CAP DESIGN

BRIDGE 15, PIERS #11 & 13 CAN USE THE DESIGN OF BRIDGE 19

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) = 39.25 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	48.00	2985980.00	5308420.00
3	48.00	2985980.00	5308420.00
4	24.00	1492990.00	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	39.25	Both
	# 11	9	6.98	14.040	0.00	39.25	Both
BOTTOM							
	# 11	4	3.45	6.240	0.00	18.86	Left
	# 11	4	3.45	6.240	13.58	28.67	None
	# 11	4	3.45	6.240	23.39	39.25	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	11.62	# 6	4	18.00	14.08
11.62	17.63	# 6	4	6.00	42.24
17.63	19.62	# 6	4	24.00	10.56
19.62	21.63	# 6	4	12.00	21.12
21.63	25.63	# 6	4	24.00	10.56
25.63	27.62	# 6	4	6.00	42.24
27.62	39.25	# 6	4	18.00	14.08

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 21.62 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
3.6	3.6	58	1.9	1571.9	762	0.01	6.24	6.24	0.00	40.56	40.56
			-69.7	-8911.6	757	0.00	6.24	6.24	0.39	40.56	40.56
11.6	11.6	81	0.0	2201.6	0	0.00	6.24	6.24	0.00	40.56	40.56
			-5437.8	-13004.3	750	0.00	6.24	6.24	16.42	40.56	40.56
17.1	17.1	96	0.0	2634.8	0	0.00	12.48	6.24	0.00	40.56	40.56
			-13297.8	-15919.1	750	0.00	12.48	10.77	34.15	40.56	40.56
17.6	17.6	96	0.0	2634.8	0	0.00	12.48	6.24	0.00	40.56	40.56
			-14017.4	-15894.6	750	0.00	12.48	9.48	36.11	40.56	40.56

Span 2: From 21.62 ft To 39.25 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
4.0	25.6	96	0.0	2634.8	0	0.00	12.48	6.24	0.00	40.56	40.56
			-8297.4	-15941.3	748	0.00	12.48	12.07	20.86	40.56	40.56
4.5	26.1	96	0.0	2634.8	0	0.00	12.48	6.24	0.00	40.56	40.56
			-7577.6	-15947.9	748	0.00	12.48	12.48	18.99	40.56	40.56
6.0	27.6	91	0.0	2481.3	0	0.00	12.48	6.24	0.00	40.56	40.56
			-5460.4	-14886.8	748	0.00	12.48	8.98	14.47	40.56	40.56
14.0	35.6	61	0.7	1659.8	757	0.00	6.24	6.24	0.00	40.56	40.56
			-70.9	-9482.7	762	0.00	6.24	6.24	0.37	40.56	40.56

SHEAR AND TORSION DESIGN

Span 1: From 0.00 ft To 21.62 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
3.62	3.62	L	18.7	735	0.0	0	387.2	282.2	0.00	0.00	0.00	14.08	0.00
		R	648.4	751	153.0	1462	387.2	282.2	1.15	0.00	1.15	14.08	0.00
11.62	11.62	L	702.5	751	153.0	1462	549.6	462.2	0.72	0.00	0.72	14.08	0.00
		R	1404.1	751	311.8	1462	549.6	462.2	2.65	0.00	2.65	42.24	0.00
17.13	17.13	L	1451.5	751	311.8	1462	661.3	595.9	2.04	0.00	2.04	42.24	0.00
		R	1451.5	751	311.8	1462	661.3	595.9	2.04	0.00	2.04	42.24	0.00
17.62	17.62	L	1456.1	751	311.8	1462	661.3	595.9	2.05	0.00	2.05	42.24	0.00

