Portsmouth Bypass
An Appalachian Development Highway

STRUCTURAL ENGINEERING
AUG 03 2009
RECEIVED

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

Stage 2 Submission

SCI-823-0837 L/R
SR823 over Swauger Valley-Minford Road
Bridge Calculations

Portsmouth Bypass, Phase 1

SCI-823-6.81
PID 19415

July 31, 2009

PREPARED FOR:
HDR Engineering, Inc.
9987 Carver Road, Suite 200
Cincinnati, Ohio 45242
513-984-7500

Ohio Department of Transportation
District 9
650 Eastern Avenue
Chillicothe, Ohio 45601

PREPARED BY:
KZF Design, Inc.
655 Eden Park Drive
Cincinnati, Ohio 45202
513-621-6211

HDR

ONE COMPANY | *Many Solutions*®

STAGE 2 DETAILED DESIGN

TABLE OF CONTENTS

A. GEOMETRY/LAYOUT

P.G.L. = Profile Grade Elevations for the Left Structure (located 11 ft. away from the Centerline Construction)
** U = WB (Up) , D = EB (Down)
*** (+) = RT of P.G.L.
Skew = 13
Right Forward

Project SCI-823-0837 (Left)
Item Superstructure
Design Screed Elevations
Originator DAT Date 30-Jun-09
Checker Date

	*	**	OFFSETS ***								SUPER-	Screed Elevations									Dead Load Deflection
Location	STATION	Dir.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	ELEV	P.G.L.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	(in.)
Begin	440+73.803	D	-37.500								1.6000%	717.624	717.024								
Bridge	440+82.460											717.449									
Limit	440+84.990	U								10.958	-4.0000%	717.399								716.960	
	440+75.599	D	-37.500								1.6000%	717.588	716.988								
	440+76.421	D		-33.938							1.6000%	717.571		717.028							
Centerline	440+78.807	D			-23.604						1.6000%	717.523			717.145						
Bearings	440+81.193	D				-13.271					1.6000%	717.475				717.262					
Rear Abut.	440+83.578	D					-2.938				1.6000%	717.427					717.380				
	440+84.256											717.413						717.413			
	440+85.964	U							7.396		-4.0000%	717.379							717.083		
	440+86.786	U								10.958	-4.0000%	717.363								716.925	
	440+88.713	D	-37.500								1.6000%	717.325	716.766								
	440+89.536	D		-33.938							1.6000%	717.306		716.807							
1/8 Pt.	440+91.922	D			-23.604						1.6000%	717.261			716.925						
span 1	440+94.307	D				-13.271					1.6000%	717.215				717.044					
	440+96.893	D					-2.938				1.6000%	717.168					717.163				
	440+97.371											717.155						717.197			0.5001
	440+99.078	U							7.396		-4.0000%	717.122							716.868		
	440+99.901	U								10.958	-4.0000%	717.106								716.710	
	441+01.828	D	-37.500								1.6000%	717.069	716.541								
	441+02.651	D		-33.938							1.6000%	717.053		716.582							
2/8 Pt.	441+05.036	D			-23.604						1.6000%	717.008			716.701						
span 1	441+07.422	D				-13.271					1.6000%	716.962				716.821					
	441+09.807	D					-2.938				1.6000%	716.917					716.942				
	441+10.486											716.904						716.976			0.8573
	441+12.193	U							7.396		-4.0000%	716.872							716.648		
	441+13.016	U								10.958	-4.0000%	716.857								716.490	
	441+14.943	D	-37.500								1.6000%	716.821	716.310								
	441+15.765	D		-33.938							1.6000%	716.806		716.352							
3/8 Pt.	441+18.151	D			-23.604						1.6000%	716.761			716.473						
span 1	441+20.536	D				-13.271					1.6000%	716.717				716.594					
	441+22.922	D					-2.938				1.6000%	716.673					716.716				
	441+23.600											716.661						716.750			1.0716
	441+25.308	U							7.396		-4.0000%	716.63							716.423		
	441+26.130	U								10.958	-4.0000%	716.615								716.266	
	441+28.057	D	-37.500								1.6000%	716.58	716.075								
	441+28.880	D		-33.938							1.6000%	716.566		716.117							
4/8 Pt.	441+31.265	D			-23.604						1.6000%	716.522			716.240						
span 1	441+33.651	D				-13.271					1.6000%	716.48				716.362					
	441+36.037	D					-2.938				1.6000%	716.437					716.485				
	441+36.715											716.425						716.520			1.143
	441+38.422	U							7.396		-4.0000%	716.396							716.194		
	441+39.245	U								10.958	-4.0000%	716.38								716.037	
	441+41.172	D	-37.500								1.6000%	716.347	715.836								
	441+41.994	D		-33.938							1.6000%	716.332		715.878							
5/8 Pt.	441+44.380	D			-23.604						1.6000%	716.291			716.002						
span 1	441+46.766	D				-13.271					1.6000%	716.249				716.126					
	441+49.151	D					-2.938				1.6000%	716.206					716.250				
	441+49.829											716.196						716.286			1.0716
	441+51.537	U							7.396		-4.0000%	716.167							715.961		
	441+52.359	U								10.958	-4.0000%	716.153								715.804	
	441+54.286	D	-37.500								1.6000%	716.12	715.592								
	441+55.109	D		-33.938							1.6000%	716.107		715.636							
6/8 Pt.	441+57.494	D			-23.604						1.6000%	716.066			715.760						
span 1	441+59.880	D				-13.271					1.6000%	716.026				715.885					
	441+62.266	D					-2.938				1.6000%	715.987					716.011				
	441+62.944											715.975						716.047			0.8573
	441+64.651	U							7.396		-4.0000%	715.947							715.723		
	441+65.474	U								10.958	-4.0000%	715.933								715.567	
	441+67.401	D	-37.500								1.6000%	715.902	715.343								
	441+68.223	D		-33.938							1.6000%	715.888		715.387							
7/8 Pt.	441+70.609	D			-23.604						1.6000%	715.849			715.513						
span 1	441+72.995	D				-13.271					1.6000%	715.811				715.640					
	441+75.380	D					-2.938				1.6000%	715.772					715.767				
	441+76.059											715.761						715.803			0.5001
	441+77.766	U							7.396		-4.0000%	715.734							715.480		
	441+78.588	U								10.958	-4.0000%	715.721								715.324	
	441+80.516	D	-37.500								1.6000%	715.69	715.090								
	441+81.338	D		-33.938							1.6000%	715.677		715.134							
Centerline	441+83.724	D			-23.604						1.6000%	715.64			715.262						
Bearings	441+86.109	D				-13.271					1.6000%	715.602				715.390					
Pier 1	441+88.495	D					-2.938				1.6000%	715.565					715.518				
(back)	441+89.173											715.555						715.556			
	441+90.881	U							7.396		-4.0000%	715.529							715.233		
	441+91.703	U								10.958	-4.0000%	715.516								715.078	
	441+82.932	D	-37.500								1.6000%	715.652	715.052								
	441+83.755	D		-33.938							1.6000%	715.639		715.096							
Centerline	441+86.140	D			-23.604						1.6000%	715.602			715.224						
Bearings	441+88.526	D				-13.271					1.6000%	715.565				715.353					
Pier 1	441+90.912	D					-2.938				1.6000%	715.528					715.481				
(forward)	441+91.590											715.518						715.518			
	441+93.297	U							7.396		-4.0000%	715.492							715.198		
	441+94.120	U								10.958	-4.0000%	715.479								715.041	

P.G.L. = Profile Grade Elevations for the Left Structure (located 11 ft. away from the Centerline Construction)
** U = WB (Up), D = EB (Down)
*** (+) = RT of P.G.L.
Skew = 13
Right Forward

Project SCI-823-0837 (Left)
Item Superstructure
Design Screed Elevations
Originator DAT Date 30-Jun-09
Checker Date

	*	**	OFFSETS ***								SUPER-	Screed Elevations									Dead Load Deflection
Location	STATION	Dir.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	ELEV	P.G.L.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	(in.)
	441+96.068	D	-37.500								1.6000%	715.449	714.892								
	441+96.890	D		-33.938							1.6000%	715.437		714.936							
1/8 Pt.	441+99.276	D			-23.604						1.6000%	715.401			715.065						
span 2	442+01.661	D				-13.271					1.6000%	715.366				715.196					
	442+04.047	D					-2.938				1.6000%	715.33					715.325				
	442+04.725											715.32						715.362			0.50645
	442+06.433	U							7.396		-4.0000%	715.294							715.041		
	442+07.255	U								10.958	-4.0000%	715.282								714.888	
	442+09.203	D	-37.500								1.6000%	715.254	714.726								
	442+10.026	D		-33.938							1.6000%	715.242		714.771							
2/8 Pt.	442+12.411	D			-23.604						1.6000%	715.207			714.902						
span 2	442+14.797	D				-13.271					1.6000%	715.173				715.033					
	442+17.182	D					-2.938				1.6000%	715.139					715.164				
	442+17.861											715.129						715.201			0.86815
	442+19.568	U							7.396		-4.0000%	715.105							714.881		
	442+20.391	U								10.958	-4.0000%	715.093								714.727	
	442+22.338	D	-37.500								1.6000%	715.066	714.556								
	442+23.161	D		-33.938							1.6000%	715.054		714.602							
3/8 Pt.	442+25.547	D			-23.604						1.6000%	715.021			714.734						
span 2	442+27.932	D				-13.271					1.6000%	714.988				714.866					
	442+30.318	D					-2.938				1.6000%	714.955					714.998				
	442+30.996											714.946						715.036			1.0852
	442+32.703	U							7.396		-4.0000%	714.922							714.717		
	442+33.526	U								10.958	-4.0000%	714.911								714.563	
	442+35.474	D	-37.500								1.6000%	714.885	714.381								
	442+36.296	D		-33.938							1.6000%	714.874		714.427							
4/8 Pt.	442+38.682	D			-23.604						1.6000%	714.842			714.561						
span 2	442+41.068	D				-13.271					1.6000%	714.81				714.694					
	442+43.453	D					-2.938				1.6000%	714.779					714.828				
	442+44.131											714.77						714.866			1.1575
	442+45.839	U							7.396		-4.0000%	714.747							714.548		
	442+46.661	U								10.958	-4.0000%	714.737								714.395	
	442+48.609	D	-37.500								1.6000%	714.711	714.202								
	442+49.432	D		-33.938							1.6000%	714.701		714.248							
5/8 Pt.	442+51.817	D			-23.604						1.6000%	714.67			714.383						
span 2	442+54.203	D				-13.271					1.6000%	714.64				714.518					
	442+56.589	D					-2.938				1.6000%	714.61					714.653				
	442+57.267											714.601						714.692			1.0852
	442+58.974	U							7.396		-4.0000%	714.58							714.375		
	442+59.797	U								10.958	-4.0000%	714.57								714.222	
	442+61.745	D	-37.500								1.6000%	714.546	714.018								
	442+62.567	D		-33.938							1.6000%	714.536		714.065							
6/8 Pt.	442+64.953	D			-23.604						1.6000%	714.506			714.201						
span 2	442+67.338	D				-13.271					1.6000%	714.477				714.337					
	442+69.724	D					-2.938				1.6000%	714.448					714.474				
	442+70.402											714.44						714.513			0.86815
	442+72.110	U							7.396		-4.0000%	714.42							714.196		
	442+72.932	U								10.958	-4.0000%	714.41								714.044	
	442+74.880	D	-37.500								1.6000%	714.387	713.829								
	442+75.703	D		-33.938							1.6000%	714.377		713.876							
7/8 Pt.	442+78.088	D			-23.604						1.6000%	714.349			714.014						
span 2	442+80.474	D				-13.271					1.6000%	714.322				714.152					
	442+82.860	D					-2.938				1.6000%	714.294					714.289				
	442+83.538											714.286						714.329			0.50645
	442+85.245	U							7.396		-4.0000%	714.267							714.013		
	442+86.058	U								10.958	-4.0000%	714.258								713.862	
	442+88.016	D	-37.500								1.6000%	714.236	713.636								
	442+88.838	D		-33.938							1.6000%	714.227		713.684							
Centerline	442+91.224	D			-23.604						1.6000%	714.2			713.822						
Bearings	442+93.609	D				-13.271					1.6000%	714.174				713.961					
Pier 2	442+95.995	D					-2.938				1.6000%	714.148					714.101				
(back)	442+96.673											714.14						714.140			
	442+98.381	U							7.396		-4.0000%	714.122							713.826		
	442+99.203	U								10.958	-4.0000%	714.113								713.675	
	442+90.432	D	-37.500								1.6000%	714.209	713.609								
	442+91.255	D		-33.938							1.6000%	714.2		713.657							
Centerline	442+93.640	D			-23.604						1.6000%	714.173			713.796						
Bearings	442+96.026	D				-13.271					1.6000%	714.147				713.935					
Pier 2	442+98.412	D					-2.938				1.6000%	714.121					714.074				
(forward)	442+99.090											714.114						714.114			
	443+00.797	U							7.396		-4.0000%	714.096							713.800		
	443+01.620	U								10.958	-4.0000%	714.087								713.649	
	443+03.568	D	-37.500								1.6000%	714.066	713.509								
	443+04.390	D		-33.938							1.6000%	714.058		713.557							
1/8 Pt.	443+06.776	D			-23.604						1.6000%	714.033			713.697						
span 3	443+09.161	D				-13.271					1.6000%	714.008				713.838					
	443+11.547	D					-2.938				1.6000%	713.983					713.979				
	443+12.225											713.977						714.019			0.50645
	443+13.933	U							7.396		-4.0000%	713.959							713.706		
	443+14.755	U								10.958	-4.0000%	713.951								713.555	

P.G.L. = Profile Grade Elevations for the Left Structure (located 11 ft. away from the Centerline Construction)
** U = WB (Up) , D = EB (Down)
*** (+) = RT of P.G.L.
Skew = 13
Right Forward

Project SCI-823-0837 (Left)
Item Superstructure
Design Screed Elevations
Originator DAT Date 30-Jun-09
Checker Date

