

09-NOV-09
09:09:41
GEORGIA DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION 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; 181' SPAN; 70' TALL; BRIDGE 2B ; PIER 3
PROB. NO. 0001

DESIGN NO.	NO. CAN	NO. COL	NO. LLC	SKEW D	ANG M	F'C S	FC PSI	N	FY PSI	FS PSI	DESIGN DATA EC KSI	ES KSI	CONC. STRAIN	Z FACT	* MAIN SIZE	* STR SIZ	* CAP MAX TOP	REINFORCING MAX BOT	STEEL MIN SIZE	* MIN NO.	* TOP CL.	* MIN S.SP	* CAP DEPTH	* 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 MIN.	1.00	8.00	2.50	3.750	2	2.00	0.70	0.90	1.00	1.00	0.75	16.03	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	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	V	T		70.000	6.000	8.000	6.000	10.667	8.667	6.000	0.000	8	6	11	10	8	11	22	16	11	30	24	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	12.667	12.667	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 INTENSITIES * WIND FORCE ARM * WIND ON PIER															
SUPERSTRUCTURE AREA*STD. TRANS. LONG. WIND FT1 FL1 WIND ON SUPERSTRUCTURE INTENSITIES FT2 FL2 FT3 FL3 FT4 FL4 FT5 FL5 WIND ON LIVE LOAD INTENSITIES FT1 FL1 FT2 FL2 FT3 FL3 FT4 FL4 FT5 FL5 LENGTHS OF LL * WIND ON LL ARMS TRANS. LONGI. APT APL															
1908. 7189. 1 50 0 44 6 41 12 33 16 17 19 7.771 7.771 9.897 19.291															