Span 2: From 21.62 ft To 39.25 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
4.00	25.62	R	1427.7	754	311.8	1460	661.3	595.9	1.97	0.00	1.97	10.56	0.00
4.50	26.13	L	1423.0	754	311.8	1460	661.3	595.9	1.96	0.00	1.96	42.24	0.00
		R	1423.0	754	311.8	1460	661.3	595.9	1.96	0.00	1.96	42.24	0.00
6.00	27.62	L	1409.4	754	311.8	1460	621.7	547.7	2.16	0.00	2.16	42.24	0.00
		R	707.8	754	153.0	1460	621.7	547.7	0.72	0.00	0.72	14.08	0.00
14.00	35.62	L	648.6	754	153.0	1460	409.9	306.0	0.99	0.00	0.99	14.08	0.00
		R	19.3	735	0.0	0	409.9	306.0	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 21.62 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

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
3.62	3.6	58.1	0.3	0.01	23	0.0	0.00
			0.1	0.00	28	0.0	0.00
11.62	11.6	80.6	17.3	0.48	16	2.9	0.15
			0.0	0.00	0	0.0	0.00
17.13	17.1	96.0	34.7	0.96	16	6.2	0.37
			0.0	0.00	0	0.0	0.00
17.62	17.6	96.0	36.6	1.02 *	16	6.5	0.40
			0.0	0.00	0	0.0	0.00

Span 2: From 21.62 ft To 39.25 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
4.00	25.6	96.0	21.6	0.60	14	3.8	0.20
			0.0	0.00	0	0.0	0.00
4.50	26.1	96.0	19.8	0.55	14	3.4	0.17
			0.0	0.00	0	0.0	0.00
6.00	27.6	90.5	15.2	0.42	14	2.6	0.13
			0.0	0.00	0	0.0	0.00
14.00	35.6	61.3	0.3	0.01	28	0.0	0.00
			0.0	0.00	23	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 96.00 x 72.00 in

Column Section Properties

Sec.	Area ft^2	Ixx in^4	Izz in^4
1	48.00	2985984.00	5308416.00

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	17	3.20
2	X	11	8	7.00
2	Z	11	6	7.00

Reinforcement summary

Main bars summary:

100 # 11 bars

Total number of bars in the column: 100

Ties size: # 3

Moment Magnification calculation - Mx (global)

Loc ft	Comb	K	Cm	Beta	Delta B	Delta S	pPc kips
61.00	31C	3.4219	1.0000	0.7641	----	1.8461	7269.07
98.00	31C	3.4219	1.0000	0.7416	----	1.7037	7363.01
61.00	1433C	3.4219	1.0000	0.0438	----	1.2940	12284.77
98.00	1433C	3.4219	1.0000	0.5611	----	1.4406	8214.07

Moment Magnification calculation - Mz (global)

Loc ft	Comb	K	Cm	Beta	Delta B	Delta S	pPc kips
61.00	31C	3.4219	1.0000	0.3598	----	1.2480	16764.67
98.00	31C	3.4219	1.0000	0.3598	----	1.2216	16764.67
61.00	1433C	3.4219	1.0000	0.5130	----	1.2274	15066.79
98.00	1433C	3.4219	1.0000	0.5503	----	1.2060	14704.79

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
61.00	31C	-0.0	3331.5	0.0	-1414.5	0.0	-15330.0
98.00	31C	-0.0	3041.4	0.0	1191.8	-0.0	15005.9
61.00	1433C	17.0	2791.1	-325.1	-16621.4	-643.6	-10166.8
98.00	1433C	-13.8	2512.1	321.8	1280.5	-643.6	9313.9

COLUMN DESIGN

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
61.00	1433C	2791.1	16621.4	10166.8	20478.4	31.45	1.00	1.05102
98.00	31C	3041.4	1191.8	15005.9	26828.5	85.46	1.00	1.78225

COLUMN DESIGN

Bot/Top Elev. ft	Comb	As_min in^2	As_max in^2	As_req in^2
61.00	1433C	69.12	552.96	156.00
98.00	31C	69.12	552.96	156.00

K values for all columns used in unbraced moment magnification

Column	Kx	Kz
1	3.42	3.42

Column Design : Notes

Min reinforcement = 1.0000 % of Ag = 69.12 in^2.

For layer 1, direction X: Minimum bar distance is: 1.41 in. Effective bar distance is: 2.66 in.

