CAP DESIGN

CAP DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design

Units: US

Pier View: Upstation.

DESIGN PARAMETERS

f'c = 3500.0 psi	
Fy flex = 60000.0 psi	Fy shear = 60000.0 psi
phi flex = 0.90	phi shear = 0.85
Ec = 3586.6 ksi	Es = 29000.0 ksi
crack control factor z = 170.00 kips / in	
Concrete Type : Normal Weight.	
Design of cap at face of column.	

CAP GEOMETRY

Variable Cap : Length(X) = 43.25 ft Depth(Z) = 72.00 in

Cap Section Properties

Sec.	Area ft ^2	Ixx in ^4	Izz in ^4
1	24.00	1492992.00	663552.00
2	60.00	3732480.00	10368000.00
3	60.00	3732480.00	10368000.00
4	24.00	1492992.00	663552.00

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	# 11	17	3.45	26.520	0.00	43.25	Both
	# 11	17	6.98	26.520	0.00	43.25	Both
BOTTOM							
	# 11	4	3.45	6.240	0.00	13.60	Left
	# 11	4	3.45	6.240	8.33	24.41	None
	# 11	4	3.45	6.240	19.14	43.25	Right

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
0.00	2.27	# 6	4	18.00	14.08
2.27	14.62	# 6	4	24.00	10.56
14.62	17.21	# 6	4	12.00	21.12
17.21	32.15	# 6	4	6.00	42.24
32.15	43.25	# 6	4	18.00	14.08

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 14.62 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn kips-ft	Comb	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
2.3	2.3	67	15.4	1767.1	828	0.07	6.24	5.94	0.00	53.04	50.52
			-44.3	-12676.9	823	0.00	6.24	5.94	0.21	53.04	50.52

Span 2: From 14.62 ft To 43.25 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn kips-ft	Comb	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
6.0	20.6	120	0.0	3335.1	0	0.00	12.48	6.24	0.00	53.04	53.04
			-22881.4	-26058.7	814	0.00	12.48	10.13	46.99	53.04	53.04
10.1	24.7	107	0.0	2972.7	0	0.00	6.24	6.24	0.00	53.04	53.04
			-14722.3	-22825.4	814	0.00	6.24	6.24	33.67	53.04	53.04
17.5	32.2	83	0.0	2305.2	0	0.00	6.24	6.24	0.00	53.04	53.04
			-4903.8	-17151.5	814	0.00	6.24	6.24	14.32	53.04	53.04
25.0	39.6	60	0.0	1637.7	0	0.00	6.24	6.24	0.00	53.04	53.04
			-64.4	-11477.6	828	0.00	6.24	6.24	0.35	53.04	53.04

SHEAR AND TORSION DESIGN

Span 1: From 0.00 ft To 14.62 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alt in^2
2.27	2.27	L	12.7	799	0.0	0	447.0	350.4	0.00	0.00	0.00	14.08	0.00
		R	505.5	813	72.7	1414	447.0	350.4	0.72	0.00	0.72	10.56	0.00

Span 2: From 14.62 ft To 43.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alt in^2
6.00	20.63	L	2034.5	814	484.5	1413	831.2	814.6	2.47	0.00	2.47	42.24	0.00
		R	2034.5	814	484.5	1413	831.2	814.6	2.47	0.00	2.47	42.24	0.00
10.06	24.68	L	1989.6	814	253.2	1408	737.7	695.6	2.89	0.00	2.89	42.24	0.00
		R	1349.1	814	166.2	1408	737.7	695.6	1.41	0.00	1.41	42.24	0.00
17.53	32.15	L	1279.7	814	166.2	1408	565.6	485.5	2.15	0.00	2.15	42.24	0.00
		R	677.9	814	83.6	1408	565.6	485.5	0.72	0.00	0.72	14.08	0.00
25.00	39.62	L	625.8	814	83.6	1408	393.5	292.8	1.01	0.00	1.01	14.08	0.00
		R	19.0	799	0.0	0	393.5	292.8	0.00	0.00	0.00	14.08	0.00

Shear and Torsion Design : Notes

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED flexural steel.