	*	**	OFFSETS ***								SUPER-	Screed Elevations									Dead Load Deflection
Location	STATION	Dir.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	ELEV	P.G.L.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	(in.)
2/8 Pt. span 3	443+16.703	D	-37.500								1.6000%	713.931	713.404								
	443+17.526	D		-33.938							1.6000%	713.923		713.452							
	443+19.911	D			-23.604						1.6000%	713.899			713.594						
	443+22.297	D				-13.271					1.6000%	713.876				713.736					
	443+24.682	D					-2.938				1.6000%	713.853					713.878				
	443+25.361											713.846						713.919			0.86815
	443+27.068	U							7.396		-4.0000%	713.83							713.606		
	443+27.891	U								10.958	-4.0000%	713.822								713.456	
3/8 Pt. span 3	443+29.838	D	-37.500								1.6000%	713.804	713.294								
	443+30.661	D		-33.938							1.6000%	713.796		713.343							
	443+33.047	D			-23.604						1.6000%	713.774			713.486						
	443+35.432	D				-13.271					1.6000%	713.752				713.630					
	443+37.818	D					-2.938				1.6000%	713.73					713.773				
	443+38.496											713.724						713.814			1.0852
	443+40.203	U							7.396		-4.0000%	713.708							713.503		
	443+41.026	U								10.958	-4.0000%	713.701								713.353	
4/8 Pt. span 3	443+42.974	D	-37.500								1.6000%	713.683	713.180								
	443+43.796	D		-33.938							1.6000%	713.676		713.230							
	443+46.182	D			-23.604						1.6000%	713.655			713.374						
	443+48.568	D				-13.271					1.6000%	713.634				713.519					
	443+50.953	D					-2.938				1.6000%	713.614					713.663				
	443+51.631											713.608						713.705			1.1575
	443+53.339	U							7.396		-4.0000%	713.594							713.394		
	443+54.161	U								10.958	-4.0000%	713.587								713.245	
5/8 Pt. span 3	443+56.109	D	-37.500								1.6000%	713.571	713.061								
	443+56.932	D		-33.938							1.6000%	713.564		713.111							
	443+59.317	D			-23.604						1.6000%	713.544			713.257						
	443+61.703	D				-13.271					1.6000%	713.525				713.403					
	443+64.089	D					-2.938				1.6000%	713.506					713.549				
	443+64.767											713.5						713.591			1.0652
	443+66.474	U							7.396		-4.0000%	713.487							713.281		
	443+67.297	U								10.958	-4.0000%	713.48								713.132	
6/8 Pt. span 3	443+69.245	D	-37.500								1.6000%	713.466	712.937								
	443+70.067	D		-33.938							1.6000%	713.459		712.988							
	443+72.453	D			-23.604						1.6000%	713.44			713.135						
	443+74.838	D				-13.271					1.6000%	713.422				713.282					
	443+77.224	D					-2.938				1.6000%	713.405					713.430				
	443+77.902											713.4						713.472			0.86815
	443+79.610	U							7.396		-4.0000%	713.387							713.164		
	443+80.432	U								10.958	-4.0000%	713.381								713.015	
7/8 Pt. span 3	443+82.380	D	-37.500								1.6000%	713.367	712.809								
	443+83.203	D		-33.938							1.6000%	713.361		712.860							
	443+85.588	D			-23.604						1.6000%	713.344			713.009						
	443+87.974	D				-13.271					1.6000%	713.328				713.157					
	443+90.360	D					-2.938				1.6000%	713.311					713.306				
	443+91.038											713.306						713.349			0.50645
	443+92.745	U							7.396		-4.0000%	713.296							713.041		
	443+93.568	U								10.958	-4.0000%	713.289								712.893	
Centerline Bearings Pier 3 (back)	443+95.516	D	-37.500								1.6000%	713.276	712.676								
	443+96.338	D		-33.938							1.6000%	713.271		712.726							
	443+98.724	D			-23.604						1.6000%	713.255			712.876						
	444+01.109	D				-13.271					1.6000%	713.24				713.026					
	444+03.495	D					-2.938				1.6000%	713.225					713.176				
	444+04.173											713.221						713.221			
	444+05.881	U							7.396		-4.0000%	713.21							712.914		
	444+06.703	U								10.958	-4.0000%	713.205								712.767	
Centerline Bearings Pier 3 (forward)	443+97.932	D	-37.500								1.6000%	713.261	712.661								
	443+98.755	D		-33.938							1.6000%	713.256		712.712							
	444+01.140	D			-23.604						1.6000%	713.24			712.862						
	444+03.526	D				-13.271					1.6000%	713.225				713.012					
	444+05.912	D					-2.938				1.6000%	713.21					713.163				
	444+06.590											713.206						713.208			
	444+08.297	U							7.396		-4.0000%	713.196							712.899		
	444+09.120	U								10.958	-4.0000%	713.19								712.752	
1/8 Pt. span 4	444+11.047	D	-37.500								1.6000%	713.179	712.620								
	444+11.869	D		-33.938							1.6000%	713.174		712.673							
	444+14.255	D			-23.604						1.6000%	713.16			712.824						
	444+16.641	D				-13.271					1.6000%	713.146				712.975					
	444+19.026	D					-2.938				1.6000%	713.133					713.127				
	444+19.704											713.129						713.170			0.5001
	444+21.412	U							7.396		-4.0000%	713.119							712.866		
	444+22.234	U								10.958	-4.0000%	713.115								712.718	
2/8 Pt. span 4	444+24.161	D	-37.500								1.6000%	713.104	712.578								
	444+24.984	D		-33.938							1.6000%	713.1		712.628							
	444+27.369	D			-23.604						1.6000%	713.087			712.781						
	444+29.755	D				-13.271					1.6000%	713.075				712.934					
	444+32.141	D					-2.938				1.6000%	713.063					713.087				
	444+32.819											713.059						713.131			0.8573
	444+34.526	U							7.396		-4.0000%	713.051							712.828		
	444+35.349	U								10.958	-4.0000%	713.047								712.680	
3/8 Pt. span 4	444+37.276	D	-37.500								1.6000%	713.037	712.527								
	444+38.098	D		-33.938							1.6000%	713.033		712.580							
	444+40.484	D			-23.604						1.6000%	713.022			712.734						
	444+42.870	D				-13.271					1.6000%	713.011				712.886					
	444+45.255	D					-2.938				1.6000%	713					713.042				
	444+45.934											712.997						713.086			1.0716
	444+47.641	U							7.396		-4.0000%	712.99							712.783		
	444+48.463	U								10.958	-4.0000%	712.986								712.637	
4/8 Pt. span 4	444+50.391	D	-37.500								1.6000%	712.978	712.473								
	444+51.213	D		-33.938							1.6000%	712.974		712.526							
	444+53.599	D			-23.604						1.6000%	712.964			712.682						
	444+55.984	D				-13.271					1.6000%	712.954				712.837					
	444+58.370	D					-2.938				1.6000%	712.945					712.993				
	444+59.048											712.942						713.038			1.143
	444+60.756	U							7.396		-4.0000%	712.936							712.735		
	444+61.578	U								10.958	-4.0000%	712.933								712.589	

P.G.L. = Profile Grade Elevations for the Left Structure (located 11 ft. away from the Centerline Construction)
** U = WB (Up) , D = EB (Down)
*** (+) = RT of P.G.L.
Skew = 13
Right Forward

Project SCI-823-0837 (Left)
Item Superstructure
Design Screed Elevations
Originator DAT Date 30-Jun-09
Checker Date

	*	**	OFFSETS ***								SUPER-	Screed Elevations									Dead Load Deflection
Location	STATION	Dir.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	ELEV	P.G.L.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	(in.)
	444+63.505	D	-37.500								1.6000%	712.925	712.415								
	444+64.328	D		-33.938							1.6000%	712.922		712.469							
5/8 Pt.	444+66.713	D			-23.604						1.6000%	712.914			712.625						
span 4	444+69.099	D				-13.271					1.6000%	712.906				712.782					
	444+71.485	D					-2.938				1.6000%	712.897					712.939				
	444+72.163											712.895						712.984			1.0716
	444+73.870	U							7.396		-4.0000%	712.889							712.683		
	444+74.693	U								10.958	-4.0000%	712.887								712.537	
	444+76.620	D	-37.500								1.6000%	712.88	712.352								
	444+77.442	D		-33.938							1.6000%	712.878		712.406							
6/8 Pt.	444+79.828	D			-23.604						1.6000%	712.871			712.564						
span 4	444+82.213	D				-13.271					1.6000%	712.863				712.723					
	444+84.599	D					-2.938				1.6000%	712.857					712.881				
	444+85.277											712.855						712.926			0.8573
	444+86.985	U							7.396		-4.0000%	712.85							712.626		
	444+87.807	U								10.958	-4.0000%	712.848								712.481	
	444+89.734	D	-37.500								1.6000%	712.843	712.286								
	444+90.557	D		-33.938							1.6000%	712.841		712.339							
7/8 Pt.	444+92.942	D			-23.604						1.6000%	712.836			712.499						
span 4	444+95.328	D				-13.271					1.6000%	712.829				712.658					
	444+97.714	D					-2.938				1.6000%	712.824					712.818				
	444+98.392											712.822						712.864			0.5001
	445+00.099	U							7.396		-4.0000%	712.818							712.564		
	445+00.922	U								10.958	-4.0000%	712.817								712.420	
	445+02.849	D	-37.500								1.6000%	712.813	712.213								
	445+03.671	D		-33.938							1.6000%	712.811		712.268							
Centerline	445+06.057	D			-23.604						1.6000%	712.806			712.429						
Bearings	445+08.443	D				-13.271					1.6000%	712.802				712.590					
Forward	445+10.828	D					-2.938				1.6000%	712.798					712.751				
Abut.	445+11.506											712.797						712.797			
	445+13.214	U							7.396		-4.0000%	712.794							712.498		
	445+14.036	U								10.958	-4.0000%	712.793								712.354	
End	445+04.645	D	-37.500								1.6000%	712.809	712.209								
Bridge	445+13.302											712.794									
Limit	445+15.832	U								10.958	-4.0000%	712.79								712.352	

P.G.L. = Profile Grade Elevations for the Right Structure (located 11 ft. away from the Centerline Construction)
** U = WB (Up) , D = EB (Down)
*** (+) = RT of P.G.L.
Skew = 13
Right Forward

Project SCI-823-0837 (Right)
Item Superstructure
Design Screed Elevations
Originator DAT Date 30-Jun-09
Checker Date

	*	**	OFFSETS ***								SUPER-	Screed Elevations									Dead Load Deflection
Location	STATION	Dir.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	ELEV	P.G.L.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	(in.)
Begin	440+85.010	D	-10.958								4.0000%	717.398	716.980								
Bridge	440+87.540											717.348									
Limit	440+96.197	U								37.500	-1.6000%	717.178								716.578	
	440+86.806	D	-10.958								4.0000%	717.362	716.924								
	440+87.628	D		-7.396							4.0000%	717.348		717.050							
Centerline	440+90.014	U			2.938						-1.6000%	717.299			717.252						
Bearings	440+92.399	U				13.271					-1.5000%	717.252				717.040					
Rear Abut.	440+94.785	U					23.604				-1.6000%	717.205					716.828				
	440+89.336											717.312						717.312			
	440+97.171	U							33.938		-1.6000%	717.159							716.616		
	440+97.993	U								37.500	-1.6000%	717.143								716.543	
	440+99.920	D	-10.958								4.0000%	717.106	716.709								
	441+00.743	D		-7.398							4.0000%	717.09		716.836							
1/8 Pt.	441+03.128	U			2.938						-1.6000%	717.044			717.039						
span 1	441+05.514	U				13.271					-1.6000%	716.999				716.828					
	441+07.900	U					23.604				-1.6000%	716.953					716.617				
	441+02.450											717.057						717.099			0.5001
	441+10.285	U							33.938		-1.6000%	716.908							716.407		
	441+11.108	U								37.500	-1.6000%	716.893								716.334	
	441+13.035	D	-10.958								4.0000%	716.857	716.490								
	441+13.857	D		-7.398							4.0000%	716.841		716.617							
2/8 Pt.	441+16.243	U			2.936						-1.6000%	716.797			716.821						
span 1	441+18.629	U				13.271					-1.6000%	716.752				716.612					
	441+21.014	U					23.604				-1.6000%	716.708					716.402				
	441+15.565											716.809						716.861			0.8573
	441+23.400	U							33.938		-1.6000%	716.665							716.193		
	441+24.222	U								37.500	-1.6000%	716.65								716.121	
	441+26.149	D	-10.958								4.0000%	716.615	716.266								
	441+26.972	D		-7.396							4.0000%	716.6		716.393							
3/8 Pt.	441+29.357	U			2.936						-1.6000%	716.557			716.599						
span 1	441+31.743	U				13.271					-1.6000%	716.514				716.391					
	441+34.129	U					23.604				-1.6000%	716.471					716.183				
	441+28.679											716.569						716.656			1.0716
	441+36.514	U							33.936		-1.6000%	716.429							715.975		
	441+37.337	U								37.500	-1.6000%	716.414								715.903	
	441+39.264	D	-10.958								4.0000%	716.38	716.037								
	441+40.066	D		-7.396							4.0000%	716.366		716.166							
4/8 Pt.	441+42.472	U			2.936						-1.6000%	716.324			716.372						
span 1	441+44.858	U				13.271					-1.6000%	716.282				716.165					
	441+47.243	U					23.604				-1.6000%	716.241					715.959				
	441+41.794											716.336						716.431			1.143
	441+49.629	U							33.936		-1.6000%	716.2							715.752		
	441+50.451	U								37.500	-1.6000%	716.186								715.681	
	441+52.379	D	-10.958								4.0000%	716.153	715.804								
	441+53.201	D		-7.396							4.0000%	716.139		715.932							
5/8 Pt.	441+55.587	U			2.936						-1.6000%	716.098			716.141						
span 1	441+57.972	U				13.271					-1.6000%	716.058				715.935					
	441+60.358	U					23.604				-1.5000%	716.018					715.730				
	441+54.906											716.11						716.199			1.0716
	441+62.744	U							33.936		-1.6000%	715.979							715.525		
	441+63.566	U								37.500	-1.6000%	715.965								715.454	
	441+65.493	D	-10.958								4.0000%	715.933	715.566								
	441+66.316	D		-7.396							4.0000%	715.92		715.695							
6/8 Pt.	441+68.701	U			2.936						-1.6000%	715.88			715.905						
span 1	441+71.087	U				13.271					-1.6000%	715.842				715.701					
	441+73.473	U					23.604				-1.6000%	715.803					715.497				
	441+68.023											715.892						715.963			0.8573
	441+75.858	U							33.938		-1.6000%	715.766							715.293		
	441+76.681	U								37.500	-1.6000%	715.751								715.223	
	441+78.608	D	-10.958								4.0000%	715.721	715.324								
	441+79.430	D		-7.396							4.0000%	715.706		715.453							
7/8 Pt.	441+81.816	U			2.938						-1.6000%	715.67			715.665						
span 1	441+84.201	U				13.271					-1.6000%	715.632				715.462					
	441+86.587	U					23.604				-1.6000%	715.595					715.259				
	441+81.138											715.681						715.722			0.5001
	441+88.973	U							33.938		-1.6000%	715.558							715.057		
	441+89.796	U								37.500	-1.6000%	715.546								714.967	
	441+91.722	D	-10.958								4.0000%	715.516	715.077								
	441+92.545	D		-7.396							4.0000%	715.503		715.207							
Centerline	441+94.930	U			2.938						-1.6000%	715.467			715.420						
Bearings	441+97.316	U				13.271					-1.6000%	715.43				715.218					
Pier 1	441+99.702	U					23.604				-1.6000%	715.394					715.017				
(back)	441+94.252											715.477						715.477			
	442+02.087	U							33.938		-1.6000%	715.359							714.816		
	442+02.910	U								37.500	-1.6000%	715.347								714.747	
	441+94.139	D	-10.958								4.0000%	715.479	715.040								
	441+94.961	D		-7.396							4.0000%	715.466		715.170							
Centerline	441+97.347	U			2.938						-1.6000%	715.43			715.383						
Bearings	441+99.733	U				13.271					-1.6000%	715.394				715.182					
Pier 1	442+02.118	U					23.604				-1.6000%	715.358					714.981				
(forward)	441+96.669											715.44						715.440			
	442+04.504	U							33.938		-1.6000%	715.323							714.780		
	442+05.326	U								37.500	-1.6000%	715.311								714.711	

