29-OCT-09 GEORGIA DEPARTMENT OF TRANSPORTATION PROB. NO. 0001
10:59:49 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
40' CURB-CURB; 6 BEAMS; 100' SPAN; 40' TALL; BRIDGE 13 ; PIER 12

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	22.22	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	21.625	6.000	4.000	6.000	6.000	4.000	15.625	18.678	7.471	5.207					
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	12.000	6.000	12.000	6.000	6.000	0.000	12	6	11	12	6	11	34	16	11	34	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	14.000	14.000	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 FORCE ARM APT	APL	* WIND ON PIER PT	PL
975.	1950.	1	50	0	44	6	41	12	33	16	17	19	7.375	7.375	5.273	17.838

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	100.0	200.0	15.583	15.583

MISCELLANEOUS FORCES

CENTRI. FT	TRACTION FORCE AND ARMS FL	APT	APL	EXPANSION COEFFICIENT	SHRINKAGE COEFFICIENT	STREAM FLOW PT	PL
6.184	7.300	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	191.469	224.467	0.000	448.933	0.000	224.467	191.469					
LL 1	1	55.861	54.138	0.000	0.000	0.000	0.000	0.000					
LL 2	2	55.861	85.536	0.000	78.601	0.000	0.000	0.000					
LL 3	3	55.861	85.536	0.000	157.210	0.000	31.390	0.000					
LL 4	1	0.000	0.000	0.000	0.000	0.000	54.153	55.846					
LL 5	2	0.000	0.000	0.000	78.609	0.000	85.544	55.846					
LL 6	3	0.000	31.398	0.000	157.210	0.000	85.544	55.846					
LL 7	1	0.000	22.085	0.000	87.914	0.000	0.000	0.000					
LL 8	2	40.703	87.914	0.000	91.381	0.000	0.000	0.000					
LL 9	3	40.703	87.914	0.000	160.678	0.000	40.703	0.000					
LL10	2	0.000	31.398	0.000	157.210	0.000	31.390	0.000					
LL11	3	55.861	85.536	0.000	157.210	0.000	31.390	0.000					
LL12	2	55.861	54.138	0.000	0.000	0.000	54.153	55.846					
LL13	3	55.861	85.536	0.000	78.601	0.000	54.153	55.846					

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	1535.955 1903.155	0.000	0.000	0.000	1903.155	7313.647	-7313.647	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	-157.556	-7.300	-405.756	-405.756
CENT. FORCE 1 LN	1	0.000	-133.469	6.184	343.725	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	-107.028	-17.838	-713.520	-713.520
GROUP 2 WIND 1 1	1	0.000	-683.669	54.023	2520.451	0.000	0.000	0.000	-107.028	-17.838	-713.520	-713.520
GROUP 2 WIND 1 2	1	0.000	-683.669	54.023	2520.451	0.000	0.000	0.000	107.028	17.838	713.520	713.520

