05-NOV-09 GEORGIA DEPARTMENT OF TRANSPORTATION PROB. NO. 0001
15:33:12 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; 5 BEAMS; 139' SPAN; 70' TALL; BRIDGE 13 ; PIER 5

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	CAP REINFORCING STEEL MAX BOT	MIN SIZE	* MIN NO.	* TOP CL.	* MIN S.SP	CAP DEPTH INCR.	BOT CL.
D D D L	2	1	8	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.	R CLEAR	KL MODE	OC COEF	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	17.625	4.000	4.000	6.000	6.000	4.000	13.625	14.000	7.000	3.000					
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	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 ON SUPERSTRUCTURE INTENSITIES WIND	FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	* WIND FORCE ARM APT	APL	* WIND ON PIER PT	PL
1355.	2711.	1	50	0	44	6	41	12	33	16	17	19	7.375	7.375	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	139.0	278.0	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	9.796	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	263.754	296.997	0.000	296.997	0.000	296.997	263.754					
LL 1	1	78.144	58.608	0.000	0.000	0.000	0.000	0.000					
LL 2	2	78.144	97.680	0.000	78.144	0.000	19.536	0.000					
LL 3	1	0.000	0.000	0.000	0.000	0.000	58.608	78.144					
LL 4	2	0.000	19.536	0.000	78.144	0.000	97.680	78.144					
LL 5	1	0.000	29.304	0.000	78.144	0.000	29.304	0.000					
LL 6	2	58.608	107.448	0.000	78.144	0.000	29.304	0.000					
LL 7	2	9.768	78.144	0.000	97.680	0.000	78.144	9.768					
LL 8	2	78.144	58.608	0.000	0.000	0.000	58.608	78.144					

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

LOAD	COL	TRANSVERSE PC	MT	V	MB	RF	ML	MR	* MT	LONGITUDINAL 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	1623.249 2084.049	0.000	0.000	0.000	2084.049	6568.973	-6568.973	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	-211.427	-9.796	-838.371	-838.371
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	-959.412	76.626	5863.476	0.000	0.000	0.000	-109.626	-18.271	-1278.970	-1278.970
GROUP 2 WIND 1 2	1	0.000	-959.412	76.626	5863.476	0.000	0.000	0.000	109.626	18.271	1278.970	1278.970
GROUP 2 WIND 2 1	1	0.000	-850.673	68.496	5234.417	0.000	0.000	0.000	-327.184	-34.537	-2537.552	-2537.552
GROUP 2 WIND 2 2	1	0.000	-850.673	68.496	5234.417	0.000	0.000	0.000	327.184	34.537	2537.552	2537.552
GROUP 2 WIND 3 1	1	0.000	-796.304	64.431	4919.888	0.000	0.000	0.000	-544.742	-50.803	-3796.134	-3796.134
GROUP 2 WIND 3 2	1	0.000	-796.304	64.431	4919.888	0.000	0.000	0.000	544.742	50.803	3796.134	3796.134
GROUP 2 WIND 4 1	1	0.000	-651.319	53.591	4081.143	0.000	0.000	0.000	-689.780	-61.647	-4635.188	-4635.188
GROUP 2 WIND 4 2	1	0.000	-651.319	53.591	4081.143	0.000	0.000	0.000	689.780	61.647	4635.188	4635.188

