09-NOV-09 GEORGIA DEPARTMENT OF TRANSPORTATION PROB. NO. 0001
09:19:14 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
32' CURB-CURB; 4 BEAMS; 193' SPAN; 70' TALL; BRIDGE 2B ; PIER 9

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	6	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 REINFORCING STEEL MIN.P	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	15.15	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	17.625	4.000	4.000	6.000	6.000	4.000	13.625	14.000	9.333	0.667					
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	0	C	T		70.000	0.000	8.000	6.000	8.000	6.000	6.000	0.000	8	6	11	8	6	11	22	16	11	22	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	10.000	10.000	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	FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	* WIND FORCE ARM APT	APL	* WIND ON PIER PT	PL
2029.	2029.	1	50	0	44	6	41	12	33	16	17	19	7.771	7.771	8.876	18.271

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	192.5	192.5	16.375	16.375

MISCELLANEOUS FORCES

CENTRI. FT	TRACTION FORCE AND ARMS FL	APT	APL	EXPANSION COEFFICIENT	SHRINKAGE COEFFICIENT	STREAM FLOW PT	PL
0.000	7.060	16.375	16.375	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	443.320	478.000	0.000	0.000	477.930	492.230						
LL01	1	30.090	68.870	0.000	0.000	90.590	143.040						
LL02	1	134.900	87.600	0.000	0.000	69.790	36.380						
LL03	2	42.290	110.540	0.000	0.000	147.250	179.420						
LL04	2	41.570	116.850	0.000	0.000	160.370	153.910						
LL05	2	139.870	156.470	0.000	0.000	117.370	48.900						
LL06	2	164.990	142.450	0.000	0.000	110.370	48.520						

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	2096.230 2557.030	684.414	0.000	-684.414	2557.030	9234.743	-9919.157	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	-157.967	-7.060	-609.807	-609.807
WIND ON SUBSTR.	1	0.000	-53.256	8.876	621.320	0.000	0.000	0.000	-109.626	-18.271	-1278.970	-1278.970
GROUP 2 WIND 1 1	1	0.000	-1450.324	110.326	8511.188	0.000	0.000	0.000	-109.626	-18.271	-1278.970	-1278.970
GROUP 2 WIND 1 2	1	0.000	-1450.324	110.326	8511.188	0.000	0.000	0.000	109.626	18.271	1278.970	1278.970
GROUP 2 WIND 2 1	1	0.000	-1282.676	98.152	7564.404	0.000	0.000	0.000	-277.274	-30.445	-2225.754	-2225.754
GROUP 2 WIND 2 2	1	0.000	-1282.676	98.152	7564.404	0.000	0.000	0.000	277.274	30.445	2225.754	2225.754
GROUP 2 WIND 3 1	1	0.000	-1198.852	92.065	7091.012	0.000	0.000	0.000	-444.922	-42.619	-3172.538	-3172.538
GROUP 2 WIND 3 2	1	0.000	-1198.852	92.065	7091.012	0.000	0.000	0.000	444.922	42.619	3172.538	3172.538
GROUP 2 WIND 4 1	1	0.000	-975.321	75.833	5828.633	0.000	0.000	0.000	-556.688	-50.735	-3803.728	-3803.728
GROUP 2 WIND 4 2	1	0.000	-975.321	75.833	5828.633	0.000	0.000	0.000	556.688	50.735	3803.728	3803.728
GROUP 2 WIND 5 1	1	0.000	-528.259	43.369	3303.875	0.000	0.000	0.000	-640.512	-56.822	-4277.120	-4277.120
GROUP 2 WIND 5 2	1	0.000	-528.259	43.369	3303.875	0.000	0.000	0.000	640.512	56.822	4277.120	4277.120

