04-NOV-09 GEORGIA DEPARTMENT OF TRANSPORTATION PROB. NO. 0001
10:32:34 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
36' CURB-CURB; 5 BEAMS; 147' SPAN; 40' TALL; BRIDGE 15 ; PIER 17

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	12	24-39-21	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	17.92	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	21.715	4.000	4.000	6.000	6.000	4.000	17.715	17.704	8.852	4.852					
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	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
1433.	2867.	1	50	0	44	6	41	12	33	16	17	19	7.375	7.375	5.273	15.298

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	147.0	294.0	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	10.308	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	295.923	342.044	0.000	342.044	0.000	342.044	295.923					
LL 1	1	88.918	53.351	0.000	0.000	0.000	0.000	0.000					
LL 2	2	88.918	106.702	0.000	88.918	0.000	0.000	0.000					
LL 3	3	88.918	106.702	0.000	124.486	0.000	88.918	17.783					
LL 4	1	0.000	0.000	0.000	0.000	0.000	53.351	88.918					
LL 5	2	0.000	0.000	0.000	88.918	0.000	106.702	88.918					
LL 6	3	17.783	88.918	0.000	124.486	0.000	106.702	88.918					
LL 7	1	0.000	26.675	0.000	88.918	0.000	26.675	0.000					
LL 8	2	44.459	115.594	0.000	97.810	0.000	26.675	0.000					
LL 9	3	44.459	115.594	0.000	106.702	0.000	115.594	44.459					
LL10	2	0.000	88.918	0.000	106.702	0.000	88.918	0.000					
LL11	2	88.918	53.351	0.000	0.000	0.000	53.351	88.918					
LL12	3	88.918	106.702	0.000	88.918	0.000	53.351	88.918					

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	1866.900 2111.700	0.000	0.000	0.000	2111.700	9460.210	-9460.210	0.000	0.000	0.000	0.000
TRAC. FORCE 1 LN	1	0.000	-92.810	4.300	239.015	0.000	0.000	0.000	-202.194	-9.368	-520.714	-520.714
WIND ON SUBSTR.	1	0.000	-31.638	5.273	210.920	0.000	0.000	0.000	-91.788	-15.298	-611.920	-611.920
GROUP 2 WIND 1 1	1	0.000	-902.587	70.391	3295.870	0.000	0.000	0.000	307.991	14.592	804.118	804.118
GROUP 2 WIND 1 2	1	0.000	-902.587	70.391	3295.870	0.000	0.000	0.000	491.567	45.188	2027.958	2027.958
GROUP 2 WIND 2 1	1	0.000	-894.053	69.753	3265.644	0.000	0.000	0.000	50.916	-4.629	-106.453	-106.453
GROUP 2 WIND 2 2	1	0.000	-702.093	55.400	2585.708	0.000	0.000	0.000	652.694	57.235	2598.680	2598.680

