05-NOV-09 GEORGIA DEPARTMENT OF TRANSPORTATION PROB. NO. 0001
09:47:26 PRECONSTUCTION DIVISION - OFFICE OF BRIDGE & STRUCTURAL DESIGN
THE ANALYSIS AND DESIGN OF PIERS FOR BRIDGES - V 4.2.07 - AASHTO SPECS 1984 INTERIM
REVISED: JUNE 30, 2008
44' CURB-CURB; 6 BEAMS; 140' SPAN; 70' TALL; BRIDGE 2A ; PIER 12

DESIGN DATA

DESIGN OPTIONS	NO. CAN	NO. COL	NO. LLC	SKEW ANG D M S	F'C PSI	FC PSI	N	FY PSI	FS PSI	EC KSI	ES KSI	CONC. STRAIN	Z FACT	* MAIN SIZE	* STR SIZ	* MAX TOP	MAX BOT	MIN SIZE	MIN NO.	TOP CL.	MIN S.SP	CAP DEPTH INCR.	BOT CL.
D D D L	2	1	13	0-00-00	3500.	1400.	8.	60000.	24000.	3409.	29000.	0.0030	170.	11	5	16	16	11	2	2.00	4.00	3.00	2.00

COLUMN MIN.P	REINFORCING STEEL MAX.P	CL.SP.	CLEAR	R MODE	KL COEF	OC	OF	CM	BD1	BD2	IMPACT %	SOIL WT KCF	ALL.S.P. KSF	MIN PL SP	MAX PL SP	EDGE DIST	PILE DEPTH	REBAR CLEAR	ALL.PILE CAPACITY	ALL.PILE UPLIFT	I P
1.00	8.00	2.50	3.750	2	2.00	0.70	0.90	1.00	1.00	0.75	18.87	0.120	0.000	3.00	9.00	1.250	1.000	3.000	235.000	-9.999	

CAP DATA

CN	C	L	A	DE	BC	BE	DH	LH	XB1	XB2	XB3	XB4	XB5	XB6	XB7	XB8
11	L	23.625	8.000	4.000	6.000	6.000	4.000	15.625	20.000	8.000	4.000					
12	2 SAME AS CANTILEVER 1															

COLUMN DATA

CN	P	I	T	S	HT	A	DT	BT	DB	BB	DL	FLEX	ND	NB	SZ	ND	NB	SZ	ND	NB	SZ	ND	NB	SZ	SLOPE	EP	AP
21	1	C	T		70.000	0.000	16.000	6.000	16.000	6.000	6.000	0.000	16	6	11	16	6	11	46	16	11	46	16	11	0.000	0.000	0.000

FOOTING DATA

CN	S/P	B	D	T	DEL.B	DEL.D	DEL.T	R.B/D	R.D/B	S.HT.	NP	SYM.	BP	DP	SET.
31	P	18.000	18.000	3.000	0.500	0.500	0.250	1.000	1.000	2.500	4	3	0.000	0.000	0.000

GROUP II WIND

SUPERSTRUCTURE AREA*STD. TRANS.	LONG.	WIND	WIND ON SUPERSTRUCTURE INTENSITIES FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	* WIND FORCE ARM APT	APL	* WIND ON PIER PT	PL
1365.	2730.	1	50	0	44	6	41	12	33	16	17	19	7.375	7.375	8.876	31.051

GROUP III WIND

STD. * WIND	WIND ON SUPERSTRUCTURE INTENSITIES FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	* STD. * WIND	WIND ON LIVE LOAD INTENSITIES FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	* LENGTHS OF LL TRANS.	LONGI.	* WIND ON LL ARMS APT	APL
1	50	0	44	6	41	12	33	16	17	19	1	100	0	88	12	82	24	66	32	34	38	140.0	280.0	15.583	15.583

MISCELLANEOUS FORCES

CENTRI. FT	TRACTION FORCE AND ARMS FL	APT	APL	EXPANSION COEFFICIENT	SHRINKAGE COEFFICIENT	STREAM FLOW PT	PL
0.000	9.860	15.583	15.583	0.00018000	0.00044000	0.000	0.000