GROUP 3 WIND 1 1	1	0.000	-865.816	52.348	4216.075	0.000	0.000	0.000	-32.888	-5.481	-383.691	-383.691
GROUP 3 WIND 1 2	1	0.000	-865.816	52.348	4216.075	0.000	0.000	0.000	32.888	5.481	383.691	383.691
GROUP 3 WIND 2 1	1	0.000	-763.835	46.386	3732.514	0.000	0.000	0.000	-134.868	-11.444	-867.253	-867.253
GROUP 3 WIND 2 2	1	0.000	-763.835	46.386	3732.514	0.000	0.000	0.000	134.868	11.444	867.253	867.253
GROUP 3 WIND 3 1	1	0.000	-712.845	43.404	3490.733	0.000	0.000	0.000	-236.849	-17.406	-1350.814	-1350.814
GROUP 3 WIND 3 2	1	0.000	-712.845	43.404	3490.733	0.000	0.000	0.000	236.849	17.406	1350.814	1350.814
GROUP 3 WIND 4 1	1	0.000	-576.871	35.455	2845.984	0.000	0.000	0.000	-304.836	-21.381	-1673.188	-1673.188
GROUP 3 WIND 4 2	1	0.000	-576.871	35.455	2845.984	0.000	0.000	0.000	304.836	21.381	1673.188	1673.188
GROUP 3 WIND 5 1	1	0.000	-304.922	19.556	1556.487	0.000	0.000	0.000	-355.827	-24.362	-1914.969	-1914.969
GROUP 3 WIND 5 2	1	0.000	-304.922	19.556	1556.487	0.000	0.000	0.000	355.827	24.362	1914.969	1914.969
LIVE LOAD LL01	1	332.590	1682.667	0.000	-1682.667	332.590	742.676	-2425.344	0.000	0.000	0.000	0.000
LIVE LOAD LL02	1	328.670	-1462.399	0.000	1462.399	328.670	2297.429	-835.030	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 LL03	1	479.500	2091.146	0.000	-2091.146	479.500	1107.950	-3199.096	0.000	0.000	0.000	0.000
LIVE LOAD LL04	1	472.700	1775.868	0.000	-1775.868	472.700	1127.319	-2903.187	0.000	0.000	0.000	0.000
LIVE LOAD LL05	1	462.610	-1456.059	0.000	1456.059	462.610	2688.425	-1232.366	0.000	0.000	0.000	0.000
LIVE LOAD LL06	1	466.330	-1780.297	0.000	1780.297	466.330	2974.674	-1194.377	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	-33.476	-33.476	-33.476	-33.476	-33.476	-33.476	-33.476		-19.222	-595.538	-19.222	-595.538	-19.222	-953.731
P 2	-5896.225	-5896.225	-9239.243	-5896.225	-5896.225	-5896.225	-7898.032		-665.797	-1287.197	-665.797	-1287.197	-1023.990	-1954.649
P 3	-6756.833	-6756.833	-10545.042	-6756.833	-6756.833	-6756.833	-9025.222		-1293.364	-1293.364	-1293.364	-1293.364	-1960.816	-1960.816
C 1L	-12005.166	-12005.166	-18463.184	-12005.166	-12005.166	-12005.166	-15872.243		-1330.803		-1330.803		-1998.256	
C 1R	-12894.904	-12894.904	-19840.141	-12894.904	-12894.904	-12894.904	-17053.729			1394.296		2103.496		1394.296
P 4	-7392.602	-7392.602	-11501.036	-7392.602	-7392.602	-7392.602	-9852.743		1356.855	1356.855	2066.056	2066.056	1356.855	1356.855
P 5	-6489.645	-6489.645	-10125.043	-6489.645	-6489.645	-6489.645	-8666.529		1350.689	729.380	2059.889	1118.901	1350.689	729.380
P 6	-33.476	-33.476	-33.476	-33.476	-33.476	-33.476	-33.476		659.121	19.222	1048.642	19.222	659.121	19.222

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	-25.751	-25.751	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.184	D#5@ 6.75	60.77		0.08	0.000	0.098
P 2	-4535.558	-6075.409	23.52	16 # 11	3.12	2 # 11	24.00	0.080	#5@ 7.72	24.00	0.282	D#5@ 4.39	93.65		0.40	0.599	0.950
P 3	-5197.564	-6942.479	26.25	17 # 11	3.12	2 # 11	24.00	0.273	D#5@ 4.54	24.00	0.273	D#5@ 4.54	96.00		0.43	0.644	0.994
C 1	-9234.743	-13118.253	49.77	32 # 11	3.12	2 # 11	24.00	0.271	D#5@ 4.58	12.00	0.292	D#5@ 4.24	99.00	M	0.77	0.733	0.902
P 4	-5686.617	-7579.033	28.77	19 # 11	3.12	2 # 11	12.00	0.296	D#5@ 4.19	12.00	0.296	D#5@ 4.19	96.00		0.47	0.622	0.966
P 5	-4992.035	-6666.562	25.88	17 # 11	3.12	2 # 11	12.00	0.306	D#5@ 4.06	24.00	0.101	#5@ 6.13	93.65		0.44	0.629	0.981
P 6	-25.751	-25.751	3.12	2 # 11	3.12	2 # 11	24.00	0.216	D#5@ 5.74	0.00	0.000	#5@ 0.00	60.77		0.08	0.000	0.098

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	LL03	0.0					3766.1	5429.6	0.0	3766.1	9233.3	5476.2	5781.2	14209.5	8427.6	1.539	72.00	96.00
1	B	2		3.1	R				3324.1	-10108.1	4124.3	3324.1	14925.3	7325.2	3292.4	14770.6	7249.3	0.990	72.00	96.00

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	15 # 11	15 # 11	8 # 11	8 # 11	71.76	1.038	1.00	0.164	4066.	9869.	1.701	2.423	1.000	2	0.70
1	B	16 # 11	16 # 11	9 # 11	9 # 11	78.00	1.128	1.00	0.226	3025.	9371.	1.477	1.776	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	2		3.1R				2557.030	-7775.426	-92.065	3172.538	42.619	117.554	51.272	226.594	292.876	268.564	45.885	43.049	MAX.P1

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1 2       1.1R            3324.139*********-143.424 1662.661  23.752 106.254  71.352 341.138 376.040 372.014  63.545  55.964  MAX.MT
1 2       1.1R            3324.139*********-143.424 1662.661  23.752 106.254  71.352 341.138 376.040 372.014  63.545  55.964  MAX.VT
1 2       1.1R            3324.139*********-143.424 1662.661  23.752 106.254  71.352 341.138 376.040 372.014  63.545  55.964  MAX.VP
1 2       4.1R            3324.139-8466.961 -98.583 4944.846  65.955 179.971  76.716 267.421 370.676 376.808  59.300  55.964  MAX.ML
1 2       4.1R            3324.139-8466.961 -98.583 4944.846  65.955 179.971  76.716 267.421 370.676 376.808  59.300  55.964  MAX.VL
1 5       3.1R  E         2557.030-7775.426 -92.065 3172.538  42.619 117.554  51.272 226.594 292.876 268.564  45.885  43.049  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
21.500  21.500   6.000  0.997  1.54  22 #11 @11.625  TOP TRAN 384.617  66.240 132.479  54.885  0.000
                                1.52  21 #11 @12.250  BOT.LONG 377.221  67.941 135.883  56.295  0.000
NUMBER OF PILES = 18  BP = 3.167  DP = 4.750
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