FLSmidth

PLANT SYSTEMS GROUP - SALT LAKE CITY, UTAH

CALCULATION COVER SHEET

JOB NUMBER	CLIENT	PROJECT	CALC. NUMBER
11021	CC&V	High Grade Ore	C-006

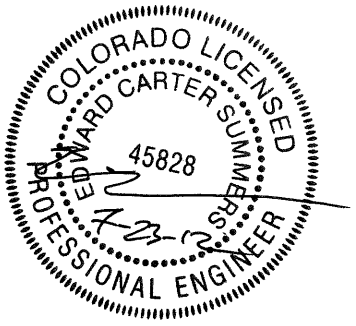
TITLE/SUBJECT:

Gravity Circuit Area Concrete

STATEMENT OF PROBLEM:

Design Concrete Pedestals, Footings, and Retaining Wall for Gravity Circuit Area

P.E. SEAL



SOURCES OF DATA, FORMULA & REFERENCES:

GA from Render
Site Specific Design Criteria (Excel Spread Sheet)
ASCE /SEI 7-10 Minimum Design Loads for Buildings and Other Structure
ACI 318-08
ENERCLAC Version 6
AutoDesk Robot Structural Analysis Professional 2012

CONCLUSIONS & RECOMMENDATIONS:

See details in report

REV	DATE	DESCRIPTION/STATUS	CALC BY	CHKD BY	DWG./SPECS REVISED	QA REVIEW
A	May-12	Ready for Check	CCK	WC		
0	Jul-12	Issued for Permit	CCK	WC		
0						

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0						

FLSmidth	PROJECT Cripple Creek & Victor	Proj No. 11021		
		Calc No.		
	SUBJECT Column Load Summary	By	CCK	May-18-2012
	LRFD Load Combinations	Check		
		Sheet		*of*

Column Location: L , 6

W10x33

SEISMIC CRITERIA

S_{DS} = 0.213

LOADS

	F_X	F_Y	F_Z
Dead	0.00 k	0.00 k	13.44 k
Live	0.00 k	0.00 k	60.22 k
Seismic X	-0.02 k	0.00 k	0.00 k
Seismic -X	0.02 k	0.00 k	0.00 k
Seismic Y	0.00 k	-0.02 k	0.00 k
Seismic -Y	0.00 k	0.02 k	0.00 k

LRFD LOAD COMBINATIONS

		Column/Footing Loads		
		Pu	Vu_X	Vu_Y
1	1.4D	18.82 k	0.00 k	0.00 k
2	1.2D+1.6L	112.48 k	0.00 k	0.00 k
3	1.2D+L	76.35 k	0.00 k	0.00 k
4	1.2D+L	76.35 k	0.00 k	0.00 k
5	$(1.2+0.2S_{DS})$D+1.0E+L	76.92 k	0.02 k	0.02 k
	$(1.2+0.2S_{DS})$D-1.0E+L	76.92 k	-0.02 k	-0.02 k
6	0.9D+1.6W	12.10 k	0.00 k	0.00 k
	0.9D-1.6W	12.10 k	0.00 k	0.00 k
7	$(0.9-0.2S_{DS})$D+1.0E	11.52 k	0.02 k	0.02 k
	$(0.9-0.2S_{DS})$D-1.0E	11.52 k	-0.02 k	-0.02 k

DESIGN VALUES

Compression	Pu =	112.48 k
Tension	Tu =	11.52 k
Shear	Vu_X =	0.02 k
	Vu_Y =	0.02 k

FLSmidth	PROJECT Cripple Creek & Victor	Proj No. 11021	
		Calc No.	
	SUBJECT Column Load Summary	By CCK	May-18-2012
	LRFD Load Combinations	Check	
		Sheet	*of*

Column Location: K , 6

W10x49

SEISMIC CRITERIA

S_{DS} = 0.213

LOADS

	F_X	F_Y	F_Z
Dead	-0.01 k	0.00 k	34.11 k
Live	-0.03 k	-0.01 k	135.76 k
Seismic X	-0.03 k	0.00 k	-0.12 k
Seismic -X	0.03 k	0.00 k	0.12 k
Seismic Y	0.00 k	-0.05 k	0.00 k
Seismic -Y	0.00 k	0.05 k	0.00 k

LRFD LOAD COMBINATIONS

		Column/Footing Loads		
		Pu	Vu_X	Vu_Y
1	1.4D	47.75 k	-0.01 k	0.00 k
2	1.2D+1.6L	258.15 k	-0.06 k	-0.02 k
3	1.2D+L	176.69 k	-0.04 k	-0.01 k
4	1.2D+L	176.69 k	-0.04 k	-0.01 k
5	$(1.2+0.2S_{DS})$D+1.0E+L	178.27 k	-0.01 k	0.04 k
	$(1.2+0.2S_{DS})$D-1.0E+L	178.03 k	-0.07 k	-0.06 k
6	0.9D+1.6W	30.70 k	-0.01 k	0.00 k
	0.9D-1.6W	30.70 k	-0.01 k	0.00 k
7	$(0.9-0.2S_{DS})$D+1.0E	29.37 k	0.02 k	0.05 k
	$(0.9-0.2S_{DS})$D-1.0E	29.13 k	-0.04 k	-0.05 k

DESIGN VALUES

Compression	Pu =	258.15 k
Tension	Tu =	29.13 k
Shear	Vu_X =	0.07 k
	Vu_Y =	0.06 k

FLSmidth	PROJECT Cripple Creek & Victor	Proj No. 11021	
		Calc No.	
	SUBJECT Column Load Summary	By CCK	May-18-2012
	LRFD Load Combinations	Check	
		Sheet	of

Column Location: J , 6

W10x49

SEISMIC CRITERIA

S_{DS} = 0.213

LOADS

	F_X	F_Y	F_Z
Dead	-0.03 k	0.00 k	49.02 k
Live	-0.09 k	-0.01 k	181.73 k
Seismic X	-0.02 k	0.00 k	-9.73 k
Seismic -X	0.02 k	0.00 k	9.72 k
Seismic Y	0.00 k	-0.08 k	0.00 k
Seismic -Y	0.00 k	0.08 k	0.00 k

LRFD LOAD COMBINATIONS

		Column/Footing Loads Pu	Vu_X	Vu_Y
1	1.4D	68.63 k	-0.04 k	0.00 k
2	1.2D+1.6L	349.59 k	-0.18 k	-0.02 k
3	1.2D+L	240.55 k	-0.13 k	-0.01 k
4	1.2D+L	240.55 k	-0.13 k	-0.01 k
5	$(1.2+0.2S_{DS})$D+1.0E+L	252.36 k	-0.11 k	0.07 k
	$(1.2+0.2S_{DS})$D-1.0E+L	232.91 k	-0.15 k	-0.09 k
6	0.9D+1.6W	44.12 k	-0.03 k	0.00 k
	0.9D-1.6W	44.12 k	-0.03 k	0.00 k
7	$(0.9-0.2S_{DS})$D+1.0E	51.75 k	-0.01 k	0.08 k
	$(0.9-0.2S_{DS})$D-1.0E	32.30 k	-0.05 k	-0.08 k

DESIGN VALUES

Compression	Pu =	349.59 k
Tension	Tu =	32.30 k
Shear	Vu_X =	0.18 k
	Vu_Y =	0.09 k

FLSmidth	PROJECT Cripple Creek & Victor	Proj No. 11021	
		Calc No.	
	SUBJECT Column Load Summary	By CCK	May-18-2012
	LRFD Load Combinations	Check	
		Sheet	*of*

Column Location: H , 6

W10x33

SEISMIC CRITERIA

S_{DS} = 0.213

LOADS

	F_X	F_Y	F_Z
Dead	-2.42 k	0.00 k	42.13 k
Live	-14.75 k	-0.07 k	146.28 k
Seismic X	-13.24 k	-0.09 k	9.84 k
Seismic -X	13.09 k	0.09 k	-9.84 k
Seismic Y	-0.09 k	-0.40 k	-0.03 k
Seismic -Y	0.09 k	0.40 k	0.03 k

LRFD LOAD COMBINATIONS

		Column/Footing Loads		
		Pu	Vu_X	Vu_Y
1	1.4D	58.98 k	-3.39 k	0.00 k
2	1.2D+1.6L	284.60 k	-26.50 k	-0.11 k
3	1.2D+L	196.84 k	-17.65 k	-0.07 k
4	1.2D+L	196.84 k	-17.65 k	-0.07 k
5	$(1.2+0.2S_{DS})$D+1.0E+L	208.47 k	-4.67 k	0.33 k
	$(1.2+0.2S_{DS})$D-1.0E+L	188.79 k	-31.00 k	-0.47 k
6	0.9D+1.6W	37.92 k	-2.18 k	0.00 k
	0.9D-1.6W	37.92 k	-2.18 k	0.00 k
7	$(0.9-0.2S_{DS})$D+1.0E	45.96 k	11.02 k	0.40 k
	$(0.9-0.2S_{DS})$D-1.0E	26.28 k	-15.31 k	-0.40 k

DESIGN VALUES

Compression	Pu =	284.60 k
Tension	Tu =	26.28 k
Shear	Vu_X =	31.00 k
	Vu_Y =	0.47 k

FLSmidth	PROJECT CC&V High Grade Ore	Proj No.	11021	
		Calc No.		
	SUBJECT Anchor Bolt Design	By	CCK	Feb-1-2012
		Check		
		Sheet		of

ANCHOR BOLT DESIGN

Reference: ACI 318-08 Appendix D

Column Location: H, 6 — **AISC Steel Design Guide Series No 7 (2nd Edition)**

Pier Width, w =	24	in	perpendicular to web	
Pier Depth, d =	24	in	parallel to web	
g =	2.83	in	lateral offset distance between anchor bolt and reinforcing	
cover =	2	in	vertical distance from top of pier to vertical reinforcing	
N_u =	0.0	kips	Net Tension	☐ Seismic Load
V_u =	31.0	kips	Net Shear	☑ Seismic Load
Anchor Material =	ASTM F1554-36		Friction Factor	
n =	4		Number of Anchor Bolts	
d_b =	1	in	Diameter of Anchor Bolt	
$F_{y,a}$ =	36	ksi	Yield Strength of Anchor Bolt	
$F_{u,a}$ =	58	ksi	Ultimate Strength of Anchor Bolt	
$F_{y,bar}$ =	60	ksi	Yield Strength of Reinforcing	
f_c' =	4	ksi	Concrete Compressive Strength	

1. Steel Strength of Anchor in Tension (ACI 318-08 Appendix D, D.5.1)

A_{se}:	0.61	in^2	ϕ:	0.75	
f_{uta}:	58	ksi	N_{sa}:	140.59	kips
n:	4		ϕN_{sa}:	**105 kips**	
				Interaction:	0.00

2. Pull-Out Strenght of Anchor in Tension (ACI 318-08 Appendix D, D.5.3)

A_{brg}:	1.00	in^2	$\psi_{c,p}$:	1.00	
f'c:	4	ksi	ϕ:	0.75	
N_p:	32	kips	N_{pn}:	32.00	kips
n:	4		$\phi n N_{pn}$:	**96 kips**	
				Interaction:	0.00

3. Steel Strenght of Anchor in Shear (ACI 318-08 Appendix D, D.6.1)

A_{se}:	0.61	in^2	ϕ:	0.65	
f_{uta}:	58	ksi	V_{sa}:	50.61	kips
n:	4		ϕV_{sa}:	**33 kips**	
				Interaction:	0.94

4. Combined Shear and Tension Interaction (ACI 318-08 Appendix D, D.7)

N_{ua}:	0.0	kips	V_{ua}:	31.0	kips
ϕN_n:	96 kips	kips	ϕV_n:	33 kips	kips
				Interaction:	0.94

FLSmidth	PROJECT CC&V High Grade Ore	Proj No.	11021	
		Calc No.		
	SUBJECT Anchor Bolt Design	By	CCK	Feb-1-2012
		Check		
		Sheet		of

ANCHOR BOLT DESIGN

5. Reinforcement Strength and Anchor Bolt Embedment (ACI 318-08 Appendix D, D.5.2.9 & AISC D.G.7)

Bar Size:	8	in^2			
Number of Bars:	8		l_d (in)	29.65	in
A_s:	0.79		l_e (in)	0.00	in
ϕ:	0.75		h_{ef} (in)	3.89	in
F_y:	60	ksi	**Embedment:**	**30 in**	
N_{sa}:	379.20	kips			
ϕN_{sa}:	**284 kips**				

Interaction: 0.00

6. Tie Rebar Strength (ACI 318-08 Appendix D, D.6.2.9 & AISC D.G.7)

Bar Size =	4	
Spacing :	12	in
A_s:	0.2	in^2
b_w:	24.0	in
d =	21.6	in
ϕ:	0.75	
ϕV_n:	**61 kips**	

Interaction: 0.51

SUMMARY: **USE 4- 1 in. Anchor Bolt, Embedded 30 in.**
With # 4 Ties @ 12 in. o.c.

