04-NOV-09 GEORGIA DEPARTMENT OF TRANSPORTATION PROB. NO. 0001
09:22:03 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; 200' SPAN; 40' TALL; BRIDGE 7 ; PIER 10

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	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	14.71	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	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		40.000	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	S	10.000	10.000	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*STD. TRANS.	LONG.	WIND FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	* WIND ON SUPERSTRUCTURE INTENSITIES APT	APL	* WIND FORCE ARM PT	* WIND ON PIER PL
2250.	6199.	1	50	0	44	6	41	12	33	16	17	19	8.125	8.125	5.273	13.389

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	200.0	551.0	17.084	17.084

MISCELLANEOUS FORCES

CENTRI. FT	TRACTION FORCE AND ARMS FL	APT	APL	EXPANSION COEFFICIENT	SHRINKAGE COEFFICIENT	STREAM FLOW PT	PL
16.232	18.532	17.084	17.084	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	423.450	619.980	0.000	0.000	478.800	537.940						
LL01	1	27.340	79.390	0.000	0.000	75.150	151.910						
LL02	1	117.860	116.370	0.000	0.000	68.090	36.340						
LL03	2	34.420	116.450	0.000	0.000	124.660	188.250						
LL04	2	37.350	127.150	0.000	0.000	143.240	163.960						
LL05	2	120.060	195.760	0.000	0.000	128.130	50.570						
LL06	2	145.200	191.500	0.000	0.000	126.200	51.950						

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	40.000	0.000	0.000	0.000	6.000	1.000	40.000	40.000
DEAD LOAD TOTAL	1	2264.920 2509.720	943.973	0.000	-943.973	2509.720	9619.185	-10563.157	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	-427.793	-18.532	-1057.881	-1057.881
CENT. FORCE 1 LN	1	0.000	-374.699	16.232	926.588	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WIND ON SUBSTR.	1	0.000	-31.638	5.273	210.920	0.000	0.000	0.000	-80.334	-13.389	-535.560	-535.560
GROUP 2 WIND 1 1	1	0.000	-1620.700	117.773	5624.982	0.000	0.000	0.000	-80.334	-13.389	-535.560	-535.560
GROUP 2 WIND 1 2	1	0.000	-1620.700	117.773	5624.982	0.000	0.000	0.000	80.334	13.389	535.560	535.560
GROUP 2 WIND 2 1	1	0.000	-1430.013	104.273	4975.295	0.000	0.000	0.000	-605.699	-50.583	-2325.521	-2325.521
GROUP 2 WIND 2 2	1	0.000	-1430.013	104.273	4975.295	0.000	0.000	0.000	605.699	50.583	2325.521	2325.521
GROUP 2 WIND 3 1	1	0.000	-1334.669	97.523	4650.451	0.000	0.000	0.000	-1131.064	-87.777	-4115.482	-4115.482
GROUP 2 WIND 3 2	1	0.000	-1334.669	97.523	4650.451	0.000	0.000	0.000	1131.064	87.777	4115.482	4115.482
GROUP 2 WIND 4 1	1	0.000	-1080.419	79.523	3784.201	0.000	0.000	0.000	-1481.308	-112.573	-5308.791	-5308.791
GROUP 2 WIND 4 2	1	0.000	-1080.419	79.523	3784.201	0.000	0.000	0.000	1481.308	112.573	5308.791	5308.791
GROUP 2 WIND 5 1	1	0.000	-571.919	43.523	2051.701	0.000	0.000	0.000	-1743.991	-131.170	-6203.771	-6203.771

