

21-OCT-09
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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
36' CURB-CURB; 5 BEAMS; 140' SPAN; 30' TALL; BRIDGE 14 ; PIER 2

PROB. NO. 0001

DESIGN DATA										DESIGN DATA																
DESIGN NO.	NO. CAN	NO. COL	NO. LLC	SKEW	ANG	F'C	FC	N	FY	FS	EC	ES	CONC.	Z	* * *	* CAP	REINFORCING	STEEL	* * *	CAP						
OPTIONS				D	M	PSI	PSI		PSI	PSI	KSI	KSI	STRAIN	FACT	MAIN	STR	MAX	MAX	MIN	MIN	TOP	MIN	DEPTH	BOT		
D	D	D	L	2	1	12	11-43-02	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										CAP DATA														
MIN.P	MAX.P	CL.SP.	R	KL	OC	OF	CM	BD1	BD2	IMPACT	SOIL	WT	ALL.S.P.	MIN	MAX	EDGE	PILE	REBAR	ALL.PILE	ALL.PILE	ALL.PILE	ALL.PILE	ALL.PILE	ALL.PILE
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	0.000	0.000	0.000	0.000

COLUMN DATA										COLUMN DATA														
CN	C	L	A	DE	BC	BE	DH	LH	XB1	XB2	XB3	XB4	XB5	XB6	XB7	XB8								

FOOTING DATA										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.									

GROUP II WIND										GROUP II WIND														
WIND	FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	WIND	FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	WIND	FT1	FL1

GROUP III WIND										GROUP III WIND														
STD.	WIND	ON	SUPERSTRUCTURE	INTENSITIES	STD.	WIND	ON	LIVE	LOAD	INTENSITIES	LENGTHS	OF	LL	WIND	ON	LL	ARMS	APL						

MISCELLANEOUS FORCES										MISCELLANEOUS FORCES														
CENTRI.	TRACTION	FORCE	AND	ARMS	EXPANSION	SHRINKAGE	STREAM	FLOW																

DEAD LOAD SUPERSTRUCTURE AND LIVE LOAD CASES										DEAD LOAD SUPERSTRUCTURE AND LIVE LOAD CASES														
I.D.	NL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12											