FLSmidth	PROJECT CC&V High Grade Ore	Proj No.	11021	
		Calc No.		
	SUBJECT Base Plate Design	By	CCK	May-18-2012
		Check		
		Sheet		of

BASE PLATE DESIGN

Column Location: J, 6 *Reference:* ***AISC Steel Design Guide 1, 2nd Ed.***

Column Member:	W10X49		
d (in):	10	P_u (k):	349.59
b_f (in):	10		
t_f (in):	0.56	Concrete Lendth (in):	24
f'_c (ksi):	4	Concrete Width (in):	24
f_y (ksi):	36		

Required Plate Area

ϕ_c:	0.65
$A_{1(req)}$ (in^2):	79.09

Trial Base Plate Size

Δ:	0.75	
	Trial Size	Use
Length -N (in):	10	16
Width -B (in):	8	16

Areas

A_1 (in^2):	256
A_2 (in^2):	576
ϕ_c:	0.65
$\phi_c P_p$ (k):	848.64

Bearing Length

X:	0.412
λ:	0.727
m:	3.3
n:	4.0
λn':	1.8
l:	4.0

Minimum Plate Thickness

ϕ_b:	0.9
t_{min} (in):	1.16
Design Thickness	1 1/4

Use 16 in wide x 1.25 in thick x 16 in long 36 ksi Base Plate

Concrete Column

Description : Pedestal J, 6

General Information

Calculations per ACI 318-05, IBC 2006, CBC 2007, ASCE 7-05

f'c : Concrete 28 day strength	=	4.0 ksi
E =	=	3,605.0 ksi
Density	=	145.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	*ASTM A615 Bars Used*	
Min. Reinf.	=	1.0 %
Max. Reinf.	=	8.0 %

Load Combination :2006 IBC & ASCE 7-05

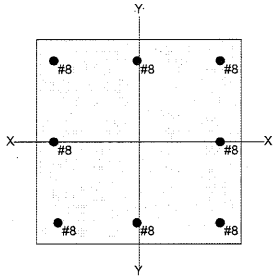
Overall Column Height = 4.0 ft
End Fixity Top Free, Bottom Fixed

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 2 ft, K = 1.0
Y-Y (depth) axis :Unbraced Length for Y-Y Axis buckling = 2 ft, K = 1.0

Column Cross Section

Column Dimensions :24.0in Square Column, Column Edge to Rebar
Edge Cover = 2.0in

Column Reinforcing : 4 - #8 bars @ corners,, 1.0 - #8 bars top & bottom between corner bars, 1.0 - #8 bars left & right between corner bars



Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 2,320.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 4.0 ft above base, D = 49.020, L = 181.730, E = 9.720 k
BENDING LOADS . . .
Lat. Point Load at 4.0 ft creating My-y, E = -0.080 k
Lat. Point Load at 4.0 ft creating Mx-x, D = -0.020, E = 0.020 k

DESIGN SUMMARY

Load Combination +1.20D+0.50Lr+1.60L+1.60H
Location of max.above base 3.973 ft

Maximum Stress Ratio **0.2925 : 1**
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5

Pu =	352.376 k	φ * Pn =	1,204.38 k
Mu-x =	0.0960 k-ft	φ * Mn-x =	0.0 k-ft
Mu-y =	0.0 k-ft	φ * Mn-y =	0.0 k-ft
Mu Angle =	0.0 deg		
Mu at Angle =	0.0960 k-ft	φMn at Angle =	2.981 k-ft

Pn & Mn values located at Pu-Mu vector intersection with capacity curve

Column Capacities . . .

Pnmax : Nominal Max. Compressive Axial Capacity	2,316.11 k
Pnmin : Nominal Min. Tension Axial Capacity	-379.20 k
φ Pn, max : Usable Compressive Axial Capacity	1,204.38 k
φ Pn, min : Usable Tension Axial Capacity	-246.480 k

Maximum SERVICE Load Reactions . .

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

Maximum SERVICE Load Deflections . . .

Along Y-Y -.0000150 in at 4.0 ft above base
for load combination : D-E Only

Along X-X -.0000290 in at 4.0 ft above base
for load combination : E Only

General Section Information . φ = 0.650 β = 0.850 θ = 0.80

ρ : % Reinforcing	1.097 % Rebar % Ok
Reinforcing Area	6.320 in^2
Concrete Area	576.0 in^2

Governing Load Combination Results

Governing Factored Load Combination	Dist. from base ft	Axial Load k		Bending Analysis k-ft							Utilization Ratio
		Pu	φ * Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	φ Mn	
+1.40D	3.97	71.88	1,204.38	1.000	0.11	1.000		0.000	0.11	2.98	**0.060**
+1.20D+0.50Lr+1.60L+1.60H	3.97	352.38	1,204.38	1.000	0.10	1.000		0.000	0.10	2.98	**0.292**

Concrete Column

Description : Pedestal J, 6

Governing Load Combination Results

Governing Factored Load Combination	Dist. from base ft	Axial Load k		Bending Analysis k-ft							Utilization Ratio
		Pu	φ * Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	φ Mn	
+1.20D+1.60L+0.50S+1.60H	3.97	352.38	1,204.38	1.000	0.10	1.000		0.000	0.10	2.98	**0.292**
+1.20D+1.60Lr+0.50L	3.97	152.47	1,204.38	1.000	0.10	1.000		0.000	0.10	2.98	**0.127**
+1.20D+0.50L+1.60S	3.97	152.47	1,204.38	1.000	0.10	1.000		0.000	0.10	2.98	**0.127**
+1.20D+0.50Lr+0.50L+1.60W	3.97	152.47	1,204.38	1.000	0.10	1.000		0.000	0.10	2.98	**0.127**
+1.20D+0.50Lr+0.50L-1.60W	3.97	152.47	1,204.38	1.000	0.10	1.000		0.000	0.10	2.98	**0.127**
+1.20D+0.50L+0.50S+1.60W	3.97	152.47	1,204.38	1.000	0.10	1.000		0.000	0.10	2.98	**0.127**
+1.20D+0.50L+0.50S-1.60W	3.97	152.47	1,204.38	1.000	0.10	1.000		0.000	0.10	2.98	**0.127**
+1.243D+0.50L+0.20S+E	3.97	164.38	1,204.38	1.000	0.02	1.000	0.32	87.000	0.32	2.82	**0.136**
+1.243D+0.50L+0.20S-1.0E	3.97	144.94	1,204.38	1.000	0.18	1.000	-0.32	61.000	0.37	3.43	**0.120**
+0.8574D+E+1.60H	3.97	53.74	1,204.38	1.000	-0.01	1.000	0.32	88.000	0.32	8.00	**0.045**
+0.8574D-1.0E+1.60H	3.97	34.30	1,204.38	1.000	0.15	1.000	-0.32	65.000	0.35	13.64	**0.028**

Maximum Reactions - Unfactored

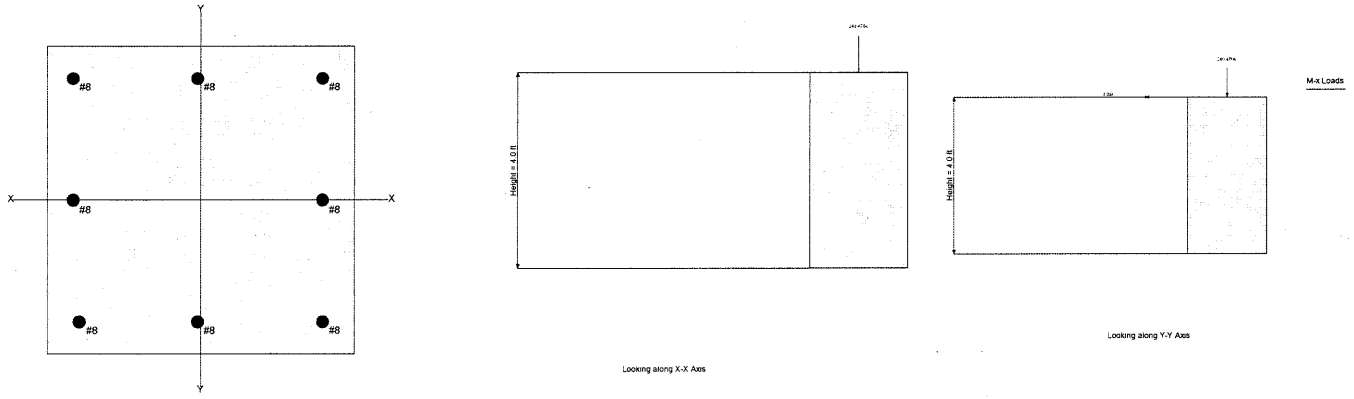
Note: Only non-zero reactions are listed.

Load Combination	Reaction along X-X Axis		Reaction along Y-Y Axis		Axial Reaction
	@ Base	@ Top	@ Base	@ Top	@ Base
D Only	0.020	0.020 k		k	51.340 k
L Only		k		k	181.730 k
E Only	0.020	0.020 k	0.080	k	9.720 k
-E Only	0.020	0.020 k	0.080	k	9.720 k
D+L	0.020	0.020 k		k	233.070 k
D+E		k	0.080	k	61.060 k
D-E Only	0.040	0.040 k	0.080	k	41.620 k
D+L+E		k	0.080	k	242.790 k
D+L-E Only	0.040	0.040 k	0.080	k	223.350 k

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	-0.0000	in	4.000	ft	0.000	in	0.000	ft
-E Only	0.0000	in	4.000	ft	0.000	in	0.000	ft
D+L	0.0000	in	0.000	ft	0.000	in	0.000	ft
D+E	-0.0000	in	4.000	ft	0.000	in	0.000	ft
D-E Only	0.0000	in	4.000	ft	-0.000	in	4.000	ft
D+L+E	-0.0000	in	4.000	ft	0.000	in	0.000	ft
D+L-E Only	0.0000	in	3.973	ft	-0.000	in	3.973	ft

Sketches



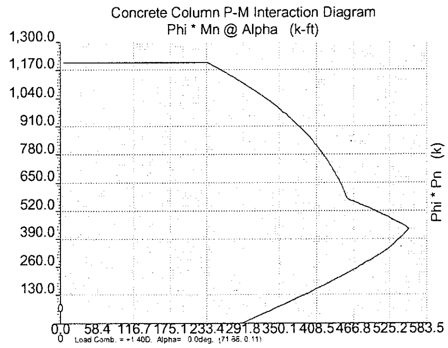
Interaction Diagrams

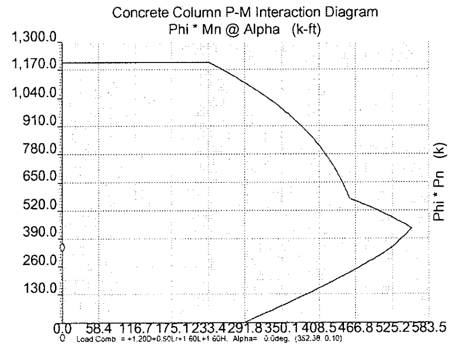
Concrete Column

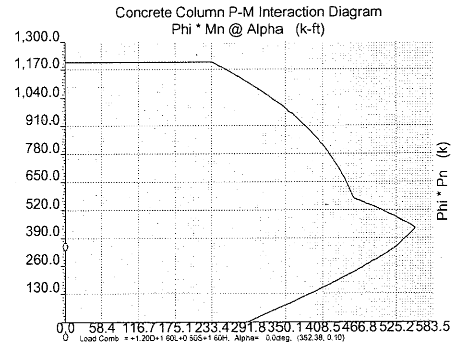
File: P:\11021\116 - Calculations\116.d - Arch_Civil_Struc\C-006 Gravity Circuit Area Concrete\Gravity Circuit.ec6
ENERCALC, INC. 1983-2011, Build:6.12.5.17, Ver:6.11.8.31

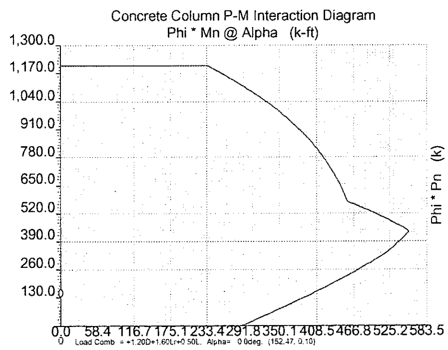
Lic. # : KW-06000120 **Licensee : flsmidth centry**

