30-OCT-09 GEORGIA DEPARTMENT OF TRANSPORTATION PROB. NO. 0001
18:47:24 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
42' CURB-CURB; 6 BEAMS; 140' SPAN; 60' TALL; BRIDGE 19 ; PIER 20

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	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 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	18.87	0.120	10.000	2.50	5.00	1.250	0.300	3.000	0.000	0.000	

CAP DATA

CN	C	L	A	DE	BC	BE	DH	LH	XB1	XB2	XB3	XB4	XB5	XB6	XB7	XB8
11	L	22.855	7.080	4.000	6.000	6.000	4.000	15.775	19.433	7.773	4.580					
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		60.000	0.000	14.160	6.000	14.160	6.000	6.000	0.000	14	6	11	14	6	11	40	16	11	40	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	S	16.160	16.160	2.250	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* TRANS.	STD. 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	7.676	25.546

GROUP III WIND

STD. WIND	* FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	* STD. WIND	* 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
6.828	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	272.573	315.123	0.000	787.808	0.000	315.123	272.573					
LL 1	1	80.806	56.605	0.000	0.000	0.000	0.000	0.000					
LL 2	2	80.806	103.841	0.000	90.175	0.000	0.000	0.000					
LL 3	3	80.806	103.841	0.000	202.104	0.000	25.483	0.000					
LL 4	1	0.000	0.000	0.000	0.000	0.000	56.622	80.789					
LL 5	2	0.000	0.000	0.000	90.184	0.000	103.850	80.789					
LL 6	3	0.000	25.491	0.000	202.104	0.000	103.850	80.789					
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	80.806	56.605	0.000	0.000	0.000	56.623	80.788					
LL13	3	80.806	103.841	0.000	90.175	0.000	56.623	80.788					

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	60.000	0.000	0.000	0.000	6.000	1.000	60.000	60.000
DEAD LOAD TOTAL	1	2235.522 2923.698	0.000	0.000	0.000	2923.698	10352.052	-10352.052	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	-745.248	-745.248
CENT. FORCE 1 LN	1	0.000	-147.369	6.828	516.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WIND ON SUBSTR.	1	0.000	-46.056	7.676	460.560	0.000	0.000	0.000	-153.276	-25.546	-1532.760	-1532.760
GROUP 2 WIND 1 1	1	0.000	-958.900	75.926	5058.904	0.000	0.000	0.000	-153.276	-25.546	-1532.760	-1532.760
GROUP 2 WIND 1 2	1	0.000	-958.900	75.926	5058.904	0.000	0.000	0.000	153.276	25.546	1532.760	1532.760

GROUP 2 WIND 2 1	1	0.000	-849.359	67.736	4507.103	0.000	0.000	0.000	-372.359	-41.926	-2636.363	-2636.363
GROUP 2 WIND 2 2	1	0.000	-849.359	67.736	4507.103	0.000	0.000	0.000	372.359	41.926	2636.363	2636.363
GROUP 2 WIND 3 1	1	0.000	-794.588	63.641	4231.202	0.000	0.000	0.000	-591.441	-58.306	-3739.965	-3739.965
GROUP 2 WIND 3 2	1	0.000	-794.588	63.641	4231.202	0.000	0.000	0.000	591.441	58.306	3739.965	3739.965
GROUP 2 WIND 4 1	1	0.000	-648.533	52.721	3495.467	0.000	0.000	0.000	-737.496	-69.226	-4475.700	-4475.700
GROUP 2 WIND 4 2	1	0.000	-648.533	52.721	3495.467	0.000	0.000	0.000	737.496	69.226	4475.700	4475.700
GROUP 2 WIND 5 1	1	0.000	-356.423	30.881	2023.997	0.000	0.000	0.000	-847.037	-77.416	-5027.501	-5027.501
GROUP 2 WIND 5 2	1	0.000	-356.423	30.881	2023.997	0.000	0.000	0.000	847.037	77.416	5027.501	5027.501
GROUP 3 WIND 1 1	1	0.000	-589.832	36.778	2575.833	0.000	0.000	0.000	-45.983	-7.664	-459.828	-459.828
GROUP 3 WIND 1 2	1	0.000	-589.832	36.778	2575.833	0.000	0.000	0.000	45.983	7.664	459.828	459.828
GROUP 3 WIND 2 1	1	0.000	-520.710	32.641	2283.313	0.000	0.000	0.000	-184.226	-15.938	-1044.868	-1044.868
GROUP 3 WIND 2 2	1	0.000	-520.710	32.641	2283.313	0.000	0.000	0.000	184.226	15.938	1044.868	1044.868
GROUP 3 WIND 3 1	1	0.000	-486.149	30.572	2137.053	0.000	0.000	0.000	-322.470	-24.212	-1629.907	-1629.907
GROUP 3 WIND 3 2	1	0.000	-486.149	30.572	2137.053	0.000	0.000	0.000	322.470	24.212	1629.907	1629.907
GROUP 3 WIND 4 1	1	0.000	-393.987	25.056	1747.027	0.000	0.000	0.000	-414.633	-29.728	-2019.934	-2019.934
GROUP 3 WIND 4 2	1	0.000	-393.987	25.056	1747.027	0.000	0.000	0.000	414.633	29.728	2019.934	2019.934
GROUP 3 WIND 5 1	1	0.000	-209.662	14.024	966.974	0.000	0.000	0.000	-483.754	-33.865	-2312.454	-2312.454
GROUP 3 WIND 5 2	1	0.000	-209.662	14.024	966.974	0.000	0.000	0.000	483.754	33.865	2312.454	2312.454
LIVE LOAD LL 1	1	137.411	-2230.317	0.000	2230.317	137.411	2230.317	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 2	1	274.822	-2781.089	0.000	2781.089	274.822	2781.089	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 3	1	371.011	-2235.562	0.000	2235.562	371.011	2502.980	-267.419	0.000	0.000	0.000	0.000
LIVE LOAD LL 4	1	137.411	2230.185	0.000	-2230.185	137.411	0.000	-2230.185	0.000	0.000	0.000	0.000
LIVE LOAD LL 5	1	274.823	2780.864	0.000	-2780.864	274.823	0.000	-2780.864	0.000	0.000	0.000	0.000
LIVE LOAD LL 6	1	371.011	2235.275	0.000	-2235.275	371.011	267.503	-2502.777	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	-0.140	0.000	0.140	274.822	2230.317	-2230.177	0.000	0.000	0.000	0.000
LIVE LOAD LL13	1	371.010	-495.820	0.000	495.820	371.010	2502.980	-2007.160	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	-29.383	-29.383	-29.383	-29.383	-29.383	-29.383	-29.383	-17.752	-372.097	-17.752	-372.097	-17.752	-547.527
P 2	-3116.964	-3116.964	-4480.581	-3116.964	-3116.964	-3116.964	-3933.501	-425.328	-834.988	-425.328	-834.988	-600.758	-1235.857
P 3	-7029.878	-7029.878	-10229.473	-7029.878	-7029.878	-7029.878	-8945.803	-874.745	-874.745	-874.745	-874.745	-1275.614	-1275.614
C 1L	-13457.667	-13457.667	-19495.412	-13457.667	-13457.667	-13457.667	-17073.082	-941.014		-941.014		-1341.883	
C 1R	-13457.667	-13457.667	-19494.922	-13457.667	-13457.667	-13457.667	-17072.791		941.014		1341.865		941.014
P 5	-7029.877	-7029.877	-10229.104	-7029.877	-7029.877	-7029.877	-8945.583	874.745	874.745	1275.597	1275.597	874.745	874.745
P 6	-3116.964	-3116.964	-4480.292	-3116.964	-3116.964	-3116.964	-3933.328	834.988	425.328	1235.839	600.721	834.988	425.328
P 7	-29.382	-29.382	-29.383	-29.382	-29.382	-29.382	-29.383	372.097	17.752	547.490	17.752	372.097	17.752