P.G.L. = Profile Grade Elevations for the Right Structure (located 11 ft. away from the Centerline Construction)
** U = WB (Up) , D = EB (Down)
*** (+) = RT of P.G.L.
Skew = 13
Right Forward

Project SCI-823-0837 (Right)
Item Superstructure
Design Screed Elevations
Originator DAT Date 30-Jun-09
Checker Date

	*	**	OFFSETS ***								SUPER-	Screed Elevations									Dead Load Deflection
Location	STATION	Dir.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	ELEV	P.G.L.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	(in.)
	442+07.274	D	-10.958								4.0000%	715.282	714.886								
	442+08.097	D		-7.396							4.0000%	715.27		715.016							
1/8 Pt.	442+10.482	U			2.938						-1.6000%	715.235			715.230						
span 2	442+12.868	U				13.271					-1.6000%	715.201				715.030					
	442+15.254	U					23.604				-1.6000%	715.166					714.831				
	442+09.804											715.245						715.287			0.50645
	442+17.639	U							33.938		-1.6000%	715.132							714.631		
	442+18.462	U								37.500	-1.6000%	715.12								714.563	
	442+20.410	D	-10.958								4.0000%	715.093	714.727								
	442+21.232	D		-7.396							4.0000%	715.081		714.858							
2/8 Pt.	442+23.618	U			2.938						-1.6000%	715.048			715.073						
span 2	442+26.004	U				13.271					-1.6000%	715.014				714.874					
	442+28.389	U					23.604				-1.6000%	714.981					714.676				
	442+22.940											715.057						715.130			0.86815
	442+30.775	U							33.938		-1.6000%	714.949							714.476		
	442+31.597	U								37.500	-1.6000%	714.937								714.410	
	442+33.545	D	-10.958								4.0000%	714.911	714.563								
	442+34.368	D		-7.396							4.0000%	714.9		714.694							
3/8 Pt.	442+36.753	U			2.938						-1.6000%	714.868			714.911						
span 2	442+39.139	U				13.271					-1.6000%	714.836				714.714					
	442+41.525	U					23.604				-1.6000%	714.804					714.517				
	442+36.075											714.877						714.967			1.0852
	442+43.910	U							33.938		-1.6000%	714.773							714.320		
	442+44.733	U								37.500	-1.6000%	714.762								714.252	
	442+46.681	D	-10.958								4.0000%	714.736	714.396								
	442+47.503	D		-7.396							4.0000%	714.726		714.526							
4/8 Pt.	442+49.889	U			2.938						-1.6000%	714.696			714.744						
span 2	442+52.274	U				13.271					-1.6000%	714.664				714.549					
	442+54.660	U					23.604				-1.6000%	714.634					714.353				
	442+49.211											714.704						714.800			1.1575
	442+57.046	U							33.938		-1.6000%	714.604							714.158		
	442+57.868	U								37.500	-1.6000%	714.594								714.090	
	442+59.816	D	-10.958								4.0000%	714.569	714.222								
	442+60.639	D		-7.396							4.0000%	714.559		714.354							
5/8 Pt.	442+63.024	U			2.938						-1.6000%	714.53			714.573						
span 2	442+65.410	U				13.271					-1.6000%	714.501				714.379					
	442+67.795	U					23.604				-1.6000%	714.472					714.184				
	442+62.346											714.538						714.629			1.0852
	442+70.181	U							33.938		-1.6000%	714.443							713.990		
	442+71.004	U								37.500	-1.6000%	714.433								713.923	
	442+72.951	D	-10.958								4.0000%	714.41	714.044								
	442+73.774	D		-7.396							4.0000%	714.4		714.177							
6/8 Pt.	442+76.160	U			2.938						-1.6000%	714.372			714.397						
span 2	442+78.545	U				13.271					-1.6000%	714.344				714.204					
	442+80.931	U					23.604				-1.6000%	714.316					714.011				
	442+75.461											714.38						714.452			0.86815
	442+83.316	U							33.938		-1.6000%	714.289							713.818		
	442+84.139	U								37.500	-1.6000%	714.28								713.752	
	442+86.087	D	-10.958								4.0000%	714.258	713.861								
	442+86.909	D		-7.396							4.0000%	714.248		713.996							
7/8 Pt.	442+89.295	U			2.938						-1.6000%	714.221			714.217						
span 2	442+91.681	U				13.271					-1.6000%	714.195				714.025					
	442+94.066	U					23.604				-1.6000%	714.169					713.833				
	442+88.617											714.229						714.271			0.50645
	442+96.452	U							33.938		-1.6000%	714.143							713.642		
	442+97.274	U								37.500	-1.6000%	714.134								713.576	
	442+99.222	D	-10.958								4.0000%	714.113	713.674								
	443+00.045	D		-7.396							4.0000%	714.104		713.808							
Centerline	443+02.430	U			2.938						-1.6000%	714.078			714.031						
Bearings	443+04.816	U				13.271					-1.6000%	714.053				713.841					
Pier 2	443+07.202	U					23.604				-1.6000%	714.028					713.651				
(back)	443+01.752											714.086						714.086			
	443+09.587	U							33.938		-1.6000%	714.004							713.461		
	443+10.410	U								37.500	-1.6000%	713.996								713.396	
	443+01.639	D	-10.958								4.0000%	714.087	713.648								
	443+02.461	D		-7.396							4.0000%	714.078		713.782							
Centerline	443+04.847	U			2.938						-1.6000%	714.053			714.006						
Bearings	443+07.233	U				13.271					-1.6000%	714.028				713.816					
Pier 2	443+09.618	U					23.604				-1.6000%	714.003					713.626				
(forward)	443+04.169											714.06						714.060			
	443+12.004	U							33.938		-1.6000%	713.979							713.436		
	443+12.826	U								37.500	-1.6000%	713.97								713.370	
	443+14.774	D	-10.958								4.0000%	713.951	713.556								
	443+15.597	D		-7.396							4.0000%	713.942		713.689							
1/8 Pt.	443+17.982	U			2.938						-1.6000%	713.919			713.914						
span 3	443+20.368	U				13.271					-1.6000%	713.895				713.725					
	443+22.754	U					23.604				-1.6000%	713.872					713.536				
	443+17.304											713.925						713.968			0.50645
	443+25.139	U							33.938		-1.6000%	713.848							713.346		
	443+25.962	U								37.500	-1.6000%	713.841								713.283	

P.G.L. = Profile Grade Elevations for the Right Structure (located 11 ft. away from the Centerline Construction)
** U = WB (Up) , D = EB (Down)
*** (+) = RT of P.G.L.
Skew = 13
Right Forward

Project SCI-823-0837 (Right)
Item Superstructure
Design Screed Elevations
Originator DAT Date 30-Jun-09
Checker Date

	*	**	OFFSETS ***								SUPER-	Screed Elevations									Dead Load
Location	STATION	Dir.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	ELEV	P.G.L.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	Deflection (in.)
	443+27.910	D	-10.958								4.0000%	713.822	713.456								
	443+28.732	D		-7.396							4.0000%	713.814		713.591							
2/8 Pt.	443+31.118	U			2.938						-1.6000%	713.792			713.617						
span 3	443+33.504	U				13.271					-1.6000%	713.789				713.629					
	443+35.889	U					23.604				-1.6000%	713.747					713.442				
	443+30.440											713.796						713.870			0.86815
	443+38.275	U							33.938		-1.6000%	713.726							713.255		
	443+39.097	U								37.500	-1.6000%	713.718								713.190	
	443+41.045	D	-10.958								4.0000%	713.701	713.353								
	443+41.868	D		-7.396							4.0000%	713.693		713.488							
3/8 Pt.	443+44.253	U			2.938						-1.6000%	713.672			713.716						
span 3	443+46.639	U				13.271					-1.6000%	713.651				713.529					
	443+49.025	U					23.604				-1.6000%	713.631					713.343				
	443+43.575											713.678						713.769			1.0652
	443+51.410	U							33.938		-1.6000%	713.61							713.158		
	443+52.233	U								37.500	-1.6000%	713.603								713.094	
	443+54.181	D	-10.958								4.0000%	713.587	713.245								
	443+55.003	D		-7.396							4.0000%	713.58		713.380							
4/8 Pt.	443+57.389	U			2.938						-1.6000%	713.56			713.609						
span 3	443+59.774	U				13.271					-1.6000%	713.54				713.425					
	443+62.160	U					23.604				-1.6000%	713.521					713.240				
	443+56.711											713.586						713.662			1.1575
	443+64.546	U							33.938		-1.6000%	713.502							713.055		
	443+65.368	U								37.500	-1.6000%	713.495								712.992	
	443+67.316	D	-10.958								4.0000%	713.48	713.132								
	443+68.139	D		-7.396							4.0000%	713.474		713.268							
5/8 Pt.	443+70.524	U			2.938						-1.6000%	713.455			713.499						
span 3	443+72.910	U				13.271					-1.6000%	713.437				713.315					
	443+75.295	U					23.604				-1.6000%	713.419					713.132				
	443+69.846											713.46						713.551			1.0652
	443+77.681	U							33.938		-1.6000%	713.401							712.949		
	443+78.504	U								37.500	-1.6000%	713.395								712.886	
	443+80.451	D	-10.958								4.0000%	713.381	713.015								
	443+81.274	D		-7.396							4.0000%	713.375		713.152							
6/8 Pt.	443+83.660	U			2.938						-1.6000%	713.358			713.383						
span 3	443+86.045	U				13.271					-1.6000%	713.341				713.201					
	443+88.431	U					23.604				-1.6000%	713.324					713.019				
	443+82.981											713.363						713.436			0.86815
	443+90.816	U							33.938		-1.6000%	713.308							712.837		
	443+91.639	U								37.500	-1.6000%	713.302								712.775	
	443+93.587	D	-10.958								4.0000%	713.289	712.893								
	443+94.409	D		-7.396							4.0000%	713.284		713.030							
7/8 Pt.	443+96.795	U			2.938						-1.6000%	713.268			713.263						
span 3	443+99.181	U				13.271					-1.6000%	713.252				713.062					
	444+01.566	U					23.604				-1.6000%	713.237					712.902				
	443+96.117											713.272						713.315			0.50645
	444+03.952	U							33.938		-1.6000%	713.222							712.721		
	444+04.774	U								37.500	-1.6000%	713.217								712.659	
	444+06.722	D	-10.958								4.0000%	713.206	712.767								
	444+07.545	D		-7.396							4.0000%	713.2		712.904							
Centerline	444+09.930	U			2.938						-1.6000%	713.185			713.136						
Bearings	444+12.316	U				13.271					-1.6000%	713.171				712.959					
Pier 3	444+14.702	U					23.604				-1.6000%	713.157					712.780				
(back)	444+09.252											713.189						713.189			
	444+17.087	U							33.938		-1.6000%	713.144							712.601		
	444+17.910	U								37.500	-1.6000%	713.139								712.539	
	444+09.139	D	-10.958								4.0000%	713.19	712.752								
	444+09.961	D		-7.396							4.0000%	713.185		712.889							
Centerline	444+12.347	U			2.938						-1.6000%	713.171			713.124						
Bearings	444+14.733	U				13.271					-1.6000%	713.157				712.945					
Pier 3	444+17.118	U					23.604				-1.6000%	713.143					712.766				
(forward)	444+11.669											713.175						713.175			
	444+19.504	U							33.938		-1.6000%	713.13							712.587		
	444+20.326	U								37.500	-1.6000%	713.125								712.525	
	444+22.254	D	-10.958								4.0000%	713.115	712.718								
	444+23.076	D		-7.396							4.0000%	713.11		712.856							
1/8 Pt.	444+25.462	U			2.938						-1.6000%	713.097			713.092						
span 4	444+27.847	U				13.271					-1.6000%	713.085				712.914					
	444+30.233	U					23.604				-1.6000%	713.072					712.736				
	444+24.783											713.101						713.143			0.5001
	444+32.619	U							33.938		-1.6000%	713.06							712.559		
	444+33.441	U								37.500	-1.6000%	713.056								712.496	
	444+35.368	D	-10.958								4.0000%	713.047	712.680								
	444+36.191	D		-7.396							4.0000%	713.043		712.818							
2/8 Pt.	444+38.576	U			2.938						-1.6000%	713.031			713.055						
span 4	444+40.962	U				13.271					-1.6000%	713.02				712.879					
	444+43.348	U					23.604				-1.6000%	713.009					712.703				
	444+37.898											713.034						713.106			0.8573
	444+45.733	U							33.938		-1.6000%	712.996							712.526		
	444+46.556	U								37.500	-1.6000%	712.994								712.466	
	444+48.483	D	-10.958								4.0000%	712.986	712.637								
	444+49.305	D		-7.396							4.0000%	712.982		712.776							
3/8 Pt.	444+51.691	U			2.938						-1.6000%	712.972			713.014						
span 4	444+54.076	U				13.271					-1.6000%	712.962				712.839					
	444+56.462	U					23.604				-1.6000%	712.952					712.664				
	444+51.013											712.975						713.064			1.0716
	444+58.848	U							33.938		-1.6000%	712.943							712.489		
	444+59.670	U								37.500	-1.6000%	712.94								712.429	
	444+61.597	D	-10.958								4.0000%	712.932	712.589								
	444+62.420	D		-7.396							4.0000%	712.929		712.729							
4/8 Pt.	444+64.805	U			2.938						-1.6000%	712.921			712.969						
span 4	444+67.191	U				13.271					-1.6000%	712.912				712.795					
	444+69.577	U					23.604				-1.6000%	712.904					712.621				
	444+64.127											712.923						713.018			1.143
	444+71.962	U							33.938		-1.6000%	712.896							712.448		
	444+72.785	U								37.500	-1.6000%	712.893								712.388	