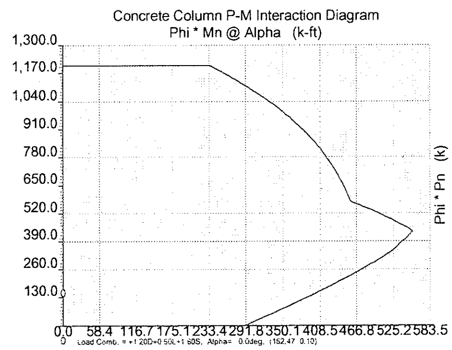
Description : Pedestal J, 6

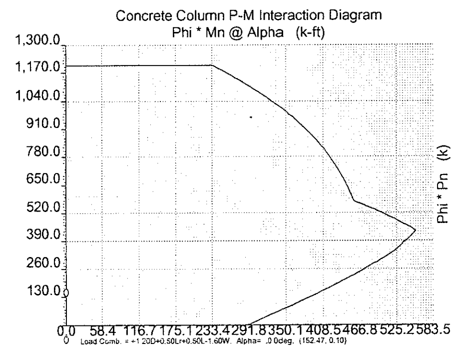


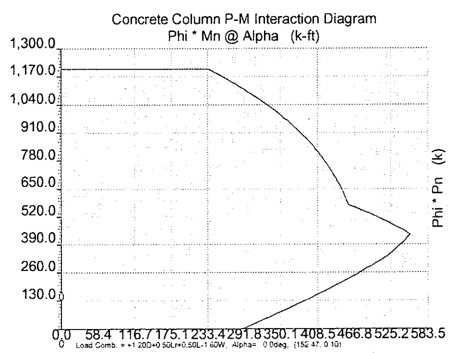


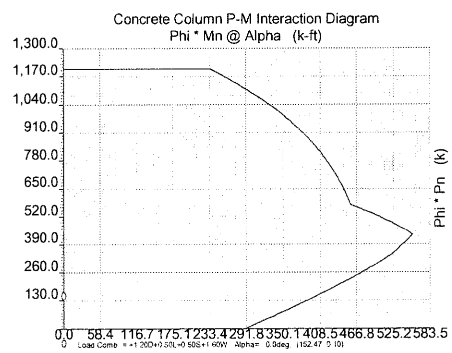


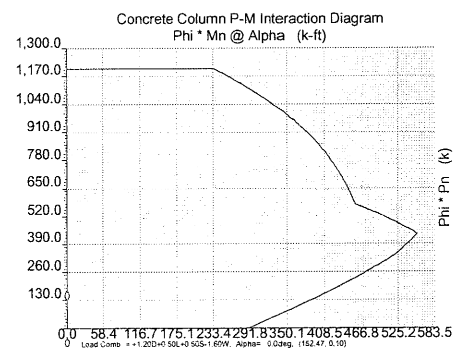


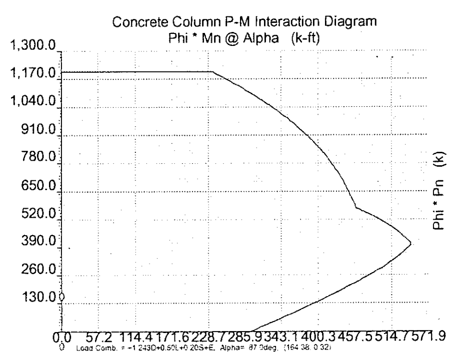


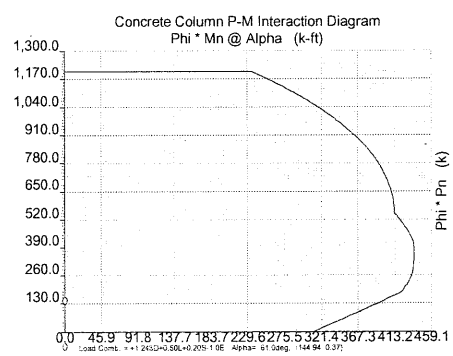


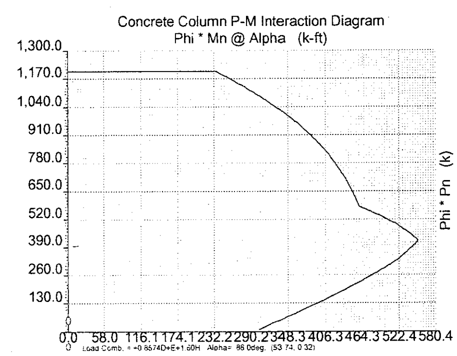








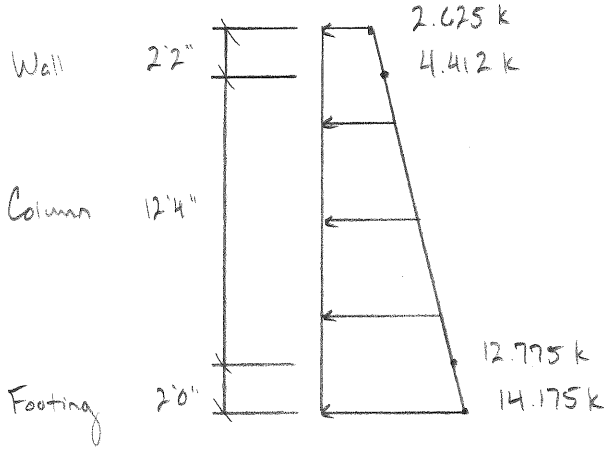




FLSmidth	PROJECT	PROJ NO.
	CC&V High Grade Ore	11021
	SUBJECT	CALC NO.
	Retaining Wall Column	BY DATE 2-17-11
	Equivalent Moment	CHK DATE
		SHEET OF REV

H.6

From Spreadsheet:



$$V = \frac{(2.625 + 12.775\ k)(2'2" + 12'4")}{2} = \boxed{111.65\ k}$$

-column input

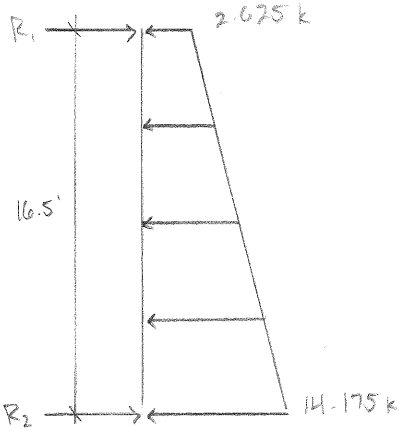
$$M = \frac{(2.625)(14.5')^2}{2} + \frac{(12.775 - 2.625\ k)(14.5')^2}{2(3)}$$

$$= 631.63\ k\text{-}ft$$

$$L = \frac{M}{V} = \frac{631.63\ k\text{-}ft}{111.65\ k} = \boxed{5.66\ ft}$$

-column input

or



$$R_1 = \frac{3(2.625k)(16.5')}{8} + \frac{(14.175 - 2.625)(16.5')}{2(3)} = 48.0\ k$$

$$R_2 = \frac{5(2.625k)(16.5')}{8} + \frac{(14.175 - 2.625)(16.5')2}{2(3)} = 90.6\ k$$

$$M_2 = \frac{(2.625k)(16.5')^2}{8} + \frac{(14.175 - 2.625)(16.5')^2}{15} = 298.96k\text{-}ft$$

$$L = \frac{M_2}{R_2} = \frac{298.96\ k\text{-}ft}{90.6\ k} = 3.3\ ft$$

Concrete Column

File: P:\11021\116 - Calculations\116.d - Arch_Civil_Struc\C-006 Gravity Circuit Area Concrete\Gravity Circuit.ec6
ENERCALC, INC. 1983-2011, Build:6.12.5.17, Ver:6.11.8.31

Lic. # : KW-06000120 — Licensee : flsmidth centry

Description : Pedestal H, 6

General Information

Calculations per ACI 318-05, IBC 2006, CBC 2007, ASCE 7-05

f'c : Concrete 28 day strength	=	4.0 ksi
E =	=	3,605.0 ksi
Density	=	145.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	*ASTM A615 Bars Used*	
Min. Reinf.	=	1.0 %
Max. Reinf.	=	8.0 %

Load Combination 2006 IBC & ASCE 7-05

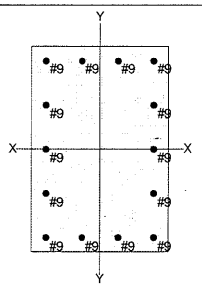
Overall Column Height = 12.333 ft
End Fixity Top Pinned, Bottom Fixed

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 2 ft, K = 1.0
Y-Y (depth) axis :Unbraced Length for Y-Y Axis buckling = 2 ft, K = 1.0

Column Cross Section

Column Dimensions 36.0in high x 24.0in Wide, Column Edge to Rebar Edge Cover = 2.0in

Column Reinforcing : 4 - #9 bars @ corners,, 2.0 - #9 bars top & bottom between corner bars, 3.0 - #9 bars left & right between corner bars



Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 10,729.7 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 12.333 ft above base, Yecc = -5.0in, D = 42.130, L = 146.280, E = 9.840 k
BENDING LOADS . . .
Lat. Point Load at 5.660 ft creating Mx-x, H = -111.650 k
Lat. Point Load at 0.0 ft creating Mx-x, D = -7.120, LR = -12.420, E = -12.410 k
Lat. Point Load at 0.0 ft creating My-y, E = -0.570 k

DESIGN SUMMARY

Load Combination +0.8574D-1.0E+1.60H
Location of max.above base 12.250 ft

Maximum Stress Ratio **0.3905 : 1**
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5

Pu =	35.482 k	φ * Pn =	94.701 k
Mu-x =	416.037 k-ft	φ * Mn-x =	0.0 k-ft
Mu-y =	0.0 k-ft	φ * Mn-y =	0.0 k-ft
Mu Angle =	0.0 deg		
Mu at Angle =	416.037 k-ft	φMn at Angle =	1,065.49 k-ft

Pn & Mn values located at Pu-Mu vector intersection with capacity curve

Column Capacities . . .

Pnmax : Nominal Max. Compressive Axial Capacity	3,730.0 k
Pnmin : Nominal Min. Tension Axial Capacity	-840.0 k
φ Pn, max : Usable Compressive Axial Capacity	1,939.60 k
φ Pn, min : Usable Tension Axial Capacity	-546.0 k

Maximum SERVICE Load Reactions . .

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

Maximum SERVICE Load Deflections . . .

Along Y-Y -0.009430 in at 6.705 ft above base
for load combination : H Only

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

General Section Information . φ = 0.650 β = 0.850 θ = 0.80

ρ : % Reinforcing	1.620 %	Rebar % Ok
Reinforcing Area	14.0 in^2	
Concrete Area	864.0 in^2	

Governing Load Combination Results

Governing Factored Load Combination	Dist. from base ft	Axial Load k Pu	φ * Pn	Bending Analysis k-ft δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	φ Mn	Utilization Ratio
+1.40D	12.25	74.00	1,881.61	1.000	24.33	1.000		0.000	24.33	623.41	**0.039**

FLSmidth Salt Lake City, Inc.
7158 South FLSmidth Dr.
Midvale, UT 8047

Title : CC & V HIGH GRADE
Engineer: Clint Karren
Project Desc.:

Job # 11021

Printed: 18 MAY 2012, 1:12PM

Concrete Column

File: P:\11021\116 - Calculations\116.d - Arch_Civil_Struc\C-006 Gravity Circuit Area Concrete\Gravity Circuit.ec6
ENERCALC, INC. 1983-2011, Build:6.12.5.17, Ver:6.11.8.31

Lic. # : KW-06000120 — Licensee : flsmidth centry

Description : Pedestal H, 6

Governing Load Combination Results

Governing Factored Load Combination	Dist. from base ft	Axial Load k		Bending Analysis k-ft							Utilization
		Pu	φ * Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	φ Mn	Ratio
+1.20D+0.50Lr+1.60L+1.60H	12.25	297.48	939.34	1.000	362.22	1.000		0.000	362.22	1,149.33	**0.315**
+1.20D+1.60L+0.50S+1.60H	12.25	297.48	939.34	1.000	362.22	1.000		0.000	362.22	1,149.33	**0.315**
+1.20D+1.60Lr+0.50L	12.25	136.57	1,822.14	1.000	51.02	1.000		0.000	51.02	678.91	**0.075**
+1.20D+1.60Lr+0.80W	12.25	63.43	1,881.61	1.000	20.85	1.000		0.000	20.85	623.41	**0.033**
+1.20D+1.60Lr-0.80W	12.25	63.43	1,881.61	1.000	20.85	1.000		0.000	20.85	623.41	**0.033**
+1.20D+0.50L+1.60S	12.25	136.57	1,822.14	1.000	51.02	1.000		0.000	51.02	678.91	**0.075**
+1.20D+0.50Lr+0.50L+1.60W	12.25	136.57	1,822.14	1.000	51.02	1.000		0.000	51.02	678.91	**0.075**
+1.20D+0.50Lr+0.50L-1.60W	12.25	136.57	1,822.14	1.000	51.02	1.000		0.000	51.02	678.91	**0.075**
+1.20D+0.50L+0.50S+1.60W	12.25	136.57	1,822.14	1.000	51.02	1.000		0.000	51.02	678.91	**0.075**
+1.20D+0.50L+0.50S-1.60W	12.25	136.57	1,822.14	1.000	51.02	1.000		0.000	51.02	678.91	**0.075**
+1.243D+0.50L+0.20S+E	12.25	148.66	1,822.14	1.000	55.82	1.000	-0.00	0.000	55.82	678.91	**0.082**
+1.243D+0.50L+0.20S-1.0E	12.25	128.98	1,822.14	1.000	47.70	1.000	0.00	0.000	47.70	678.91	**0.070**
+0.90D+1.60W+1.60H	12.25	47.57	127.68	1.000	413.61	1.000		0.000	413.61	1,096.44	**0.377**
+0.90D-1.60W+1.60H	12.25	47.57	127.68	1.000	413.61	1.000		0.000	413.61	1,096.44	**0.377**
+0.8574D+E+1.60H	12.25	55.16	144.49	1.000	411.94	1.000	-0.00	0.000	411.94	1,112.10	**0.370**
+0.8574D-1.0E+1.60H	12.25	35.48	94.70	1.000	416.04	1.000	0.00	0.000	416.04	1,065.49	**0.390**

Maximum Reactions - Unfactored

Note: Only non-zero reactions are listed.

