JOHNSTON BURKHOLDER ASSOCIATES
consulting structural engineers
930 CENTRAL · KANSAS CITY, MO 64105
816.421.4200 · WWW.JBAENGR.COM

JOB TITLE	Hy-Vee		
JOB NO.	20332	**SHEET NO.**	
CALCULATED BY	JSH	**DATE**	
CHECKED BY		**DATE**	

STRUCTURAL CALCULATIONS

FOR

Hy-Vee

ASI #8

Lee's Summit, MO

05/20/21

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PROJECT NAME:		
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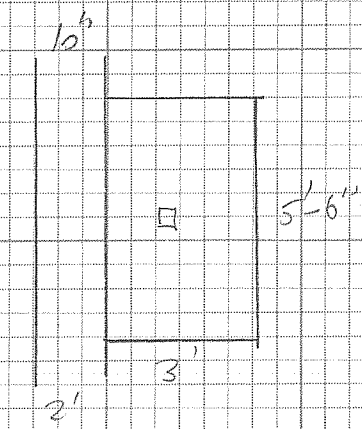
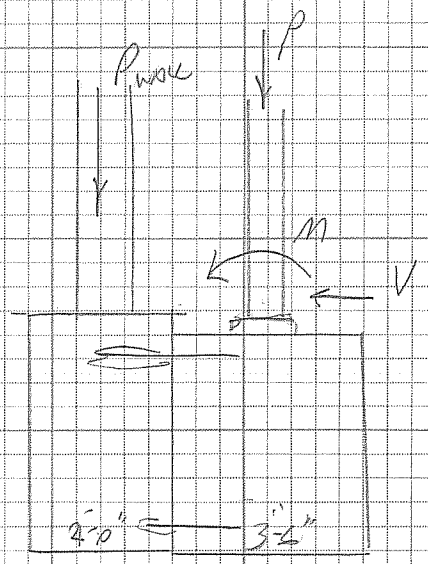
CHAPT FOOTING AT CMU WALL





FOOTING = 5'-6" x 5'-6" x 8'-0"

$M_{uL} = 11.62^{ft\text{-}k}$ (SERV)
$M_{EL} = 9.71^{ft\text{-}k}$ (SERV)
$V_{wL} = .06^{k}$ (SERV)
$V_{EL} = .05^{k}$ (SERV)
$\rho = 3.1$
$P_{SL} = 24.2^{k}$
$P_{uL} = 6.25$
$P_{wL} = 4.37$
$P_{WALL} = 150^{pcf}(21.4') = 1493^{plf}$

THICKENED KEYS:

$T_{wL} = 11.42^{ft\text{-}k}/2'\text{-}4\tfrac{1}{2}'' = .683^{k}$ (SERV)
$T_{EL} = .56^{k}/6 = .093^{k}$ (SERV)
$T_{SL} = 24.2^{k}(1'\text{-}5'')/2'\text{-}10''/6 = 2^{k}$
$T_{DL} = 3.1^{k}(1'\text{-}5'')/2'\text{-}10''/6 = .258^{k}$
$T_{LL} = 6.25^{k}(1'\text{-}5'')/2'\text{-}10''/6 = .52^{k}$

#5 AT 12" o.c.

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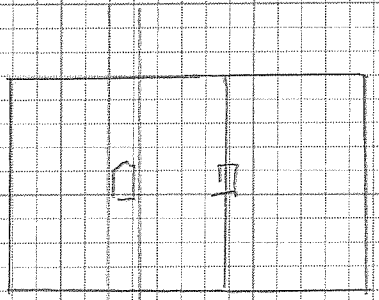
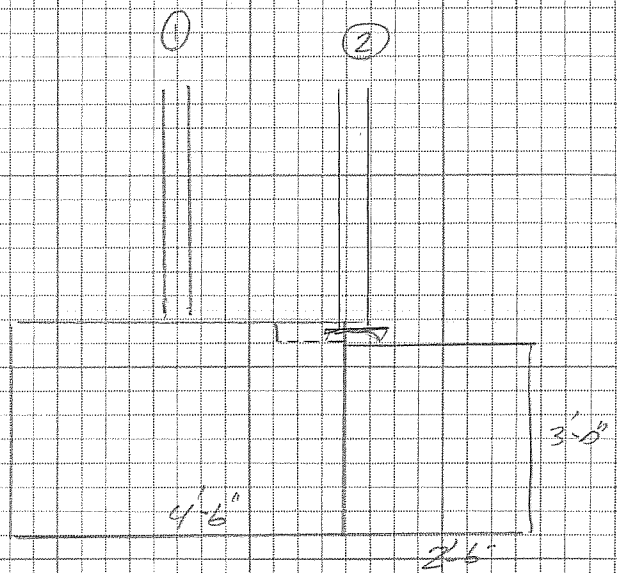
GRADE BEAM AT CANOPY FOOTING