DEAD LOAD SUPERSTRUCTURE AND LIVE LOAD CASES

I.D.	NL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
D.L.	0	278.354	322.067	0.000	805.168	0.000	322.067	278.354					
LL 1	1	86.572	50.839	0.000	0.000	0.000	0.000	0.000					
LL 2	2	86.572	104.762	0.000	83.489	0.000	0.000	0.000					
LL 3	3	86.572	104.762	0.000	205.861	0.000	15.039	0.000					
LL 4	1	0.000	0.000	0.000	0.000	0.000	50.839	86.572					
LL 5	2	0.000	0.000	0.000	83.489	0.000	104.762	86.572					
LL 6	3	0.000	15.039	0.000	205.861	0.000	104.762	86.572					
LL 7	1	0.000	25.547	0.000	111.863	0.000	0.000	0.000					
LL 8	2	42.000	111.864	0.000	120.958	0.000	0.000	0.000					
LL 9	3	42.000	111.864	0.000	216.370	0.000	42.000	0.000					
LL10	2	0.000	33.773	0.000	207.276	0.000	33.773	0.000					
LL11	3	50.226	120.090	0.000	208.144	0.000	33.773	0.000					
LL12	2	86.572	50.839	0.000	0.000	0.000	50.839	86.572					
LL13	3	86.572	104.762	0.000	83.489	0.000	50.839	86.572					

COLUMN MOMENTS(KIP-FEET), SHEARS(KIPS), REACTIONS(KIPS)

LOAD	COL	TRANSVERSE PC	MT	V	MB	RF	ML	MR	* LONGITUDINAL MT	V	MB	MF
UNIT F.AT CL.CAP	1	0.000	-6.000	1.000	70.000	0.000	0.000	0.000	6.000	1.000	70.000	70.000
DEAD LOAD TOTAL	1	2289.960 3211.560	0.000	0.000	0.000	3211.560	10923.222	-10923.222	0.000	0.000	0.000	0.000
TRAC. FORCE 1 LN	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-212.808	-9.860	-843.848	-843.848
WIND ON SUBSTR.	1	0.000	-53.256	8.876	621.320	0.000	0.000	0.000	-186.306	-31.051	-2173.570	-2173.570
GROUP 2 WIND 1 1	1	0.000	-966.100	77.126	5902.164	0.000	0.000	0.000	-186.306	-31.051	-2173.570	-2173.570
GROUP 2 WIND 1 2	1	0.000	-966.100	77.126	5902.164	0.000	0.000	0.000	186.306	31.051	2173.570	2173.570
GROUP 2 WIND 2 1	1	0.000	-856.558	68.936	5268.462	0.000	0.000	0.000	-405.389	-47.431	-3440.973	-3440.973

GROUP 2 WIND 2 2	1	0.000	-856.558	68.936	5268.462	0.000	0.000	0.000	405.389	47.431	3440.973	3440.973
GROUP 2 WIND 3 1	1	0.000	-801.788	64.841	4951.612	0.000	0.000	0.000	-624.471	-63.811	-4708.375	-4708.375
GROUP 2 WIND 3 2	1	0.000	-801.788	64.841	4951.612	0.000	0.000	0.000	624.471	63.811	4708.375	4708.375
GROUP 2 WIND 4 1	1	0.000	-655.733	53.921	4106.677	0.000	0.000	0.000	-770.526	-74.731	-5553.310	-5553.310
GROUP 2 WIND 4 2	1	0.000	-655.733	53.921	4106.677	0.000	0.000	0.000	770.526	74.731	5553.310	5553.310
GROUP 2 WIND 5 1	1	0.000	-363.623	32.081	2416.807	0.000	0.000	0.000	-880.067	-82.921	-6187.011	-6187.011
GROUP 2 WIND 5 2	1	0.000	-363.623	32.081	2416.807	0.000	0.000	0.000	880.067	82.921	6187.011	6187.011
GROUP 3 WIND 1 1	1	0.000	-591.992	37.138	2968.811	0.000	0.000	0.000	-55.892	-9.315	-652.071	-652.071
GROUP 3 WIND 1 2	1	0.000	-591.992	37.138	2968.811	0.000	0.000	0.000	55.892	9.315	652.071	652.071
GROUP 3 WIND 2 1	1	0.000	-522.870	33.001	2634.921	0.000	0.000	0.000	-194.135	-17.589	-1319.851	-1319.851
GROUP 3 WIND 2 2	1	0.000	-522.870	33.001	2634.921	0.000	0.000	0.000	194.135	17.589	1319.851	1319.851
GROUP 3 WIND 3 1	1	0.000	-488.309	30.932	2467.976	0.000	0.000	0.000	-332.379	-25.863	-1987.630	-1987.630
GROUP 3 WIND 3 2	1	0.000	-488.309	30.932	2467.976	0.000	0.000	0.000	332.379	25.863	1987.630	1987.630
GROUP 3 WIND 4 1	1	0.000	-396.147	25.416	2022.790	0.000	0.000	0.000	-424.542	-31.379	-2432.817	-2432.817
GROUP 3 WIND 4 2	1	0.000	-396.147	25.416	2022.790	0.000	0.000	0.000	424.542	31.379	2432.817	2432.817
GROUP 3 WIND 5 1	1	0.000	-211.822	14.384	1132.417	0.000	0.000	0.000	-493.663	-35.516	-2766.707	-2766.707
GROUP 3 WIND 5 2	1	0.000	-211.822	14.384	1132.417	0.000	0.000	0.000	493.663	35.516	2766.707	2766.707
LIVE LOAD LL 1	1	137.411	-2341.508	0.000	2341.508	137.411	2341.508	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 2	1	274.823	-2988.584	0.000	2988.584	274.823	2988.584	0.000	0.000	0.000	0.000	0.000