Load Combination	Reaction along X-X Axis		Reaction along Y-Y Axis		Axial Reaction
	@ Base	@ Top	@ Base	@ Top	@ Base
D Only	2.135	2.135 k		k	52.860 k
L Only	7.413	7.413 k		k	146.280 k
Lr Only	0.000	0.000 k		k	k
L+Lr	7.413	7.413 k		k	146.280 k
E Only	0.499	0.499 k		k	9.840 k
-E Only	0.499	0.499 k		k	9.840 k
D+Lr	2.135	2.135 k		k	52.860 k
D+L	9.548	9.548 k		k	199.140 k
D+L+Lr	9.548	9.548 k		k	199.140 k
D+E	2.634	2.634 k		k	62.700 k
D-E Only	1.636	1.636 k		k	43.020 k
D+L+E	10.046	10.046 k		k	208.980 k
D+L-E Only	9.049	9.049 k		k	189.300 k
D+Lr+E	2.634	2.634 k		k	62.700 k
D+Lr-E Only	1.636	1.636 k		k	43.020 k
H Only	81.771	29.879 k		k	k

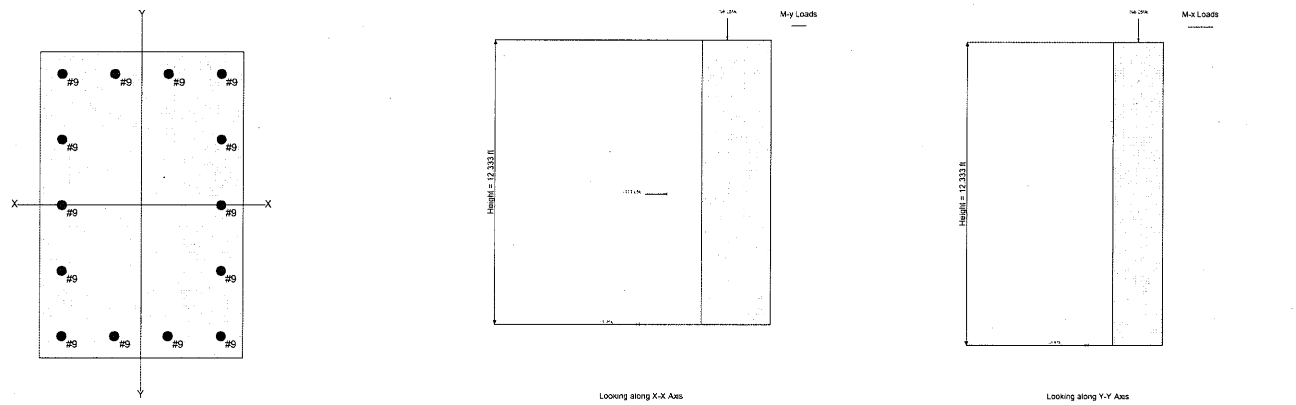
Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.001	in	8.277	ft
L Only	0.0000	in	0.000	ft	0.002	in	8.277	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L+Lr	0.0000	in	0.000	ft	0.002	in	8.277	ft
E Only	0.0000	in	0.000	ft	0.000	in	8.277	ft
-E Only	0.0000	in	0.000	ft	-0.000	in	8.277	ft
D+Lr	0.0000	in	0.000	ft	0.001	in	8.277	ft
D+L	0.0000	in	0.000	ft	0.002	in	8.277	ft
D+L+Lr	0.0000	in	0.000	ft	0.002	in	8.277	ft
D+E	0.0000	in	0.000	ft	0.001	in	8.277	ft
D-E Only	0.0000	in	0.000	ft	0.000	in	8.277	ft
D+L+E	0.0000	in	0.000	ft	0.002	in	8.277	ft
D+L-E Only	0.0000	in	0.000	ft	0.002	in	8.277	ft
D+Lr+E	0.0000	in	0.000	ft	0.001	in	8.277	ft
D+Lr-E Only	0.0000	in	0.000	ft	0.000	in	8.277	ft
H Only	0.0000	in	0.000	ft	-0.009	in	6.705	ft

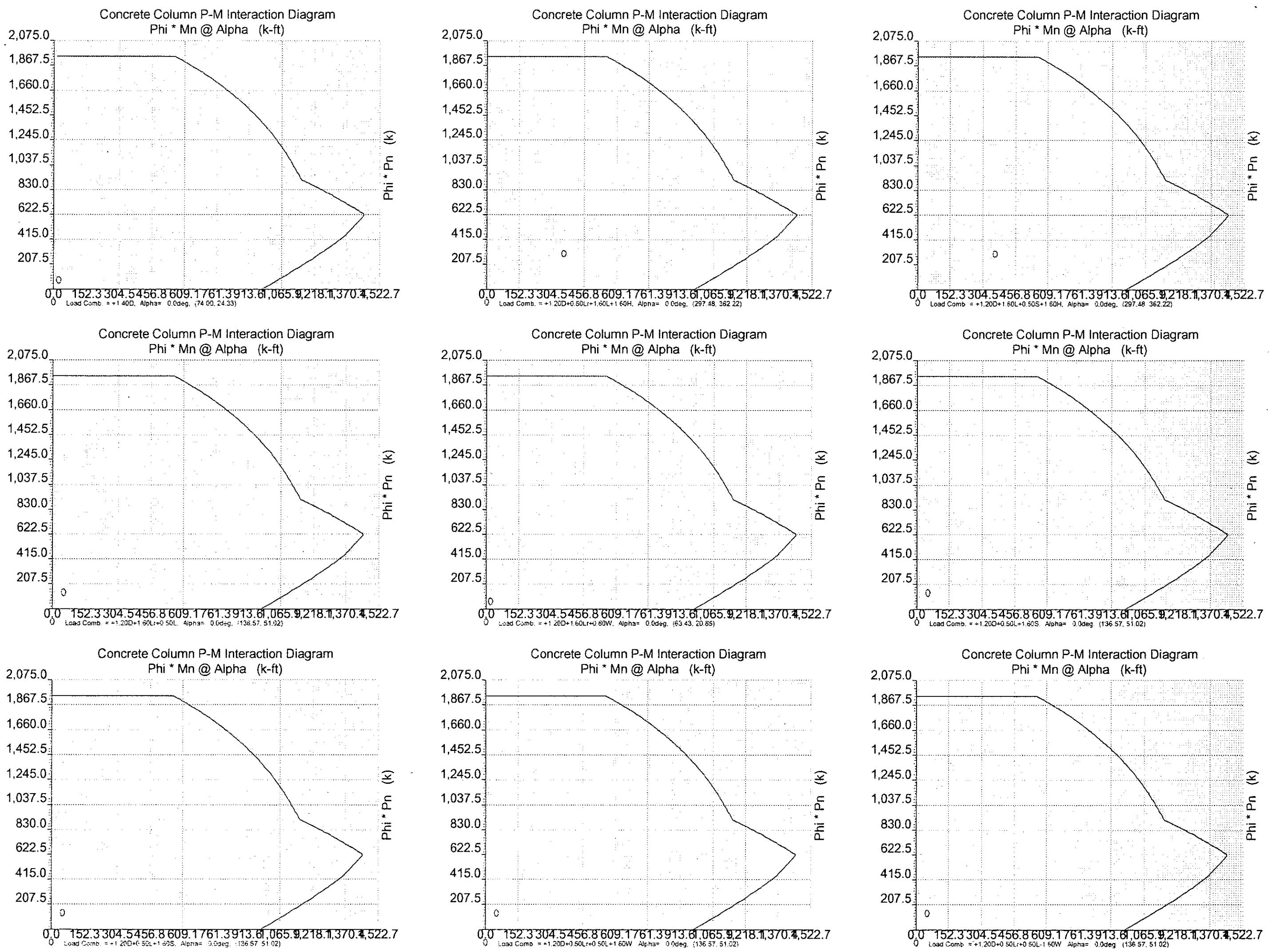
Concrete Column

Description : Pedestal H, 6

Sketches



Interaction Diagrams



FLSmidth Salt Lake City, Inc.
7158 South FLSmidth Dr.
Midvale, UT 8047

Title : CC & V HIGH GRADE
Engineer: Clint Karren
Project Desc.:

Job # 11021

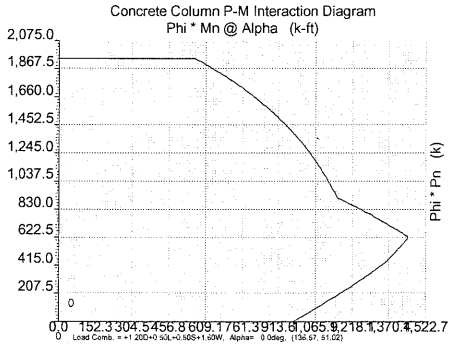
Printed: 18 MAY 2012, 1:12PM

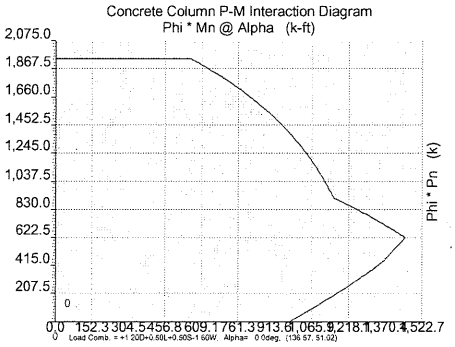
Concrete Column

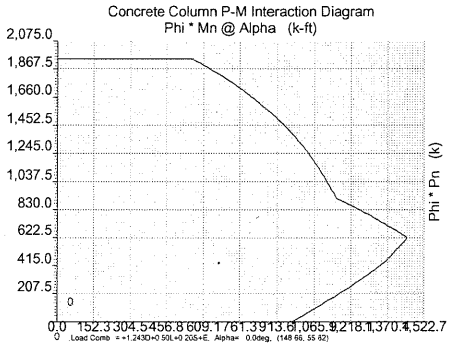
File: P:\11021\116 - Calculations\116.d - Arch_Civil_Struc\C-006 Gravity Circuit Area Concrete\Gravity Circuit.ec6
ENERCALC, INC. 1983-2011, Build:6.12.5.17, Ver:6.11.8.31

Lic. # : KW-06000120 **Licensee : fismidth centry**

Description : Pedestal H, 6







General Footing

File: P:\11021\116 - Calculations\116.d - Arch_Civil_Struc\C-006 Gravity Circuit Area Concrete\Gravity Circuit.ec6
ENERCALC, INC. 1983-2011, Build:6.12.5.17, Ver:6.11.8.31

Lic. # : KW-06000120 — Licensee : fismidth centry

Description : Spot Footing L,6

General Information

Calculations per ACI 318-05, IBC 2006, CBC 2007, ASCE 7-05

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,605.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Include Pedestal Weight as DL	:	Yes

Soil Design Values

Allowable Soil Bearing	=	4.50 ksf
Increase Bearing By Footing Weight	=	Yes
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	ft
Allowable pressure increase per foot of deptl	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depl	=	ksf
when maximum length or width is greater	=	ft

Dimensions

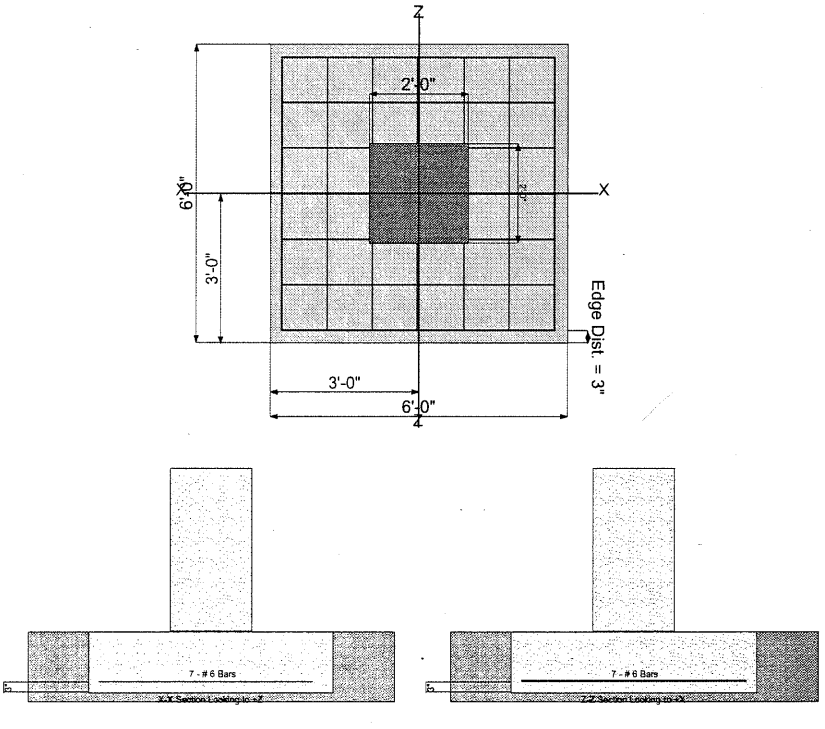
Width parallel to X-X Axis	=	6.0 ft
Length parallel to Z-Z Axis	=	6.0 ft
Footing Thicknes	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	24.0 in
pz : parallel to Z-Z Axis	=	24.0 in
Height	=	48.0 in

Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	3.0 in



Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	7.0
Reinforcing Bar Size	=	# 6
Bars parallel to Z-Z Axis		
Number of Bars	=	7.0
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	=	13.440		60.220					k
OB : Overburden	=	0.150							ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=						0.020		k
V-z	=						-0.020		k

General Footing

Description : Spot Footing L,6

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.5217	Soil Bearing	2.461 ksf	4.718 ksf	+D+L+H
PASS	663.66	Overturning - X-X	0.0770 k-ft	51.102 k-ft	0.6D+0.7E
PASS	663.66	Overturning - Z-Z	0.0770 k-ft	51.102 k-ft	0.6D+0.7E
PASS	365.014	Sliding - X-X	0.0140 k	5.110 k	0.6D+0.7E
PASS	365.014	Sliding - Z-Z	0.0140 k	5.110 k	0.6D+0.7E
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1884	Z Flexure (+X)	6.364 k-ft	33.778 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1884	Z Flexure (-X)	6.364 k-ft	33.778 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1884	X Flexure (+Z)	6.364 k-ft	33.778 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1884	X Flexure (-Z)	6.364 k-ft	33.778 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1342	1-way Shear (+X)	12.727 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1342	1-way Shear (-X)	12.727 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1342	1-way Shear (+Z)	12.727 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1342	1-way Shear (-Z)	12.727 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1809	2-way Punching	34.322 psi	189.737 psi	+1.20D+0.50Lr+1.60L+1.60H