CRACKING/FATIGUE CHECK

Span 1: From 0.00 ft To 14.62 ft

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
2.27	2.3	66.9	0.1	0.00	25	0.0	0.00
			0.4	0.02	30	0.0	0.00

Span 2: From 14.62 ft To 43.25 ft

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
6.00	20.6	120.0	36.5	1.01 *	16	6.1	0.38
			0.0	0.00	0	0.0	0.00
10.06	24.7	107.1	26.7	0.74	16	4.4	0.24

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
			0.0	0.00	0	0.0	0.00
17.53	32.2	83.3	11.7	0.33	16	2.0	0.09
			0.0	0.00	0	0.0	0.00
25.00	39.6	59.6	0.2	0.01	30	0.0	0.00
			0.0	0.00	0	0.0	0.00

Cracking and fatigue Check : Notes

* Cracking / fatigue checking failed.

Column Design

COLUMN DESIGN - Column: 1

Code: AASHTO STANDARD (17th Edition 2002) - Factored Load Design

Units: US

Pier View: Upstation.

Design/Analysis Method: Moment Magnification - Unbraced Column.

Column Type: Rectangular 144.00 x 72.00 in

Column Section Properties

Sec.	Area ft^2	Ixx in^4	Izz in^4
1	72.00	4478976.00	17915904.00

DESIGN PARAMETERS

f'c = 3500.0 psi	fy = 60000.0 psi
phi flex = 0.90	phi axial = 0.70
Ec = 3586.6 ksi	Es = 29000 ksi

Concrete Type : Normal Weight.

Reinforcement

Rebar Pattern: Rectangular

Rebar Orientation: Face Parallel

Reinforcement Schedule

Layer	Dir	Size	No. bars	Bar Dist. in
1	X	11	23	3.20
1	Z	11	13	3.20

Reinforcement summary

Main bars summary:

68 # 11 bars

Total number of bars in the column: 68

Ties size: # 3

Moment Magnification calculation - Mx (global)

Loc ft	Comb	K	Cm	Beta	Delta B	Delta S	pPc kips
50.00	31C	3.4219	1.0000	0.8022	----	2.6793	6340.74
98.00	31C	3.4219	1.0000	0.7697	----	2.1208	6457.36
50.00	1205C	3.4219	1.0000	0.1005	----	1.5149	10384.02
98.00	1205C	3.4219	1.0000	0.8302	----	1.9185	6243.75

Moment Magnification calculation - Mz (global)

Loc ft	Comb	K	Cm	Beta	Delta B	Delta S	pPc kips
50.00	31C	3.4219	1.0000	0.5709	----	1.1582	29097.37
98.00	31C	3.4219	1.0000	0.5709	----	1.1329	29097.37
50.00	1205C	3.4219	1.0000	0.6635	----	1.1474	27478.05
98.00	1205C	3.4219	1.0000	0.7431	----	1.1287	26222.87

Design values used after Moment Magnification (e-min effect included).

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
50.00	31C	-0.0	3974.1	0.0	2449.0	0.0	34078.1
98.00	31C	-0.0	3412.5	0.0	-1664.6	-0.0	-33332.9
50.00	1205C	-56.3	3529.3	133.6	10629.6	-819.3	27932.0
98.00	1205C	52.0	2989.3	-129.3	-1342.3	-819.3	-24532.6

COLUMN DESIGN

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
50.00	1205C	3529.3	10629.6	27932.0	30706.1	69.17	1.00	1.02743
98.00	31C	3412.5	1664.6	33332.9	36791.0	87.14	1.00	1.10237

COLUMN DESIGN

Bot/Top Elev. ft	Comb	As_min in^2	As_max in^2	As_req in^2
50.00	1205C	103.68	829.44	106.08
98.00	31C	103.68	829.44	106.08

K values for all columns used in unbraced moment magnification

Column	Kx	Kz

Column	Kx	Kz
1	3.42	3.42

Column Design : Notes

Min reinforcement = 1.0000 % of Ag = 103.68 in^2.

For layer 1, direction X: Minimum bar distance is: 1.41 in. Effective bar distance is: 4.84 in.

For layer 1, direction Z: Minimum bar distance is: 1.41 in. Effective bar distance is: 4.06 in.

---- Values do not exist at that location as computation is done at the top and bottom of clear length of column.

ISOLATED FOOTING DESIGN

ISOLATED FOOTING DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View: Upstation.