P.G.L. = Profile Grade Elevations for the Right Structure (located 11 ft. away from the Centerline Construction)
** U = WB (Up) , D = EB (Down)
*** (+) = RT of P.G.L.
Skew = 13
Right Forward

Project SCI-823-0837 (Right)
Item Superstructure
Design Screed Elevations
Originator DAT Date 30-Jun-09
Checker Date

	*	**	OFFSETS ***								SUPER-	Screed Elevations									Dead Load Deflection
Location	STATION	Dir.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	ELEV	P.G.L.	Lt. Edge	Beam 1	Beam 2	Beam 3	Beam 4	PGL	Beam 5	Rt. Edge	(in.)
	444+74.712	D	-10.958								4.0000%	712.886	712.537								
	444+75.534	D		-7.396							4.0000%	712.884		712.677							
5/8 Pt. span 4	444+77.920	U			2.938						-1.6000%	712.876			712.919						
	444+80.306	U				13.271					-1.6000%	712.869				712.746					
	444+82.691	U					23.604				-1.6000%	712.862					712.574				
	444+77.242											712.878						712.968			1.0716
	444+85.077	U							33.938		-1.6000%	712.855							712.402		
	444+85.899	U								37.500	-1.6000%	712.853								712.342	
	444+87.826	D	-10.958								4.0000%	712.848	712.481								
	444+88.649	D		-7.396							4.0000%	712.846		712.621							
6/8 Pt. span 4	444+91.035	U			2.938						-1.6000%	712.84			712.864						
	444+93.420	U				13.271					-1.6000%	712.834				712.693					
	444+95.806	U					23.604				-1.6000%	712.828					712.522				
	444+90.356											712.841						712.913			0.8573
	444+98.191	U							33.938		-1.6000%	712.823							712.351		
	444+99.014	U								37.500	-1.6000%	712.821								712.292	
	445+00.941	D	-10.958								4.0000%	712.817	712.420								
	445+01.764	D		-7.396							4.0000%	712.815		712.561							
7/8 Pt. span 4	445+04.149	U			2.938						-1.6000%	712.81			712.805						
	445+06.535	U				13.271					-1.6000%	712.805				712.636					
	445+08.920	U					23.604				-1.6000%	712.801					712.465				
	445+03.471											712.811						712.853			0.5001
	445+11.306	U							33.938		-1.6000%	712.797							712.296		
	445+12.129	U								37.500	-1.6000%	712.796								712.237	
	445+14.058	D	-10.958								4.0000%	712.793	712.354								
	445+14.878	D		-7.396							4.0000%	712.791		712.496							
Centerline	445+17.264	U			2.938						-1.5000%	712.788			712.741						
Bearings	445+19.649	U				13.271					-1.5000%	712.785				712.572					
Forward	445+22.035	U					23.604				-1.6000%	712.782					712.404				
Abut.	445+18.586											712.789						712.789			
	445+24.421	U							33.938		-1.6000%	712.779							712.236		
	445+25.243	U								37.500	-1.6000%	712.778								712.178	
End	445+15.862	D	-10.958								4.0000%	712.79	712.352								
Bridge	445+18.362											712.786									
Limit	445+27.039	U								37.500	-1.6000%	712.776								712.176	

Project	SCI-823-0837 (Left)
Item	Superstructure
Design	Abutment & Pier Cap Elevations
Originator	DAT — Date 30-Jun-09
Checker	Date

		Deck Elevations					THICKNESS (in.)						Top of Abutment & Pier Cap Elevations				
Location	STATION	Beam 1	Beam 2	Beam 3	Beam 4	Beam 5	deck	haunch	HP14x73	beam	brgs.	load plates	Beam 1	Beam 2	Beam 3	Beam 4	Beam 5
Centerline	440+78.421	717.028					8.750	4.490	4.500	72.000	3.780	3.000	708.985				
Bearings	440+78.807		717.145				8.750	4.490	5.904	72.000	3.780	3.000		708.985			
Rear Abut.	440+81.193			717.262			8.750	4.490	7.312	72.000	3.780	3.000			708.985		
	440+83.578				717.380		8.750	4.490	8.722	72.000	3.780	3.000				708.985	
	440+85.964					717.083	8.750	4.490	5.165	72.000	3.780	3.000					708.985
Centerline	441+81.338	715.134					8.750	4.490		72.000	2.750	1.500	707.677				
Bearings	441+83.724		715.262											707.805			
Pier 1	441+86.109			715.390											707.933		
(back)	441+88.495				715.518											708.061	
	441+90.881					715.233					total =	89.490					707.775
Centerline	441+83.755	715.096					8.750	4.490		72.000	2.750	1.500	707.639				
Bearings	441+86.140		715.224											707.767			
Pier 1	441+88.526			715.353											707.895		
(forward)	441+90.912				715.481											708.024	
	441+93.297					715.196					total =	89.490					707.738
Centerline	442+88.836	713.684					8.750	4.490		72.000	1.720	1.500	706.312				
Bearings	442+91.224		713.822											706.451			
Pier 2	442+93.609			713.961											706.590		
(back)	442+95.995				714.101											706.729	
	442+98.381					713.826					total =	88.460					706.454
Centerline	442+91.255	713.657					8.750	4.490		72.000	1.720	1.500	706.285				
Bearings	442+93.640		713.796											706.424			
Pier 2	442+96.026			713.935											706.563		
(forward)	442+98.412				714.074											706.703	
	443+00.797					713.800					total =	88.460					706.428
Centerline	443+96.338	712.726					8.750	4.490		72.000	2.750	1.500	705.270				
Bearings	443+98.724		712.878											705.420			
Pier 3	444+01.109			713.028											705.570		
(back)	444+03.495				713.178											705.720	
	444+05.881					712.914					total =	89.490					705.457
Centerline	443+98.755	712.712					8.750	4.490		72.000	2.750	1.500	705.255				
Bearings	444+01.140		712.862											705.405			
Pier 3	444+03.526			713.012											705.555		
(forward)	444+05.912				713.163											705.705	
	444+08.297					712.899					total =	89.490					705.442
Centerline	445+03.671	712.268					8.750	4.490	4.500	72.000	3.780	3.000	704.225				
Bearings	445+06.057		712.429				8.750	4.490	6.429	72.000	3.780	3.000		704.225			
Fwd. Abut.	445+08.443			712.590			8.750	4.490	8.360	72.000	3.780	3.000			704.225		
	445+10.828				712.751		8.750	4.490	10.295	72.000	3.780	3.000				704.225	
	445+13.214					712.498	8.750	4.490	7.262	72.000	3.780	3.000					704.225

Top of Slope (Rear Abut.) = 706.485
Top of Slope (Fwd. Abut.) = 703.725
Bot. of Ftg. (Rear Abut.) = 703.137
Bot. of Ftg. (Fwd. Abut.) = 696.378

Project	SCI-823-0837 (Right)
Item	Superstructure
Design	Abutment & Pier Cap Elevations
Originator	DAT	Date 30-Jun-09
Checker		Date

		Deck Elevations					THICKNESS (in.)						Top of Abutment & Pier Cap Elevations				
Location	STATION	Beam 1	Beam 2	Beam 3	Beam 4	Beam 5	deck	haunch	HP14x73	beam	brgs.	load plates	Beam 1	Beam 2	Beam 3	Beam 4	Beam 5
Centerline	440+87.628	717.050					8.750	4.490	9.712	72.000	3.780	3.000	708.573				
Bearings	440+90.014		717.252				8.750	4.490	12.132	72.000	3.780	3.000		708.573			
Rear Abut.	440+92.399			717.040			8.750	4.490	9.586	72.000	3.780	3.000			708.573		
	440+94.785				716.828		8.750	4.490	7.041	72.000	3.780	3.000				708.573	
	440+97.171					716.616	8.750	4.490	4.500	72.000	3.780	3.000					708.573
Centerline	441+92.545	715.207					8.750	4.490		72.000	2.750	1.500	707.750				
Bearings	441+94.930		715.420											707.962			
Pier 1	441+97.316			715.218											707.761		
(back)	441+99.702				715.017											707.559	
	442+02.087					714.816					total =	89.490					707.358
Centerline	441+94.961	715.170					8.750	4.490		72.000	2.750	1.500	707.713				
Bearings	441+97.347		715.383											707.925			
Pier 1	441+99.733			715.182											707.724		
(forward)	442+02.118				714.981											707.523	
	442+04.504					714.780					total =	89.490					707.322
Centerline	443+00.045	713.806					8.750	4.490		72.000	1.720	1.500	706.436				
Bearings	443+02.430		714.031											706.660			
Pier 2	443+04.816			713.841											706.469		
(back)	443+07.202				713.651											706.279	
	443+09.587					713.461					total =	88.460					706.089
Centerline	443+02.461	713.782					8.750	4.490		72.000	1.720	1.500	706.411				
Bearings	443+04.847		714.006											706.634			
Pier 2	443+07.233			713.816											706.444		
(forward)	443+09.618				713.626											706.254	
	443+12.004					713.436					total =	88.460					706.064
Centerline	444+07.545	712.904					8.750	4.490		72.000	2.750	1.500	705.447				
Bearings	444+09.930		713.138											705.681			
Pier 3	444+12.316			712.959											705.501		
(back)	444+14.702				712.780											705.322	
	444+17.087					712.601					total =	89.490					705.143
Centerline	444+09.961	712.889					8.750	4.490		72.000	2.750	1.500	705.432				
Bearings	444+12.347		713.124											705.667			
Pier 3	444+14.733			712.945											705.487		
(forward)	444+17.118				712.766											705.306	
	444+19.504					712.587					total =	89.490					705.129
Centerline	445+14.878	712.496					8.750	4.490	7.615	72.000	3.780	3.000	704.193				
Bearings	445+17.264		712.741				8.750	4.490	10.559	72.000	3.780	3.000		704.193			
Fwd. Abut.	445+19.649			712.572			8.750	4.490	8.537	72.000	3.780	3.000			704.193		
	445+22.035				712.404		8.750	4.490	6.517	72.000	3.780	3.000				704.193	
	445+24.421					712.236	8.750	4.490	4.500	72.000	3.780	3.000					704.193

Top of Slope (Rear Abut.) =	708.073
Top of Slope (Fwd. Abut.) =	703.693
Bot. of Ftg. (Rear Abut.) =	702.726
Bot. of Ftg. (Fwd. Abut.) =	698.346

B. DECK DESIGN

Where S is the effective span length in feet [millimeters]. Tmin shall be rounded up to the nearest one-quarter inch [5 mm].

The one inch [25 mm] wearing thickness, Section 302.1.3.1, is included in the calculations for minimum concrete deck thickness but not in the calculations during actual structural design of the deck slab.

For transversely reinforced concrete deck slabs supported on steel stringers the effective span length "S" shall be considered equal to the distance center-to-center of stringers minus 6 inches [150 mm].

For concrete I-beam stringers the effective span length shall meet the requirements of AASHTO 3.24.1.2.

302.2.2 CONCRETE DECK DESIGN

The concrete deck design shall be in conformance with AASHTO, latest edition, and additional requirements in this Manual. The design live load shall be HS25 for decks on new superstructures and HS20 for decks on existing superstructures.

For continuous slabs on three or more supports a continuity factor of 0.80 shall be applied to the simple span bending moments for both live load and dead load.

See Figures 312 & 313 for an illustration of a method of design for a reinforced concrete deck slab. Design data tables for HS25 (Fig. 314A) and HS20-44 (Fig. 314B) live loads are also provided.

Upon completing the concrete deck design from the example shown in Figure 312 & 313, or similar method, the designer should assure any cantilevered deck overhang will not over stress the initial deck design due to the dead load and the greater live load of either the vehicle wheel loads or the railing live loads. See relevant AASHTO sections for live load application requirements. See example Figures 315 & 316.

Transverse spacing of the top and bottom reinforcing in a deck design shall meet section 302.2.4.2.

302.2.3 DECK ELEVATION REQUIREMENTS

302.2.3.1 SCREED ELEVATIONS

Screed elevations are control elevations for concrete deck finishing machines that account for dead load deflections to ensure that the bridge deck is completed to the correct elevation. To establish screed elevations, the final surface elevations are adjusted for non-composite spacing between points of 25'-0" [7.5 m] for each: girder centerline; curbline or deck edge; transverse grade-break line; and phased construction line. The final deck surface elevation locations should be identified in a plan view. Refer to Figure 335.

302.2.4 REINFORCEMENT

302.2.4.1 LONGITUDINAL

Distribution reinforcement in the top-reinforcing layer of a reinforced concrete deck on steel or concrete stringers shall be approximately 1/3 of the main reinforcement, uniformly spaced.

Research has shown that secondary bars in the top mat of reinforced concrete bridge decks on stringers should be small bars at close spacing. Therefore the required secondary bar size shall be a #4 [#13M]. The only exception to this requirement is if the bar spacing becomes less than 3 inches [75 mm].