GROUP 2 WIND 5 1	1	0.000	-361.349	31.911	2403.653	0.000	0.000	0.000	-798.559	-69.780	-5264.479	-5264.479
GROUP 2 WIND 5 2	1	0.000	-361.349	31.911	2403.653	0.000	0.000	0.000	798.559	69.780	5264.479	5264.479
GROUP 3 WIND 1 1	1	0.000	-587.827	36.888	2948.646	0.000	0.000	0.000	-32.888	-5.481	-383.691	-383.691
GROUP 3 WIND 1 2	1	0.000	-587.827	36.888	2948.646	0.000	0.000	0.000	32.888	5.481	383.691	383.691
GROUP 3 WIND 2 1	1	0.000	-519.205	32.781	2617.177	0.000	0.000	0.000	-170.156	-13.697	-1046.770	-1046.770
GROUP 3 WIND 2 2	1	0.000	-519.205	32.781	2617.177	0.000	0.000	0.000	170.156	13.697	1046.770	1046.770
GROUP 3 WIND 3 1	1	0.000	-484.894	30.727	2451.441	0.000	0.000	0.000	-307.424	-21.913	-1709.850	-1709.850
GROUP 3 WIND 3 2	1	0.000	-484.894	30.727	2451.441	0.000	0.000	0.000	307.424	21.913	1709.850	1709.850
GROUP 3 WIND 4 1	1	0.000	-393.398	25.251	2009.481	0.000	0.000	0.000	-398.936	-27.390	-2151.903	-2151.903
GROUP 3 WIND 4 2	1	0.000	-393.398	25.251	2009.481	0.000	0.000	0.000	398.936	27.390	2151.903	2151.903
GROUP 3 WIND 5 1	1	0.000	-210.406	14.299	1125.561	0.000	0.000	0.000	-467.570	-31.498	-2483.442	-2483.442
GROUP 3 WIND 5 2	1	0.000	-210.406	14.299	1125.561	0.000	0.000	0.000	467.570	31.498	2483.442	2483.442
LIVE LOAD LL 1	1	136.752	-1504.272	0.000	1504.272	136.752	1504.272	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 2	1	273.504	-1641.024	0.000	1641.024	273.504	1777.776	-136.752	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	136.752	1504.272	0.000	-1504.272	136.752	0.000	-1504.272	0.000	0.000	0.000	0.000
LIVE LOAD LL 4	1	273.504	1641.024	0.000	-1641.024	273.504	136.752	-1777.776	0.000	0.000	0.000	0.000
LIVE LOAD LL 5	1	136.752	0.000	0.000	0.000	136.752	205.128	-205.128	0.000	0.000	0.000	0.000
LIVE LOAD LL 6	1	273.504	-1367.520	0.000	1367.520	273.504	1572.648	-205.128	0.000	0.000	0.000	0.000
LIVE LOAD LL 7	1	273.504	0.000	0.000	0.000	273.504	683.760	-683.760	0.000	0.000	0.000	0.000
LIVE LOAD LL 8	1	273.504	0.000	0.000	0.000	273.504	1504.272	-1504.272	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	-362.102	-19.222	-362.102	-19.222	-531.753
P 2	-2732.992	-2732.992	-3920.546	-2732.992	-2732.992	-2732.992	-3444.102		-411.993	-798.089	-411.993	-798.089	-581.644	-1179.803
P 3	-5166.289	-5166.289	-7498.984	-5166.289	-5166.289	-5166.289	-6563.113		-824.624	-824.624	-824.624	-824.624	-1206.338	-1206.338
C 1L	-8539.664	-8539.664	-12399.216	-8539.664	-8539.664	-8539.664	-10850.773		-862.064		-862.064		-1243.778	
C 1R	-8539.664	-8539.664	-12399.216	-8539.664	-8539.664	-8539.664	-10850.773			862.064		1243.778		862.064
P 5	-5166.290	-5166.290	-7498.985	-5166.290	-5166.290	-5166.290	-6563.113		824.624	824.624	1206.338	1206.338	824.624	824.624
P 6	-2732.992	-2732.992	-3920.547	-2732.992	-2732.992	-2732.992	-3444.103		798.089	411.993	1179.803	581.644	798.089	411.993
P 7	-33.477	-33.477	-33.477	-33.477	-33.477	-33.477	-33.477		362.102	19.222	531.753	19.222	362.102	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	0.060	#5@10.33	60.77		0.08	0.000	0.098
P 2	-2102.302	-2649.310	10.81	7 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.140	#5@ 4.44	85.43		0.19	0.571	1.344
P 3	-3974.068	-5048.548	18.47	12 # 11	3.12	2 # 11	24.00	0.113	#5@ 5.47	24.00	0.113	#5@ 5.47	96.00		0.30	0.581	1.118
C 1	-6568.973	-8346.749	31.16	20 # 11	3.12	2 # 11	24.00	0.122	#5@ 5.08	24.00	0.122	#5@ 5.08	96.00		0.51	0.595	1.018
P 5	-3974.069	-5048.549	18.47	12 # 11	3.12	2 # 11	24.00	0.113	#5@ 5.47	24.00	0.113	#5@ 5.47	96.00		0.30	0.581	1.118
P 6	-2102.302	-2649.310	10.81	7 # 11	3.12	2 # 11	24.00	0.140	#5@ 4.44	24.00	0.060	#5@10.33	85.43		0.19	0.571	1.344
P 7	-25.751	-25.751	3.12	2 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	0.00	0.000	#5@ 0.00	60.77		0.08	0.000	0.098

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

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 2	0.0					2704.0	-3562.7	0.0	2704.0	4824.1	2866.1	7739.3	13807.8	8203.4	2.862	72.00	96.00
1	B	2		5.1					2709.3	3124.7	-6843.8	2709.3	3954.3	10498.9	3171.7	4637.9	12313.8	1.173	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	0.000	3004.	11486.	1.354	1.767	1.000	2	0.70
1	B	15 # 11	15 # 11	8 # 11	8 # 11	71.76	1.038	1.00	0.000	2410.	11486.	1.265	1.534	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		4.1				2084.049	4081.143	53.591	-4635.188	-61.647	200.090	59.164	152.134	293.060	256.526	49.563	21.157	MAX.P1
1	2		1.1				2709.264	7622.519	99.614	-1662.661	-23.752	167.574	116.736	290.317	341.156	367.200	70.562	27.504	MAX.MT
1	2		1.1				2709.264	7622.519	99.614	-1662.661	-23.752	167.574	116.736	290.317	341.156	367.200	70.562	27.504	MAX.VT
1	2		3.1				2709.264	6395.854	83.760	-4934.974	-66.044	231.167	81.054	226.725	376.837	349.350	67.316	27.504	MAX.VP
1	2		5.1				2709.264	3124.749	41.484	-6843.822	-90.714	297.336	89.314	160.556	368.578	322.276	41.985	27.504	MAX.ML
1	2		5.1				2709.264	3124.749	41.484	-6843.822	-90.714	297.336	89.314	160.556	368.578	322.276	41.985	27.504	MAX.VL
1	5		3.1	E			2084.049	4919.888	64.431	-3796.134	-50.803	177.821	62.350	174.404	289.875	268.731	51.782	21.157	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	6.250	0.998	1.37	24	#10	@10.750	TOP LONG	363.019	70.114	140.227	58.095	0.000
				1.40	24	#10	@10.750	BOT.TRAN	371.121	71.646	143.293	59.365	0.000

NUMBER OF PILES = 15 BP = 4.750 DP = 9.500