COLUMN MOMENTS(KIP-FEET), SHEARS(KIPS), REACTIONS(KIPS)

		TRANSVERSE							* LONGITUDINAL			
LOAD	COL	PC	MT	V	MB	RF	ML	MR	MT	V	MB	MF
LIVE LOAD LL 3	1	371.011	-2527.304	0.000	2527.304	371.011	2689.726	-162.421	0.000	0.000	0.000	0.000
LIVE LOAD LL 4	1	137.411	2341.508	0.000	-2341.508	137.411	0.000	-2341.508	0.000	0.000	0.000	0.000
LIVE LOAD LL 5	1	274.823	2988.584	0.000	-2988.584	274.823	0.000	-2988.584	0.000	0.000	0.000	0.000
LIVE LOAD LL 6	1	371.011	2527.304	0.000	-2527.304	371.011	162.421	-2689.726	0.000	0.000	0.000	0.000
LIVE LOAD LL 7	1	137.410	-306.564	0.000	306.564	137.410	306.564	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 8	1	274.822	-2182.368	0.000	2182.368	274.822	2182.368	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 9	1	371.011	-1510.531	0.000	1510.531	371.011	1964.131	-453.600	0.000	0.000	0.000	0.000
LIVE LOAD LL10	1	274.822	0.000	0.000	0.000	274.822	405.276	-405.276	0.000	0.000	0.000	0.000
LIVE LOAD LL11	1	371.010	-1836.292	0.000	1836.292	371.010	2201.040	-364.748	0.000	0.000	0.000	0.000
LIVE LOAD LL12	1	274.822	0.000	0.000	0.000	274.822	2341.508	-2341.508	0.000	0.000	0.000	0.000
LIVE LOAD LL13	1	371.011	-582.368	0.000	582.368	371.011	2689.726	-2107.357	0.000	0.000	0.000	0.000

CAP ANALYSIS AND DESIGN DATA

CAP MOMENTS AND SHEARS

	MOMENTS(KIP-FEET)							** SHEARS(KIPS)					
POINT	D.L.TOT.	G1 MAX.+	G1 MAX.-	G2 MAX.+	G2 MAX.-	G3 MAX.+	G3 MAX.-	DL T.LT	DL T.RT	G1 + LT	G1 + RT	G1 - LT	G1 - RT
P 1	-33.127	-33.127	-33.127	-33.127	-33.127	-33.127	-33.127	-18.933	-380.793	-18.933	-380.793	-18.933	-568.741
P 2	-3289.535	-3289.535	-4793.118	-3289.535	-3289.535	-3289.535	-4189.884	-436.504	-855.191	-436.504	-855.191	-624.452	-1270.577
P 3	-6778.790	-6778.790	-9943.916	-6778.790	-6778.790	-6778.790	-8674.075	-890.235	-890.235	-890.235	-890.235	-1305.621	-1305.621
C 1L	-14200.188	-14200.188	-20688.402	-14200.188	-14200.188	-14200.188	-18085.348	-965.115		-965.115		-1380.501	
C 1R	-14200.188	-14200.188	-20688.402	-14200.188	-14200.188	-14200.188	-18085.348		965.115		1380.501		965.115
P 5	-6778.789	-6778.789	-9943.915	-6778.789	-6778.789	-6778.789	-8674.074	890.235	890.235	1305.621	1305.621	890.235	890.235
P 6	-3289.535	-3289.535	-4793.117	-3289.535	-3289.535	-3289.535	-4189.884	855.191	436.504	1270.577	624.452	855.191	436.504
P 7	-33.126	-33.126	-33.126	-33.126	-33.126	-33.126	-33.126	380.793	18.933	568.741	18.933	380.793	18.933