For stringer type bridges with reinforced concrete decks, the secondary bars shall be placed above the top of deck primary bars. This helps in reducing shrinkage cracking and adds additional cover over the primary bars.

For reinforced concrete deck slabs on stringer type bridges, where the main reinforcement is transverse to the stringers, additional top longitudinal reinforcement shall be provided in the negative moment region over the piers. This additional secondary reinforcement shall be equal to the distributional reinforcement (1/3 of the main reinforcement). This additional reinforcement shall be uniformly spaced and furnished in length equal to the larger of: 40 percent of the length of the longer adjacent stringer span or a length that meets the requirements of AASHTO 8.24.3.3.

This reinforcement should be placed approximately symmetrical to the centerline of pier bearings but with every other reinforcing bar staggered 3 feet [1000 mm] longitudinally.

For composite designs, the total longitudinal reinforcement over a pier shall meet the requirements of AASHTO.

302.2.4.2 TRANSVERSE

To facilitate the placement of reinforcing steel and concrete in transversely reinforced deck slabs top and bottom main reinforcement shall be equally spaced and placed to coincide in a vertical plane.

For steel beam or girder bridges with a skew of less than 15 degrees the transverse reinforcing may be shown placed parallel to the abutments. Bridges with a skew greater than 15 degrees or where the transverse reinforcing will interfere with the shear studs should have the transverse reinforcement placed perpendicular to the centerline of the bridge. Refer to the appropriate Standard Bridge Drawing for the requirements on slab bridges.

For prestressed I-beams, transverse reinforcing shall be placed perpendicular to the centerline of the bridge.

For composite box beam decks, the transverse reinforcing steel may be placed parallel to the abutment.

For steel beam or girder bridges, the clearance of the bottom transverse bars over the top of any bolted beam splice plates or moment plates should be checked as reinforcing bars at a skew generally cannot be placed between bolt heads.

302.2.5 HAUNCHED DECK REQUIREMENTS

Concrete decks on steel beam, girder or prestressed I-beam structures shall have a concrete haunch to prevent a thinning of the deck slab as a result of unforeseen variations in beam camber. At a minimum, the design haunch shall allow for 2 inches [50 mm] of excessive camber. For steel beam and girder structures, the haunch shall be tapered back to the original concrete deck thickness in a 9 inch [225 mm] length and the concrete haunch shall encase the edges of the top flange. See Figures 317 & 318.

302.2.6 STAY IN PLACE FORMS

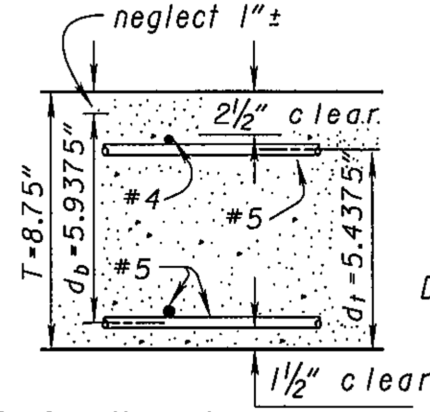
Galvanized steel or any other material type, stay in place forms, shall not be used.

302.2.7 CONCRETE DECK PLACEMENT CONSIDERATIONS

Mechanized finishing machines are preferred to hand finishing methods for both consistency of

TRANSVERSE SLAB DESIGN COMPUTATIONS

Sample problem : Using load factor design procedures determine the slab thickness and main reinforcement for a deck slab with an 9'-6" stringer spacing and an HS25-44 loading.



S = 9'-6" minus 6" = 9'-0"

Tmin. = (S+17)/(36) = 0.72' = 8.67" ≥ 8½", use 8¾"

f'_c = 4500 psi

f_y = 60000 psi

ϕ = 0.9 (8.16.1.2.2)⊕

Z = 130 k/in(top), 170 k/in(bottom) (8.16.8.4)⊕

n = 8 Impact = 30%

Dead load W :

Slab = (0.73')(1.0')(0.15 k/ft^2) = 0.110 k/ft

FWS = 60 p.s.f.(1.0') = 0.060 k/ft

TOTAL DEAD LOAD (W) = 0.170 k/ft

Design Moments :

DL = (0.125)(W)(S^2)(0.8) = (0.125)(0.170)(9.0^2)(0.8) = 1.38 ft-k

LL + I = (S+2)(20)(1.3)(0.8)/32 = 7.15 ft-k (3.24.3.1)⊕

Mu = 1.3[DL+1.67(LL+I)] = 1.3[1.38+1.67(7.15)] = 17.32 ft-k (3.22)⊕

Mw = Service load moment = DL + LL+I = 8.53 ft-k

$$\rho = \frac{(0.85)f'_c}{f_y}\left[1-\sqrt{1-\frac{2R}{(0.85)f'_c}}\right] \qquad K = [2\rho n+(\rho n)^2]^{1/2} - \rho n \qquad j = 1-(K/3)$$

Top Reinforcement	**Bottom Reinforcement**
R = Mu/ϕbd^2	
R = (17.32)(1000)/(0.9)(1)(5.438^2) = 650.77 psi	R = (17.32)(1000)/(0.9)(1)(5.938^2) = 545.79 psi
ρ = 0.01196	ρ = 0.00985
As = (0.01196)(12)(5.438) = 0.78 in^2/ft	As = (0.00985)(12)(5.938) = 0.70 in^2/ft
Try #5 bars at 4.75" in (As=0.78 in^2/ft)	Try #5 bars at 5.25" in (As=0.71 in^2/ft)

Check steel spacing (8.16.8.4)⊕

f_s (all.) = z/(d_c A)$^{1/3}$ ≤ 0.6f_y

Top	Bottom
d_c = 2+(0.625/2) = 2.312 in A = 2(2.312 x 4.75) = 21.96 in^2/ft	d_c = 1.5+(0.625/2) = 1.812 in A = 2(1.812 x 5.25) = 19.03 in^2/ft
f_s (all.) = 130/[(2.312)(21.96)]$^{1/3}$ ≤ 0.6(60) = 35.11 ksi ≤ 36.0 ksi	f_s (all.) = 170/[(1.812)(19.03)]$^{1/3}$ ≤ 36.0 ksi = 52.23, use 36.0 ksi max.
f_s (act.) = Mw/As jd	
f_s (act.) = (8.53)(12)/(0.78)(0.89)(5.438) = 27.11 ksi (OK)	f_s (act.) = (8.53)(12)/(0.71)(0.89)(5.938) = 27.28 ksi (OK)
✡Use #5 bars @ 4.75"c/c (As=0.78 in^2/ft)	✡Use #5 bars @ 4.75"c/c (As=0.78 in^2/ft)

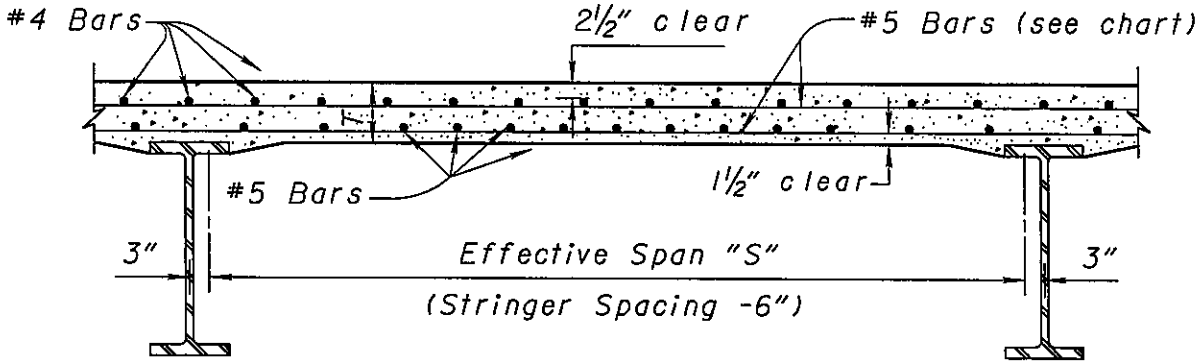
Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

⊕ AASHTO

✡Top and bottom bars shall coincide based on BDM Section 302.2.4.2

Figure 312

TRANSVERSE SLAB DESIGN* - HS25-44



EXAMPLE: Stringer spacing of 9'-6"

S= 9'-6" minus 6"= 9'-0"

T= 8¾", As (top)= 0.78 in^2/ft, As (bott.)= 0.71 in^2/ft

PRIMARY REINFORCEMENT: (SEE SEC. 302.2.4.2)

Use #5 bars (top & bott.), both at 4.75" c/c, As=0.78 in^2

DISTRIBUTIONAL REINFORCEMENT:

As (top)=(0.33)(0.78)=0.26 in^2/ft

Use #4 bars at 13 equal spaces (As= 0.27 in^2/ft)

As (bott.) : $220/\sqrt{S}$ =73.33%, use 67% max. ⊕ (3.24.10.2)

= (0.67)(0.78)= 0.52 in^2/ft in mid-half of span

= (0.50)(0.52)= 0.26 in^2/ft in each outer quarter ⊕ (3.24.10.3)

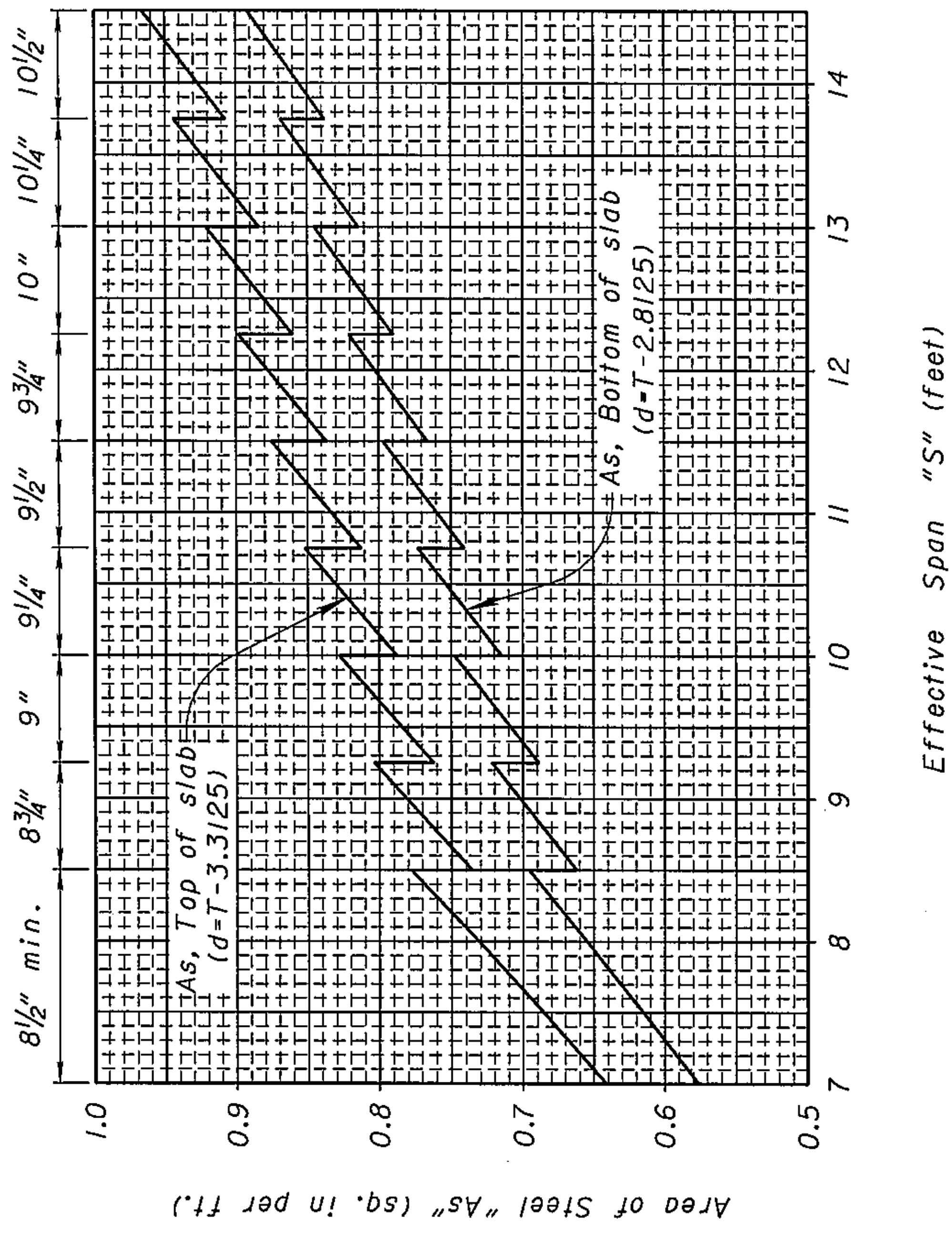
Use 9 #5 bars at 7" c/c in mid-half of span and 2 #5 bar in each outer quarter.

Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

⊕ AASHTO

* By load factor procedures. For design data and sample problem, see Fig. 312

Figure 313



Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

Note: *This Figure is for the design of a reinforced concrete deck on new steel beams/girders using HS25.*

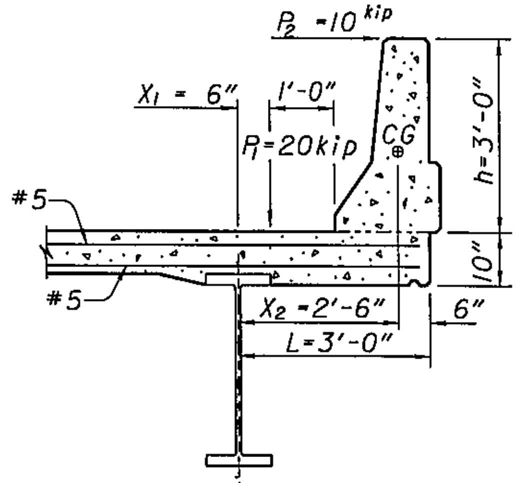
Figure 314A

Sample Problem: Using load factor design procedures, determine whether the reinforcing steel design given in the previous example is adequate to sustain a 3'-0" cantilever slab carrying a 36" deflector parapet and an HS25-44 loading.