GEOMETRY

Name : FTG03
Shape : Rectangular, Type : Pile/Shaft Cap
Bf(X) = 25.00 ft, Hf(Z) = 20.00 ft, Thickness(Y) = 72.00 in
Ag = 500.00 ft^2, Ix = 903.13 ft^2, Iz = 1512.50 ft^2
Footing eccentric: Start at X = -8.00 ft from centerline of column.
Footing eccentric: Start at Z = -10.00 ft from centerline of column.
Columns located on the footing:
Column No. 1 at x = 0.00 ft, Rectangular 144.00 in x 72.00 in
Surcharge = 0.30 ksf
Piles: Chamfer Size: W = 13.83 in, D = 14.69 in, T1 = 0.62 in, T2 = 0.00 in
Service Capacity: 234.00 kips Factored Capacity: 328.00 kips
Piles Section Properties: Area = 0.18 ft^2 Ix = 904.00 in^4 Iz = 326.00 in^4

DESIGN PARAMETERS

f'c = 3500.00 psi	fy = 60000.00 psi
phi flex = 0.90	phi shear = 0.85
Ec = 3586.6 ksi	Es = 29000.0 ksi
Crack control factor z = 130.00 kips/in	
Concrete Type : Normal Weight.	

Pile Reactions, Service (Without the reduction of overstress allowance)

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
1	-6.50	-1.50	18.00	-102.0	299	1.400	-2331.32	-3859.93	-6774.74	180.61
					314	1.400	-2573.52	3710.57	-19069.32	37.56
2	-1.00	-1.50	84.00	-102.0	616	1.400	-2683.62	-5511.06	-13986.96	176.27
					553	1.400	-2683.62	5346.33	-16581.67	64.64
3	4.50	-1.50	150.00	-102.0	607	1.400	-2764.54	-5768.58	-17893.82	188.87
					318	1.400	-2452.42	5862.97	-11148.56	66.92
4	10.00	-1.50	216.00	-102.0	603	1.400	-2764.54	-5598.28	-18842.58	210.55
					317	1.400	-2452.42	5435.29	-9801.72	66.45
5	15.50	-1.50	282.00	-102.0	591	1.400	-2764.54	-5382.18	-19167.39	**234.16***
					304	1.400	-2331.32	3720.97	-6774.74	55.21

Bentley	Tampa	Sheet #	DS-2
		Job #	100010194
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DRB
Version: Version: 09.00.01	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Oct/27/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: **I-75 PPI Bridge 13**		Date	

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
6	-6.50	-5.75	18.00	-51.0	299	1.400	-2331.32	-3859.93	-6774.74	162.44
					314	1.400	-2573.52	3710.57	-19069.32	55.02
7	-1.00	-5.75	84.00	-51.0	700	1.400	-2683.62	-4352.93	-11230.16	154.91
					314	1.400	-2573.52	3710.57	-19069.32	82.25