GROUP 2 WIND 3 1	1	0.000	-937.777	73.022	3420.514	0.000	0.000	0.000	-182.171	-22.056	-932.061	-932.061
GROUP 2 WIND 3 2	1	0.000	-553.855	44.317	2060.644	0.000	0.000	0.000	837.808	71.075	3254.364	3254.364
GROUP 2 WIND 4 1	1	0.000	-862.412	67.387	3153.568	0.000	0.000	0.000	-385.536	-37.260	-1652.392	-1652.392
GROUP 2 WIND 4 2	1	0.000	-350.517	29.114	1340.406	0.000	0.000	0.000	913.244	76.715	3521.562	3521.562
GROUP 2 WIND 5 1	1	0.000	-631.698	50.137	2336.367	0.000	0.000	0.000	-618.015	-54.642	-2475.847	-2475.847
GROUP 2 WIND 5 2	1	0.000	-23.823	4.689	183.239	0.000	0.000	0.000	889.865	74.967	3438.753	3438.753
GROUP 3 WIND 1 1	1	0.000	-559.121	34.477	1731.339	0.000	0.000	0.000	224.752	10.510	582.090	582.090
GROUP 3 WIND 1 2	1	0.000	-559.121	34.477	1731.339	0.000	0.000	0.000	279.824	19.689	949.242	949.242
GROUP 3 WIND 2 1	1	0.000	-553.724	34.154	1714.967	0.000	0.000	0.000	62.544	0.802	89.797	89.797
GROUP 3 WIND 2 2	1	0.000	-432.606	26.905	1347.376	0.000	0.000	0.000	381.483	25.773	1257.774	1257.774
GROUP 3 WIND 3 1	1	0.000	-581.306	35.805	1798.678	0.000	0.000	0.000	-84.526	-8.001	-356.555	-356.555
GROUP 3 WIND 3 2	1	0.000	-339.069	21.307	1063.497	0.000	0.000	0.000	498.278	32.764	1612.247	1612.247
GROUP 3 WIND 4 1	1	0.000	-533.738	32.958	1654.318	0.000	0.000	0.000	-212.847	-15.681	-746.004	-746.004
GROUP 3 WIND 4 2	1	0.000	-210.756	13.627	674.076	0.000	0.000	0.000	545.868	35.612	1756.682	1756.682
GROUP 3 WIND 5 1	1	0.000	-388.136	24.244	1212.436	0.000	0.000	0.000	-359.546	-24.461	-1191.223	-1191.223
GROUP 3 WIND 5 2	1	0.000	-4.595	1.288	48.399	0.000	0.000	0.000	531.102	34.729	1711.876	1711.876
LIVE LOAD LL 1	1	142.269	-2046.467	0.000	2046.467	142.269	2046.467	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 2	1	284.538	-2518.730	0.000	2518.730	284.538	2518.730	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 3	1	384.126	-1275.118	0.000	1275.118	384.126	2266.857	-991.739	0.000	0.000	0.000	0.000
LIVE LOAD LL 4	1	142.269	2046.467	0.000	-2046.467	142.269	0.000	-2046.467	0.000	0.000	0.000	0.000
LIVE LOAD LL 5	1	284.538	2518.730	0.000	-2518.730	284.538	0.000	-2518.730	0.000	0.000	0.000	0.000
LIVE LOAD LL 6	1	384.126	1275.118	0.000	-1275.118	384.126	991.739	-2266.857	0.000	0.000	0.000	0.000
LIVE LOAD LL 7	1	142.268	0.000	0.000	0.000	142.268	236.127	-236.127	0.000	0.000	0.000	0.000
LIVE LOAD LL 8	1	284.538	-1574.213	0.000	1574.213	284.538	1810.340	-236.127	0.000	0.000	0.000	0.000
LIVE LOAD LL 9	1	384.127	0.000	0.000	0.000	384.127	1629.306	-1629.306	0.000	0.000	0.000	0.000
LIVE LOAD LL10	1	284.538	0.000	0.000	0.000	284.538	787.102	-787.102	0.000	0.000	0.000	0.000
LIVE LOAD LL11	1	284.538	0.000	0.000	0.000	284.538	2046.467	-2046.467	0.000	0.000	0.000	0.000
LIVE LOAD LL12	1	384.126	-425.037	0.000	425.037	384.126	2266.857	-1841.821	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	-40.487	-40.487	-40.487	-40.487	-40.487	-40.487	-40.487	-20.897	-405.596	-20.897	-405.596	-20.897	-598.637
P 2	-3886.241	-3886.241	-5595.040	-3886.241	-3886.241	-3886.241	-4909.474	-466.754	-911.411	-466.754	-911.411	-659.795	-1336.102
P 3	-8408.526	-8408.526	-12177.926	-8408.526	-8408.526	-8408.526	-10665.651	-953.716	-953.716	-953.716	-953.716	-1378.407	-1378.407
C 1L	-12298.272	-12298.272	-17766.438	-12298.272	-12298.272	-12298.272	-15572.622	-991.156		-991.156		-1415.847	
C 1R	-12298.272	-12298.272	-17766.438	-12298.272	-12298.272	-12298.272	-15572.622		991.156		1415.847		991.156
P 5	-8408.526	-8408.526	-12177.926	-8408.526	-8408.526	-8408.526	-10665.651	953.716	953.716	1378.407	1378.407	953.716	953.716
P 6	-3886.241	-3886.241	-5595.040	-3886.241	-3886.241	-3886.241	-4909.474	911.411	466.754	1336.102	659.795	911.411	466.754
P 7	-40.487	-40.487	-40.487	-40.487	-40.487	-40.487	-40.487	405.596	20.897	598.637	20.897	405.596	20.897