FOOTING: 7'-0" × 7'-0" × 3'-0"

(1) $P_{DL} = 10.9^k$
$P_{LL} = 10.9^k$
$P_u = 10.9^k$
$P_{BEAM WT} = 149\ p/f (9'-6") = 6.7^k$

(2) $M_{WL} = 11.62^{ft-k}$ (SJFRV)
$M_{EL} = 9.71^{ft-k}$ (SFRV)
$V_{WL} = .56^k$ (SJFRV)
$V_{EL} = .57^k$ (SFRV)
$P_{DL} = 3.1^k$
$P_{LL} = 24.2^k$
$P_{LL} = 6.25^k$
$P_{WL} = -4.37^k$

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 20 MAY 2021, 3:01PM

Combined Footing

File: canopy footings.ec6

Lic. # : KW-06001782

JOHNSTON - BURKHOLDER

DESCRIPTION: Footing At Existing Column Footing

Code References

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

General Information

Material Properties

f'c : Concrete 28 day strength		3.0 ksi
fy : Rebar Yield		60.0 ksi
Ec : Concrete Elastic Modulus		3,122.0 ksi
Concrete Density		145.0 pcf
ϕ : Phi Values	Flexure :	0.90
	Shear :	0.750

Analysis/Design Settings

Calculate footing weight as dead load ?	Yes
Calculate Pedestal weight as dead load ?	No
Min Steel % Bending Reinf (based on 'd')	
Min Allow % Temp Reinf (based on thick)	0.00180
Min. Overturning Safety Factor	1.0: 1
Min. Sliding Safety Factor	1.0: 1

Soil Information

Allowable Soil Bearing	2.0 ksf
Increase Bearing By Footing Weight	No
Soil Passive Sliding Resistance	250.0 pcf
(Uses entry for "Footing base depth below soil surface" for force)	
Coefficient of Soil/Concrete Friction	0.30

Soil Bearing Increase

Footing base depth below soil surface	ft
Increases based on footing Depth	
Allowable pressure increase per foot	ksf
when base of footing is below	ft
Increases based on footing Width . . .	
Allowable pressure increase per foot	ksf
when maximum length or width is greater than	ft
Maximum Allowed Bearing Pressure	10.0 ksf
(A value of zero implies no limit)	
Adjusted Allowable Soil Bearing	2.0 ksf
(Allowable Soil Bearing adjusted for footing weight and depth & width increases as specified by user.)	

Dimensions & Reinforcing

Distance Left of Column #1	=	2.250 ft
Between Columns	=	2.416 ft
Distance Right of Column #2	=	2.334 ft
Total Footing Length	=	7.0 ft
Footing Width	=	7.0 ft
Footing Thickness	=	36.0 in
Rebar Center to Concrete Edge @ Top	=	3.0 in
Rebar Center to Concrete Edge @ Bottom	=	3.0 in

Pedestal dimensions...