8	4.50	-5.75	150.00	-51.0	607	1.400	-2764.54	-5768.58	-17893.82	161.73
					318	1.400	-2452.42	5862.97	-11148.56	94.51
9	10.00	-5.75	216.00	-51.0	591	1.400	-2764.54	-5382.18	-19167.39	184.37
					304	1.400	-2331.32	3720.97	-6774.74	86.23
10	15.50	-5.75	282.00	-51.0	591	1.400	-2764.54	-5382.18	-19167.39	208.83
					304	1.400	-2331.32	3720.97	-6774.74	72.72
11	-6.50	-10.00	18.00	0.0	22	1.500	-2914.82	-194.06	-11835.39	149.91
					30	1.250	-2573.52	-79.87	-19069.32	72.48
12	-1.00	-10.00	84.00	0.0	22	1.500	-2914.82	-194.06	-11835.39	145.25
					30	1.250	-2573.52	-79.87	-19069.32	99.71
13	4.50	-10.00	150.00	0.0	13	1.500	-3076.66	-235.84	-19105.13	147.07
					25	1.250	-2331.32	-69.48	-6774.74	117.25
14	10.00	-10.00	216.00	0.0	21	1.500	-3076.66	-235.84	-19631.57	168.11
					25	1.250	-2331.32	-69.48	-6774.74	103.74
15	15.50	-10.00	282.00	0.0	16	1.500	-2914.82	-194.06	-20349.33	193.19
					25	1.250	-2331.32	-69.48	-6774.74	90.23
16	-6.50	-14.25	18.00	51.0	304	1.400	-2331.32	3720.97	-6774.74	161.79
					309	1.400	-2573.52	-3870.32	-19069.32	54.27
17	-1.00	-14.25	84.00	51.0	533	1.400	-2683.62	4959.92	-11314.35	157.46
					302	1.400	-2452.42	-5584.64	-16042.33	77.61
18	4.50	-14.25	150.00	51.0	548	1.400	-2764.54	5598.46	-15509.00	160.93
					303	1.400	-2452.42	-6012.32	-14695.50	93.80
19	10.00	-14.25	216.00	51.0	398	1.400	-2764.54	4440.33	-19251.58	180.25
					299	1.400	-2331.32	-3859.93	-6774.74	85.58
20	15.50	-14.25	282.00	51.0	398	1.400	-2764.54	4440.33	-19251.58	205.01
					299	1.400	-2331.32	-3859.93	-6774.74	72.06
21	-6.50	-18.50	18.00	102.0	533	1.400	-2683.62	4959.92	-11314.35	183.57
					586	1.400	-2683.62	-5124.66	-19254.28	30.91
22	-1.00	-18.50	84.00	102.0	545	1.400	-2683.62	5176.02	-11639.16	181.65
					302	1.400	-2452.42	-5584.64	-16042.33	51.33
23	4.50	-18.50	150.00	102.0	548	1.400	-2764.54	5598.46	-15509.00	187.27
					303	1.400	-2452.42	-6012.32	-14695.50	65.51
24	10.00	-18.50	216.00	102.0	554	1.400	-2764.54	5598.46	-16494.78	202.02
					299	1.400	-2331.32	-3859.93	-6774.74	67.41
25	15.50	-18.50	282.00	102.0	398	1.400	-2764.54	4440.33	-19251.58	225.91
					299	1.400	-2331.32	-3859.93	-6774.74	53.90