TRANSVERSE										LONGITUDINAL														
LOAD	COL	PC	MT	V	MB	RF	ML	MR	MT	V	MB	MF												

PIER-36-5-140-30.OUT												
GROUP 2 WIND 3 1	1	0.000	-846.343	65.523	2418.889	0.000	0.000	0.000	-354.199	-33.575	-1159.996	-1159.996
GROUP 2 WIND 3 2	1	0.000	-668.377	52.217	1921.581	0.000	0.000	0.000	658.226	56.306	2009.565	2009.565
GROUP 2 WIND 4 1	1	0.000	-732.993	57.048	2102.144	0.000	0.000	0.000	-526.872	-46.485	-1642.511	-1642.511
GROUP 2 WIND 4 2	1	0.000	-495.704	39.307	1439.066	0.000	0.000	0.000	771.576	64.781	2326.310	2326.310
GROUP 2 WIND 5 1	1	0.000	-469.216	37.326	1365.047	0.000	0.000	0.000	-693.453	-58.940	-2108.003	-2108.003
GROUP 2 WIND 5 2	1	0.000	-187.435	16.259	577.642	0.000	0.000	0.000	819.512	68.365	2460.263	2460.263
GROUP 3 WIND 1 1	1	0.000	-571.340	34.978	1410.809	0.000	0.000	0.000	93.825	3.142	169.241	169.241
GROUP 3 WIND 1 2	1	0.000	-571.340	34.978	1410.809	0.000	0.000	0.000	140.131	10.860	400.775	400.775
GROUP 3 WIND 2 1	1	0.000	-531.733	32.607	1314.311	0.000	0.000	0.000	-55.576	-5.799	-194.761	-194.761
GROUP 3 WIND 2 2	1	0.000	-475.584	29.247	1177.507	0.000	0.000	0.000	261.457	18.122	696.375	696.375
GROUP 3 WIND 3 1	1	0.000	-525.967	32.262	1300.263	0.000	0.000	0.000	-197.957	-14.321	-541.662	-541.662
GROUP 3 WIND 3 2	1	0.000	-413.668	25.541	1026.655	0.000	0.000	0.000	389.801	25.803	1009.075	1009.075
GROUP 3 WIND 4 1	1	0.000	-454.442	27.981	1125.997	0.000	0.000	0.000	-306.916	-20.842	-807.131	-807.131
GROUP 3 WIND 4 2	1	0.000	-304.710	19.020	761.186	0.000	0.000	0.000	461.327	30.084	1183.341	1183.341
GROUP 3 WIND 5 1	1	0.000	-287.995	18.019	720.463	0.000	0.000	0.000	-412.030	-27.133	-1063.234	-1063.234
GROUP 3 WIND 5 2	1	0.000	-110.189	7.378	287.251	0.000	0.000	0.000	491.575	31.894	1257.039	1257.039
LIVE LOAD LL 1	1	137.411	-1828.237	0.000	1828.237	137.411	1828.237	0.000	0.000	0.000	0.000	0.000
LIVE LOAD LL 2	1	274.823	-2250.165	0.000	2250.165	274.823	2250.165	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 LL 3	1	371.011	-1139.135	0.000	1139.135	371.011	2025.148	-886.013	0.000	0.000	0.000	0.000
LIVE LOAD LL 4	1	137.411	1828.237	0.000	-1828.237	137.411	0.000	-1828.237	0.000	0.000	0.000	0.000
LIVE LOAD LL 5	1	274.823	2250.165	0.000	-2250.165	274.823	0.000	-2250.165	0.000	0.000	0.000	0.000
LIVE LOAD LL 6	1	371.011	1139.135	0.000	-1139.135	371.011	886.013	-2025.148	0.000	0.000	0.000	0.000
LIVE LOAD LL 7	1	137.410	0.000	0.000	0.000	137.410	210.956	-210.956	0.000	0.000	0.000	0.000
LIVE LOAD LL 8	1	274.822	-1406.369	0.000	1406.369	274.822	1617.325	-210.956	0.000	0.000	0.000	0.000
LIVE LOAD LL 9	1	371.011	0.000	0.000	0.000	371.011	1455.592	-1455.592	0.000	0.000	0.000	0.000
LIVE LOAD LL10	1	274.823	0.000	0.000	0.000	274.823	703.202	-703.202	0.000	0.000	0.000	0.000
LIVE LOAD LL11	1	274.822	0.000	0.000	0.000	274.822	1828.237	-1828.237	0.000	0.000	0.000	0.000
LIVE LOAD LL12	1	371.011	-379.735	0.000	379.735	371.011	2025.148	-1645.413	0.000	0.000	0.000	0.000

□ CAP ANALYSIS AND DESIGN DATA

POINT	MOMENTS(KIP-FEET)								SHEARS(KIPS)					
	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	-34.684	-34.684	-34.684	-34.684	-34.684	-34.684	-34.684	-19.365	-385.657	-19.365	-385.657	-19.365	-572.107	
P 2	-3411.688	-3411.688	-4938.152	-3411.688	-3411.688	-3411.688	-4325.738	-442.560	-865.864	-442.560	-865.864	-629.010	-1276.055	
P 3	-7111.983	-7111.983	-10355.916	-7111.983	-7111.983	-7111.983	-9054.458	-902.503	-902.503	-902.503	-902.503	-1312.693	-1312.693	
C 1L	-10797.813	-10797.813	-15682.922	-10797.813	-10797.813	-10797.813	-13723.028	-939.952		-939.952		-1350.143		
C 1R	-10797.813	-10797.813	-15682.922	-10797.813	-10797.813	-10797.813	-13723.028		939.952		1350.143		939.952	
P 5	-7111.983	-7111.983	-10355.918	-7111.983	-7111.983	-7111.983	-9054.459	902.503	902.503	1312.693	1312.693	902.503	902.503	
P 6	-3411.688	-3411.688	-4938.153	-3411.688	-3411.688	-3411.688	-4325.739	865.864	442.560	1276.055	629.010	865.864	442.560	
P 7	-34.685	-34.685	-34.685	-34.685	-34.685	-34.685	-34.685	385.657	19.365	572.107	19.365	385.657	19.365	