GROUP 2 WIND 2 1	1	0.000	-605.426	48.173	2243.308	0.000	0.000	0.000	-263.516	-29.538	-1267.807	-1267.807
GROUP 2 WIND 2 2	1	0.000	-605.426	48.173	2243.308	0.000	0.000	0.000	263.516	29.538	1267.807	1267.807
GROUP 2 WIND 3 1	1	0.000	-566.304	45.248	2104.736	0.000	0.000	0.000	-420.003	-41.238	-1822.095	-1822.095
GROUP 2 WIND 3 2	1	0.000	-566.304	45.248	2104.736	0.000	0.000	0.000	420.003	41.238	1822.095	1822.095
GROUP 2 WIND 4 1	1	0.000	-461.979	37.448	1735.211	0.000	0.000	0.000	-524.328	-49.038	-2191.620	-2191.620
GROUP 2 WIND 4 2	1	0.000	-461.979	37.448	1735.211	0.000	0.000	0.000	524.328	49.038	2191.620	2191.620
GROUP 2 WIND 5 1	1	0.000	-253.329	21.848	996.161	0.000	0.000	0.000	-602.572	-54.888	-2468.764	-2468.764
GROUP 2 WIND 5 2	1	0.000	-253.329	21.848	996.161	0.000	0.000	0.000	602.572	54.888	2468.764	2468.764
GROUP 3 WIND 1 1	1	0.000	-420.931	26.207	1311.965	0.000	0.000	0.000	-32.108	-5.351	-214.056	-214.056
GROUP 3 WIND 1 2	1	0.000	-420.931	26.207	1311.965	0.000	0.000	0.000	32.108	5.351	214.056	214.056
GROUP 3 WIND 2 1	1	0.000	-371.558	23.252	1162.123	0.000	0.000	0.000	-130.854	-11.261	-513.741	-513.741
GROUP 3 WIND 2 2	1	0.000	-371.558	23.252	1162.123	0.000	0.000	0.000	130.854	11.261	513.741	513.741
GROUP 3 WIND 3 1	1	0.000	-346.872	21.774	1087.201	0.000	0.000	0.000	-229.599	-17.171	-813.427	-813.427
GROUP 3 WIND 3 2	1	0.000	-346.872	21.774	1087.201	0.000	0.000	0.000	229.599	17.171	813.427	813.427
GROUP 3 WIND 4 1	1	0.000	-281.041	17.834	887.411	0.000	0.000	0.000	-295.430	-21.111	-1013.217	-1013.217
GROUP 3 WIND 4 2	1	0.000	-281.041	17.834	887.411	0.000	0.000	0.000	295.430	21.111	1013.217	1013.217
GROUP 3 WIND 5 1	1	0.000	-149.381	9.954	487.830	0.000	0.000	0.000	-344.802	-24.066	-1163.060	-1163.060
GROUP 3 WIND 5 2	1	0.000	-149.381	9.954	487.830	0.000	0.000	0.000	344.802	24.066	1163.060	1163.060
LIVE LOAD LL 1	1	109.999	-1650.096	0.000	1650.096	109.999	1650.096	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	219.998	-2001.974	0.000	2001.974	219.998	2001.974	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 3	1	296.997	-1485.167	0.000	1485.167	296.997	1801.776	-316.609	0.000	0.000	0.000	0.000
LIVE LOAD LL 4	1	109.999	1649.984	0.000	-1649.984	109.999	0.000	-1649.984	0.000	0.000	0.000	0.000
LIVE LOAD LL 5	1	219.999	2001.783	0.000	-2001.783	219.999	0.000	-2001.783	0.000	0.000	0.000	0.000
LIVE LOAD LL 6	1	296.998	1484.915	0.000	-1484.915	296.998	316.690	-1801.605	0.000	0.000	0.000	0.000
LIVE LOAD LL 7	1	109.999	-247.507	0.000	247.507	109.999	247.507	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 8	1	219.998	-1745.503	0.000	1745.503	219.998	1745.503	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 9	1	296.998	-1160.410	0.000	1160.410	296.998	1570.952	-410.543	0.000	0.000	0.000	0.000
LIVE LOAD LL10	1	219.998	-0.090	0.000	0.090	219.998	351.877	-351.788	0.000	0.000	0.000	0.000
LIVE LOAD LL11	1	296.997	-1485.167	0.000	1485.167	296.997	1801.776	-316.609	0.000	0.000	0.000	0.000
LIVE LOAD LL12	1	219.998	-0.112	0.000	0.112	219.998	1650.096	-1649.984	0.000	0.000	0.000	0.000
LIVE LOAD LL13	1	296.997	-316.791	0.000	316.791	296.997	1801.776	-1484.986	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	-21.600	-21.600	-21.600	-21.600	-21.600	-21.600	-21.600	-15.093	-264.002	-15.093	-264.002	-15.093	-385.276
P 2	-2170.021	-2170.021	-3076.061	-2170.021	-2170.021	-2170.021	-2712.560	-313.920	-605.727	-313.920	-605.727	-435.194	-912.700
P 3	-5436.835	-5436.835	-7941.283	-5436.835	-5436.835	-5436.835	-6936.504	-650.404	-650.404	-650.404	-650.404	-957.377	-957.377
C 1L	-9507.740	-9507.740	-13854.025	-9507.740	-9507.740	-9507.740	-12110.307	-706.564		-706.564		-1013.537	
C 1R	-9507.740	-9507.740	-13853.612	-9507.740	-9507.740	-9507.740	-12110.059		706.564		1013.522		706.564
P 5	-5436.835	-5436.835	-7940.960	-5436.835	-5436.835	-5436.835	-6936.312	650.404	650.404	957.362	957.362	650.404	650.404
P 6	-2170.021	-2170.021	-3075.818	-2170.021	-2170.021	-2170.021	-2712.414	605.727	313.920	912.685	435.162	605.727	313.920
P 7	-21.601	-21.600	-21.601	-21.601	-21.601	-21.600	-21.601	264.002	15.093	385.244	15.093	264.002	15.093