For layer 2, direction X: Minimum bar distance is: 1.41 in. Effective bar distance is: 10.30 in.

For layer 1, direction Z: Minimum bar distance is: 1.41 in. Effective bar distance is: 2.69 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 : FTG08
Shape : Rectangular, Type : Pile/Shaft Cap
Bf(X) = 22.00 ft, Hf(Z) = 20.00 ft, Thickness(Y) = 78.00 in
Ag = 440.00 ft^2, Ix = 903.13 ft^2, Iz = 1128.13 ft^2
Footing eccentric: Start at X = -13.00 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 96.00 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	-11.50	-1.50	18.00	-102.0	421	1.400	-2189.27	-3328.45	6531.54	159.47
					290	1.400	-2067.97	9117.89	-657.24	-21.02
2	-6.75	-1.50	75.00	-102.0	421	1.400	-2189.27	-3328.45	6531.54	150.40
					290	1.400	-2067.97	9117.89	-657.24	-0.84
3	-2.00	-1.50	132.00	-102.0	340	1.400	-2270.19	-4384.37	1910.14	154.51
					294	1.400	-1958.07	10616.45	4706.28	0.84
4	2.75	-1.50	189.00	-102.0	335	1.400	-2270.19	-4265.95	948.56	168.52
					280	1.400	-1848.17	9117.90	7456.82	-5.28
5	7.50	-1.50	246.00	-102.0	325	1.400	-2189.27	-3900.45	-142.66	184.79
					280	1.400	-1848.17	9117.90	7456.82	-21.12

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	10/28/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: **I-75 PPI**		Date	

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
6	-11.50	-5.75	18.00	-51.0	17	1.500	-2420.47	-104.10	8026.11	146.57
					290	1.400	-2067.97	9117.89	-657.24	21.89
7	-6.75	-5.75	75.00	-51.0	421	1.400	-2189.27	-3328.45	6531.54	134.74
					290	1.400	-2067.97	9117.89	-657.24	42.07
8	-2.00	-5.75	132.00	-51.0	340	1.400	-2270.19	-4384.37	1910.14	133.88
					294	1.400	-1958.07	10616.45	4706.28	50.80
9	2.75	-5.75	189.00	-51.0	324	1.400	-2270.19	-4113.85	685.09	148.84
					280	1.400	-1848.17	9117.90	7456.82	37.63
10	7.50	-5.75	246.00	-51.0	325	1.400	-2189.27	-3900.45	-142.66	166.44
					280	1.400	-1848.17	9117.90	7456.82	21.79
11	-11.50	-10.00	18.00	0.0	16	1.500	-2420.47	103.90	8026.11	146.08
					28	1.250	-2067.97	-0.08	-657.24	64.80
12	-6.75	-10.00	75.00	0.0	16	1.500	-2420.47	103.90	8026.11	132.67
					28	1.250	-2067.97	-0.08	-657.24	84.98
13	-2.00	-10.00	132.00	0.0	12	1.500	-2582.31	140.29	6524.12	125.73
					23	1.250	-1848.17	-0.07	7456.82	96.37
14	2.75	-10.00	189.00	0.0	14	1.500	-2420.47	103.90	627.71	137.00
					23	1.250	-1848.17	-0.07	7456.82	80.53
15	7.50	-10.00	246.00	0.0	14	1.500	-2420.47	103.90	627.71	154.74
					23	1.250	-1848.17	-0.07	7456.82	64.70
16	-11.50	-14.25	18.00	51.0	706	1.400	-2189.27	10114.10	6453.73	175.08
					285	1.400	-2067.97	-2904.23	-657.24	51.13
17	-6.75	-14.25	75.00	51.0	706	1.400	-2189.27	10114.10	6453.73	166.34
					277	1.400	-1958.07	-3755.82	554.55	68.93
18	-2.00	-14.25	132.00	51.0	724	1.400	-2270.19	10598.01	4645.06	163.12
					279	1.400	-1958.07	-4402.78	2093.31	80.04
19	2.75	-14.25	189.00	51.0	587	1.400	-2270.19	9755.49	607.27	175.72
					275	1.400	-1848.17	-2904.22	7456.82	66.87
20	7.50	-14.25	246.00	51.0	583	1.400	-2189.27	9542.10	-220.48	193.64
					275	1.400	-1848.17	-2904.22	7456.82	51.03
21	-11.50	-18.50	18.00	102.0	706	1.400	-2189.27	10114.10	6453.73	222.68
					325	1.400	-2189.27	-3900.45	-142.66	35.23
22	-6.75	-18.50	75.00	102.0	713	1.400	-2270.19	10479.59	5191.52	214.62
					278	1.400	-1958.07	-4117.25	1045.78	49.93
23	-2.00	-18.50	132.00	102.0	724	1.400	-2270.19	10598.01	4645.06	212.99
					279	1.400	-1958.07	-4402.78	2093.31	59.33
24	2.75	-18.50	189.00	102.0	587	1.400	-2270.19	9755.49	607.27	221.62
					275	1.400	-1848.17	-2904.22	7456.82	53.20
25	7.50	-18.50	246.00	102.0	583	1.400	-2189.27	9542.10	-220.48	238.55*
					275	1.400	-1848.17	-2904.22	7456.82	37.37