Pile Reactions, Factored

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
1	-6.50	-1.50	18.0	-102.0	1097	---	-2914.15	-4824.91	-8468.42	225.76
					1112	---	-3216.90	4638.22	-23836.65	46.95
2	-1.00	-1.50	84.0	-102.0	1414	---	-3354.53	-6888.83	-17483.69	220.33
					1351	---	-3354.53	6682.91	-20727.09	80.80
3	4.50	-1.50	150.0	-102.0	1405	---	-3455.68	-7210.73	-22367.27	236.09
					1116	---	-3065.53	7328.71	-13935.70	83.65
4	10.00	-1.50	216.0	-102.0	1401	---	-3455.68	-6997.85	-23553.23	263.19
					1115	---	-3065.53	6794.11	-12252.15	83.07
5	15.50	-1.50	282.0	-102.0	1389	---	-3455.68	-6727.72	-23959.24	292.70

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
					1102	---	-2914.15	4651.21	-8468.42	69.01
6	-6.50	-5.75	18.0	-51.0	1097	---	-2914.15	-4824.91	-8468.42	203.06
					1112	---	-3216.90	4638.22	-23836.65	68.77
7	-1.00	-5.75	84.0	-51.0	820	---	-3849.38	-267.80	-15244.74	193.99
					1112	---	-3216.90	4638.22	-23836.65	102.81
8	4.50	-5.75	150.0	-51.0	1405	---	-3455.68	-7210.73	-22367.27	202.16
					1116	---	-3065.53	7328.71	-13935.70	118.13
9	10.00	-5.75	216.0	-51.0	1389	---	-3455.68	-6727.72	-23959.24	230.46
					1102	---	-2914.15	4651.21	-8468.42	107.79
10	15.50	-5.75	282.0	-51.0	1389	---	-3455.68	-6727.72	-23959.24	261.04
					1102	---	-2914.15	4651.21	-8468.42	90.89
11	-6.50	-10.00	18.0	0.0	820	---	-3849.38	-267.80	-15244.74	200.28
					1107	---	-3216.90	-4837.90	-23836.65	90.60
12	-1.00	-10.00	84.0	0.0	820	---	-3849.38	-267.80	-15244.74	192.73
					1107	---	-3216.90	-4837.90	-23836.65	124.64
13	4.50	-10.00	150.0	0.0	811	---	-4080.81	-327.55	-25640.47	194.43
					1097	---	-2914.15	-4824.91	-8468.42	146.57
14	10.00	-10.00	216.0	0.0	818	---	-4080.81	73.99	-26393.28	223.63
					1097	---	-2914.15	-4824.91	-8468.42	129.67
15	15.50	-10.00	282.0	0.0	814	---	-3849.38	-267.80	-27419.68	258.61
					1097	---	-2914.15	-4824.91	-8468.42	112.78
16	-6.50	-14.25	18.0	51.0	1102	---	-2914.15	4651.21	-8468.42	202.24
					1107	---	-3216.90	-4837.90	-23836.65	67.83
17	-1.00	-14.25	84.0	51.0	1331	---	-3354.53	6199.90	-14142.94	196.82
					1100	---	-3065.53	-6980.80	-20052.91	97.01
18	4.50	-14.25	150.0	51.0	1346	---	-3455.68	6998.08	-19386.25	201.16
					1101	---	-3065.53	-7515.40	-18369.37	117.25
19	10.00	-14.25	216.0	51.0	1196	---	-3455.68	5550.41	-24064.47	225.31
					1097	---	-2914.15	-4824.91	-8468.42	106.97
20	15.50	-14.25	282.0	51.0	817	---	-3849.38	29.64	-27419.68	258.75
					1097	---	-2914.15	-4824.91	-8468.42	90.08
21	-6.50	-18.50	18.0	102.0	1331	---	-3354.53	6199.90	-14142.94	229.46
					1384	---	-3354.53	-6405.82	-24067.84	38.64
22	-1.00	-18.50	84.0	102.0	1343	---	-3354.53	6470.03	-14548.95	227.06
					1100	---	-3065.53	-6980.80	-20052.91	64.16
23	4.50	-18.50	150.0	102.0	1346	---	-3455.68	6998.08	-19386.25	234.09
					1101	---	-3065.53	-7515.40	-18369.37	81.89
24	10.00	-18.50	216.0	102.0	1352	---	-3455.68	6998.08	-20618.48	252.52
					1097	---	-2914.15	-4824.91	-8468.42	84.26
25	15.50	-18.50	282.0	102.0	1196	---	-3455.68	5550.41	-24064.47	282.39
					1097	---	-2914.15	-4824.91	-8468.42	67.37

Pile Reactions, Service (After the reduction of overstress allowance)

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
1	-6.50	-1.50	18.00	-102.0	299	1.400	-2331.32	-3859.93	-6774.74	129.01
					314	1.400	-2573.52	3710.57	-19069.32	26.83
2	-1.00	-1.50	84.00	-102.0	284	1.250	-2683.62	-3924.82	-13155.83	131.49
					553	1.400	-2683.62	5346.33	-16581.67	46.17
3	4.50	-1.50	150.00	-102.0	275	1.250	-2764.54	-3945.71	-17062.69	137.37
					318	1.400	-2452.42	5862.97	-11148.56	47.80
4	10.00	-1.50	216.00	-102.0	9	1.000	-2764.54	-155.26	-17325.91	153.81
					317	1.400	-2452.42	5435.29	-9801.72	47.47