STD. WIND	* FT1	ON FL1	SUPERSTRUCTURE FT2	INTENSITIES FL2	* FT3	STD. WIND FT3	* FT4	ON FL4	SUPERSTRUCTURE FT4	INTENSITIES FL4	* FT5	STD. WIND FT5	* FT6	ON FL6	SUPERSTRUCTURE FT6	INTENSITIES FL6	* FT7	STD. WIND FT7	* FT8	ON FL8	SUPERSTRUCTURE FT8	INTENSITIES FL8	* FT9	STD. WIND FT9	* FT10	ON FL10	SUPERSTRUCTURE FT10	INTENSITIES FL10	* FT11	STD. WIND FT11	* FT12	ON FL12	SUPERSTRUCTURE FT12	INTENSITIES FL12	* FT13	STD. WIND FT13	* FT14	ON FL14	SUPERSTRUCTURE FT14	INTENSITIES FL14	* FT15	STD. WIND FT15	* FT16	ON FL16	SUPERSTRUCTURE FT16	INTENSITIES FL16	* FT17	STD. WIND FT17	* FT18	ON FL18	SUPERSTRUCTURE FT18	INTENSITIES FL18	* FT19	STD. WIND FT19	* FT20	ON FL20	SUPERSTRUCTURE FT20	INTENSITIES FL20	* FT21	STD. WIND FT21	* FT22	ON FL22	SUPERSTRUCTURE FT22	INTENSITIES FL22	* FT23	STD. WIND FT23	* FT24	ON FL24	SUPERSTRUCTURE FT24	INTENSITIES FL24	* FT25	STD. WIND FT25	* FT26	ON FL26	SUPERSTRUCTURE FT26	INTENSITIES FL26	* FT27	STD. WIND FT27	* FT28	ON FL28	SUPERSTRUCTURE FT28	INTENSITIES FL28	* FT29	STD. WIND FT29	* FT30	ON FL30	SUPERSTRUCTURE FT30	INTENSITIES FL30	* FT31	STD. WIND FT31	* FT32	ON FL32	SUPERSTRUCTURE FT32	INTENSITIES FL32	* FT33	STD. WIND FT33	* FT34	ON FL34	SUPERSTRUCTURE FT34	INTENSITIES FL34	* FT35	STD. WIND FT35	* FT36	ON FL36	SUPERSTRUCTURE FT36	INTENSITIES FL36	* FT37	STD. WIND FT37	* FT38	ON FL38	SUPERSTRUCTURE FT38	INTENSITIES FL38	* FT39	STD. WIND FT39	* FT40	ON FL40	SUPERSTRUCTURE FT40	INTENSITIES FL40	* FT41	STD. WIND FT41	* FT42	ON FL42	SUPERSTRUCTURE FT42	INTENSITIES FL42	* FT43	STD. WIND FT43	* FT44	ON FL44	SUPERSTRUCTURE FT44	INTENSITIES FL44	* FT45	STD. WIND FT45	* FT46	ON FL46	SUPERSTRUCTURE FT46	INTENSITIES FL46	* FT47	STD. WIND FT47	* FT48	ON FL48	SUPERSTRUCTURE FT48	INTENSITIES FL48	* FT49	STD. WIND FT49	* FT50	ON FL50	SUPERSTRUCTURE FT50	INTENSITIES FL50	* FT51	STD. WIND FT51	* FT52	ON FL52	SUPERSTRUCTURE FT52	INTENSITIES FL52	* FT53	STD. WIND FT53	* FT54	ON FL54	SUPERSTRUCTURE FT54	INTENSITIES FL54	* FT55	STD. WIND FT55	* FT56	ON FL56	SUPERSTRUCTURE FT56	INTENSITIES FL56	* FT57	STD. WIND FT57	* FT58	ON FL58	SUPERSTRUCTURE FT58	INTENSITIES FL58	* FT59	STD. WIND FT59	* FT60	ON FL60	SUPERSTRUCTURE FT60	INTENSITIES FL60	* FT61	STD. WIND FT61	* FT62	ON FL62	SUPERSTRUCTURE FT62	INTENSITIES FL62	* FT63	STD. WIND FT63	* FT64	ON FL64	SUPERSTRUCTURE FT64	INTENSITIES FL64	* FT65	STD. WIND FT65	* FT66	ON FL66	SUPERSTRUCTURE FT66	INTENSITIES FL66	* FT67	STD. WIND FT67	* FT68	ON FL68	SUPERSTRUCTURE FT68	INTENSITIES FL68	* FT69	STD. WIND FT69	* FT70	ON FL70	SUPERSTRUCTURE FT70	INTENSITIES FL70	* FT71	STD. WIND FT71	* FT72	ON FL72	SUPERSTRUCTURE FT72	INTENSITIES FL72	* FT73	STD. WIND FT73	* FT74	ON FL74	SUPERSTRUCTURE FT74	INTENSITIES FL74	* FT75	STD. WIND FT75	* FT76	ON FL76	SUPERSTRUCTURE FT76	INTENSITIES FL76	* FT77	STD. WIND FT77	* FT78	ON FL78	SUPERSTRUCTURE FT78	INTENSITIES FL78	* FT79	STD. WIND FT79	* FT80	ON FL80	SUPERSTRUCTURE FT80	INTENSITIES FL80	* FT81	STD. WIND FT81	* FT82	ON FL82	SUPERSTRUCTURE FT82	INTENSITIES FL82	* FT83	STD. WIND FT83	* FT84	ON FL84	SUPERSTRUCTURE FT84	INTENSITIES FL84	* FT85	STD. WIND FT85	* FT86	ON FL86	SUPERSTRUCTURE FT86	INTENSITIES FL86	* FT87	STD. WIND FT87	* FT88	ON FL88	SUPERSTRUCTURE FT88	INTENSITIES FL88	* FT89	STD. WIND FT89	* FT90	ON FL90	SUPERSTRUCTURE FT90	INTENSITIES FL90	* FT91	STD. WIND FT91	* FT92	ON FL92	SUPERSTRUCTURE FT92	INTENSITIES FL92	* FT93	STD. WIND FT93	* FT94	ON FL94	SUPERSTRUCTURE FT94	INTENSITIES FL94	* FT95	STD. WIND FT95	* FT96	ON FL96	SUPERSTRUCTURE FT96	INTENSITIES FL96	* FT97	STD. WIND FT97	* FT98	ON FL98	SUPERSTRUCTURE FT98	INTENSITIES FL98	* FT99	STD. WIND FT99	* FT100	ON FL100	SUPERSTRUCTURE FT100	INTENSITIES FL100
1	50	0	44	6	41	12	33	16	17	19	1	100	0	88	12	82	24	66	32	34	38	181.0	682.0	16.375	16.375																																																																																																																																																																																																																																																																																	