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	-11.50	-1.50	18.0	-102.0	1155	---	-2736.59	-4160.57	8164.43	199.34
					1024	---	-2584.97	11397.36	-821.55	-26.28
2	-6.75	-1.50	75.0	-102.0	1155	---	-2736.59	-4160.57	8164.43	188.00
					1024	---	-2584.97	11397.36	-821.55	-1.05
3	-2.00	-1.50	132.0	-102.0	1074	---	-2837.74	-5480.46	2387.68	193.14
					1028	---	-2447.59	13270.57	5882.85	1.05
4	2.75	-1.50	189.0	-102.0	1069	---	-2837.74	-5332.44	1185.70	210.65
					1014	---	-2310.22	11397.38	9321.03	-6.60
5	7.50	-1.50	246.0	-102.0	1059	---	-2736.59	-4875.56	-178.32	230.99

Bentley	Tampa	Sheet #	DS-3
		Job #	100010194
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DRB
Version: Version: 09.00.01	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	10/28/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: **I-75 PPI**		Date	

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
					1014	---	-2310.22	11397.38	9321.03	-26.39
6	-11.50	-5.75	18.0	-51.0	751	---	-3206.73	-148.85	11035.36	197.06
					1024	---	-2584.97	11397.36	-821.55	27.36
7	-6.75	-5.75	75.0	-51.0	751	---	-3206.73	-148.85	11035.36	177.60
					1024	---	-2584.97	11397.36	-821.55	52.59
8	-2.00	-5.75	132.0	-51.0	747	---	-3438.16	-200.92	4718.78	167.64
					1028	---	-2447.59	13270.57	5882.85	63.50
9	2.75	-5.75	189.0	-51.0	1058	---	-2837.74	-5142.31	856.36	186.05
					1014	---	-2310.22	11397.38	9321.03	47.03
10	7.50	-5.75	246.0	-51.0	754	---	-3206.73	-148.85	455.65	208.31
					1014	---	-2310.22	11397.38	9321.03	27.24
11	-11.50	-10.00	18.0	0.0	750	---	-3206.73	148.59	11035.36	196.36
					1019	---	-2584.97	-3630.29	-821.55	80.99
12	-6.75	-10.00	75.0	0.0	750	---	-3206.73	148.59	11035.36	176.90
					1019	---	-2584.97	-3630.29	-821.55	106.22
13	-2.00	-10.00	132.0	0.0	746	---	-3438.16	200.63	8887.51	166.70
					1009	---	-2310.22	-3630.27	9321.03	120.46
14	2.75	-10.00	189.0	0.0	748	---	-3206.73	148.59	455.65	182.53
					1009	---	-2310.22	-3630.27	9321.03	100.67
15	7.50	-10.00	246.0	0.0	748	---	-3206.73	148.59	455.65	207.61