		Col #1	Col #2	
Sq. Dim.	=			in
Height	=			in

	Count	Size #	As Provided	As Req'd
Bars left of Col #1				
Bottom Bars	3.0	5	0.930	5.443 in^2
Top Bars	3.0	5	0.930	0.0 in^2
Bars Btwn Cols				
Bottom Bars	3.0	5	0.930	5.443 in^2
Top Bars	3.0	5	0.930	5.443 in^2
Bars Right of Col #2				
Bottom Bars	3.0	5	0.930	5.443 in^2
Top Bars	3.0	5	0.930	0.0 in^2

Applied Loads

Applied @ Left Column		D	Lr	L	S	W	E	H	
Axial Load Downward	=	17.60		10.90	10.90				k
Moment (+CW)	=								k-ft
Shear (+X)	=								k
Applied @ Right Column									
Axial Load Downward	=	3.10	6.250		24.20	-7.30			k
Moment (+CW)	=					19.40	13.90		k-ft
Shear (+X)	=					0.930	0.820		k
Overburden	=								

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Project Title:
Engineer:
Project ID:
Project Descr:

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Combined Footing

File: canopy footings.ec6

Lic. # : KW-06001782 JOHNSTON - BURKHOLDER

DESCRIPTION: Footing At Existing Column Footing

DESIGN SUMMARY

Design OK

Factor of Safety		Item	Applied	Capacity	Governing Load Combination
PASS	4.217	Overturning	23.537 k-ft	99.263 k-ft	+0.60D+0.60W+0.60H
PASS	11.198	Sliding	0.5580 k	6.249 k	+0.60D+0.60W+0.60H
PASS	5.755	Uplift	4.380 k	25.209 k	+0.60D+0.60W+0.60H

Utilization Ratio		Item	Applied	Capacity	Governing Load Combination
PASS	0.9348	Soil Bearing	1.870 ksf	2.0 ksf	+D+0.750L+0.750S+H
PASS	0.05460	1-way Shear - Col #1	4.486 psi	82.158 psi	+1.20D+0.50Lr+L+W+1.60H
PASS	0.05460	1-way Shear - Col #2	4.486 psi	82.158 psi	+1.20D+0.50Lr+L+W+1.60H
PASS	0.04849	2-way Punching - Col #1	7.968 psi	164.317 psi	+1.20D+L+1.60S+1.60H
PASS	0.05085	2-way Punching - Col #2	8.355 psi	164.317 psi	+1.20D+1.60L+0.50S+1.60H
PASS	No Bending	Flexure - Left of Col #1 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.2590	Flexure - Left of Col #1 - Bottom	35.622 k-ft	137.560 k-ft	+1.20D+L+1.60S+1.60H
PASS	0.1339	Flexure - Between Cols - Top	-18.415 k-ft	137.560 k-ft	+0.90D+W+1.60H
PASS	0.3062	Flexure - Between Cols - Bottom	42.125 k-ft	137.560 k-ft	+1.20D+1.60S-0.50W+1.60H
PASS	No Bending	Flexure - Right of Col #2 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.2331	Flexure - Right of Col #2 - Bottom	32.060 k-ft	137.560 k-ft	+1.20D+L+1.60S+1.60H

Soil Bearing

Load Combination...	Total Bearing	Eccentricity from Ftg CL	Actual Soil Bearing Stress @ Left Edge	@ Right Edge	Allowable	Actual / Allow Ratio
+D+H	42.02 k	-0.438 ft	1.18 ksf	0.54 ksf	2.00 ksf	0.589
+D+L+H	52.92 k	-0.605 ft	1.64 ksf	0.52 ksf	2.00 ksf	0.819
+D+Lr+H	48.27 k	-0.230 ft	1.18 ksf	0.79 ksf	2.00 ksf	0.589
+D+S+H	77.12 k	-0.049 ft	1.64 ksf	1.51 ksf	2.00 ksf	0.820
+D+0.750Lr+0.750L+H	54.88 k	-0.422 ft	1.52 ksf	0.72 ksf	2.00 ksf	0.762
+D+0.750L+0.750S+H	76.52 k	-0.231 ft	1.87 ksf	1.25 ksf	2.00 ksf	0.935
+D+0.60W+H	37.64 k	-0.270 ft	0.95 ksf	0.59 ksf	2.00 ksf	0.473
+D+0.750Lr+0.750L+0.450W+H	51.59 k	-0.329 ft	1.35 ksf	0.76 ksf	2.00 ksf	0.675
+D+0.750L+0.750S+0.450W+H	73.23 k	-0.157 ft	1.70 ksf	1.29 ksf	2.00 ksf	0.848
+0.60D+0.60W+0.60H	20.83 k	-0.136 ft	0.47 ksf	0.38 ksf	2.00 ksf	0.237
+D+0.70E+0.60H	42.02 k	-0.165 ft	0.98 ksf	0.74 ksf	2.00 ksf	0.489
+D+0.750L+0.750S+0.5250E+H	76.52 k	-0.119 ft	1.72 ksf	1.40 ksf	2.00 ksf	0.860
+0.60D+0.70E+H	25.21 k	0.017 ft	0.51 ksf	0.52 ksf	2.00 ksf	0.261