GROUP 2 WIND 5 2	1	0.000	-571.919	43.523	2051.701	0.000	0.000	0.000	1743.991	131.170	6203.771	6203.771
GROUP 3 WIND 1 1	1	0.000	-947.890	55.332	2829.175	0.000	0.000	0.000	-24.100	-4.017	-160.668	-160.668
GROUP 3 WIND 1 2	1	0.000	-947.890	55.332	2829.175	0.000	0.000	0.000	24.100	4.017	160.668	160.668
GROUP 3 WIND 2 1	1	0.000	-835.282	48.882	2497.267	0.000	0.000	0.000	-334.341	-21.787	-1075.096	-1075.096
GROUP 3 WIND 2 2	1	0.000	-835.282	48.882	2497.267	0.000	0.000	0.000	334.341	21.787	1075.096	1075.096
GROUP 3 WIND 3 1	1	0.000	-778.978	45.657	2331.313	0.000	0.000	0.000	-644.582	-39.557	-1989.524	-1989.524
GROUP 3 WIND 3 2	1	0.000	-778.978	45.657	2331.313	0.000	0.000	0.000	644.582	39.557	1989.524	1989.524
GROUP 3 WIND 4 1	1	0.000	-628.835	37.057	1888.769	0.000	0.000	0.000	-851.410	-51.404	-2599.142	-2599.142
GROUP 3 WIND 4 2	1	0.000	-628.835	37.057	1888.769	0.000	0.000	0.000	851.410	51.404	2599.142	2599.142
GROUP 3 WIND 5 1	1	0.000	-328.547	19.857	1003.682	0.000	0.000	0.000	-1006.530	-60.289	-3056.356	-3056.356
GROUP 3 WIND 5 2	1	0.000	-328.547	19.857	1003.682	0.000	0.000	0.000	1006.530	60.289	3056.356	3056.356
LIVE LOAD LL01	1	333.790	1724.192	0.000	-1724.192	333.790	753.273	-2477.465	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 LL02	1	338.660	-1366.603	0.000	1366.603	338.660	2193.139	-826.536	0.000	0.000	0.000	0.000
LIVE LOAD LL03	1	463.780	2191.936	0.000	-2191.936	463.780	1025.352	-3217.288	0.000	0.000	0.000	0.000
LIVE LOAD LL04	1	471.700	1847.632	0.000	-1847.632	471.700	1116.309	-2963.941	0.000	0.000	0.000	0.000
LIVE LOAD LL05	1	494.520	-1288.489	0.000	1288.489	494.520	2594.452	-1305.963	0.000	0.000	0.000	0.000
LIVE LOAD LL06	1	514.850	-1610.255	0.000	1610.255	514.850	2926.530	-1316.275	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	-569.707	-19.222	-569.707	-19.222	-884.936
P 2	-5655.144	-5655.144	-8597.178	-5655.144	-5655.144	-5655.144	-7416.841		-639.966	-1445.940	-639.966	-1445.940	-955.195	-2176.915
P 3	-6621.634	-6621.634	-10051.229	-6621.634	-6621.634	-6621.634	-8675.283		-1452.106	-1452.106	-1452.106	-1452.106	-2183.082	-2183.082
C 1L	-12504.939	-12504.939	-18858.438	-12504.939	-12504.939	-12504.939	-16309.429		-1489.546		-1489.546		-2220.522	
C 1R	-13732.104	-13732.104	-20716.836	-13732.104	-13732.104	-13732.104	-17914.578			1454.849		2134.177		1454.849
P 4	-7987.586	-7987.586	-12255.008	-7987.586	-7987.586	-7987.586	-10542.929		1417.409	1417.409	2096.737	2096.737	1417.409	1417.409
P 5	-7044.240	-7044.240	-10858.549	-7044.240	-7044.240	-7044.240	-9328.258		1411.243	788.803	2090.570	1197.494	1411.243	788.803
P 6	-33.476	-33.476	-33.476	-33.476	-33.476	-33.476	-33.476		718.544	19.222	1127.234	19.222	718.544	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	0.160	D#5@ 7.74	60.77		0.08	0.000	0.098
P 2	-4350.111	-5705.263	20.40	14 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	12.00	0.301	D#5@ 4.12	99.65	V	0.32	0.568	0.993
P 3	-5093.564	-6673.295	24.12	16 # 11	3.12	2 # 11	12.00	0.305	D#5@ 4.06	12.00	0.305	D#5@ 4.06	99.00	V	0.39	0.600	0.983
C 1	-9619.185	-13780.445	48.59	32 # 11	3.12	2 # 11	12.00	0.289	D#5@ 4.29	24.00	0.272	D#5@ 4.55	105.00	M	0.71	0.728	0.889
P 4	-6144.297	-8109.945	30.76	20 # 11	3.12	2 # 11	12.00	0.303	D#5@ 4.09	12.00	0.303	D#5@ 4.09	96.00		0.51	0.627	0.979
P 5	-5418.646	-7175.583	26.88	18 # 11	3.12	2 # 11	12.00	0.298	D#5@ 4.16	24.00	0.110	#5@ 5.63	96.65	V	0.44	0.602	0.962
P 6	-25.751	-25.751	3.12	2 # 11	3.12	2 # 11	24.00	0.243	D#5@ 5.11	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			C		3951.3	5011.6	0.0	3951.3	5949.0	2971.1	9272.7	13966.3	6975.3	2.347	72.00	96.00
1	B	2		5.1	R				3262.6	-3894.4	8064.9	3262.6	4502.4	9516.9	4363.8	6027.2	12739.9	1.339	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	0.294	4110.	26087.	1.187	1.253	1.000	2	0.70
1	B	15 # 11	15 # 11	8 # 11	8 # 11	71.76	1.038	1.00	0.469	3104.	22980.	1.156	1.180	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	LL03	4.1R		2914.027	-4743.592	-37.057	4714.903	88.468	6.809	1.423	6.596	11.982	203.905	24.146	48.921	MAX.P1
1	3	LL03	2.1R		3788.234	-6957.716	-63.546	4148.114	76.506	7.264	2.531	10.163	14.895	274.426	32.578	63.597	MAX.MT
1	3	LL03	2.1R		3788.234	-6957.716	-63.546	4148.114	76.506	7.264	2.531	10.163	14.895	274.426	32.578	63.597	MAX.VT
1	3	LL06	4.1	C	3846.111	5462.253	90.377	-6129.374	-115.008	9.238	2.235	8.418	15.420	262.488	31.026	64.569	MAX.VP
1	3	LL04	5.1R		3797.210	-4625.858	-25.814	6723.752	126.559	10.075	2.392	7.387	15.071	352.779	42.800	63.748	MAX.ML
1	3	LL04	5.1R		3797.210	-4625.858	-25.814	6723.752	126.559	10.075	2.392	7.387	15.071	352.779	42.800	63.748	MAX.VL
1	2		4.1R		2509.720	-4728.174	-79.523	5308.791	112.573	6.288	0.162	5.520	11.646	184.825	21.968	42.133	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
22.500	22.500	4.500	0.959	1.27	29 # 9	@ 9.250	TOP TRAN	278.069	59.169	118.337	49.026	0.000
				1.60	24 #11	@11.250	BOT.LONG	366.138	60.700	121.400	50.295	0.000