P_1 = 20 Kip (3.24.3)⊕
P_2 = 10 kip (2.7.1.3)⊕

Truck Load Distribution Factor:
$E_1 = 0.8\ X_1 + 3.75$ (3.24.5.1.1)⊕
$E_1 = 0.8\ (0.5) + 3.75 = 4.15$

Railing Load Distribution Factor:
$E_2 = 0.8\ X_2 + 5.0$ (3.24.5.2)⊕
$E_2 = 0.8\ (2.5) + 5.0 = 7.0$



Uniform Dead Load: (per ft of length)
Slab = w_1 = (0.83)(1.0)(0.15) = 0.125 Kip/ft
F.W.S. = w_2 = 60 psf(1.0) = 0.060 Kip/ft

Concentrated Dead Load: (per ft of length)
Parapet = P = 0.47 Kip (located @ CG)

Dead Load Moment:
$$DLM = \tfrac{1}{2} w_1 L^2 + \tfrac{1}{2} w_2 (L - 1.5)^2 + P(L - 0.5)$$
$$DLM = \tfrac{1}{2}(0.125)(3.00)^2 + \tfrac{1}{2}(0.06)(3.0 - 1.5)^2 + 0.47(3.00 - 0.5) = 1.81 \text{ Kip-ft}$$

Live Load Moment:
$$\text{Truck Load Moment} + \text{Impact} = TLM + I = 1.3\ X_1 \left(\frac{P_1}{E_1}\right)$$
$$TLM + I = 1.3\ (0.5) \frac{20}{4.15} = 3.13 \text{ Kip-ft}$$
$$\text{Railing Load Moment} = RLM = h \left(\frac{P_2}{E_2}\right)$$
$$RLM = 3.0 \left(\frac{10.0}{7.0}\right) = 4.29 \text{ Kip-ft}$$
Live Load Moment = Greater of TLM+I & RLM = 4.29 kip-ft

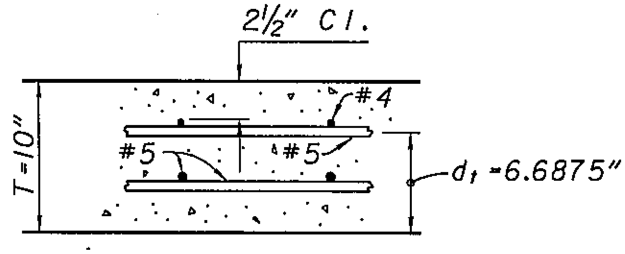
Design Moments:
$$M_u = 1.3\ [\ DLM + 1.67\ LLM\ ]$$
$$M_u = 1.3\ [\ 1.81 + 1.67\ (4.29)] = 11.67 \text{ Kip-ft}$$

$$M_w = \text{Service Load Moment} = DLM + LLM$$
$$M_w = 1.81 + 4.29 = 6.10 \text{ Kip-ft}$$

CHECK TOP REINFORCEMENT

⊕AASHTO

Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99



$f'_c = 4500$ psi
$f_y = 60000$ psi
$\phi = 0.9$ (8.16.1.2.2) ⊕
$Z = 130$ kip/in (top steel) (8.16.8.4) ⊕

$R = M_u / \phi b d^2 = 11.67\ (1000) / 0.9\ (1)\ (6.6875)^2 = 289.94$ psi
$\rho = 0.00503$ (see fig. 312)
$A_s = \rho b d = 0.00503\ (12)\ (6.6875) = 0.40\ in^2/ft < 0.78\ in^2/ft$ ★ ok

Check Steel Spacing (8.16.8.4) ⊕

$$f_{s\,(ALL)} = \frac{Z}{(d_c\ A)^{1/3}} \leqslant 0.6 f_y$$

$d_c = 2 + (0.625/2) = 2.312$ in
$A = 2(2.312 \times 4.75) = 21.96\ in^2/ft$

$$f_{s\,(ALL)} = \frac{130}{[(2.312)(21.96)]^{1/3}} = 35.11 \text{ ksi}$$

$$f_{s\,(ACT)} = \frac{M_w}{A_s\ j\ d_t}$$

$$f_{s\,(ACT)} = \frac{6.10\ (12)}{(0.78)\ (0.91)\ (6.6875)} = 15.42 \text{ ksi} < 35.11 \text{ ksi ok}$$

★ - Steel reinforcing ratio for top steel taken from Transverse Slab Design example (#5 bars @ 4.75").

Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

⊕ AASHTO

Deck Design SpreadSheet::

Design Code:	AASHTO LFD	
Loading:	HS25 Loading	
Wheel P Loading =	20	kips
Concrete, F'c=	4500	psi
Reinforcement=	60000	psi
phi =	0.9	
Z (top slab) =	130	k/in
Z (bot slab) =	170	k/in
n =	8	
Impact =	1.3	
Fut. Wearing Sur=	60	psf

""Summary""

Top Bars::

Use # 5 Bars at 4.75" o.c. =

Bottom Bars::

Use # 5 Bars at 4.75" o.c. =

Top Dist. #4 Long. Bars::

Use #4 Bars Spaced at = 9" o.c.

Bottom Dist. #5 Bars::

Use #5 Bars at 7" o.c. Spacing

8.83
EFF.
1.5'
.5'
10.33'

Beam Spacing=	10.33333333	feet
Top Flange Width=	36	in
S eff =	8.83333333	feet aashto 3.24.1.2
Tmin. =	S+17/36= 0.717592593	feet
	= 8.61111111	inches-Minimum
T Slab Selected=	8.75	inches

Dead Loads:

Slab DL =	0.109375	k/ft
FWS DL =	0.06	k/ft
Total DL =	0.169375	k/ft

Service Design Moments:

DL=0.125xS^2x0.8W=	1.321595485	k-ft
LL+I=1.3x0.8xPx(S+2)/32=	7.041666665	k-ft
Total Service Mo:DL+(LL+I)=	8.36326215	k-ft

Conc. Slab LFD Moment:

Mu=1.3(DL + 1.67(LL+I)) =	17.00553246	k-ft

Top Reinforcement Design:::

d = T-2.5-0.5-0.3125=	5.4375	inches =(T- 2.5"cover-#4 Bar-(1/2)#5)
Ru=Mu/(phi x b x d^2)=	639.0711102	psi
Reinf., rho =	0.011730423	
Area Steel, As = pbd =	0.765410101	in2/ft

Required:::::

Spacing# 5 Bar= 0.31x12/As=	4.860139676	in O.C.
Use # 5 Bars at 4.75" o.c. =	4.75	in O.C.
Recalculated #5 Bar As/ft =	0.783157895	in2/ft
Revised rho =As/dxb =	0.01200242	

Reinforcement Cracking and Spacing Control:

dc=2+(0.625/2) =	2.3125	inch
Ac=2x(dc x bar spacing) =	21.96875	in2

fs (All.)=z/(dcAc)^0.333= 35.10058244 Ksi
Maximun fs = 0.60xFy= 36 Ksi

Reinforce Stress Actual: fs::
K=(2pn+(pn)^2)^0.5-pn= 0.352599003
j = 1-k/3 =......J= 0.882466999

fs(Act) =Mo/Asjd = 26.70606383 Ksi..... ""OK""

Bottom Reinforcement Design:::

d = T-1-1.5-0.3125= 5.9375 inches =(T-1-1.5"cover-(1/2)#5 Bar)

Ru=Mu/(phi x b x d^2)= 535.9699981 psi

Reinf., rho = 0.009665564
Area Steel, As = pbd = 0.688671411 in2/ft

Required:::::
Spacing# 5 Bar= 0.31x12/As= 5.401705285 in O.C. Required Minimum As

Use # 5 Bars at 4.75" o.c. = 4.75 in O.C. BDM 302.2.4.2 T&B Match

Recalculated #5 Bar As/ft = 0.783157895 in2/ft
Revised rho =As/dxb = 0.01099169

Reinforcement Cracking and Spacing Control:

dc=1.5+(0.625/2) = 1.8125 inch
Ac=2x(dc x bar spacing) = 17.21875 in2

fs (All.)=z/(dcAc)^0.333= 53.99526904 Ksi
Maximun fs = 0.60xFy= 36 Ksi....Controls

Reinforce Stress Actual: fs::
K=(2pn+(pn)^2)^0.5-pn= 0.340551417
j = 1-k/3 =......J= 0.886482861

fs(Act) =Mo/Asjd = 24.34633872 Ksi..... ""OK"" < 36 ksi

Distribution Reinforcement:::
Top Dist. #4 Bars::
As (top)=0.33As = 0.261052632 in2/ft

Use #4 Bars Spaced at = 9.193548387 in O.C.
Use #4 Bars Spaced at = 9" o.c.

Bottom Dist. #5 Bars::
As (bottom) % =220/(s)^0.5 = 74.02192435 Precent

Maximun Precent = 67 Precent

Use Precent = 67 Precent
Middle Half Design Only = 0.524715789 in2/ft

Spacing #5 Bars = 7.089552239 in O.C.

Use #5 Bars at 7" o.c. Spacing

Overhang Deck Design SpreadSheet::

Design Code:	AASHTO LFD
Loading:	HS25 Loading
Wheel Loading, P1 =	20 kips
Barrier Fx Loading, P2=	10 Kips
Overhang dist =	3.583333333 feet
Barrier width =	1.5 feet
Barrier height =	3.5 feet
Dist. C.G. Bar to Slab Edge=	0.570304018 feet
Barrier Weight; Use =	639.5833333 PLF
X1=O.D.-Bw-1 ft =	1.083333333 ft
X2=O.D.-Barrier Edge dist=	3.013029315

Truck Load Distribution Factor:

E1=0.8(X1)+3.75 = 4.616666667 feet

Railing Distribution Factor:

E2=0.8(X2)+5 = 7.410423452 feet

Slab T overhang = T+2" = 10.75 inches

Uniform Dead Loads::

Slab =	0.134 ksf
FWS =	0.06 ksf

Dead Load Moments: (per ft of Length):

DLM=MoSlab+MoFWS+Barrier

DLM Slab=0.5w1L^2 =	0.863 K-ft
DLM FWS =0.5w2(L-1.5)^2 =	0.130208333 K-ft
DLM Parapet =P(L-0.5)=	1.927083333 K-Ft
......Total DLM =	2.920 K-Ft

Service LL+I Design Moments:

LL+I=1.3xPxd / E1 =	6.101 k-ft	==CONTROLS==
Rail LL M= P2xh / E2 =	4.723 k-Ft	
Total Service Mo:DL+(LL+I)=	6.101 k-ft	

Conc. Slab LFD Moment:

Mu=1.3(DL + 1.67(LL+I)) = 17.041 k-ft

Conc. Slab Service Moment:

Mu=(DL + (LL+I)) = 9.021 k-ft

Top Reinforcement Design:::

d = T2-2.5-0.5-0.3125=	7.4375 inches	=(T2- 2.5"cover-#4 Bar-(1/2)#5)
Ru=Mu/(phi x b x d^2)=	342.302474 psi	
Reinf., rho =	0.005986086	

Area Steel, As = pbd = **0.534258189 in2/ft**

Required:::::
Spacing# 5 Bar= 0.31x12/As= **6.962925556 in O.C.**

Use # 5 Bars at 4.75" o.c. =	4.75	in O.C.	Match Top Bar Spacing

Recalculated #5 Bar As/ft =	**0.783157895 in2/ft**
Revised rho =As/dxb =	**0.008774878**

Reinforcement Cracking and Spacing Control:

dc=2+(0.625/2) =	**2.3125 inch**
Ac=2x(dc x bar spacing) =	**21.96875 in2**
fs (All.)=z/(dcAc)^0.333=	**35.10058244 Ksi**
Maximun fs = 0.60xFy=	**36 Ksi**

Reinforce Stress Actual: fs::

K=(2pn+(pn)^2)^0.5-pn=	**0.311017391**	
j = 1-k/3 =......J=	**0.896327536**	
fs(Act) =Mo/Asjd =	**20.73465311 Ksi.....**	""OK""

KZFDESIGN

DECK DESIGN LOAD FACTOR

DESCRIPTION

8-Jul-09

by: RBK

INPUT

GIRDER SPACING		10.33	ft	**EFFECTIVE SPAN**	8.83	ft
DECK THICKNESS		8.75	in			
				fs =	24000.00	psi
CONCRETE DATA	f'c =	4500	psi	**STEEL DATA** fy =	60000.00	psi
				n =	8	
CLEARANCE OF REBAR	top deck	3.00	in (clr)	rebar size =	0.625	in
AND AREA OF STEEL	top spacing o.c.	4.75	in	As =	0.78	in^2
	bottom deck	1.50	in (clr)	rebar size =	0.625	in
	bottom spacing o.c.	4.75	in	As =	0.78	in^2
DEAD LOADS	p.w.s. + f.w.s.	60.000	lbs/ft			
	misc. =		lbs/ft	deck =	109.375	lbs/ft

OUTPUT

DEAD LOAD MOMENT	(W*S^2/10)*1.3*.8 where w = deck + future wearing surface + misc.	1374.46	lbs-ft	
LIVE LOAD MOMENT	P20*((S+2)/32) *1.3*2.17*.8	12224.33	lbs-ft	
TOTAL MOMENT		13598.79	lbs-ft	
CRACKING MOMENT	1.2*Mcr = 1.2*7.5*f'c^.5 * S	7703.95	lbs-ft	ok !

TOP DECK STEEL

d = deck - clr - 1/2 rebar dia.
p = As/bd
MOMENT CAPACITY = 0.9*(As*fy*d*(1-0.6*p*fy/f'c))
p < .75pb .75*pb =.75(.85*B*f'c/fy)(87000/(87000+fy))

d =	5.438	in	
p=	0.0120		
phi*Mn =	17322.89	lbs-ft	ok !
.75*pb =	0.0233		ok !

BOTTOM DECK STEEL

d = deck - clr - 1/2 rebar dia.
p = As/bd
MOMENT CAPACITY = 0.9*(As*fy*d*(1-0.6*p*fy/f'c))
p < .75pb .75*pb = .75(.85*B*f'c/fy)(87000/(87000+fy))

d =	6.938	in	
p=	0.0094		
phi*Mn =	22609.20	lbs-ft	ok !
.75*pb =	0.0233		ok !

DISTRIBUTION (CRACK WIDTH)

fs = z/(dc*A)^.333 < .6*fy

top steel fs =	27,665	psi	
bot steel fs =	36,000	psi	

fs at service load

(top)	k=	0.3453
(top)	j=	0.8849
(bot)	k=	0.3131
(bot)	j=	0.8956

actual top fs =	21,306	psi	ok !
actual bot fs =	16,499	psi	ok !