CENTRI. FT	TRACTION FL	FORCE APT	MISCELLANEOUS FORCES AND ARMS APL	EXPANSION COEFFICIENT	SHRINKAGE COEFFICIENT	STREAM PT	FLOW PL
14.624	22.724	16.375	16.375	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	375.230	344.770	0.000	0.000	396.410	330.490						
LL01	1	28.390	60.300	0.000	0.000	93.250	112.510						
LL02	1	126.920	68.430	0.000	0.000	66.050	27.580						
LL03	2	44.850	104.890	0.000	0.000	152.830	140.090						
LL04	2	42.460	107.930	0.000	0.000	159.290	117.010						
LL05	2	133.720	128.730	0.000	0.000	107.580	36.770						
LL06	2	155.310	112.710	0.000	0.000	99.230	112.710						

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

LOAD	COL	TRANSVERSE								LONGITUDINAL				
		PC	MT	V	MB	RF	ML	MR	MT	V	MB	MF		
UNIT F.AT CL.CAP	1	0.000	-6.000	1.000	70.000	0.000	0.000	0.000	0.000	6.000	1.000	70.000	70.000	
DEAD LOAD TOTAL	1	1651.650 2314.434	-385.356	0.000	385.356	2314.434	7659.699	-7274.343	0.000	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	-508.450	-22.724	-1962.786	-1962.786		
CENT. FORCE 1 LN	1	0.000	-327.212	14.624	1263.148	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
WIND ON SUBSTR.	1	0.000	-59.382	9.897	692.790	0.000	0.000	0.000	-115.746	-19.291	-1350.370	-1350.370		
GROUP 2 WIND 1 1	1	0.000	-1373.135	105.297	8112.144	0.000	0.000	0.000	-115.746	-19.291	-1350.370	-1350.370		
GROUP 2 WIND 1 2	1	0.000	-1373.135	105.297	8112.144	0.000	0.000	0.000	115.746	19.291	1350.370	1350.370		
GROUP 2 WIND 2 1	1	0.000	-1215.485	93.849	7221.821	0.000	0.000	0.000	-709.744	-62.425	-4704.944	-4704.944		
GROUP 2 WIND 2 2	1	0.000	-1215.485	93.849	7221.821	0.000	0.000	0.000	709.744	62.425	4704.944	4704.944		
GROUP 2 WIND 3 1	1	0.000	-1136.660	88.125	6776.660	0.000	0.000	0.000	-1303.743	-105.559	-8059.519	-8059.519		
GROUP 2 WIND 3 2	1	0.000	-1136.660	88.125	6776.660	0.000	0.000	0.000	1303.743	105.559	8059.519	8059.519		
GROUP 2 WIND 4 1	1	0.000	-926.459	72.861	5589.563	0.000	0.000	0.000	-1699.741	-134.315	-10295.901	-10295.901		
GROUP 2 WIND 4 2	1	0.000	-926.459	72.861	5589.563	0.000	0.000	0.000	1699.741	134.315	10295.901	10295.901		
GROUP 2 WIND 5 1	1	0.000	-506.058	42.333	3215.370	0.000	0.000	0.000	-1996.740	-155.882	-11973.188	-11973.188		