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress +Z	+Z	-X	-X	Actual / Allowable Ratio
X-X, +D	4.718	n/a	0.0	0.7886	0.7886	n/a	n/a	0.167
X-X, +D+L+H	4.718	n/a	0.0	2.461	2.461	n/a	n/a	0.522
X-X, +D+0.750Lr+0.750L+H	4.718	n/a	0.0	2.043	2.043	n/a	n/a	0.433
X-X, +D+0.750L+0.750S+H	4.718	n/a	0.0	2.043	2.043	n/a	n/a	0.433
X-X, +1.030D+0.70E+H	4.718	n/a	-0.03160	0.8142	0.810	n/a	n/a	0.173
X-X, +1.030D-0.70E+H	4.718	n/a	0.03160	0.810	0.8142	n/a	n/a	0.173
X-X, +D+0.750Lr+0.750L+0.750W+H	4.718	n/a	0.0	2.043	2.043	n/a	n/a	0.433
X-X, +D+0.750Lr+0.750L-0.750W+H	4.718	n/a	0.0	2.043	2.043	n/a	n/a	0.433
X-X, +D+0.750L+0.750S+0.750W+H	4.718	n/a	0.0	2.043	2.043	n/a	n/a	0.433
X-X, +D+0.750L+0.750S-0.750W+H	4.718	n/a	0.0	2.043	2.043	n/a	n/a	0.433
X-X, +1.022D+0.750Lr+0.750L+0.5250	4.718	n/a	-0.009341	2.062	2.059	n/a	n/a	0.437
X-X, +1.022D+0.750Lr+0.750L-0.5250	4.718	n/a	0.009341	2.059	2.062	n/a	n/a	0.437
X-X, +D+0.750L+0.750S+0.5250E+H	4.718	n/a	-0.009422	2.045	2.042	n/a	n/a	0.434
X-X, +D+0.750L+0.750S-0.5250E+H	4.718	n/a	0.009422	2.042	2.045	n/a	n/a	0.434
X-X, +0.5702D+0.70E+H	4.718	n/a	-0.05708	0.4518	0.4475	n/a	n/a	0.096
X-X, +0.5702D-0.70E+H	4.718	n/a	0.05708	0.4475	0.4518	n/a	n/a	0.096
Z-Z, +D	4.718	0.0	n/a	n/a	n/a	0.7886	0.7886	0.167
Z-Z, +D+L+H	4.718	0.0	n/a	n/a	n/a	2.461	2.461	0.522
Z-Z, +D+0.750Lr+0.750L+H	4.718	0.0	n/a	n/a	n/a	2.043	2.043	0.433
Z-Z, +D+0.750L+0.750S+H	4.718	0.0	n/a	n/a	n/a	2.043	2.043	0.433
Z-Z, +1.030D+0.70E+H	4.718	0.03160	n/a	n/a	n/a	0.810	0.8142	0.173
Z-Z, +1.030D-0.70E+H	4.718	-0.03160	n/a	n/a	n/a	0.8142	0.810	0.173
Z-Z, +D+0.750Lr+0.750L+0.750W+H	4.718	0.0	n/a	n/a	n/a	2.043	2.043	0.433
Z-Z, +D+0.750Lr+0.750L-0.750W+H	4.718	0.0	n/a	n/a	n/a	2.043	2.043	0.433
Z-Z, +D+0.750L+0.750S+0.750W+H	4.718	0.0	n/a	n/a	n/a	2.043	2.043	0.433
Z-Z, +D+0.750L+0.750S-0.750W+H	4.718	0.0	n/a	n/a	n/a	2.043	2.043	0.433
Z-Z, +1.022D+0.750Lr+0.750L+0.5250	4.718	0.009341	n/a	n/a	n/a	2.059	2.062	0.437
Z-Z, +1.022D+0.750Lr+0.750L-0.5250	4.718	-0.009341	n/a	n/a	n/a	2.062	2.059	0.437
Z-Z, +D+0.750L+0.750S+0.5250E+H	4.718	0.009422	n/a	n/a	n/a	2.042	2.045	0.434
Z-Z, +D+0.750L+0.750S-0.5250E+H	4.718	-0.009422	n/a	n/a	n/a	2.045	2.042	0.434
Z-Z, +0.5702D+0.70E+H	4.718	0.05708	n/a	n/a	n/a	0.4475	0.4518	0.096
Z-Z, +0.5702D-0.70E+H	4.718	-0.05708	n/a	n/a	n/a	0.4518	0.4475	0.096

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D	None	0.0 k-ft	Infinity	OK
X-X, D+L	None	0.0 k-ft	Infinity	OK
X-X, 0.6D+0.7E	0.0770 k-ft	51.102 k-ft	663.66	OK
X-X, 0.6D-0.7E	0.0770 k-ft	51.102 k-ft	663.66	OK

General Footing

Description : Spot Footing L,6

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Z-Z, D	None	0.0 k-ft	Infinity	OK
Z-Z, D+L	None	0.0 k-ft	Infinity	OK
Z-Z, 0.6D+0.7E	0.0770 k-ft	51.102 k-ft	663.66	OK
Z-Z, 0.6D-0.7E	0.0770 k-ft	51.102 k-ft	663.66	OK

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
X-X, D	0.0 k	8.517 k	No Sliding	OK
X-X, D+L	0.0 k	26.583 k	No Sliding	OK
X-X, 0.6D+0.7E	0.0140 k	5.110 k	365.014	OK
X-X, 0.6D-0.7E	-0.0140 k	5.110 k	365.014	OK
Z-Z, D	0.0 k	8.517 k	No Sliding	OK
Z-Z, D+L	0.0 k	26.583 k	No Sliding	OK
Z-Z, 0.6D+0.7E	-0.0140 k	5.110 k	365.014	OK
Z-Z, 0.6D-0.7E	0.0140 k	5.110 k	365.014	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	1.179	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.40D	1.179	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	6.364	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	6.364	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+1.60L+0.50S+1.60H	6.364	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+1.60L+0.50S+1.60H	6.364	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+1.60Lr+0.50L	2.683	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+1.60Lr+0.50L	2.683	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+1.60S	2.683	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+1.60S	2.683	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	2.683	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	2.683	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50Lr+0.50L-1.60W	2.683	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50Lr+0.50L-1.60W	2.683	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+0.50S+1.60W	2.683	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+0.50S+1.60W	2.683	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+0.50S-1.60W	2.683	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+0.50S-1.60W	2.683	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+0.20S+E	2.679	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+0.20S+E	2.688	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+0.20S-1.0E	2.688	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +1.20D+0.50L+0.20S-1.0E	2.679	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +0.90D+E+1.60H	0.7532	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +0.90D+E+1.60H	0.7628	-Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +0.90D-1.0E+1.60H	0.7628	+Z	Bottom	0.39	Bending	0.51	33.778	OK
X-X, +0.90D-1.0E+1.60H	0.7532	-Z	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.40D	1.179	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.40D	1.179	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	6.364	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	6.364	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	6.364	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	6.364	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+1.60Lr+0.50L	2.683	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+1.60Lr+0.50L	2.683	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+1.60S	2.683	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+1.60S	2.683	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50Lr+0.50L+1.60W	2.683	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50Lr+0.50L+1.60W	2.683	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50Lr+0.50L-1.60W	2.683	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50Lr+0.50L-1.60W	2.683	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	2.683	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	2.683	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+0.50S-1.60W	2.683	-X	Bottom	0.39	Bending	0.51	33.778	OK

General Footing

Description : Spot Footing L,6

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D+0.50L+0.50S-1.60W	2.683	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+0.20S+E	2.679	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+0.20S+E	2.688	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+0.20S-1.0E	2.688	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +1.20D+0.50L+0.20S-1.0E	2.679	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +0.90D+E+1.60H	0.7532	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +0.90D+E+1.60H	0.7628	+X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +0.90D-1.0E+1.60H	0.7628	-X	Bottom	0.39	Bending	0.51	33.778	OK
Z-Z, +0.90D-1.0E+1.60H	0.7532	+X	Bottom	0.39	Bending	0.51	33.778	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.358 psi	2.358 psi	2.358 psi	2.358 psi	2.358 psi	94.868 psi	0.02486	OK
+1.20D+0.50Lr+1.60L+1.60H	12.727 psi	12.727 psi	12.727 psi	12.727 psi	12.727 psi	94.868 psi	0.1342	OK
+1.20D+1.60L+0.50S+1.60H	12.727 psi	12.727 psi	12.727 psi	12.727 psi	12.727 psi	94.868 psi	0.1342	OK
+1.20D+1.60Lr+0.50L	5.367 psi	5.367 psi	5.367 psi	5.367 psi	5.367 psi	94.868 psi	0.05657	OK
+1.20D+0.50L+1.60S	5.367 psi	5.367 psi	5.367 psi	5.367 psi	5.367 psi	94.868 psi	0.05657	OK
+1.20D+0.50Lr+0.50L+1.60W	5.367 psi	5.367 psi	5.367 psi	5.367 psi	5.367 psi	94.868 psi	0.05657	OK
+1.20D+0.50Lr+0.50L-1.60W	5.367 psi	5.367 psi	5.367 psi	5.367 psi	5.367 psi	94.868 psi	0.05657	OK
+1.20D+0.50L+0.50S+1.60W	5.367 psi	5.367 psi	5.367 psi	5.367 psi	5.367 psi	94.868 psi	0.05657	OK
+1.20D+0.50L+0.50S-1.60W	5.367 psi	5.367 psi	5.367 psi	5.367 psi	5.367 psi	94.868 psi	0.05657	OK
+1.20D+0.50L+0.20S+E	5.367 psi	5.367 psi	5.378 psi	5.356 psi	5.378 psi	94.868 psi	0.05669	OK
+1.20D+0.50L+0.20S-1.0E	5.367 psi	5.367 psi	5.356 psi	5.378 psi	5.378 psi	94.868 psi	0.05669	OK
+0.90D+E+1.60H	1.516 psi	1.516 psi	1.527 psi	1.505 psi	1.527 psi	94.868 psi	0.01609	OK
+0.90D-1.0E+1.60H	1.516 psi	1.516 psi	1.505 psi	1.527 psi	1.527 psi	94.868 psi	0.01609	OK

Punching Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	6.36 psi	189.737 psi	0.03352	OK
+1.20D+0.50Lr+1.60L+1.60H	34.322 psi	189.737 psi	0.1809	OK
+1.20D+1.60L+0.50S+1.60H	34.322 psi	189.737 psi	0.1809	OK
+1.20D+1.60Lr+0.50L	14.473 psi	189.737 psi	0.07628	OK
+1.20D+0.50L+1.60S	14.473 psi	189.737 psi	0.07628	OK
+1.20D+0.50Lr+0.50L+1.60W	14.473 psi	189.737 psi	0.07628	OK
+1.20D+0.50Lr+0.50L-1.60W	14.473 psi	189.737 psi	0.07628	OK
+1.20D+0.50L+0.50S+1.60W	14.473 psi	189.737 psi	0.07628	OK
+1.20D+0.50L+0.50S-1.60W	14.473 psi	189.737 psi	0.07628	OK
+1.20D+0.50L+0.20S+E	14.473 psi	189.737 psi	0.07628	OK
+1.20D+0.50L+0.20S-1.0E	14.473 psi	189.737 psi	0.07628	OK
+0.90D+E+1.60H	4.088 psi	189.737 psi	0.02155	OK
+0.90D-1.0E+1.60H	4.088 psi	189.737 psi	0.02155	OK

FLSmidth Salt Lake City, Inc.
7158 South FLSmidth Dr.
Midvale, UT 8047

Title : CC & V HIGH GRADE
Engineer: Clint Karren
Project Desc.:

Job # 11021

Printed: 18 MAY 2012, 1:19PM

General Footing

File: P:\11021\116 - Calculations\116.d - Arch_Civil_Struc\C-006 Gravity Circuit Area Concrete\Gravity Circuit.ec6
ENERCALC, INC. 1983-2011, Build:6.12.5.17, Ver:6.11.8.31

Lic. # : KW-06000120 — Licensee : flsmidth centry

Description : Spot Footing J,6

General Information

Calculations per ACI 318-05, IBC 2006, CBC 2007, ASCE 7-05

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,605.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Include Pedestal Weight as DL	:	Yes

Soil Design Values

Allowable Soil Bearing	=	5.0 ksf
Increase Bearing By Footing Weight	=	Yes
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	ft
Allowable pressure increase per foot of deptl	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of dept	=	ksf
when maximum length or width is greater	=	ft

Dimensions

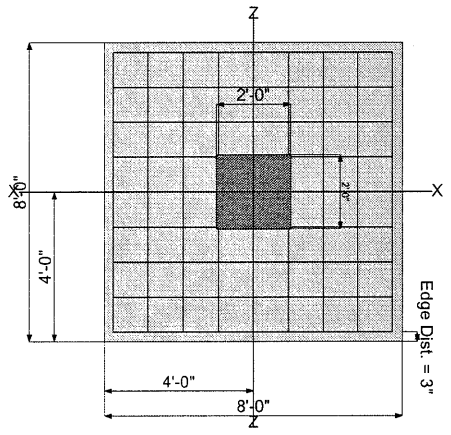
Width parallel to X-X Axis	=	8.0 ft
Length parallel to Z-Z Axis	=	8.0 ft
Footing Thicknes	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	24.0 in
pz : parallel to Z-Z Axis	=	24.0 in
Height	=	48.0 in

Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	3.0 in

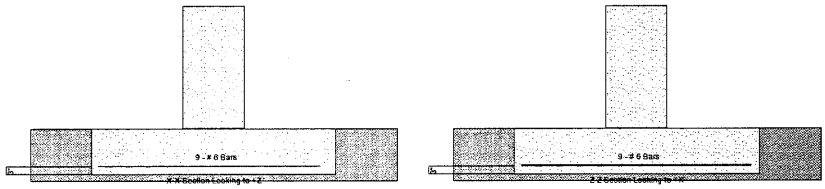


Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	9.0
Reinforcing Bar Size	=	# 6
Bars parallel to Z-Z Axis		
Number of Bars	=	9.0
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	=	49.020		181.730			9.720		k
OB : Overburden	=	0.150							ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=	-0.030		-0.090			-0.080		k
V-z	=								k

General Footing

Description : Spot Footing J,6

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8014	Soil Bearing	4.007 ksf	5.0 ksf	+D+L+H
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	6.479	Overturning - Z-Z	27.524 k-ft	178.323 k-ft	0.6D-0.7E
PASS	208.216	Sliding - X-X	0.0740 k	15.408 k	0.6D+0.7E
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	6.549	Uplift	6.804 k	44.556 k	+0.60D+0.70E
PASS	0.7572	Z Flexure (+X)	24.686 k-ft	32.602 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.7596	Z Flexure (-X)	24.764 k-ft	32.602 k-ft	+1.20D+1.60L+0.50S+1.60H
PASS	0.7584	X Flexure (+Z)	24.725 k-ft	32.602 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.7584	X Flexure (-Z)	24.725 k-ft	32.602 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.5492	1-way Shear (+X)	52.097 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.5492	1-way Shear (-X)	52.097 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.5492	1-way Shear (+Z)	52.097 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.5492	1-way Shear (-Z)	52.097 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.6567	2-way Punching	124.606 psi	189.737 psi	+1.20D+0.50Lr+1.60L+1.60H

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress +Z	+Z	-X	-X	Actual / Allowable Ratio
X-X, +D	5.0	n/a	0.0	1.160	1.160	n/a	n/a	0.232
X-X, +D+L+H	5.0	n/a	0.0	4.0	4.0	n/a	n/a	0.800
X-X, +D+0.750Lr+0.750L+H	5.0	n/a	0.0	3.290	3.290	n/a	n/a	0.658
X-X, +D+0.750L+0.750S+H	5.0	n/a	0.0	3.290	3.290	n/a	n/a	0.658
X-X, +1.030D+0.70E+H	5.0	n/a	0.0	1.301	1.301	n/a	n/a	0.260
X-X, +1.030D-0.70E+H	5.0	n/a	0.0	1.089	1.089	n/a	n/a	0.218
X-X, +D+0.750Lr+0.750L+0.750W+H	5.0	n/a	0.0	3.290	3.290	n/a	n/a	0.658
X-X, +D+0.750Lr+0.750L-0.750W+H	5.0	n/a	0.0	3.290	3.290	n/a	n/a	0.658
X-X, +D+0.750L+0.750S+0.750W+H	5.0	n/a	0.0	3.290	3.290	n/a	n/a	0.658
X-X, +D+0.750L+0.750S-0.750W+H	5.0	n/a	0.0	3.290	3.290	n/a	n/a	0.658
X-X, +1.022D+0.750Lr+0.750L+0.5250	5.0	n/a	0.0	3.396	3.396	n/a	n/a	0.679
X-X, +1.022D+0.750Lr+0.750L-0.5250	5.0	n/a	0.0	3.236	3.236	n/a	n/a	0.647
X-X, +D+0.750L+0.750S+0.5250E+H	5.0	n/a	0.0	3.370	3.370	n/a	n/a	0.674
X-X, +D+0.750L+0.750S-0.5250E+H	5.0	n/a	0.0	3.210	3.210	n/a	n/a	0.642
X-X, +0.5702D+0.70E+H	5.0	n/a	0.0	0.7679	0.7679	n/a	n/a	0.154
X-X, +0.5702D-0.70E+H	5.0	n/a	0.0	0.5553	0.5553	n/a	n/a	0.111
Z-Z, +D	5.0	-0.02666	n/a	n/a	n/a	1.162	1.158	0.232
Z-Z, +D+L+H	5.0	-0.03094	n/a	n/a	n/a	4.007	3.992	0.801
Z-Z, +D+0.750Lr+0.750L+H	5.0	-0.03056	n/a	n/a	n/a	3.296	3.284	0.659
Z-Z, +D+0.750L+0.750S+H	5.0	-0.03056	n/a	n/a	n/a	3.296	3.284	0.659
Z-Z, +1.030D+0.70E+H	5.0	-0.06887	n/a	n/a	n/a	1.307	1.296	0.261
Z-Z, +1.030D-0.70E+H	5.0	0.02378	n/a	n/a	n/a	1.087	1.090	0.218
Z-Z, +D+0.750Lr+0.750L+0.750W+H	5.0	-0.03056	n/a	n/a	n/a	3.296	3.284	0.659
Z-Z, +D+0.750Lr+0.750L-0.750W+H	5.0	-0.03056	n/a	n/a	n/a	3.296	3.284	0.659
Z-Z, +D+0.750L+0.750S+0.750W+H	5.0	-0.03056	n/a	n/a	n/a	3.296	3.284	0.659
Z-Z, +D+0.750L+0.750S-0.750W+H	5.0	-0.03056	n/a	n/a	n/a	3.296	3.284	0.659
Z-Z, +1.022D+0.750Lr+0.750L+0.5250	5.0	-0.04257	n/a	n/a	n/a	3.405	3.387	0.681
Z-Z, +1.022D+0.750Lr+0.750L-0.5250	5.0	-0.01790	n/a	n/a	n/a	3.240	3.233	0.648
Z-Z, +D+0.750L+0.750S+0.5250E+H	5.0	-0.04269	n/a	n/a	n/a	3.379	3.361	0.676
Z-Z, +D+0.750L+0.750S-0.5250E+H	5.0	-0.01783	n/a	n/a	n/a	3.214	3.207	0.643
Z-Z, +0.5702D+0.70E+H	5.0	-0.09818	n/a	n/a	n/a	0.7725	0.7633	0.155
Z-Z, +0.5702D-0.70E+H	5.0	0.07224	n/a	n/a	n/a	0.5528	0.5577	0.112

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D	None	0.0 k-ft	Infinity	OK
X-X, D+L	None	0.0 k-ft	Infinity	OK
X-X, 0.6D+0.7E	None	0.0 k-ft	Infinity	OK
X-X, 0.6D-0.7E	None	0.0 k-ft	Infinity	OK

General Footing

Description : Spot Footing J,6

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Z-Z, D	0.1650 k-ft	297.040 k-ft	1,800.24	OK
Z-Z, D+L	0.660 k-ft	1,023.96 k-ft	1,551.46	OK
Z-Z, 0.6D+0.7E	0.4070 k-ft	205.440 k-ft	504.77	OK
Z-Z, 0.6D-0.7E	27.524 k-ft	178.323 k-ft	6.479	OK

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
X-X, D	-0.030 k	22.278 k	742.60	OK
X-X, D+L	-0.120 k	76.797 k	639.98	OK
X-X, 0.6D+0.7E	-0.0740 k	15.408 k	208.216	OK
X-X, 0.6D-0.7E	0.0380 k	11.326 k	298.042	OK
Z-Z, D	0.0 k	22.278 k	No Sliding	OK
Z-Z, D+L	0.0 k	76.797 k	No Sliding	OK
Z-Z, 0.6D+0.7E	0.0 k	15.408 k	No Sliding	OK
Z-Z, 0.6D-0.7E	0.0 k	11.326 k	No Sliding	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	4.995	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.40D	4.995	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	24.725	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	24.725	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+1.60L+0.50S+1.60H	24.725	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+1.60L+0.50S+1.60H	24.725	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+1.60Lr+0.50L	10.67	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+1.60Lr+0.50L	10.67	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+1.60S	10.67	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+1.60S	10.67	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	10.67	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	10.67	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50Lr+0.50L-1.60W	10.67	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50Lr+0.50L-1.60W	10.67	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+0.50S+1.60W	10.67	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+0.50S+1.60W	10.67	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+0.50S-1.60W	10.67	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+0.50S-1.60W	10.67	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+0.20S+E	11.353	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+0.20S+E	11.353	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+0.20S-1.0E	9.987	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +1.20D+0.50L+0.20S-1.0E	9.987	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +0.90D+E+1.60H	3.894	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +0.90D+E+1.60H	3.894	-Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +0.90D-1.0E+1.60H	2.527	+Z	Bottom	0.39	Bending	0.5	32.602	OK
X-X, +0.90D-1.0E+1.60H	2.527	-Z	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.40D	5.004	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.40D	4.985	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	24.764	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	24.686	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	24.764	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	24.686	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+1.60Lr+0.50L	10.688	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+1.60Lr+0.50L	10.652	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+1.60S	10.688	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+1.60S	10.652	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50Lr+0.50L+1.60W	10.688	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50Lr+0.50L+1.60W	10.652	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50Lr+0.50L-1.60W	10.688	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50Lr+0.50L-1.60W	10.652	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	10.688	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	10.652	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+0.50S-1.60W	10.688	-X	Bottom	0.39	Bending	0.5	32.602	OK

General Footing

Description : Spot Footing J,6

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D+0.50L+0.50S-1.60W	10.652	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+0.20S+E	11.388	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+0.20S+E	11.318	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+0.20S-1.0E	9.987	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +1.20D+0.50L+0.20S-1.0E	9.986	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +0.90D+E+1.60H	3.918	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +0.90D+E+1.60H	3.871	+X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +0.90D-1.0E+1.60H	2.516	-X	Bottom	0.39	Bending	0.5	32.602	OK
Z-Z, +0.90D-1.0E+1.60H	2.539	+X	Bottom	0.39	Bending	0.5	32.602	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	10.524 psi	10.524 psi	10.524 psi	10.524 psi	10.524 psi	94.868 psi	0.1109	OK
+1.20D+0.50Lr+1.60L+1.60H	52.097 psi	52.097 psi	52.097 psi	52.097 psi	52.097 psi	94.868 psi	0.5492	OK
+1.20D+1.60L+0.50S+1.60H	52.097 psi	52.097 psi	52.097 psi	52.097 psi	52.097 psi	94.868 psi	0.5492	OK
+1.20D+1.60Lr+0.50L	22.482 psi	22.482 psi	22.482 psi	22.482 psi	22.482 psi	94.868 psi	0.237	OK
+1.20D+0.50L+1.60S	22.482 psi	22.482 psi	22.482 psi	22.482 psi	22.482 psi	94.868 psi	0.237	OK
+1.20D+0.50Lr+0.50L+1.60W	22.482 psi	22.482 psi	22.482 psi	22.482 psi	22.482 psi	94.868 psi	0.237	OK
+1.20D+0.50Lr+0.50L-1.60W	22.482 psi	22.482 psi	22.482 psi	22.482 psi	22.482 psi	94.868 psi	0.237	OK
+1.20D+0.50L+0.50S+1.60W	22.482 psi	22.482 psi	22.482 psi	22.482 psi	22.482 psi	94.868 psi	0.237	OK
+1.20D+0.50L+0.50S-1.60W	22.482 psi	22.482 psi	22.482 psi	22.482 psi	22.482 psi	94.868 psi	0.237	OK
+1.20D+0.50L+0.20S+E	23.922 psi	23.922 psi	23.922 psi	23.922 psi	23.922 psi	94.868 psi	0.2522	OK
+1.20D+0.50L+0.20S-1.0E	21.042 psi	21.042 psi	21.042 psi	21.042 psi	21.042 psi	94.868 psi	0.2218	OK
+0.90D+E+1.60H	8.205 psi	8.205 psi	8.205 psi	8.205 psi	8.205 psi	94.868 psi	0.08649	OK
+0.90D-1.0E+1.60H	5.325 psi	5.325 psi	5.325 psi	5.325 psi	5.325 psi	94.868 psi	0.05613	OK

Punching Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	25.171 psi	189.737 psi	0.1327	OK
+1.20D+0.50Lr+1.60L+1.60H	124.606 psi	189.737 psi	0.6567	OK
+1.20D+1.60L+0.50S+1.60H	124.606 psi	189.737 psi	0.6567	OK
+1.20D+1.60Lr+0.50L	53.772 psi	189.737 psi	0.2834	OK
+1.20D+0.50L+1.60S	53.772 psi	189.737 psi	0.2834	OK
+1.20D+0.50Lr+0.50L+1.60W	53.772 psi	189.737 psi	0.2834	OK
+1.20D+0.50Lr+0.50L-1.60W	53.772 psi	189.737 psi	0.2834	OK
+1.20D+0.50L+0.50S+1.60W	53.772 psi	189.737 psi	0.2834	OK
+1.20D+0.50L+0.50S-1.60W	53.772 psi	189.737 psi	0.2834	OK
+1.20D+0.50L+0.20S+E	57.216 psi	189.737 psi	0.3016	OK
+1.20D+0.50L+0.20S-1.0E	50.328 psi	189.737 psi	0.2653	OK
+0.90D+E+1.60H	19.625 psi	189.737 psi	0.1034	OK
+0.90D-1.0E+1.60H	12.737 psi	189.737 psi	0.06713	OK

