28-OCT-09 GEORGIA DEPARTMENT OF TRANSPORTATION PROB. NO. 0001
18:19:36 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
43' CURB-CURB; 6 BEAMS; 140' SPAN; 40' TALL; BRIDGE 19 ; PIER 4

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	CAP REINFORCING STEEL 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	MODE	COEF							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	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	23.060	7.435	4.000	6.000	6.000	4.000	15.625	19.433	7.773	4.225					
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		40.000	0.000	14.870	6.000	14.870	6.000	6.000	0.000	15	6	11	15	6	11	42	16	11	42	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	16.870	16.870	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 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	5.273	20.361

GROUP III WIND

STD. * WIND FT1	WIND ON SUPERSTRUCTURE INTENSITIES FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	* STD. * WIND FT1	WIND ON LIVE LOAD INTENSITIES 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	274.250	315.410	0.000	630.820	0.000	315.410	274.250					
LL 1	1	84.404	53.007	0.000	0.000	0.000	0.000	0.000					
LL 2	2	84.404	102.055	0.000	88.363	0.000	0.000	0.000					
LL 3	3	84.404	102.055	0.000	202.105	0.000	23.671	0.000					
LL 4	1	0.000	0.000	0.000	0.000	0.000	53.016	84.395					
LL 5	2	0.000	0.000	0.000	88.372	0.000	102.055	84.395					
LL 6	3	0.000	23.679	0.000	202.104	0.000	102.055	84.395					
LL 7	1	0.000	26.517	0.000	110.894	0.000	0.000	0.000					
LL 8	2	46.201	110.894	0.000	117.727	0.000	0.000	0.000					
LL 9	3	46.201	110.894	0.000	208.936	0.000	46.201	0.000					
LL10	2	0.000	36.363	0.000	202.104	0.000	36.355	0.000					
LL11	3	59.062	114.713	0.000	202.104	0.000	36.355	0.000					
LL12	2	84.404	53.007	0.000	0.000	0.000	53.016	84.395					
LL13	3	84.404	102.055	0.000	88.363	0.000	53.016	84.395					

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

LOAD	COL	PC	TRANSVERSE MT	V	MB	RF	ML	MR	* LONGITUDINAL MT	V	MB	MF
UNIT F.AT CL.CAP	1	0.000	-6.000	1.000	40.000	0.000	0.000	0.000	6.000	1.000	40.000	40.000
DEAD LOAD TOTAL	1	2085.954 2540.976	0.000	0.000	0.000	2540.976	10419.452	-10419.452	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	-548.048	-548.048
WIND ON SUBSTR.	1	0.000	-31.638	5.273	210.920	0.000	0.000	0.000	-122.166	-20.361	-814.440	-814.440
GROUP 2 WIND 1 1	1	0.000	-944.482	73.523	3444.264	0.000	0.000	0.000	-122.166	-20.361	-814.440	-814.440
GROUP 2 WIND 1 2	1	0.000	-944.482	73.523	3444.264	0.000	0.000	0.000	122.166	20.361	814.440	814.440
GROUP 2 WIND 2 1	1	0.000	-834.940	65.333	3056.262	0.000	0.000	0.000	-341.249	-36.741	-1590.443	-1590.443