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
5	15.50	-1.50	282.00	-102.0	9	1.000	-2764.54	-155.26	-17325.91	171.57
					304	1.400	-2331.32	3720.97	-6774.74	39.43
6	-6.50	-5.75	18.00	-51.0	10	1.000	-2683.62	-134.37	-13155.83	124.13
					314	1.400	-2573.52	3710.57	-19069.32	39.30
7	-1.00	-5.75	84.00	-51.0	10	1.000	-2683.62	-134.37	-13155.83	128.05
					314	1.400	-2573.52	3710.57	-19069.32	58.75
8	4.50	-5.75	150.00	-51.0	1	1.000	-2764.54	-155.26	-17062.69	135.31
					318	1.400	-2452.42	5862.97	-11148.56	67.50
9	10.00	-5.75	216.00	-51.0	9	1.000	-2764.54	-155.26	-17325.91	153.08
					304	1.400	-2331.32	3720.97	-6774.74	61.59
10	15.50	-5.75	282.00	-51.0	9	1.000	-2764.54	-155.26	-17325.91	170.84
					304	1.400	-2331.32	3720.97	-6774.74	51.94
11	-6.50	-10.00	18.00	0.0	10	1.000	-2683.62	-134.37	-13155.83	123.49
					309	1.400	-2573.52	-3870.32	-19069.32	51.77
12	-1.00	-10.00	84.00	0.0	10	1.000	-2683.62	-134.37	-13155.83	127.42
					309	1.400	-2573.52	-3870.32	-19069.32	71.22
13	4.50	-10.00	150.00	0.0	1	1.000	-2764.54	-155.26	-17062.69	134.58
					299	1.400	-2331.32	-3859.93	-6774.74	83.75
14	10.00	-10.00	216.00	0.0	9	1.000	-2764.54	-155.26	-17325.91	152.35
					299	1.400	-2331.32	-3859.93	-6774.74	74.10
15	15.50	-10.00	282.00	0.0	4	1.000	-2683.62	-134.37	-17412.80	170.16
					299	1.400	-2331.32	-3859.93	-6774.74	64.45
16	-6.50	-14.25	18.00	51.0	11	1.000	-2683.62	-30.37	-13155.83	123.35
					309	1.400	-2573.52	-3870.32	-19069.32	38.76
17	-1.00	-14.25	84.00	51.0	11	1.000	-2683.62	-30.37	-13155.83	127.28
					302	1.400	-2452.42	-5584.64	-16042.33	55.44
18	4.50	-14.25	150.00	51.0	2	1.000	-2764.54	-14.86	-16340.13	134.51
					303	1.400	-2452.42	-6012.32	-14695.50	67.00
19	10.00	-14.25	216.00	51.0	8	1.000	-2764.54	-14.86	-17325.91	152.28
					299	1.400	-2331.32	-3859.93	-6774.74	61.13
20	15.50	-14.25	282.00	51.0	8	1.000	-2764.54	-14.86	-17325.91	170.04
					299	1.400	-2331.32	-3859.93	-6774.74	51.47
21	-6.50	-18.50	18.00	102.0	533	1.400	-2683.62	4959.92	-11314.35	131.12
					586	1.400	-2683.62	-5124.66	-19254.28	22.08
22	-1.00	-18.50	84.00	102.0	297	1.250	-2683.62	3760.08	-13155.83	130.25
					302	1.400	-2452.42	-5584.64	-16042.33	36.66
23	4.50	-18.50	150.00	102.0	288	1.250	-2764.54	3775.59	-16340.13	136.09
					303	1.400	-2452.42	-6012.32	-14695.50	46.79
24	10.00	-18.50	216.00	102.0	8	1.000	-2764.54	-14.86	-17325.91	152.21
					299	1.400	-2331.32	-3859.93	-6774.74	48.15
25	15.50	-18.50	282.00	102.0	8	1.000	-2764.54	-14.86	-17325.91	169.97
					299	1.400	-2331.32	-3859.93	-6774.74	38.50

Footing Design : Notes

* Service Force in pile is greater than service pile capacity.
Only max. force in piles is considered for design.
Pile coordinates X and Z are from the most left edge of the footing.
Plong= Lateral load in longitudinal direction at the top of pile, Kips.
Php= Available resisting horizontal component due to batter= batter * Vertical pile reaction, Kips.
Plong-Php= Remaining lateral force required to resist by pile.

Max. Pile Reaction Used in Design: (without selfweight and surcharge)

Factored pile reaction	262.70 kips
Service pile reaction	210.16 kips
Fatigue pile reaction	29.25 kips

Reinforcement Schedule

Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	50	# 11	15.64	78.00	4.75	Both
Z	40	# 10	17.14	50.80	7.51	Both

Flexure

Dir ft	Loc	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-6.00	56.36	656.8	1389	3.45	78.00	65.45	0.00	0.00	0.00
X	6.00	56.36	17732.3	1389	73.99	78.00	78.00	0.00	0.00	0.00
Z	-3.00	54.86	8866.2	1389	47.99	50.80	50.80	0.00	0.00	0.00
Z	3.00	54.86	8866.2	1389	47.99	50.80	50.80	0.00	0.00	0.00

One Way Shear

Col	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-10.70	Outside of Footing	---	---	---
	X	10.70	1389	56.36	1313.5	1360.5
	Z	-7.57	1389	54.86	1313.5	1655.4
	Z	7.57	1389	54.86	1313.5	1655.4

Two Way Shear

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns						
1	43.27	173.53	1389	55.61	4203.2	5808.5
Piles - max						
7	23.15	33.49	1389	55.61	262.7	3107.5
Piles - min						

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
1	8.79	19.30	1389	55.61	262.7	1179.6

Two Way Shear Note

TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.