Distribution Reinforcement

% = 220/S^0.5 =	74.0%	
As = 67%max(As req'	0.525	use # 5
# bars middle half =	9.34	bars
# bars outer quarter =	1.87	bars

Temperature and Shrinkage:

As > 1/3As req'd	0.261	in^2/ft	
use	#4 @ 9. in		
As =	0.27	in^2/ft	ok !

ODOT BDM 302.2.7

3 SOURCES OF GIRDER TWIST FROM DECK PLACEMENT

1) GLOBAL SUPERSTRUCTURE DISTORTION
2) OIL-CANNING
3) GIRDER WARPING

1.) GIRDER TWIST CAN BE NEGLECTED FOR NEW SUPERSTRUCTURES WHEN TRIBUTARY DECK LOAD CARRIED BY EXTERIOR BEAM DOES NOT EXCEED 110% OF INTERIOR BEAM.

FOR BRIDGE NO. SCI-823-0837 L/R

EXT. BEAM TRIBUTARY AREA $= \frac{3.58 + 0.5(10.33)}{10.33} = 0.85 < 1.10$

$\therefore$ NEGLECT GIRDER TWIST RESULTING FROM GLOBAL SUPER

FOR BRIDGE NO. SCI-TR234-0122:

EXT. BEAM TRIBUTARY AREA $= \frac{3.65 + 0.5(7.75)}{7.75} = 0.97 < 1.10$

$\therefore$ NEGLECT GIRDER TWIST RESULTING FROM GLOBAL SUPER.

2.) OIL-CANNING

NEGLECT GIRDER TWIST RESULTING FROM OIL-CANNING FOR PRESTRESSED I-BEAM SUPERSTRUCTURES.

3.) GIRDER WARPING

NEGLECT GIRDER TWIST FROM GIRDER WARPING FOR PRESTRESSED I-BEAMS.

CALCULATE MAXIMUM WHEEL LOAD

- FOR BRIDGE NO. SCI-823-0837 L/R (SKEW = 15° ROUNDED UP)

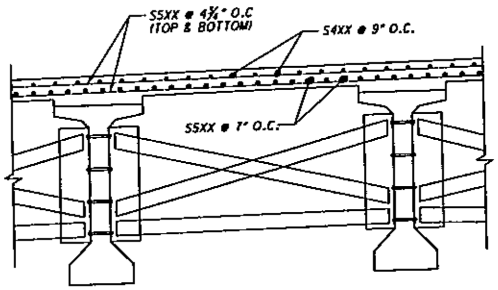
RAIL-TO-RAIL $L = 1.04W = 1.04(48.46') = 50.4'$

EXTRA END $L = 5.0$ ft.

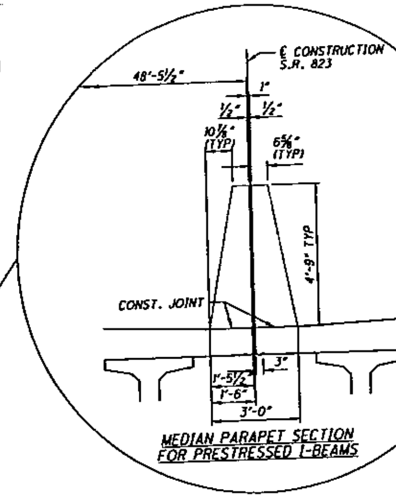
TOTAL FINISHING MACHINE $L = 2(5.0) + 50.4' = \underline{60.4'}$

TOTAL MACHINE WEIGHT $= 7.6K + 0.09(60.4' - 36') = \underline{9.80K}$

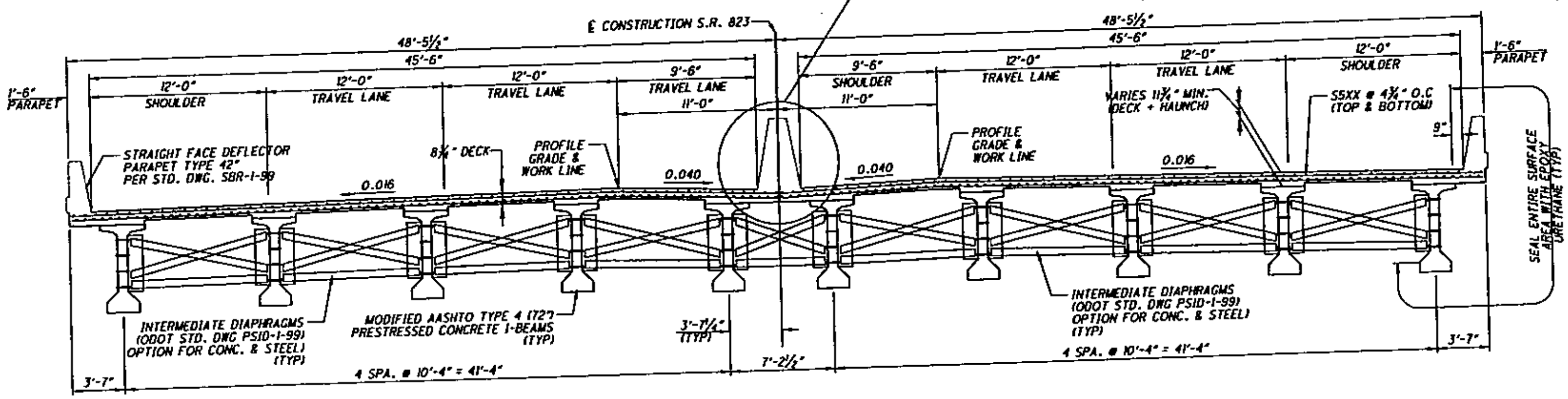
MAXIMUM WHEEL LOAD $= 9.8/8 = \underline{1.23K}$



TYPICAL BAY SECTION
REINFORCING STEEL SHOWN



MEDIAN PARAPET SECTION
FOR PRESTRESSED I-BEAMS



TRANSVERSE SECTION

NOTES: 1. INTERMEDIATE DIAPHRAGMS ARE TO BE LOCATED AT QUARTER POINTS OF SPAN

DESIGN AGENCY K Z F DESIGN
DESIGNED DEF | DRAWN RBK | REVIEWED BMB | DATE 10/31/08
CHECKED DAT | REVISED | STRUCTURE FILE NUMBER 7306458/7306466

TRANSVERSE SECTION
BRIDGE NO. SCI-823-0837 L/R
SR 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR 31)

SCI-823-0.00
PID No. 19415

16 / 18

XX / XXX

ET
NCHMARK 2
OVIDED LATER)
SS
E
EVATIONS
ksi) DRIVEN
IRING
YPE 4
SITE
L
ASSEMBLY TYPE 1
ASSEMBLY TYPE 2
N

DESIGN AGENCY K Z F DESIGN
DESIGNED DEF | DRAWN RBK | REVIEWED BMB | DATE 10/31/08
CHECKED DAT | REVISED | STRUCTURE FILE NUMBER 7306458

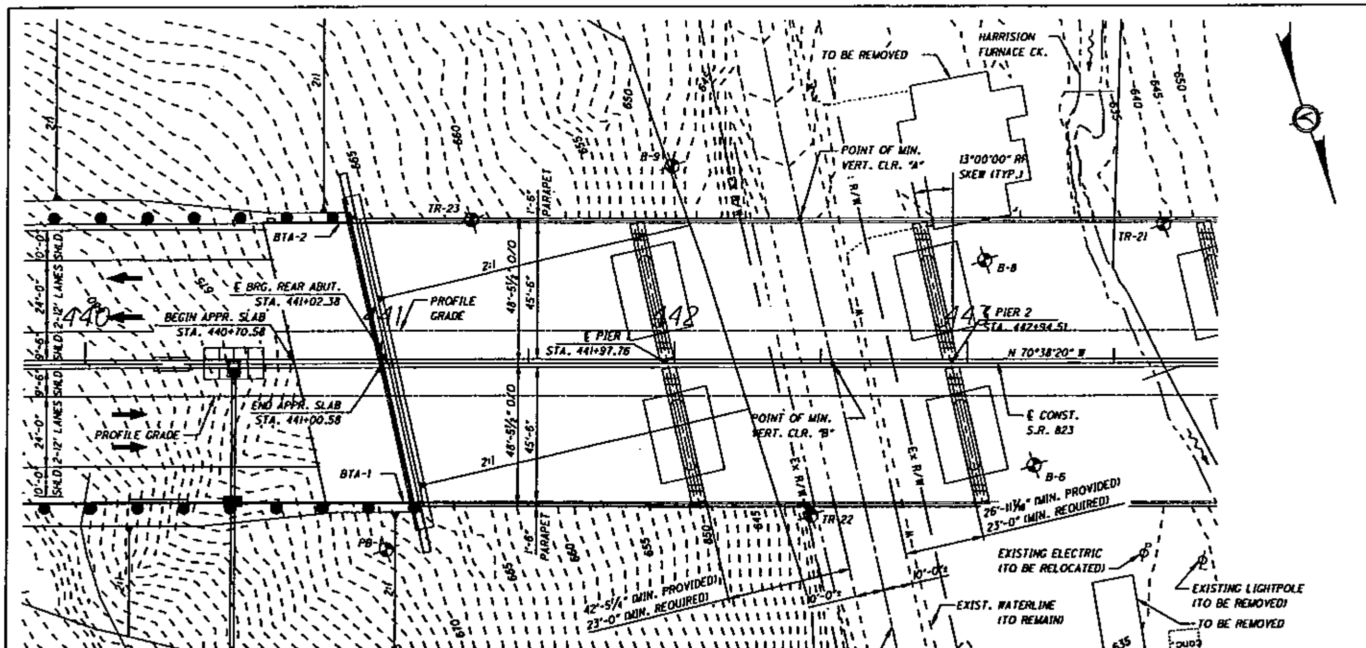
SCIOTO COUNTY
STA. 441+00.58
STA. 444+88.43

SITE PLAN
BRIDGE NO. SCI-823-0837 L
SR 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR 31)

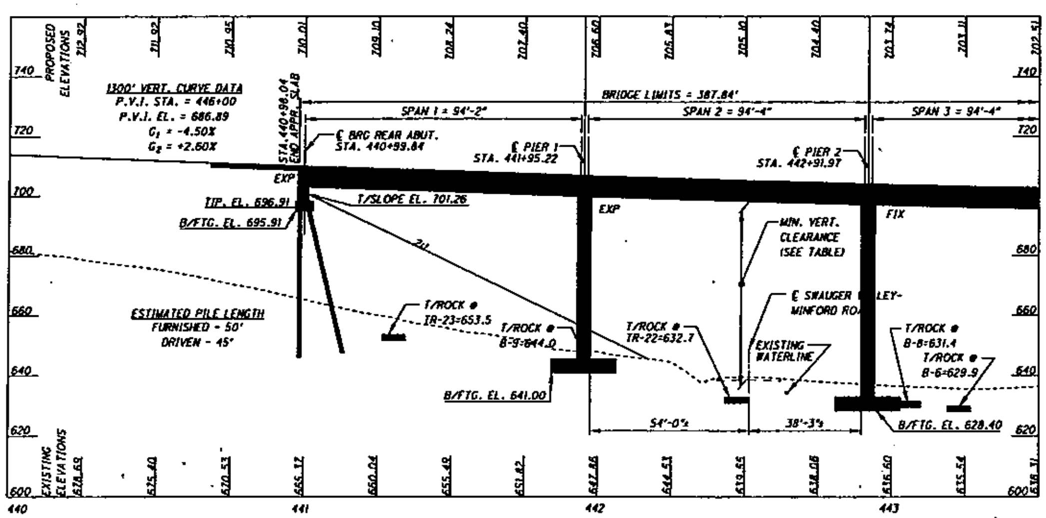
SCI-823-0.00
PID No. 19415

1 / 18

XX / XXX



PLAN



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

STAGE 2 SUBMITTAL 10/31/08

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	440+84.97	LT.
FWD. ABUT.	444+82.23	LT.

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA

(SR 823)
CURRENT YEAR ADT (2010) = 21,200
DESIGN YEAR ADT (2030) = 31,200
CURRENT YEAR ADTT (2010) = 2,968
DESIGN YEAR ADTT (2030) = 4,368

HYDRAULIC DATA

DRAINAGE AREA = 0.873 sq.mi. = 558.9 acres
Q_{50} = 493 cfs Q_{100} = 581 cfs
V_{50} = 6.5 fps V_{100} = 6.9 fps
EL $_{50}$ = 638.2   EL $_{100}$ = 638.5
OHWM EL. 636.2
AREA BELOW OHWM: 0.17 ACRES
TEMP. FILL BELOW OHWM: 1130 CY

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

FOUNDATION DATA:

ALL NEW PILES SHALL BE HP12x53 H-PILES (Fy=50 ksi) DRIVEN TO BEDROCK AND HAVE A MAXIMUM ALLOWABLE BEARING LOAD RESISTANCE OF 194 KIPS PER PILE.

PROPOSED STRUCTURE

TYPE: 4 SPAN CONTINUOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAMS WITH COMPOSITE REINFORCED CONCRETE DECK ON SEMI-INTEGRAL ABUTMENTS AND T-TYPE PIERS.

SPANS: 94'-2", 94'-4", 94'-4", 94'-2" c/c BEARINGS

ROADWAY: 45'-6" TOE TO TOE OF PARAPETS

LOADING: HS-25 AND ALTERNATE MILITARY LOADING

SKEW: 13°00'00" RF

CROWN: 0.016 FT./FT.