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	-22.602	-22.602	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.060	#5@10.33	58.42		0.08	0.000	0.089
P 2	-2397.665	-3025.770	12.94	9 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.166	D#5@ 7.48	82.07		0.25	0.511	1.153
P 3	-5407.599	-6881.387	25.44	17 # 11	3.12	2 # 11	24.00	0.128	#5@ 4.84	24.00	0.128	#5@ 4.84	96.00		0.42	0.559	0.986
C 1	-10352.052	-13133.141	48.84	32 # 11	3.12	2 # 11	24.00	0.135	#5@ 4.59	24.00	0.135	#5@ 4.59	99.00	M	0.76	0.565	0.903
P 5	-5407.598	-6881.218	25.44	17 # 11	3.12	2 # 11	24.00	0.128	#5@ 4.84	24.00	0.128	#5@ 4.84	96.00		0.42	0.558	0.986
P 6	-2397.665	-3025.637	12.94	9 # 11	3.12	2 # 11	24.00	0.166	D#5@ 7.48	24.00	0.060	#5@10.33	82.07		0.25	0.511	1.153

P 7 -22.602 -22.602 3.12 2 # 11 3.12 2 # 11 24.00 0.060 #5@10.33 0.00 0.000 #5@ 0.00 58.42 0.08 0.000 0.089

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			C		3711.6	-5370.7	0.0	3711.6	5664.4	3017.0	19060.3	29181.4	15542.8	5.148	72.00	169.92
1	B	2		5.1					3800.8	2631.2	-6535.8	3800.8	5616.8	8285.1	11531.7	17048.8	25148.0	3.035	72.00	169.92

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	24 # 11	24 # 11	124.80	1.020	1.00	0.000	4159.	80211.	1.055	1.355	1.000	2	0.70
1	B	16 # 11	16 # 11	24 # 11	24 # 11	124.80	1.020	1.00	0.000	3353.	80211.	1.044	1.268	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		C		3235.812	5411.149	49.008	-3642.078	-50.834	6.202	2.059	8.148	12.290	73.724	18.896	49.568	MAX.P1
1	3	LL 3	1.1		C		4206.556	7604.907	71.777	-3213.598	-44.572	7.113	3.580	11.775	15.308	105.782	0.000	44.830	MAX.MT
1	3	LL 3	3.1		C		4206.556	7034.494	63.710	-4734.701	-66.084	8.264	3.057	10.624	15.831	103.302	0.000	44.830	MAX.VT
1	3	LL 3	3.1		C		4206.556	7034.494	63.710	-4734.701	-66.084	8.264	3.057	10.624	15.831	103.302	0.000	44.830	MAX.VP
1	3	LL 3	5.1		C		4206.556	5513.391	42.198	-5622.011	-78.633	9.589	3.406	9.299	15.482	362.967	41.287	44.830	MAX.ML
1	3	LL 3	5.1		C		4206.556	5513.391	42.198	-5622.011	-78.633	9.589	3.406	9.299	15.482	362.967	41.287	44.830	MAX.VL
1	3	LL 3	3.1		C		3235.812	5411.149	49.008	-3642.078	-50.834	6.202	2.059	8.148	12.290	73.724	18.896	49.568	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
22.660	22.660	4.750	0.983	0.60	45 # 5	@ 6.000	TOP TRAN	143.391	63.093	126.185	52.278	0.000
				1.55	23 #11	@11.750	BOT.LONG	370.264	64.321	128.641	53.295	0.000