					1009	---	-2310.22	-3630.27	9321.03	80.87
16	-11.50	-14.25	18.0	51.0	1440	---	-2736.59	12642.62	8067.16	218.85
					1019	---	-2584.97	-3630.29	-821.55	63.91
17	-6.75	-14.25	75.0	51.0	1440	---	-2736.59	12642.62	8067.16	207.93
					1011	---	-2447.59	-4694.78	693.19	86.17
18	-2.00	-14.25	132.0	51.0	1458	---	-2837.74	13247.51	5806.33	203.90
					1013	---	-2447.59	-5503.48	2616.64	100.05
19	2.75	-14.25	189.0	51.0	1321	---	-2837.74	12194.37	759.09	219.65
					1009	---	-2310.22	-3630.27	9321.03	83.58
20	7.50	-14.25	246.0	51.0	1317	---	-2736.59	11927.63	-275.60	242.05
					1009	---	-2310.22	-3630.27	9321.03	63.79
21	-11.50	-18.50	18.0	102.0	1440	---	-2736.59	12642.62	8067.16	278.35
					1059	---	-2736.59	-4875.56	-178.32	44.03
22	-6.75	-18.50	75.0	102.0	1447	---	-2837.74	13099.49	6489.40	268.28
					1012	---	-2447.59	-5146.56	1307.23	62.41
23	-2.00	-18.50	132.0	102.0	1458	---	-2837.74	13247.51	5806.33	266.24
					1013	---	-2447.59	-5503.48	2616.64	74.16
24	2.75	-18.50	189.0	102.0	1321	---	-2837.74	12194.37	759.09	277.03
					1009	---	-2310.22	-3630.27	9321.03	66.50
25	7.50	-18.50	246.0	102.0	1317	---	-2736.59	11927.63	-275.60	298.18
					1009	---	-2310.22	-3630.27	9321.03	46.71

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	-11.50	-1.50	18.00	-102.0	6	1.000	-2189.27	-52.09	5005.13	115.78
					290	1.400	-2067.97	9117.89	-657.24	-15.01
2	-6.75	-1.50	75.00	-102.0	6	1.000	-2189.27	-52.09	5005.13	113.14
					290	1.400	-2067.97	9117.89	-657.24	-0.60
3	-2.00	-1.50	132.00	-102.0	2	1.000	-2270.19	-70.29	2548.80	113.91
					294	1.400	-1958.07	10616.45	4706.28	0.60
4	2.75	-1.50	189.00	-102.0	8	1.000	-2270.19	-70.29	2133.68	124.04
					280	1.400	-1848.17	9117.90	7456.82	-3.77

Bentley	Tampa	Sheet #	DS-4
		Job #	100010194
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DRB
Version: Version: 09.00.01	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	10/28/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: **I-75 PPI**		Date	