CAP DESIGN DATA

PT.	M+ UNF. K-FT.	M- UNF. K-FT.	TOP REINFORCE. AS	NO.SIZE	BOT.REINFORCE. AS	NO.SIZE	LEFT STIRRUPS M.SP.	AV/IN	BAR&SPAC	RIGHT STIRRUPS M.SP.	AV/IN	BAR&SPAC	D IN.	FC PSI	PS %	FS/FF RATIO	FS/FZ RATIO
P 1	-25.482	-25.482	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.060	#5@10.33	59.14		0.08	0.000	0.099
P 2	-2530.412	-3222.988	13.57	9 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.168	D#5@ 7.38	83.71		0.25	0.563	1.203
P 3	-5214.454	-6672.366	24.68	16 # 11	3.12	2 # 11	24.00	0.134	#5@ 4.62	24.00	0.134	#5@ 4.62	96.00		0.41	0.594	1.016
C 1	-10923.222	-13911.806	48.52	32 # 11	3.12	2 # 11	24.00	0.126	#5@ 4.92	24.00	0.126	#5@ 4.92	105.00	M	0.71	0.566	0.898
P 5	-5214.453	-6672.365	24.68	16 # 11	3.12	2 # 11	24.00	0.134	#5@ 4.62	24.00	0.134	#5@ 4.62	96.00		0.41	0.594	1.016
P 6	-2530.411	-3222.988	13.57	9 # 11	3.12	2 # 11	24.00	0.168	D#5@ 7.38	24.00	0.060	#5@10.33	83.71		0.25	0.563	1.203
P 7	-25.482	-25.482	3.12	2 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	0.00	0.000	#5@ 0.00	59.14		0.08	0.000	0.099

NOTE: *** FS/FZ RATIO EXCEEDS 1.0! ***

NOTE: *** CAP DEPTH HAD TO BE INCREMENTED FOR DESIGN! REVIEW REBAR CONSTRAINTS! RE-ANALYZE IF NEW DEPTH IS USED!

COLUMN ANALYSIS AND DESIGN OUTPUT

CRITICAL COLUMN LOADS

CN	T B	GR	LLC	WC	R	E S	C F	S F	PF	MTF	MLF	PM	MTM	MLM	PU	MTU	MLU	PU/PM	B	D
1	T	1	LL 3	0.0					3782.4	-5486.8	0.0	3782.4	6381.1	3388.1	20990.7	35498.3	18848.3	5.560	72.00	192.00
1	B	2		5.1					4175.0	3141.8	-8043.1	4175.0	6973.7	11010.1	11083.3	18547.6	29283.0	2.659	72.00	192.00

COLUMN DESIGN DATA

CN	T B	B FACE 1 NO.SIZE	B FACE 2 NO.SIZE	D FACE 3 NO.SIZE	D FACE 4 NO.SIZE	AS	PS	BD12	BD	SUMPU	SUMPC	DEL.T	DEL.L	CM	R	PHIC
1	T	16 # 11	16 # 11	29 # 11	29 # 11	140.40	1.016	1.00	0.000	4381.	84928.	1.054	1.493	1.000	2	0.70
1	B	16 # 11	16 # 11	29 # 11	29 # 11	140.40	1.016	1.00	0.000	3576.	84928.	1.044	1.369	1.000	2	0.70

FOOTING 1 DESIGN LOADS

F	G	LLID	WC	ES	C	S	P	MT	VT	ML	VL	P4	P3	P2	P1	MTF	VBF	VPF	LOAD
1	3	LL 3	3.1				3523.675	4594.084	30.932	-4266.021	-52.485	172.043	80.425	199.916	291.535	-0.938	0.000	0.000	MAX.P1
1	2		4.1				4175.028	5338.680	70.097	-7219.303	-97.150	228.484	72.439	216.421	372.465	-1.219	0.000	0.000	MAX.MT
1	2		4.1				4175.028	5338.680	70.097	-7219.303	-97.150	228.484	72.439	216.421	372.465	-1.219	0.000	0.000	MAX.VT
1	2		4.1				4175.028	5338.680	70.097	-7219.303	-97.150	228.484	72.439	216.421	372.465	-1.219	0.000	0.000	MAX.VP
1	2		5.1				4175.028	3141.849	41.705	-8043.114	-107.797	266.950	93.152	177.954	351.752	459.439	62.930	0.000	MAX.ML
1	2		5.1				4175.028	3141.849	41.705	-8043.114	-107.797	266.950	93.152	177.954	351.752	459.439	62.930	0.000	MAX.VL
1	2		3.1				3211.560	4951.612	64.841	-4708.375	-63.811	155.271	53.447	186.963	288.788	-0.938	0.000	0.000	MAX.P3

FOOTING 1 ANALYSIS/DESIGN RESULTS

FOOTING SIZE			* BAR REINFORCEMENT STEEL				* SECTION CAPACITIES				
B	D	T	P1/PA	AS	NO.SIZE	SPAC.	PLACEMENT	MT.	VB	VP	DS	FC
18.500	18.500	6.000	0.992	0.00	0 # 0	@ 0.000	TOP TRAN	0.000	0.000	0.000	56.295	0.000
				1.87	23 #11	@ 9.625	BOT.LONG	477.094	67.941	135.883	56.295	0.000

NUMBER OF PILES = 21 BP = 4.000 DP = 4.000