GROUP	WIND	5	2	1	0.000	-506.058	42.333	3215.370	0.000	PIER-32-4-181-70.OUT	0.000	0.000	1996.740	155.882	11973.188	11973.188
GROUP 3	WIND 1	1	1	0.000	-816.928	49.689	3997.030	0.000	0.000	0.000	-34.724	-5.787	-405.111	-405.111		
GROUP 3	WIND 1	2	1	0.000	-816.928	49.689	3997.030	0.000	0.000	0.000	34.724	5.787	405.111	405.111		
GROUP 3	WIND 2	1	1	0.000	-721.034	44.083	3542.327	0.000	0.000	0.000	-396.040	-26.911	-2118.376	-2118.376		
GROUP 3	WIND 2	2	1	0.000	-721.034	44.083	3542.327	0.000	0.000	0.000	396.040	26.911	2118.376	2118.376		
GROUP 3	WIND 3	1	1	0.000	-673.088	41.279	3314.976	0.000	0.000	0.000	-757.357	-48.036	-3831.642	-3831.642		
GROUP 3	WIND 3	2	1	0.000	-673.088	41.279	3314.976	0.000	0.000	0.000	757.357	48.036	3831.642	3831.642		
GROUP 3	WIND 4	1	1	0.000	-545.229	33.804	2708.705	0.000	0.000	0.000	-998.235	-62.119	-4973.819	-4973.819		
GROUP 3	WIND 4	2	1	0.000	-545.229	33.804	2708.705	0.000	0.000	0.000	998.235	62.119	4973.819	4973.819		
GROUP 3	WIND 5	1	1	0.000	-289.513	18.854	1496.163	0.000	0.000	0.000	-1178.893	-72.681	-5830.451	-5830.451		
GROUP 3	WIND 5	2	1	0.000	-289.513	18.854	1496.163	0.000	0.000	0.000	1178.893	72.681	5830.451	5830.451		
LIVE LOAD	LL01		1	294.450	1331.458	0.000	-1331.458	294.450	678.880	-2010.338	0.000	0.000	0.000	0.000	0.000	0.000

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

LOAD	COL	TRANSVERSE								LONGITUDINAL			
		PC	MT	V	MB	RF	ML	MR	MT	V	MB	MF	
LIVE LOAD LL02	1	288.980	-1401.868	0.000	1401.868	288.980	2096.243	-694.375	0.000	0.000	0.000	0.000	
LIVE LOAD LL03	1	442.660	1557.096	0.000	-1557.096	442.660	1117.422	-2674.518	0.000	0.000	0.000	0.000	
LIVE LOAD LL04	1	426.690	1283.397	0.000	-1283.397	426.690	1098.149	-2381.546	0.000	0.000	0.000	0.000	
LIVE LOAD LL05	1	406.800	-1456.007	0.000	1456.007	406.800	2472.863	-1016.856	0.000	0.000	0.000	0.000	
LIVE LOAD LL06	1	479.960	-659.311	0.000	659.311	479.960	2700.357	-2041.046	0.000	0.000	0.000	0.000	

CAP MOMENTS AND SHEARS

POINT	D.L.TOT.	MOMENTS(KIP- FEET)						SHEARS(KIPS)					
		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	-507.021	-19.222	-507.021	-19.222	-844.199
P 2	-5070.095	-5070.095	-8216.978	-5070.095	-5070.095	-5070.095	-6954.456	-577.280	-1025.481	-577.280	-1025.481	-914.458	-1607.352
P 3	-5756.139	-5756.139	-9291.129	-5756.139	-5756.139	-5756.139	-7872.899	-1031.647	-1031.647	-1031.647	-1031.647	-1613.519	-1613.519
C 1L	-9957.608	-9957.608	-15820.084	-9957.608	-9957.608	-9957.608	-13468.073	-1069.087		-1069.087		-1650.959	
C 1R	-9456.646	-9456.646	-15263.022	-9456.646	-9456.646	-9456.646	-12933.518		1078.057		1713.987	1078.057	
P 4	-5219.295	-5219.295	-8481.956	-5219.295	-5219.295	-5219.295	-7172.984	1040.618	1040.618	1676.547	1676.547	1040.618	1040.618
P 5	-4527.269	-4527.269	-7365.764	-4527.269	-4527.269	-4527.269	-6226.967	1034.451	519.118	1670.380	823.253	1034.451	519.118
P 6	-33.475	-33.475	-33.476	-33.475	-33.475	-33.475	-33.476	448.859	19.222	752.994	19.222	448.859	19.222