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	-31.144	-31.144	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.069	#5@ 8.94	58.87		0.08	0.000	0.122
P 2	-2989.417	-3776.519	16.08	11 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.187	D#5@ 6.61	82.85		0.31	0.527	1.097
P 3	-6468.098	-8204.348	30.56	20 # 11	3.12	2 # 11	24.00	0.151	#5@ 4.12	24.00	0.151	#5@ 4.12	96.00		0.50	0.574	0.990
C 1	-9460.210	-11978.940	45.82	30 # 11	3.12	2 # 11	24.00	0.160	D#5@ 7.76	24.00	0.160	D#5@ 7.76	96.00		0.74	0.564	0.918
P 5	-6468.098	-8204.348	30.56	20 # 11	3.12	2 # 11	24.00	0.151	#5@ 4.12	24.00	0.151	#5@ 4.12	96.00		0.50	0.574	0.990
P 6	-2989.417	-3776.519	16.08	11 # 11	3.12	2 # 11	24.00	0.187	D#5@ 6.61	24.00	0.060	#5@10.33	82.85		0.31	0.527	1.097
P 7	-31.144	-31.144	3.12	2 # 11	3.12	2 # 11	24.00	0.069	#5@ 8.94	0.00	0.000	#5@ 0.00	58.87		0.08	0.000	0.122

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					3044.7	-5468.2	0.0	3044.7	6041.6	2168.3	8214.4	16301.8	5850.8	2.698	72.00	96.00
1	B	3	LL 2	5.1					3115.1	5472.0	-2902.4	3115.1	5997.1	3395.9	7409.2	14219.0	8051.7	2.372	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	3204.	33756.	1.105	1.187	1.000	2	0.70
1	B	15 # 11	15 # 11	8 # 11	8 # 11	71.76	1.038	1.00	0.000	2956.	33756.	1.096	1.170	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 2	4.1				2352.998	4268.314	41.559	-1787.431	-34.417	151.060	90.237	232.244	293.067	197.433	-0.598	46.702	MAX.P1
1	3	LL 2	3.1				3058.897	5736.477	57.727	-1817.377	-34.758	184.459	122.658	313.836	375.638	259.291	-0.777	60.713	MAX.MT
1	3	LL 2	3.1				3058.897	5736.477	57.727	-1817.377	-34.758	184.459	122.658	313.836	375.638	259.291	-0.777	60.713	MAX.VT
1	3	LL 3	4.1				3168.687	4395.302	57.939	-2797.510	-53.268	230.105	135.013	283.875	378.967	248.638	-0.777	62.810	MAX.VP
1	3	LL 3	5.1				3168.687	3820.855	46.611	-3376.295	-64.682	250.029	135.197	263.951	378.783	299.212	53.904	62.810	MAX.ML
1	3	LL 3	5.1				3168.687	3820.855	46.611	-3376.295	-64.682	250.029	135.197	263.951	378.783	299.212	53.904	62.810	MAX.VL
1	3	LL 2	4.1				2352.998	4268.314	41.559	-1787.431	-34.417	151.060	90.237	232.244	293.067	197.433	-0.598	46.702	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
17.500	17.500	5.500	0.998	1.20	21 # 9	@10.000	TOP TRAN	260.051	59.337	118.675	49.166	0.000
				1.35	19 #10	@11.000	BOT.LONG	305.318	60.785	121.569	50.365	0.000

NUMBER OF PILES = 14 BP = 2.500 DP = 2.500