FLSmidth	PROJECT Cripple Creek & Victor	Proj No. 11021	
		Calc No.	
	SUBJECT Gravity Circuit Retaining Wall	By CCK	May-18-2012
	Passive Soil Pressure on Footings	Check	
	H,6	Sheet	of

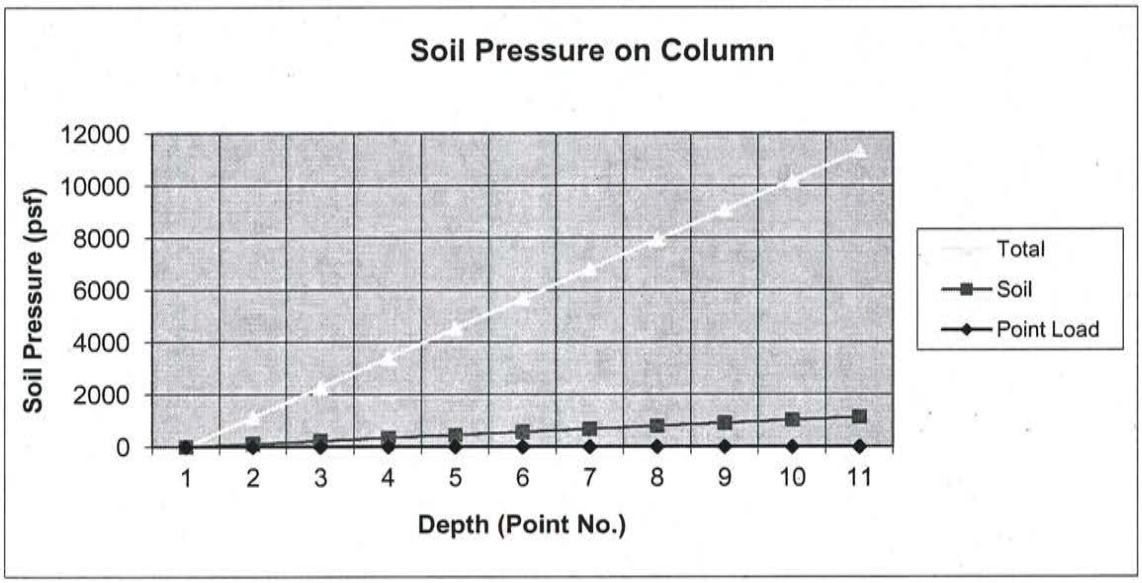
Pressure on retaining structure from point load (m≤.4)
REF. NAVFAC DM-7 figure 10-6

Point Load Qp=	0	kips	Tributary Width of Wall =	10	feet
Wall Height H=	2.83	feet	Distance of Load from wall =	0	feet
Equiv. Fluid =	400	pcf	m =	0.000	OK
Surcharge =	0	psf			

slab: 8"
soil: 8"
ftg: 18"

Depth (z ft.)	n	Coeff	Pressure KSF	Depth ft.	Point Pressure PSF	EFP Pressure PSF	Total Pressure LB
0	0	0	0	0	0	0	0
0.283	0.1	0.57	0.00	0.283	0	113	1133
0.567	0.2	1.40	0.00	0.567	0	227	2267
0.850	0.3	1.61	0.00	0.850	0	340	3400
1.133	0.4	1.37	0.00	1.133	0	453	4533
1.417	0.5	1.02	0.00	1.417	0	567	5667
1.700	0.6	0.72	0.00	1.700	0	680	6800
1.983	0.7	0.50	0.00	1.983	0	793	7933
2.267	0.8	0.35	0.00	2.267	0	907	9067
2.550	0.9	0.25	0.00	2.550	0	1020	10200
2.833	1	0.18	0.00	2.833	0	1133	11333

	Point	EFP	Total
RESULTANT FORCE in pounds (Ph) =	**0**	**1606**	**16056**
RESULTANT MOMENT ARM in feet (R) =	**0.00**	**0.95**	**0.95**
RESULTANT MOMENT @ BASE in foot-pounds (Mb) =	**0**	**1524**	**15239**
ACI DESIGN MOMENT in foot-pounds (Mu = 1.7Mb) =	**0**	**2591**	**25907**



FLSmidth	PROJECT Cripple Creek & Victor	Proj No.	11021	
		Calc No.		
	SUBJECT Footing Loads & Overturning	By	CCK	May-18-2012
	Spot Footing	Check		
	H,6	Sheet		of

FOOTING LOADS & OVERTURNING

Column Width (ft)	2	Soil Height Over Heel (ft)	14.8
Column Depth (ft)	3	Soil Height Over Toe (ft)	1
Column Height (ft)	12.33	Footing Width (ft)	10
Upper Wall Width (ft)	0.83	Footing Length (ft)	10
Upper Wall Height (ft)	2.17	Footing Thickness (ft)	2.0
Lower Wall Width (ft)	1.5	Soil Density (pcf)	120
Lower Wall Height (ft)	12.33	Concrete Density (pcf)	150
Wall Length (ft)	20	Upper Slab Surcharge (psf)	350
Upper Slab Thickness (in)	8		
Lower Slab Thickness (in)	8		

LOADS

Dead Loads	Vertical	Center-Line Eccentricity (ft)	Center-Line Moment (k-ft)	Footing Eccentricity (ft)	Over-Turning Moment (k-ft)	
Steel Frame	42.13	-0.42	-17.55	4.58	193.10	
Upper Wall	7.13	1.08	7.72	6.08	43.34	
Lower Wall	49.95	0.75	37.46	5.75	287.21	
Upper Slab	3.50	3.25	11.38	8.25	28.88	
Lower Slab	3.50	-3.25	-11.38	1.75	6.13	
Column	11.10	0.00	0.00	5.00	55.50	(Auto in ENERCALC)
Footing	30.00	0.00	0.00	5.00	150.00	(Auto in ENERCALC)
Heel Soil	62.30	3.25	202.48	8.25	513.98	
Toe Soil	2.80	-3.25	-9.10	1.75	4.90	
Upper Slab Surcharge	12.25	3.25	39.81	8.25	101.06	
ENERCALC Input	183.56		260.81			
Total	224.66		260.81		1384.09	

Lateral Earth Loads	Lateral	Height from Bottom (ft)	
Input Active Pressure	74.54	14.33	1068.46
Actual Active Pressure	90.60	3.30	298.98
Passive Pressure	-16.06	0.95	-15.25
ENERCALC Input	74.54		784.74

OVERTURNING

Overturning Moment	Load (k)	Moment Arm (ft)	
Seismic (from frame)	0.00	14.33	0.00
Earth (Active)	90.60	3.30	298.98
		0.6D+0.7E+H :	298.98
Resisting Moment			
Dead	-	-	1384.09
Seismic (from frame)	0	14.33	0.00
Earth (Passive)	16.06	0.95	15.25
		0.6D-0.7E+H :	845.71
Factor of Safety			2.83

FLSmidth Salt Lake City, Inc.
7158 South FLSmidth Dr.
Midvale, UT 8047

Title : CC & V HIGH GRADE
Engineer: Clint Karren
Project Desc.:

Job # 11021

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General Footing

File: P:\11021\116 - Calculations\116.d - Arch_Civil_Struc\C-006 Gravity Circuit Area Concrete\Gravity Circuit.ec6
ENERCALC, INC. 1983-2011, Build:6.12.5.17, Ver:6.11.8.31

Lic. # : KW-06000120 — Licensee : flsmidth centry

Description : Spot Footing H,6

General Information

Calculations per ACI 318-05, IBC 2006, CBC 2007, ASCE 7-05

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,605.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Include Pedestal Weight as DL	:	Yes

Soil Design Values

Allowable Soil Bearing	=	5.0 ksf
Increase Bearing By Footing Weight	=	Yes
Soil Passive Resistance (for Sliding)	=	400.0 pcf
Soil/Concrete Friction Coeff.	=	0.40

Increases based on footing Depth

Footing base depth below soil surface	=	3.330 ft
Allowable pressure increase per foot of deptl	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depl	=	ksf
when maximum length or width is greater	=	ft

Dimensions

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

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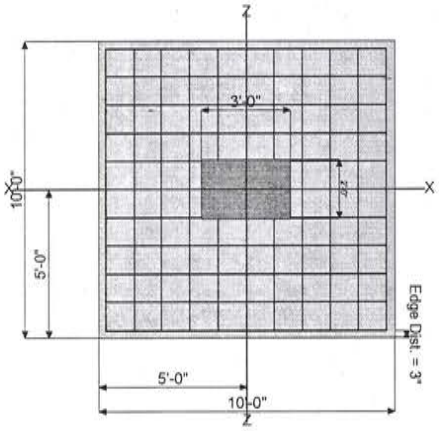
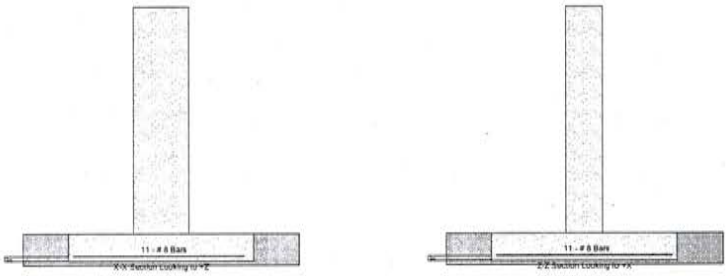
Pedestal dimensions...

px : parallel to X-X Axis	=	36.0 in
pz : parallel to Z-Z Axis	=	24.0 in
Height	=	148.0 in
Rebar Centerline to Edge of Concrete.. at Bottom of footing	=	3.0 in





Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	11.0
Reinforcing Bar Size	=	# 8
Bars parallel to Z-Z Axis		
Number of Bars	=	11.0
Reinforcing Bar Size	=	# 8

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	=	183.560		146.280			9.840		k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=	260.810						784.74	k-ft
V-x	=	-2.420		-14.750			-13.420	-74.540	k
V-z	=						-0.40		k

General Footing

Description : Spot Footing H,6

DESIGN SUMMARY

Design N.G.

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9888	Soil Bearing	4.944 ksf	5.0 ksf	+D+L+H
PASS	16.916	Overturning - X-X	38.313 k-ft	648.12 k-ft	0.6D-0.7E+H
FAIL	1.375	Overturning - Z-Z	1,181.17 k-ft	1,623.79 k-ft	0.6D+0.7E+H - Incorrect. See Spreadsheet
FAIL	0.8208	Sliding - X-X	85.386 k	70.085 k	0.6D+0.7E+H - Footing Braced by Slab.
PASS	230.623	Sliding - Z-Z	0.280 k	64.574 k	0.6D-0.7E+H
PASS	18.819	Uplift	6.888 k	129.624 k	+0.60D+0.70E+H
PASS	0.5021	Z Flexure (+X)	28.195 k-ft	56.159 k-ft	+1.20D+0.50L+0.20S-1.0E
PASS	0.7342	Z Flexure (-X)	41.230 k-ft	56.159 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.6655	X Flexure (+Z)	37.376 k-ft	56.159 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.6655	X Flexure (-Z)	37.376 k-ft	56.159 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.6201	1-way Shear (+X)	58.832 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.6201	1-way Shear (-X)	58.832 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.7661	1-way Shear (+Z)	72.675 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.7661	1-way Shear (-Z)	72.675 psi	94.868 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.7863	2-way Punching	149.195 psi	189.737 psi	+1.20D+0.50Lr+1.60L+1.60H