Overturning Stability

Load Combination...	Moments about Left Edge k-ft Overturning	Resisting	Ratio	Moments about Right Edge k-ft Overturning	Resisting	Ratio
+D+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+L+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+Lr+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+S+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.750Lr+0.750L+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.750L+0.750S+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.60W+H	20.44	141.98	6.947	23.54	165.44	7.029
+D+0.750Lr+0.750L+0.450W+H	15.33	178.92	11.673	17.65	215.21	12.191
+D+0.750L+0.750S+0.450W+H	15.33	260.13	16.971	17.65	285.46	16.171
+0.60D+0.60W+0.60H	20.44	90.51	4.429	23.54	99.26	4.217
+D+0.70E+0.60H	0.00	0.00	999.000	11.45	165.44	14.446
+D+0.750L+0.750S+0.5250E+H	0.00	0.00	999.000	8.59	285.46	33.236
+0.60D+0.70E+H	0.00	0.00	999.000	11.45	99.26	8.668

Sliding Stability

Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio
+D+H	0.00 k	12.60 k	999
+D+L+H	0.00 k	15.87 k	999
+D+Lr+H	0.00 k	14.48 k	999
+D+S+H	0.00 k	23.13 k	999
+D+0.750Lr+0.750L+H	0.00 k	16.46 k	999
+D+0.750L+0.750S+H	0.00 k	22.95 k	999

Combined Footing

DESCRIPTION: Footing At Existing Column Footing

Sliding Stability

Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio
+D+0.60W+H	0.56 k	11.29 k	20.234
+D+0.750Lr+0.750L+0.450W+H	0.42 k	15.48 k	36.984
+D+0.750L+0.750S+0.450W+H	0.42 k	21.97 k	52.495
+0.60D+0.60W+0.60H	0.56 k	6.25 k	11.198
+D+0.70E+0.60H	0.57 k	12.60 k	21.959
+D+0.750L+0.750S+0.5250E+H	0.43 k	22.95 k	53.321
+0.60D+0.70E+H	0.57 k	7.56 k	13.175

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Combined Footing

File: canopy footings.ec6

Lic. # : KW-06001782

JOHNSTON - BURKHOLDER

DESCRIPTION: Typical Footing At CMU Wall

Code References

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

General Information

Material Properties

f'c : Concrete 28 day strength		3.0 ksi
fy : Rebar Yield		60.0 ksi
Ec : Concrete Elastic Modulus		3,122.0 ksi
Concrete Density		145.0 pcf
ϕ : Phi Values	Flexure :	0.90
	Shear :	0.750

Analysis/Design Settings

Calculate footing weight as dead load ?	Yes
Calculate Pedestal weight as dead load ?	No
Min Steel % Bending Reinf (based on 'd')	
Min Allow % Temp Reinf (based on thick)	0.00180
Min. Overturning Safety Factor	1.0: 1
Min. Sliding Safety Factor	1.0: 1

Soil Information

Allowable Soil Bearing	2.0 ksf
Increase Bearing By Footing Weight	No
Soil Passive Sliding Resistance	250.0 pcf
(Uses entry for "Footing base depth below soil surface" for force)	
Coefficient of Soil/Concrete Friction	0.30

Soil Bearing Increase

Footing base depth below soil surface	ft
Increases based on footing Depth	
Allowable pressure increase per foot	ksf
when base of footing is below	ft
Increases based on footing Width . . .	
Allowable pressure increase per foot	ksf
when maximum length or width is greater than	ft
Maximum Allowed Bearing Pressure	10.0 ksf
(A value of zero implies no limit)	
Adjusted Allowable Soil Bearing	2.0 ksf
(Allowable Soil Bearing adjusted for footing weight and depth & width increases as specified by user.)	