GROUP 2 WIND 2 2	1	0.000	-834.940	65.333	3056.262	0.000	0.000	0.000	341.249	36.741	1590.443	1590.443
GROUP 2 WIND 3 1	1	0.000	-780.170	61.238	2862.262	0.000	0.000	0.000	-560.331	-53.121	-2366.445	-2366.445
GROUP 2 WIND 3 2	1	0.000	-780.170	61.238	2862.262	0.000	0.000	0.000	560.331	53.121	2366.445	2366.445
GROUP 2 WIND 4 1	1	0.000	-634.115	50.318	2344.927	0.000	0.000	0.000	-706.386	-64.041	-2883.780	-2883.780
GROUP 2 WIND 4 2	1	0.000	-634.115	50.318	2344.927	0.000	0.000	0.000	706.386	64.041	2883.780	2883.780
GROUP 2 WIND 5 1	1	0.000	-342.005	28.478	1310.257	0.000	0.000	0.000	-815.927	-72.231	-3271.781	-3271.781
GROUP 2 WIND 5 2	1	0.000	-342.005	28.478	1310.257	0.000	0.000	0.000	815.927	72.231	3271.781	3271.781
GROUP 3 WIND 1 1	1	0.000	-585.507	36.057	1811.441	0.000	0.000	0.000	-36.650	-6.108	-244.332	-244.332
GROUP 3 WIND 1 2	1	0.000	-585.507	36.057	1811.441	0.000	0.000	0.000	36.650	6.108	244.332	244.332
GROUP 3 WIND 2 1	1	0.000	-516.385	31.920	1601.661	0.000	0.000	0.000	-174.893	-14.382	-663.892	-663.892
GROUP 3 WIND 2 2	1	0.000	-516.385	31.920	1601.661	0.000	0.000	0.000	174.893	14.382	663.892	663.892
GROUP 3 WIND 3 1	1	0.000	-481.824	29.851	1496.771	0.000	0.000	0.000	-313.137	-22.656	-1083.451	-1083.451
GROUP 3 WIND 3 2	1	0.000	-481.824	29.851	1496.771	0.000	0.000	0.000	313.137	22.656	1083.451	1083.451
GROUP 3 WIND 4 1	1	0.000	-389.661	24.335	1217.065	0.000	0.000	0.000	-405.299	-28.172	-1363.158	-1363.158
GROUP 3 WIND 4 2	1	0.000	-389.661	24.335	1217.065	0.000	0.000	0.000	405.299	28.172	1363.158	1363.158
GROUP 3 WIND 5 1	1	0.000	-205.337	13.303	657.652	0.000	0.000	0.000	-474.421	-32.309	-1572.938	-1572.938
GROUP 3 WIND 5 2	1	0.000	-205.337	13.303	657.652	0.000	0.000	0.000	474.421	32.309	1572.938	1572.938
LIVE LOAD LL 1	1	137.411	-2258.285	0.000	2258.285	137.411	2258.285	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 2	1	274.822	-2830.184	0.000	2830.184	274.822	2830.184	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	-2298.762	0.000	2298.762	371.011	2547.166	-248.404	0.000	0.000	0.000	0.000
LIVE LOAD LL 4	1	137.411	2258.215	0.000	-2258.215	137.411	0.000	-2258.215	0.000	0.000	0.000	0.000
LIVE LOAD LL 5	1	274.822	2830.010	0.000	-2830.010	274.822	0.000	-2830.010	0.000	0.000	0.000	0.000
LIVE LOAD LL 6	1	371.010	2298.521	0.000	-2298.521	371.010	248.487	-2547.009	0.000	0.000	0.000	0.000
LIVE LOAD LL 7	1	137.411	-309.188	0.000	309.188	137.411	309.188	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 8	1	274.822	-2190.848	0.000	2190.848	274.822	2190.848	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 9	1	371.009	-1486.930	0.000	1486.930	371.009	1971.763	-484.833	0.000	0.000	0.000	0.000
LIVE LOAD LL10	1	274.822	-0.093	0.000	0.093	274.822	423.993	-423.899	0.000	0.000	0.000	0.000
LIVE LOAD LL11	1	371.011	-1855.266	0.000	1855.266	371.011	2236.775	-381.509	0.000	0.000	0.000	0.000
LIVE LOAD LL12	1	274.822	-0.070	0.000	0.070	274.822	2258.285	-2258.215	0.000	0.000	0.000	0.000
LIVE LOAD LL13	1	371.010	-514.772	0.000	514.772	371.010	2547.166	-2032.393	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	-33.165	-33.165	-33.165	-33.165	-33.165	-33.165	-33.165	-18.944	-375.469	-18.944	-375.469	-18.944	-558.711
P 2	-3149.334	-3149.334	-4573.667	-3149.334	-3149.334	-3149.334	-4002.228	-429.340	-839.373	-429.340	-839.373	-612.581	-1244.175
P 3	-6771.695	-6771.695	-9906.318	-6771.695	-6771.695	-6771.695	-8648.714	-876.245	-876.245	-876.245	-876.245	-1281.048	-1281.048
C 1L	-13545.287	-13545.287	-19689.617	-13545.287	-13545.287	-13545.287	-17224.527	-945.837		-945.837		-1350.640	
C 1R	-13545.287	-13545.287	-19689.238	-13545.287	-13545.287	-13545.287	-17224.301		945.837		1350.620		945.837
P 5	-6771.695	-6771.695	-9906.083	-6771.695	-6771.695	-6771.695	-8648.574	876.245	876.245	1281.028	1281.028	876.245	876.245
P 6	-3149.333	-3149.333	-4573.514	-3149.333	-3149.333	-3149.333	-4002.135	839.373	429.340	1244.156	612.561	839.373	429.340
P 7	-33.163	-33.163	-33.164	-33.163	-33.163	-33.163	-33.164	375.469	18.944	558.691	18.944	375.469	18.944