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress +Z	+Z	-X	-X	Actual / Allowable Ratio
X-X, +D	5.0	n/a	0.0	2.160	2.160	n/a	n/a	0.432
X-X, +D+L+H	5.0	n/a	0.0	3.623	3.623	n/a	n/a	0.725
X-X, +D+Lr+H	5.0	n/a	0.0	2.160	2.160	n/a	n/a	0.432
X-X, +D+S+H	5.0	n/a	0.0	2.160	2.160	n/a	n/a	0.432
X-X, +D+0.750Lr+0.750L+H	5.0	n/a	0.0	3.258	3.258	n/a	n/a	0.652
X-X, +D+0.750L+0.750S+H	5.0	n/a	0.0	3.258	3.258	n/a	n/a	0.652
X-X, +D+W+H	5.0	n/a	0.0	2.160	2.160	n/a	n/a	0.432
X-X, +D-1.0W+H	5.0	n/a	0.0	2.160	2.160	n/a	n/a	0.432
X-X, +1.030D+0.70E+H	5.0	n/a	-0.2026	2.317	2.271	n/a	n/a	0.463
X-X, +1.030D-0.70E+H	5.0	n/a	0.2156	2.133	2.179	n/a	n/a	0.436
X-X, +D+0.750Lr+0.750L+0.750W+H	5.0	n/a	0.0	3.258	3.258	n/a	n/a	0.652
X-X, +D+0.750Lr+0.750L-0.750W+H	5.0	n/a	0.0	3.258	3.258	n/a	n/a	0.652
X-X, +D+0.750L+0.750S+0.750W+H	5.0	n/a	0.0	3.258	3.258	n/a	n/a	0.652
X-X, +D+0.750L+0.750S-0.750W+H	5.0	n/a	0.0	3.258	3.258	n/a	n/a	0.652
X-X, +1.022D+0.750Lr+0.750L+0.5250	5.0	n/a	-0.1038	3.375	3.340	n/a	n/a	0.675
X-X, +1.022D+0.750Lr+0.750L-0.5250	5.0	n/a	0.1071	3.237	3.271	n/a	n/a	0.654
X-X, +D+0.750L+0.750S+0.5250E+H	5.0	n/a	-0.1053	3.326	3.292	n/a	n/a	0.665
X-X, +D+0.750L+0.750S-0.5250E+H	5.0	n/a	0.1087	3.189	3.223	n/a	n/a	0.645
X-X, +0.60D+W+H	5.0	n/a	0.0	1.296	1.296	n/a	n/a	0.259
X-X, +0.60D-1.0W+H	5.0	n/a	0.0	1.296	1.296	n/a	n/a	0.259
X-X, +0.5702D+0.70E+H	5.0	n/a	-0.3573	1.324	1.278	n/a	n/a	0.265
X-X, +0.5702D-0.70E+H	5.0	n/a	0.3997	1.140	1.186	n/a	n/a	0.237
Z-Z, +D	5.0	12.627	n/a	n/a	n/a	0.8146	3.506	0.701
Z-Z, +D+L+H	5.0	-7.389	n/a	n/a	n/a	4.944	2.302	0.989
Z-Z, +D+Lr+H	5.0	-1.059	n/a	n/a	n/a	2.273	2.048	0.455
Z-Z, +D+S+H	5.0	-1.059	n/a	n/a	n/a	2.273	2.048	0.455
Z-Z, +D+0.750Lr+0.750L+H	5.0	-6.340	n/a	n/a	n/a	4.276	2.239	0.855
Z-Z, +D+0.750L+0.750S+H	5.0	-6.340	n/a	n/a	n/a	4.276	2.239	0.855
Z-Z, +D+W+H	5.0	-1.059	n/a	n/a	n/a	2.273	2.048	0.455
Z-Z, +D-1.0W+H	5.0	-1.059	n/a	n/a	n/a	2.273	2.048	0.455
Z-Z, +1.030D+0.70E+H	5.0	-7.441	n/a	n/a	n/a	3.136	1.452	0.627
Z-Z, +1.030D-0.70E+H	5.0	6.549	n/a	n/a	n/a	1.459	2.853	0.571
Z-Z, +D+0.750Lr+0.750L+0.750W+H	5.0	-6.340	n/a	n/a	n/a	4.276	2.239	0.855
Z-Z, +D+0.750Lr+0.750L-0.750W+H	5.0	-6.340	n/a	n/a	n/a	4.276	2.239	0.855
Z-Z, +D+0.750L+0.750S+0.750W+H	5.0	-6.340	n/a	n/a	n/a	4.276	2.239	0.855
Z-Z, +D+0.750L+0.750S-0.750W+H	5.0	-6.340	n/a	n/a	n/a	4.276	2.239	0.855
Z-Z, +1.022D+0.750Lr+0.750L+0.5250	5.0	-9.453	n/a	n/a	n/a	4.923	1.792	0.985
Z-Z, +1.022D+0.750Lr+0.750L-0.5250	5.0	-2.565	n/a	n/a	n/a	3.666	2.842	0.733
Z-Z, +D+0.750L+0.750S+0.5250E+H	5.0	-9.775	n/a	n/a	n/a	4.905	1.713	0.981
Z-Z, +D+0.750L+0.750S-0.5250E+H	5.0	-2.794	n/a	n/a	n/a	3.648	2.764	0.730

General Footing

Description : Spot Footing H,6

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	+Z	Actual Soil Bearing Stress +Z	-X	-X	Actual / Allowable Ratio
Z-Z, +0.60D+W+H	5.0	-10.183	n/a	n/a	n/a	1.947	0.6451	0.389
Z-Z, +0.60D-1.0W+H	5.0	-10.183	n/a	n/a	n/a	1.947	0.6451	0.389
Z-Z, +0.5702D+0.70E+H	5.0	-22.763	n/a	n/a	n/a	2.774	0.0	0.555
Z-Z, +0.5702D-0.70E+H	5.0	1.359	n/a	n/a	n/a	1.085	1.241	0.248

Overturning Stability

- Incorrect See 'Footing Loads & Overturning' Spreadsheet

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D	None	0.0 k-ft	Infinity	OK
X-X, D+L+H	None	0.0 k-ft	Infinity	OK
X-X, 0.6D+0.7E+H	3.873 k-ft	682.56 k-ft	176.220	OK
X-X, 0.6D-0.7E+H	38.313 k-ft	648.12 k-ft	16.916	OK
Z-Z, D	260.810 k-ft	1,113.68 k-ft	4.270	OK
Z-Z, D+L+H	1,268.66 k-ft	2,857.15 k-ft	2.252	OK
Z-Z, 0.6D+0.7E+H	1,181.17 k-ft	1,623.79 k-ft	1.375	No Good!
Z-Z, 0.6D-0.7E+H	1,105.62 k-ft	1,699.34 k-ft	1.537	OK

Sliding Stability

- Footing Braced by Slab

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
X-X, D	-2.420 k	101.896 k	42.106	OK
X-X, D+L+H	-91.710 k	160.408 k	1.749	OK
X-X, 0.6D+0.7E+H	-85.386 k	70.085 k	0.8208	No Good!
X-X, 0.6D-0.7E+H	-66.598 k	64.574 k	0.9696	No Good!
Z-Z, D	0.0 k	101.896 k	No Sliding	OK
Z-Z, D+L+H	0.0 k	160.408 k	No Sliding	OK
Z-Z, 0.6D+0.7E+H	-0.280 k	70.085 k	250.303	OK
Z-Z, 0.6D-0.7E+H	0.280 k	64.574 k	230.623	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	21.76	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.40D	21.76	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	37.376	+Z	Bottom	0.57	Bending	0.87	56.159	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	37.376	-Z	Bottom	0.57	Bending	0.87	56.159	OK
X-X, +1.20D+1.60L+0.50S+1.60H	37.376	+Z	Bottom	0.57	Bending	0.87	56.159	OK
X-X, +1.20D+1.60L+0.50S+1.60H	37.376	-Z	Bottom	0.57	Bending	0.87	56.159	OK
X-X, +1.20D+1.60Lr+0.50L	24.503	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+1.60Lr+0.50L	24.503	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+1.60S	24.503	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+1.60S	24.503	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	24.503	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	24.503	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50Lr+0.50L-1.60W	24.503	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50Lr+0.50L-1.60W	24.503	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+0.50S+1.60W	24.503	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+0.50S+1.60W	24.503	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+0.50S-1.60W	24.503	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+0.50S-1.60W	24.503	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+0.20S+E	25.096	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+0.20S+E	25.485	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+0.20S-1.0E	23.911	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +1.20D+0.50L+0.20S-1.0E	23.521	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +0.90D+1.60W+1.60H	13.989	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +0.90D+1.60W+1.60H	13.989	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +0.90D-1.60W+1.60H	13.989	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +0.90D-1.60W+1.60H	13.989	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +0.90D+E+1.60H	14.581	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +0.90D+E+1.60H	14.971	-Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +0.90D-1.0E+1.60H	13.396	+Z	Bottom	0.39	Bending	0.87	56.159	OK
X-X, +0.90D-1.0E+1.60H	13.007	-Z	Bottom	0.39	Bending	0.87	56.159	OK

FLSmidth Salt Lake City, Inc.
7158 South FLSmidth Dr.
Midvale, UT 8047

Title : CC & V HIGH GRADE
Engineer: Clint Karren
Project Desc.:

Job # 11021

Printed: 18 MAY 2012, 3:43PM

General Footing

File: P:\11021\116 - Calculations\116.d - Arch_Civil_Struc\C-006 Gravity Circuit Area Concrete\Gravity Circuit.ec6
ENERCALC, INC. 1983-2011, Build:6.12.5.17, Ver:6.11.8.31

Lic. # : KW-06000120 — Licensee : flsmidth centry

Description : Spot Footing H,6

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.40D	7.694	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.40D	25.624	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	41.23	-X	Bottom	0.63	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	15.997	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	41.23	-X	Bottom	0.63	Bending	0.87	56.159	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	15.997	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+1.60Lr+0.50L	13.948	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+1.60Lr+0.50L	23.569	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+1.60S	13.948	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+1.60S	23.569	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50Lr+0.50L+1.60W	13.948	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50Lr+0.50L+1.60W	23.569	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50Lr+0.50L-1.60W	13.948	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50Lr+0.50L-1.60W	23.569	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	13.948	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	23.569	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+0.50S-1.60W	13.948	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+0.50S-1.60W	23.569	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+0.20S+E	19.78	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+0.20S+E	18.942	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+0.20S-1.0E	8.116	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +1.20D+0.50L+0.20S-1.0E	28.195	+X	Bottom	0.43	Bending	0.87	56.159	OK
Z-Z, +0.90D+1.60W+1.60H	16.051	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +0.90D+1.60W+1.60H	5.368	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +0.90D-1.60W+1.60H	16.051	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +0.90D-1.60W+1.60H	5.368	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +0.90D+E+1.60H	21.927	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +0.90D+E+1.60H	0.8209	+X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +0.90D-1.0E+1.60H	10.219	-X	Bottom	0.39	Bending	0.87	56.159	OK
Z-Z, +0.90D-1.0E+1.60H	9.994	+X	Bottom	0.39	Bending	0.87	56.159	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	34.253 psi	34.253 psi	42.312 psi	42.312 psi	42.312 psi	94.868 psi	0.446	OK
+1.20D+0.50Lr+1.60L+1.60H	58.832 psi	58.832 psi	72.675 psi	72.675 psi	72.675 psi	94.868 psi	0.7661	OK
+1.20D+1.60L+0.50S+1.60H	58.832 psi	58.832 psi	72.675 psi	72.675 psi	72.675 psi	94.868 psi	0.7661	OK
+1.20D+1.60Lr+0.50L	38.57 psi	38.57 psi	47.645 psi	47.645 psi	47.645 psi	94.868 psi	0.5022	OK
+1.20D+0.50L+1.60S	38.57 psi	38.57 psi	47.645 psi	47.645 psi	47.645 psi	94.868 psi	0.5022	OK
+1.20D+0.50Lr+0.50L+1.60W	38.57 psi	38.57 psi	47.645 psi	47.645 psi	47.645 psi	94.868 psi	0.5022	OK
+1.20D+0.50Lr+0.50L-1.60W	38.57 psi	38.57 psi	47.645 psi	47.645 psi	47.645 psi	94.868 psi	0.5022	OK
+1.20D+0.50L+0.50S+1.60W	38.57 psi	38.57 psi	47.645 psi	47.645 psi	47.645 psi	94.868 psi	0.5022	OK
+1.20D+0.50L+0.50S-1.60W	38.57 psi	38.57 psi	47.645 psi	47.645 psi	47.645 psi	94.868 psi	0.5022	OK
+1.20D+0.50L+0.20S+E	39.809 psi	39.809 psi	49.547 psi	48.804 psi	49.547 psi	94.868 psi	0.5223	OK
+1.20D+0.50L+0.20S-1.0E	37.33 psi	37.33 psi	45.742 psi	46.486 psi	46.486 psi	94.868 psi	0.49	OK
+0.90D+1.60W+1.60H	22.02 psi	22.02 psi	27.201 psi	27.201 psi	27.201 psi	94.868 psi	0.2867	OK
+0.90D-1.60W+1.60H	22.02 psi	22.02 psi	27.201 psi	27.201 psi	27.201 psi	94.868 psi	0.2867	OK
+0.90D+E+1.60H	23.259 psi	23.259 psi	29.103 psi	28.359 psi	29.103 psi	94.868 psi	0.3068	OK
+0.90D-1.0E+1.60H	20.78 psi	20.78 psi	25.298 psi	26.042 psi	26.042 psi	94.868 psi	0.2745	OK

Punching Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	86.863 psi	189.737 psi	0.4578	OK
+1.20D+0.50Lr+1.60L+1.60H	149.195 psi	189.737 psi	0.7863	OK
+1.20D+1.60L+0.50S+1.60H	149.195 psi	189.737 psi	0.7863	OK
+1.20D+1.60Lr+0.50L	97.81 psi	189.737 psi	0.5155	OK
+1.20D+0.50L+1.60S	97.81 psi	189.737 psi	0.5155	OK
+1.20D+0.50Lr+0.50L+1.60W	97.81 psi	189.737 psi	0.5155	OK
+1.20D+0.50Lr+0.50L-1.60W	97.81 psi	189.737 psi	0.5155	OK
+1.20D+0.50L+0.50S+1.60W	97.81 psi	189.737 psi	0.5155	OK
+1.20D+0.50L+0.50S-1.60W	97.81 psi	189.737 psi	0.5155	OK
+1.20D+0.50L+0.20S+E	100.953 psi	189.737 psi	0.5321	OK
+1.20D+0.50L+0.20S-1.0E	94.668 psi	189.737 psi	0.4989	OK
+0.90D+1.60W+1.60H	55.84 psi	189.737 psi	0.2943	OK

General Footing

Description : Spot Footing H,6

Punching Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D-1.60W+1.60H	55.84 psi	189.737 psi	0.2943	OK
+0.90D+E+1.60H	59.013 psi	189.737 psi	0.311	OK
+0.90D-1.0E+1.60H	52.698 psi	189.737 psi	0.2777	OK

View - Cases: 1 (Self Weight)