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	-16.615	-16.615	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.060	#5@10.33	57.05		0.08	0.000	0.067
P 2	-1669.247	-2086.584	10.06	7 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.091	#5@ 6.78	80.00		0.18	0.422	1.135
P 3	-4182.181	-5335.773	19.59	13 # 11	3.12	2 # 11	24.00	0.061	#5@10.23	24.00	0.061	#5@10.23	96.00		0.32	0.567	1.065
C 1	-7313.647	-9315.621	35.04	23 # 11	3.12	2 # 11	24.00	0.073	#5@ 8.44	24.00	0.073	#5@ 8.44	96.00		0.57	0.575	0.965
P 5	-4182.181	-5335.625	19.59	13 # 11	3.12	2 # 11	24.00	0.061	#5@10.23	24.00	0.061	#5@10.23	96.00		0.32	0.567	1.065
P 6	-1669.247	-2086.473	10.06	7 # 11	3.12	2 # 11	24.00	0.091	#5@ 6.78	24.00	0.060	#5@10.33	80.00		0.18	0.422	1.135

P 7 -16.616 -16.616 3.12 2 # 11 3.12 2 # 11 24.00 0.060 #5@10.33 0.00 0.000 #5@ 0.00 57.05 0.08 0.000 0.067

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			C		2474.4	-4693.3	0.0	2474.4	4813.8	1634.0	15131.8	29488.1	10009.6	6.124	72.00	144.00
1	B	3	LL 3	4.1			C		2860.2	4290.8	-2741.4	2860.2	4397.2	3007.1	14178.2	21813.7	14917.5	4.960	72.00	144.00

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	16 # 11	16 # 11	18 # 11	18 # 11	106.08	1.023	1.00	0.000	2713.	108348.	1.026	1.101	1.000	2	0.70
1	B	16 # 11	16 # 11	18 # 11	18 # 11	106.08	1.023	1.00	0.000	2622.	108348.	1.025	1.097	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		2146.157	3230.418	38.471	-1908.968	-36.881	5.738	1.893	8.252	12.097	47.610	2.627	27.244	MAX.P1
1	3	LL 3	1.1		C		2790.004	4491.737	55.775	-1702.476	-32.580	6.379	2.952	11.808	15.236	63.267	3.496	35.417	MAX.MT
1	3	LL 3	1.1		C		2790.004	4491.737	55.775	-1702.476	-32.580	6.379	2.952	11.808	15.236	63.267	3.496	35.417	MAX.VT
1	3	LL 3	3.1		C		2790.004	4199.543	50.013	-2481.658	-47.946	7.459	2.461	10.728	15.727	61.893	3.415	35.417	MAX.VP
1	3	LL 3	4.1		C		2790.004	3939.816	44.891	-2741.386	-53.068	7.983	2.461	10.204	15.727	199.399	33.933	35.417	MAX.ML
1	3	LL 3	4.1		C		2790.004	3939.816	44.891	-2741.386	-53.068	7.983	2.461	10.204	15.727	199.399	33.933	35.417	MAX.VL
1	3	LL 3	3.1		C		2146.157	3230.418	38.471	-1908.968	-36.881	5.589	1.814	8.101	11.876	47.440	11.702	33.006	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
18.500	18.500	3.250	0.968	0.55	51 # 4	@ 4.250	TOP TRAN	84.750	41.785	83.569	34.622	0.000
				1.29	24 # 9	@ 9.250	BOT.LONG	200.505	42.767	85.534	35.436	0.000