Dimensions & Reinforcing

Distance Left of Column #1	=	1.0 ft
Between Columns	=	2.0 ft
Distance Right of Column #2	=	2.50 ft
Total Footing Length	=	5.50 ft
Footing Width	=	5.50 ft
Footing Thickness	=	36.0 in
Rebar Center to Concrete Edge @ Top	=	3.0 in
Rebar Center to Concrete Edge @ Bottom	=	3.0 in

Pedestal dimensions...

		Col #1	Col #2	
Sq. Dim.	=			in
Height	=			in

	Count	Size #	As Provided	As Req'd
Bars left of Col #1				
Bottom Bars	3.0	5	0.930	4.277 in^2
Top Bars	3.0	5	0.930	0.0 in^2
Bars Btwn Cols				
Bottom Bars	3.0	5	0.930	4.277 in^2
Top Bars	3.0	5	0.930	4.277 in^2
Bars Right of Col #2				
Bottom Bars	3.0	5	0.930	4.277 in^2
Top Bars	3.0	5	0.930	4.277 in^2

Applied Loads

Applied @ Left Column		D	Lr	L	S	W	E	H	
Axial Load Downward	=	8.20							k
Moment (+CW)	=								k-ft
Shear (+X)	=								k
Applied @ Right Column									
Axial Load Downward	=	3.10	6.250		24.20	-7.30			k
Moment (+CW)	=					19.40	13.90		k-ft
Shear (+X)	=					0.930	0.820		k
Overburden	=								

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Combined Footing

File: canopy footings.ec6

Lic. # : KW-06001782
JOHNSTON - BURKHOLDER

DESCRIPTION: Typical Footing At CMU Wall

DESIGN SUMMARY

Design OK

Factor of Safety		Item	Applied	Capacity	Governing Load Combination
PASS	1.999	Overturning	24.264 k-ft	48.502 k-ft	+0.60D+0.60W+0.60H
PASS	5.535	Sliding	0.5580 k	3.089 k	+0.60D+0.60W+0.60H
PASS	3.351	Uplift	4.380 k	14.675 k	+0.60D+0.60W+0.60H

Utilization Ratio		Item	Applied	Capacity	Governing Load Combination
PASS	0.9396	Soil Bearing	1.879 ksf	2.0 ksf	+D+S+H
PASS	0.06013	1-way Shear - Col #1	4.940 psi	82.158 psi	+1.20D+L+1.60S+1.60H
PASS	0.06013	1-way Shear - Col #2	4.940 psi	82.158 psi	+1.20D+L+1.60S+1.60H
PASS	0.01257	2-way Punching - Col #1	2.065 psi	164.317 psi	+1.20D+0.50Lr+L+W+1.60H
PASS	0.01117	2-way Punching - Col #2	1.835 psi	164.317 psi	+1.40D+1.60H
PASS	0.003534	Flexure - Left of Col #1 - Top	-0.4856 k-ft	137.411 k-ft	+0.90D+W+1.60H
PASS	0.03758	Flexure - Left of Col #1 - Bottom	5.164 k-ft	137.411 k-ft	+1.20D+L+1.60S+1.60H
PASS	0.1236	Flexure - Between Cols - Top	-16.978 k-ft	137.411 k-ft	+0.90D+W+1.60H
PASS	0.1922	Flexure - Between Cols - Bottom	26.407 k-ft	137.411 k-ft	+1.20D+L+1.60S+1.60H
PASS	0.001840	Flexure - Right of Col #2 - Top	-0.2528 k-ft	137.411 k-ft	+1.40D+1.60H
PASS	0.2089	Flexure - Right of Col #2 - Bottom	28.70 k-ft	137.411 k-ft	+1.20D+1.60S+0.50W+1.60H

