psf
ACI Eq. C-2	309.76	1,050.56	680.16	680.16 psf
ACI Eq. C-3	199.13	675.36	437.25	437.25 psf

ACI Factors (per ACI 318-02, applied internally to entered loads)

ACI C-1 & C-2 DL	1.400	ACI C-2 Group Factor	0.750	Add"l "1.4" Factor for Seismic	1.400
ACI C-1 & C-2 LL	1.700	ACI C-3 Dead Load Factor	0.900	Add"l "0.9" Factor for Seismic	0.900
ACI C-1 & C-2 ST	1.700	ACI C-3 Short Term Factor	1.300		
....seismic = ST * :	1.100 Used in ACI C-2 & C-3				

ENDWALL FOOTING @ F.L. 1B, 1C, 4B, 4C



f'c = 2500 psi
fy = 60000 psi

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Jbb: 11017 Date: 6/23 By: GCS Jbb No.: 0958-23 SH.: 21

S.E. CONSULTANTS, INC.

Slab Reinforcement

The sub-grade drag equation is used for shrinkage crack control. This equation is only for crack control and is not suitable for structurally active steel.

Item	Deformed Bars, Grade 60 Bar Size	Bar Spacing (in. o.c.)	Steel Area, As (sq.in. / ft)	Welded Wire Fabric Equlvant Plain (smooth) Wire minimum yield 75 ksi	Steel Area, As (sq.in. / ft)
1	# 3	18.0	0.0736	6 x 6 - W1.4xW1.4	0.0280
2	# 3	12.0	0.1104	6 x 6 - W2.0xW2.0	0.0400
3	# 4	24.0	0.0982	6 x 6 - W2.9xW2.9	0.0580
4	# 4	18.0	0.1309	6 x 6 - W4.0xW4.0	0.0800
5	# 4	16.0	0.1473	4 x 4 - W1.4xW1.4	0.0420
6	# 4	12.0	0.1963	4 x 4 - W2.0xW2.0	0.0600
7	# 5	24.0	0.1550	4 x 4 - W2.9xW2.9	0.0870
8	# 5	18.0	0.2067	4 x 4 - W4.0xW4.0	0.1200

$$As = F * L * w / (2 * fs)$$

where,

As = the cross-sectional area of reinforcing steel, (sq.in. / ft) of slab width
F = coefficient of friction between base and slab, 1.5
L = slab length between free ends, feet, in the direction of the steel
w = weight of the concrete slab, psf
fs = allowable steel stress, psi

Area of steel required for below slab - shrinkage control.

	actual slab thickness =	4.00 inches
	L =	10.00 feet
2	Reinforcment Type =	Welded Wire Fabric
	F =	1.5
	w =	50 psf
	fs =	30000 psi

$As = F * L * w / (2 * fs) =$ 0.0125 sq.in. / ft of slab width

Item #	Reinforcement Discription	Actual Area, As (sq.in./ft)
1	6 x 6 - W1.4xW1.4	0.028

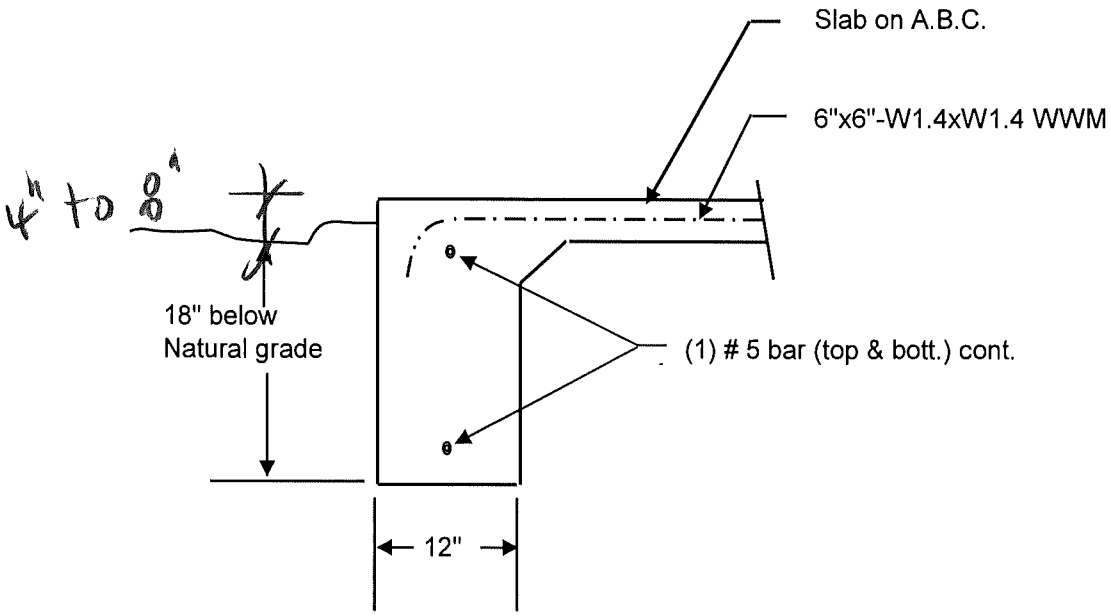
Reinforcement is adequate.

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Jbb: 11017 Date: 6/23 By: GCS Jbb No.: 0958-23 SH.: 22

S.E. CONSULTANTS, INC.

Perimeter Turndown



CHECK FOR MINIMUM REINFORCEMENT:

(18" + 4") * (12") * 0.002 IN^2 = 0.528 IN^2

USING (2) - # 5 BARS = 0.62 IN^2

REINFORCEMENT ADEQUATE!

Note:

Perimeter Turndown is to be minimum of depth as indicated above, unless frost depth is greater than value indicated. In that case the perimeter turndown shall be set at the frost depth elevation.

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

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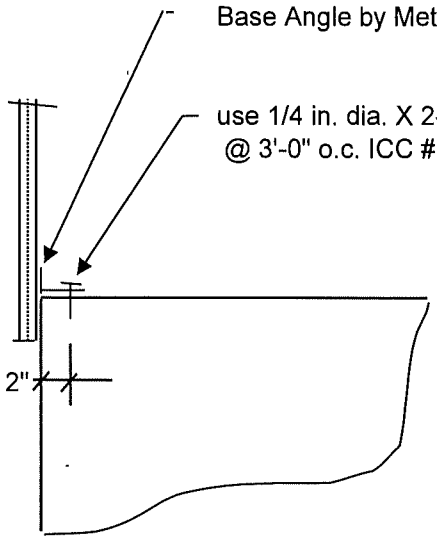
Base Angle Attachment



Note:
No Special Inspection Required Per Exception 2 of Section 1705.11.2 of the IBC.

walkdoor anchor bolts
use (2) - 1/2" dia. X 3" embed. Hilti Kwik Hus-EZ ICC #ESR-3027

framed opening anchor bolts
use (2) - 1/2" dia. X 4-1/4" embed. Hilti Kwik Hus-EZ ICC #ESR-3027

PRELIMINARY UNLESS SEALED ON EACH SHEET OR ON COVER SHEET

Jbb: 11017 Date: 6/23 By: GCS Jbb No.: 0958-23 SH.: 24

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