PT.	M+ UNF. K-FT.	M- UNF. K-FT.	TOP REINFORCE.		BOT. REINFORCE.		CAP DESIGN DATA LEFT STIRRUPS		RIGHT STIRRUPS		D IN.	FC PSI	PS %	FS/FF RATIO	FS/FZ RATIO	
			AS	NO. SIZE	AS	NO. SIZE	M.SP.	AV/IN	BAR&SPAC	M.SP.						AV/IN
P 1	-25.751	-25.751	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.146	#5@ 4.24	60.77	0.08	0.000	0.098
P 2	-3900.073	-5349.582	20.84	14 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.207	#5@ 5.99	93.65	0.35	0.634	0.995
P 3	-4427.799	-6056.077	23.01	15 # 11	3.12	2 # 11	24.00	0.199	#5@ 6.22	24.00	0.199	#5@ 6.22	96.00	0.38	0.661	1.003
C 1	-7274.343	-10360.057	40.41	26 # 11	3.12	2 # 11	24.00	0.209	#5@ 5.92	24.00	0.223	#5@ 5.57	96.00	0.66	0.730	0.936
P 4	-4014.843	-5517.681	20.96	14 # 11	3.12	2 # 11	24.00	0.213	#5@ 5.83	24.00	0.213	#5@ 5.83	96.00	0.35	0.641	1.000
P 5	-3482.514	-4789.975	18.63	12 # 11	3.12	2 # 11	24.00	0.221	#5@ 5.62	24.00	0.060	#5@10.33	93.65	0.31	0.678	1.089
P 6	-25.750	-25.751	3.12	2 # 11	3.12	2 # 11	24.00	0.115	#5@ 5.39	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

CN	T B	CRITICAL COLUMN LOADS																		
		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	3	LL05	5.1		C		2676.0	-3620.9	-2854.5	2676.0	4225.9	3542.2	7429.7	11693.8	9801.7	2.769	72.00	96.00	
1	B	2		5.1			3008.8	4680.9	*****	3008.8	5423.2	18553.9	5650.8	10196.0	34882.4	1.880	104.00	128.00		

COLUMN DESIGN DATA

CN	T B	FACE				AS	PS	BD12	BD	SUMPU	SUMPC	DEL.T	DEL.L	CM	R	PHIC				
		NO. SIZE	NO. SIZE	NO. SIZE	NO. SIZE															
1	T	15	# 11	15	# 11	8	# 11	8	# 11	71.76	1.038	1.00	0.102	3107.	21700.	1.167	1.241	1.000	2	0.70
1	B	24	# 11	24	# 11	19	# 11	19	# 11	134.16	1.008	1.00	0.270	2578.	18835.	1.159	1.192	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
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PIER-32-4-181-70.OUT														
1 3	LL05	4.1	C	2665.033	6875.211	63.052-8899.390-107.567	164.698	28.950	157.902	293.650	191.940	33.187	30.505	MAX.P1
1 3	LL05	3.1	C	3464.542	9725.927	91.686*****-121.529	195.244	41.451	224.136	377.929	256.820	44.347	39.656	MAX.MT
1 3	LL05	3.1	C	3464.542	9725.927	91.686*****-121.529	195.244	41.451	224.136	377.929	256.820	44.347	39.656	MAX.VT
1 3	LL06	5.1	C	3546.511	6468.852	62.532*****-153.567	249.498	56.016	177.688	371.170	231.106	40.090	40.606	MAX.VP
1 3	LL06	5.1	C	3546.511	6468.852	62.532*****-153.567	249.498	56.016	177.688	371.170	444.931	56.688	40.606	MAX.ML
1 3	LL06	5.1	C	3546.511	6468.852	62.532*****-153.567	249.498	56.016	177.688	371.170	444.931	56.688	40.606	MAX.VL
1 2		4.1		2314.434	5974.920	72.861*****-134.315	166.554	8.662	122.655	280.547	168.102	29.319	26.443	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
25.000	25.000	6.000	1.000	1.32	33 # 9	@ 9.000	TOP TRAN	320.266	66.410	132.820	55.026	0.000
				1.80	29 #11	@10.250	BOT.LONG	446.038	67.941	135.883	56.295	0.000

NUMBER OF PILES = 21 BP = 5.625 DP = 5.625