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	-25.511	-25.511	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.060	#5@10.33	59.15		0.08	0.000	0.099
P 2	-2422.564	-3078.637	13.05	9 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.164D	#5@ 7.55	83.02		0.24	0.526	1.159
P 3	-5208.996	-6652.857	24.59	16 # 11	3.12	2 # 11	24.00	0.129	#5@ 4.80	24.00	0.129	#5@ 4.80	96.00		0.41	0.588	1.013
C 1	-10419.452	-13249.637	49.37	32 # 11	3.12	2 # 11	24.00	0.137	#5@ 4.53	24.00	0.137	#5@ 4.53	99.00M		0.77	0.578	0.911
P 5	-5208.996	-6652.750	24.59	16 # 11	3.12	2 # 11	24.00	0.129	#5@ 4.80	24.00	0.129	#5@ 4.80	96.00		0.41	0.588	1.013
P 6	-2422.564	-3078.566	13.05	9 # 11	3.12	2 # 11	24.00	0.164D	#5@ 7.55	24.00	0.060	#5@10.33	83.02		0.24	0.526	1.159
P 7	-25.510	-25.510	3.12	2 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	0.00	0.000	#5@ 0.00	59.15		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				3517.2	-4990.6	0.0	3517.2	5230.1	2356.9	21442.0	31892.4	14372.3	6.097	72.00	178.44
1	B	3	LL	3	5.1				3785.6	3843.3	-3968.5	3785.6	5629.2	4388.8	17828.1	26534.9	20687.8	4.713	72.00	178.44

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	26 # 11	26 # 11	131.04	1.020	1.00	0.000	3813.	201887.	1.000	1.117	1.000	2	0.70
1	B	16 # 11	16 # 11	26 # 11	26 # 11	131.04	1.020	1.00	0.000	3490.	201887.	1.000	1.106	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			2853.091	3430.617	29.851	-2563.182	-49.278	190.048	108.719	211.641	292.970	22.672	0.000	0.000	MAX.P1
1	3	LL	3	2.1			3709.019	4596.159	41.496	-2786.708	-53.306	236.219	147.841	285.977	374.355	29.683	0.000	0.000	MAX.MT
1	3	LL	2	3.1			3603.823	5040.981	38.807	-2833.412	-55.089	224.324	134.319	284.722	374.727	29.640	0.000	0.000	MAX.VT
1	3	LL	2	3.1			3603.823	5040.981	38.807	-2833.412	-55.089	224.324	134.319	284.722	374.727	29.640	0.000	0.000	MAX.VP
1	3	LL	3	4.1			3709.019	4096.184	31.636	-3695.754	-71.233	258.630	141.334	263.566	380.861	313.298	61.008	0.000	MAX.ML
1	3	LL	3	4.1			3709.019	4096.184	31.636	-3695.754	-71.233	258.630	141.334	263.566	380.861	313.298	61.008	0.000	MAX.VL
1	3	LL	2	3.1			2772.172	3877.678	29.851	-2179.548	-42.376	172.557	103.322	219.017	288.252	22.800	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
18.250	18.250	5.750	0.997	0.17	16 # 4	@13.625	TOP TRAN	41.293	63.337	126.674	52.480	0.000
				1.33	20 #10	@10.875	BOT.LONG	326.901	64.405	128.810	53.365	0.000

NUMBER OF PILES = 16 BP = 2.625 DP = 2.625