Soil Bearing

Load Combination...	Total Bearing	Eccentricity from Ftg CL	Actual Soil Bearing Stress @ Left Edge	@ Right Edge	Allowable	Actual / Allow Ratio
+D+H	24.46 k	-0.555 ft	1.30 ksf	0.32 ksf	2.00 ksf	0.648
+D+L+H	24.46 k	-0.555 ft	1.30 ksf	0.32 ksf	2.00 ksf	0.648
+D+Lr+H	30.71 k	-0.391 ft	1.45 ksf	0.58 ksf	2.00 ksf	0.724
+D+S+H	48.66 k	-0.155 ft	1.88 ksf	1.34 ksf	2.00 ksf	0.940
+D+0.750Lr+0.750L+H	29.15 k	-0.426 ft	1.41 ksf	0.52 ksf	2.00 ksf	0.705
+D+0.750L+0.750S+H	42.61 k	-0.212 ft	1.73 ksf	1.08 ksf	2.00 ksf	0.867
+D+0.60W+H	20.08 k	-0.068 ft	0.71 ksf	0.61 ksf	2.00 ksf	0.356
+D+0.750Lr+0.750L+0.450W+H	25.86 k	-0.125 ft	0.97 ksf	0.74 ksf	2.00 ksf	0.486
+D+0.750L+0.750S+0.450W+H	39.32 k	0.003 ft	1.30 ksf	1.30 ksf	2.00 ksf	0.652
+0.60D+0.60W+0.60H	10.30 k	0.396 ft	0.19 ksf	0.49 ksf	2.00 ksf	0.243
+D+0.70E+0.60H	24.46 k	-0.087 ft	0.88 ksf	0.73 ksf	2.00 ksf	0.442
+D+0.750L+0.750S+0.5250E+H	42.61 k	-0.011 ft	1.42 ksf	1.39 ksf	2.00 ksf	0.712
+0.60D+0.70E+H	14.68 k	0.225 ft	0.37 ksf	0.60 ksf	2.00 ksf	0.302

Overturning Stability

Load Combination...	Moments about Left Edge k-ft Overturning	Resisting	Ratio	Moments about Right Edge k-ft Overturning	Resisting	Ratio
+D+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+L+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+Lr+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+S+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.750Lr+0.750L+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.750L+0.750S+H	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.60W+H	13.14	67.00	5.099	24.26	80.84	3.332
+D+0.750Lr+0.750L+0.450W+H	9.86	77.73	7.888	18.20	92.56	5.086
+D+0.750L+0.750S+0.450W+H	9.86	118.12	11.986	18.20	126.21	6.935
+0.60D+0.60W+0.60H	13.14	45.53	3.465	24.26	48.50	1.999
+D+0.70E+0.60H	0.00	0.00	999.000	11.45	80.84	7.059
+D+0.750L+0.750S+0.5250E+H	0.00	0.00	999.000	8.59	126.21	14.695
+0.60D+0.70E+H	0.00	0.00	999.000	11.45	48.50	4.235

Sliding Stability

Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio
+D+H	0.00 k	7.34 k	999
+D+L+H	0.00 k	7.34 k	999
+D+Lr+H	0.00 k	9.21 k	999
+D+S+H	0.00 k	14.60 k	999
+D+0.750Lr+0.750L+H	0.00 k	8.74 k	999
+D+0.750L+0.750S+H	0.00 k	12.78 k	999

Combined Footing

DESCRIPTION: Typical Footing At CMU Wall

Sliding Stability

Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio
+D+0.60W+H	0.56 k	6.02 k	10.795
+D+0.750Lr+0.750L+0.450W+H	0.42 k	7.76 k	18.539
+D+0.750L+0.750S+0.450W+H	0.42 k	11.80 k	28.189
+0.60D+0.60W+0.60H	0.56 k	3.09 k	5.535
+D+0.70E+0.60H	0.57 k	7.34 k	12.783
+D+0.750L+0.750S+0.5250E+H	0.43 k	12.78 k	29.693
+0.60D+0.70E+H	0.57 k	4.40 k	7.67