PT.	UNF.		TOP REINFORCE.		BOT. REINFORCE.		CAP DESIGN DATA				D IN.	FC PSI	PS %	FS/FF RATIO	FS/FZ RATIO	
	M+ K-FT.	M- K-FT.	AS	NO. SIZE	AS	NO. SIZE	M.SP.	AV/IN	LEFT STIRRUPS BAR&SPAC	RIGHT STIRRUPS BAR&SPAC						
P 1	-26.680	-26.680	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.060	#5@10.33	59.08	0.08	0.000	0.104
P 2	-2624.375	-3327.491	14.03	9 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.170	#5@ 7.29	83.51	0.26	0.590	1.245
P 3	-5470.756	-6964.968	25.76	17 # 11	3.12	2 # 11	24.00	0.136	#5@ 4.56	24.00	0.136	#5@ 4.56	96.00	0.42	0.571	0.998
C 1	-8306.011	-10556.176	40.03	26 # 11	3.12	2 # 11	24.00	0.145	#5@ 4.26	24.00	0.145	#5@ 4.26	96.00	0.65	0.580	0.953
P 5	-5470.757	-6964.969	25.76	17 # 11	3.12	2 # 11	24.00	0.136	#5@ 4.56	24.00	0.136	#5@ 4.56	96.00	0.42	0.571	0.998
P 6	-2624.376	-3327.492	14.03	9 # 11	3.12	2 # 11	24.00	0.170	#5@ 7.29	24.00	0.060	#5@10.33	83.51	0.26	0.590	1.245
P 7	-26.681	-26.681	3.12	2 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	0.00	0.000	#5@ 0.00	59.08	0.08	0.000	0.104

NOTE: *** FS/FZ RATIO EXCEEDS 1.0! ***

□ COLUMN ANALYSIS AND DESIGN OUTPUT

CRITICAL COLUMN LOADS

PIER-36-5-140-30.OUT

CN	T	B	GR	LLC	WC	R	E	C	S	PF	MTF	MLF	PM	MTM	MLM	PU	MTU	MLU	PU/PM	B	D
1	T		1	LL 2	0.0					2899.8	-4885.1	0.0	2899.8	5152.0	1903.5	8857.6	15741.4	5816.1	3.055	72.00	96.00
1	B		1	LL 5	0.0					3124.5	-4885.1	0.0	3124.5	5152.0	2051.0	9185.7	15153.1	6032.4	2.941	72.00	96.00

COLUMN DESIGN DATA

CN	T	B	FACE 1	B	FACE 2	D	FACE 3	D	FACE 4	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	3012.	58150.	1.055	1.094	1.000	2	0.70
1	B		15 # 11		15 # 11		8 # 11		8 # 11	71.76	1.038	1.00	0.000	3012.	58150.	1.055	1.094	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	3.1				2175.694	3375.775	36.267-1421.828	-33.630		5.292	2.211	9.324	12.406	119.612	29.187	45.777	MAX.P1
1	3	LL 2	1.1				2828.403	4532.218	50.677 -924.202	-21.017		5.723	3.842	12.744	14.625	162.871	27.629	50.543	MAX.MT
1	3	LL 2	1.1				2828.403	4532.218	50.677 -924.202	-21.017		5.723	3.842	12.744	14.625	162.871	27.629	50.543	MAX.VT
1	3	LL 3	4.1				2933.596	3029.964	43.404-2593.960	-60.982		9.182	3.890	9.900	15.191	150.949	25.439	52.423	MAX.VP
1	3	LL 3	5.1				2933.596	2502.771	30.454-2926.894	-69.161		10.062	4.088	9.019	14.993	211.538	36.007	52.423	MAX.ML
1	3	LL 3	5.1				2933.596	2502.771	30.454-2926.894	-69.161		10.062	4.088	9.019	14.993	211.538	36.007	52.423	MAX.VL
1	3	LL 2	3.1				2175.694	3375.775	36.267-1421.828	-33.630		5.292	2.211	9.324	12.406	119.612	29.187	45.777	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	0.992	1.09	26 # 8	@ 8.500	TOP TRAN	166.359	41.312	82.623	34.230	0.000	
				1.37	21 #10	@10.500	BOT.LONG	221.564	42.681	85.363	35.365	0.000	