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips
5	7.50	-1.50	246.00	-102.0	9	1.000	-2189.27	-52.09	1305.93	136.38
					280	1.400	-1848.17	9117.90	7456.82	-15.08
6	-11.50	-5.75	18.00	-51.0	6	1.000	-2189.27	-52.09	5005.13	115.53
					290	1.400	-2067.97	9117.89	-657.24	15.63
7	-6.75	-5.75	75.00	-51.0	6	1.000	-2189.27	-52.09	5005.13	112.89
					290	1.400	-2067.97	9117.89	-657.24	30.05
8	-2.00	-5.75	132.00	-51.0	2	1.000	-2270.19	-70.29	2548.80	113.58
					294	1.400	-1958.07	10616.45	4706.28	36.29
9	2.75	-5.75	189.00	-51.0	8	1.000	-2270.19	-70.29	2133.68	123.71
					280	1.400	-1848.17	9117.90	7456.82	26.88
10	7.50	-5.75	246.00	-51.0	9	1.000	-2189.27	-52.09	1305.93	136.13
					280	1.400	-1848.17	9117.90	7456.82	15.57
11	-11.50	-10.00	18.00	0.0	5	1.000	-2189.27	51.91	5005.13	115.29
					285	1.400	-2067.97	-2904.23	-657.24	46.28
12	-6.75	-10.00	75.00	0.0	5	1.000	-2189.27	51.91	5005.13	112.65
					285	1.400	-2067.97	-2904.23	-657.24	60.70
13	-2.00	-10.00	132.00	0.0	1	1.000	-2270.19	70.11	4006.40	113.25
					275	1.400	-1848.17	-2904.22	7456.82	68.83
14	2.75	-10.00	189.00	0.0	7	1.000	-2270.19	70.11	2133.68	123.38
					275	1.400	-1848.17	-2904.22	7456.82	57.52
15	7.50	-10.00	246.00	0.0	3	1.000	-2189.27	51.91	1305.93	135.89
					275	1.400	-1848.17	-2904.22	7456.82	46.21
16	-11.50	-14.25	18.00	51.0	268	1.250	-2189.27	9169.89	5005.13	126.75
					285	1.400	-2067.97	-2904.23	-657.24	36.52
17	-6.75	-14.25	75.00	51.0	268	1.250	-2189.27	9169.89	5005.13	124.64
					277	1.400	-1958.07	-3755.82	554.55	49.24
18	-2.00	-14.25	132.00	51.0	264	1.250	-2270.19	9188.08	4006.40	125.19
					279	1.400	-1958.07	-4402.78	2093.31	57.17
19	2.75	-14.25	189.00	51.0	270	1.250	-2270.19	9188.08	2133.68	133.30
					275	1.400	-1848.17	-2904.22	7456.82	47.76
20	7.50	-14.25	246.00	51.0	266	1.250	-2189.27	9169.89	1305.93	143.23
					275	1.400	-1848.17	-2904.22	7456.82	36.45
21	-11.50	-18.50	18.00	102.0	268	1.250	-2189.27	9169.89	5005.13	161.27
					325	1.400	-2189.27	-3900.45	-142.66	25.16
22	-6.75	-18.50	75.00	102.0	268	1.250	-2189.27	9169.89	5005.13	159.16
					278	1.400	-1958.07	-4117.25	1045.78	35.66
23	-2.00	-18.50	132.00	102.0	264	1.250	-2270.19	9188.08	4006.40	159.78
					279	1.400	-1958.07	-4402.78	2093.31	42.38
24	2.75	-18.50	189.00	102.0	270	1.250	-2270.19	9188.08	2133.68	167.89
					275	1.400	-1848.17	-2904.22	7456.82	38.00
25	7.50	-18.50	246.00	102.0	266	1.250	-2189.27	9169.89	1305.93	177.75
					275	1.400	-1848.17	-2904.22	7456.82	26.69

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	270.13 kips
Service pile reaction	216.11 kips
Fatigue pile reaction	25.32 kips

Reinforcement Schedule

Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	44	# 10	15.64	55.88	5.41	None
Z	40	# 10	17.14	50.80	6.58	None

Flexure

Dir	Loc ft	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	-4.00	62.36	13844.4	1317	51.09	55.88	55.88	0.00	0.00	0.00
X	4.00	62.36	4727.4	1317	22.75	55.88	55.88	0.00	0.00	0.00
Z	-3.00	60.86	9117.0	1317	44.62	50.80	50.80	0.00	0.00	0.00
Z	3.00	60.86	9117.0	1317	44.62	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	-9.20	1317	62.36	1350.7	1505.3
	X	9.20	Outside of Footing	---	---	---
	Z	-8.07	1317	60.86	1241.2	1616.0
	Z	8.07	1317	60.86	1241.2	1616.0

Two Way Shear

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns						
1	48.54	146.25	1317	61.61	5132.6	7218.8
Piles - max						
7	25.15	39.53	1317	61.61	270.1	3740.2
Piles - min						

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
1	9.29	21.56	1317	61.61	270.1	1381.2

Two Way Shear Note

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