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30 FT LONG)

LATITUDE: 38°51'00"N

LONGITUDE: 82°52'03"W

TABLE OF VERTICAL CLEARANCES	
LOCATION	"A"
PROPOSED	56.82'±
PREFERRED	15.0'

LEGEND

BTA-1 = BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 = BRIDGE TERMINAL ASSEMBLY TYPE 2
= BORING LOCATION

SITE PLAN
BRIDGE NO. SCI-823-0837 L
SR 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR 31)

SCIOTO COUNTY
STA. 441+00.58
STA. 444+88.43

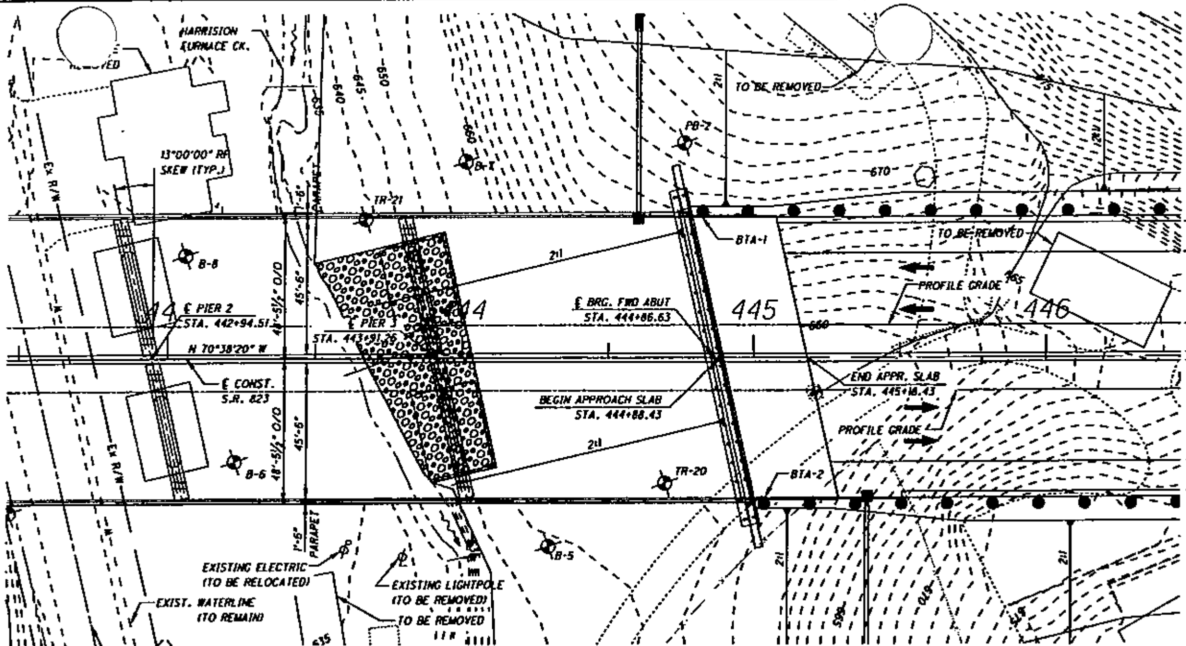
DESIGNED	CHECKED	DRAWN	REVIEWED	REVIEWED	DATE	STRUCTURE FILE NUMBER
DEF	DAT	RBK		BMB	10/31/08	7306458

DESIGN AGENCY
KZF DESIGN

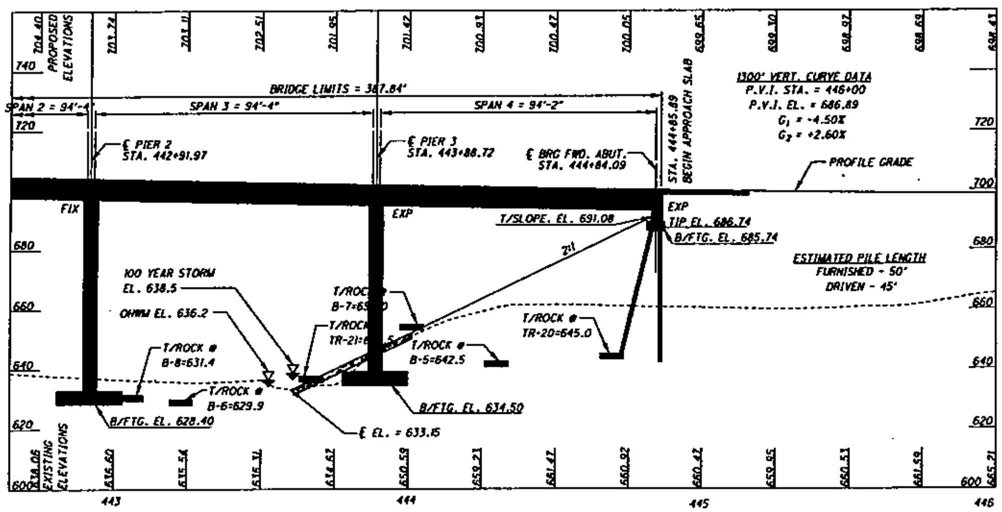
SCI-823-0.00
PID No. 19416

1 / 18

XX / XXX



PLAN



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	440+84.97	LT.
FWD. ABUT.	444+82.23	LT.

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA

(SR 823)

CURRENT YEAR ADT (2010) = 21,200
DESIGN YEAR ADT (2030) = 31,200
CURRENT YEAR ADTT (2010) = 2,968
DESIGN YEAR ADTT (2030) = 4,368

HYDRAULIC DATA

DRAINAGE AREA = 0.873 sq.mi. = 558.9 acres
Q_{50} = 493 cfs　　Q_{100} = 581 cfs
V_{50} = 6.5 fps　　V_{100} = 6.9 fps
EL $_{50}$ = 638.2　　EL $_{100}$ = 638.5
OHWM: EL. 636.2
AREA BELOW OHWM: 0.17 ACRES
TEMP. FILL BELOW OHWM: 1130 CY

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

FOUNDATION DATA:
ALL NEW PILES SHALL BE HP12x53 H-PILES (Fy=50 ksi) DRIVEN TO BEDROCK AND HAVE A MAXIMUM ALLOWABLE BEARING LOAD RESISTANCE OF 194 KIPS PER PILE.

PROPOSED STRUCTURE

TYPE: 4 SPAN CONTINUOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAMS WITH COMPOSITE REINFORCED CONCRETE DECK ON SEMI-INTEGRAL ABUTMENTS AND T-TYPE PIERS.

SPANS: 94'-2", 94'-4", 94'-4", 94'-2" c/c BEARINGS

ROADWAY: 45'-6" TOE TO TOE OF PARAPETS

LOADING: HS-25 AND ALTERNATE MILITARY LOADING

SKEW: 13°00'00" RF

CROWN: 0.016 FT./FT.

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30 FT LONG)

LATITUDE: 38°51'00"N

LONGITUDE: 82°52'03"W

TABLE OF VERTICAL CLEARANCES	
LOCATION	"A"
PROPOSED	56.82'±
PREFERRED	15.0'

LEGEND

BTA-1 = BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 = BRIDGE TERMINAL ASSEMBLY TYPE 2
= BORING LOCATION

DESIGN AGENCY	KZF DESIGN
DESIGNED DEF	CHECKED DAT
DRAWN RBK	REVIEWED
REVIEWED BMB	DATE 10/31/08
STRUCTURE FILE NUMBER	7306458

SCIOTO COUNTY
STA. 441+00.58
STA. 444+88.43

SITE PLAN
BRIDGE NO. SCI-823-0837 L
SR 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR 31)

SCI-823-0.00
PID No. 19415

2 / 18

XX / XXX

This reinforcement should be placed approximately symmetrical to the centerline of pier bearings but with every other reinforcing bar staggered 3 feet [1000 mm] longitudinally.

For composite designs, the total longitudinal reinforcement over a pier shall meet the requirements of AASHTO.

302.2.4.2 TRANSVERSE

To facilitate the placement of reinforcing steel and concrete in transversely reinforced deck slabs top and bottom main reinforcement shall be equally spaced and placed to coincide in a vertical plane.

For steel beam or girder bridges with a skew of less than 15 degrees the transverse reinforcing may be shown placed parallel to the abutments. Bridges with a skew greater than 15 degrees or where the transverse reinforcing will interfere with the shear studs should have the transverse reinforcement placed perpendicular to the centerline of the bridge. Refer to the appropriate Standard Bridge Drawing for the requirements on slab bridges.

For prestressed I-beams, transverse reinforcing shall be placed perpendicular to the centerline of the bridge.

For composite box beam decks, the transverse reinforcing steel may be placed parallel to the abutment.

For steel beam or girder bridges, the clearance of the bottom transverse bars over the top of any bolted beam splice plates or moment plates should be checked as reinforcing bars at a skew generally cannot be placed between bolt heads.

302.2.5 HAUNCHED DECK REQUIREMENTS

Concrete decks on steel beam, girder or prestressed I-beam structures shall have a concrete haunch to prevent a thinning of the deck slab as a result of unforeseen variations in beam camber. At a minimum, the design haunch shall allow for 2 inches [50 mm] of excessive camber. For steel beam and girder structures, the haunch shall be tapered back to the original concrete deck thickness in a 9 inch [225 mm] length and the concrete haunch shall encase the edges of the top flange. See Figures 317 & 318.

302.2.6 STAY IN PLACE FORMS

Galvanized steel or any other material type, stay in place forms, shall not be used.

302.2.7 CONCRETE DECK PLACEMENT CONSIDERATIONS

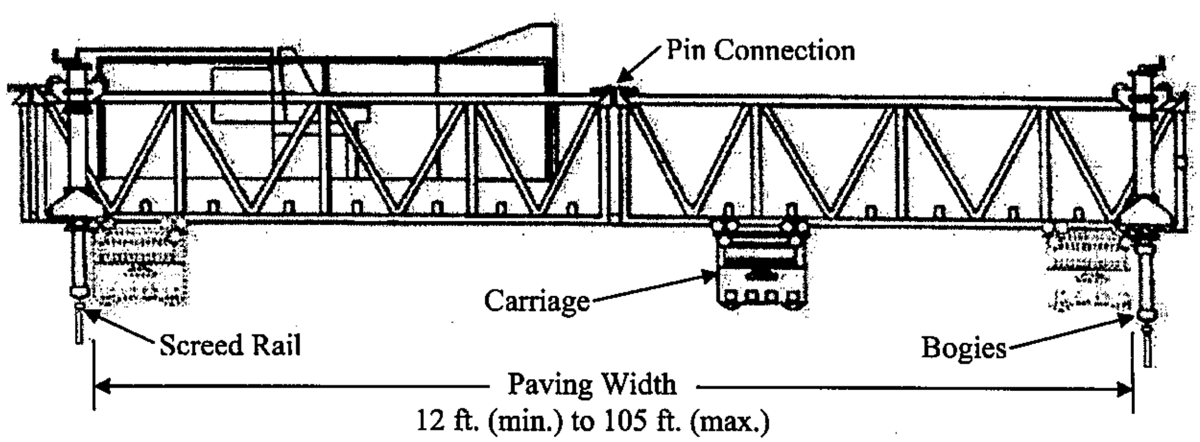
SCI-823

Mechanized finishing machines are preferred to hand finishing methods for both consistency of surface finish and economics. Designers should be aware of finishing machine limitations in order to avoid deck designs that require hand finishing methods.

The placement of deck concrete using mechanized finishing machines alone does not ensure a smooth riding surface. Achieving a smooth riding surface as well as ensuring the proper geometry of the concrete deck is further complicated by deflections of the concrete falsework and of the main structural support members during the placement operation. The Contractor is responsible for designing falsework and finishing machine support to minimize deflection during placement, but the Designer is responsible for deflections induced by deck placement on the superstructure. Many complications due to deflection during placement can be avoided with proper design considerations.

302.2.7.1 FINISHING MACHINES

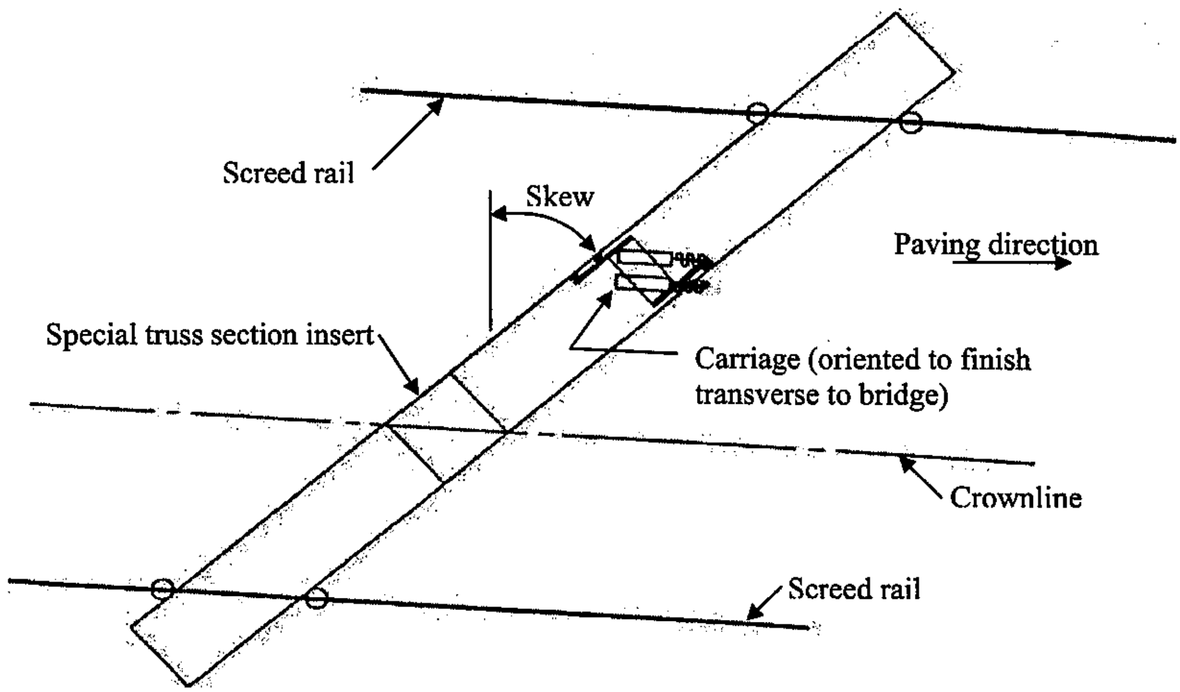
Mechanized finishing machines are comprised of fabricated truss sections pinned together to span the bridge deck width to be paved. The truss spans are supported at each end on a set of wheels, called "bogies," which ride along the length of the bridge on screed rails. Suspended below the truss is a finishing head, called a "carriage," which levels, compacts, vibrates and finishes the concrete.



Finishing machines can be placed such that the truss sections are skewed with respect to the screed rails. This orientation allows for concrete placement parallel to the substructure skew as required by the C&MS 511. For skew angles of 15° and greater, the finishing machine can be skewed to within 5 degrees of the plan specified skew angle.

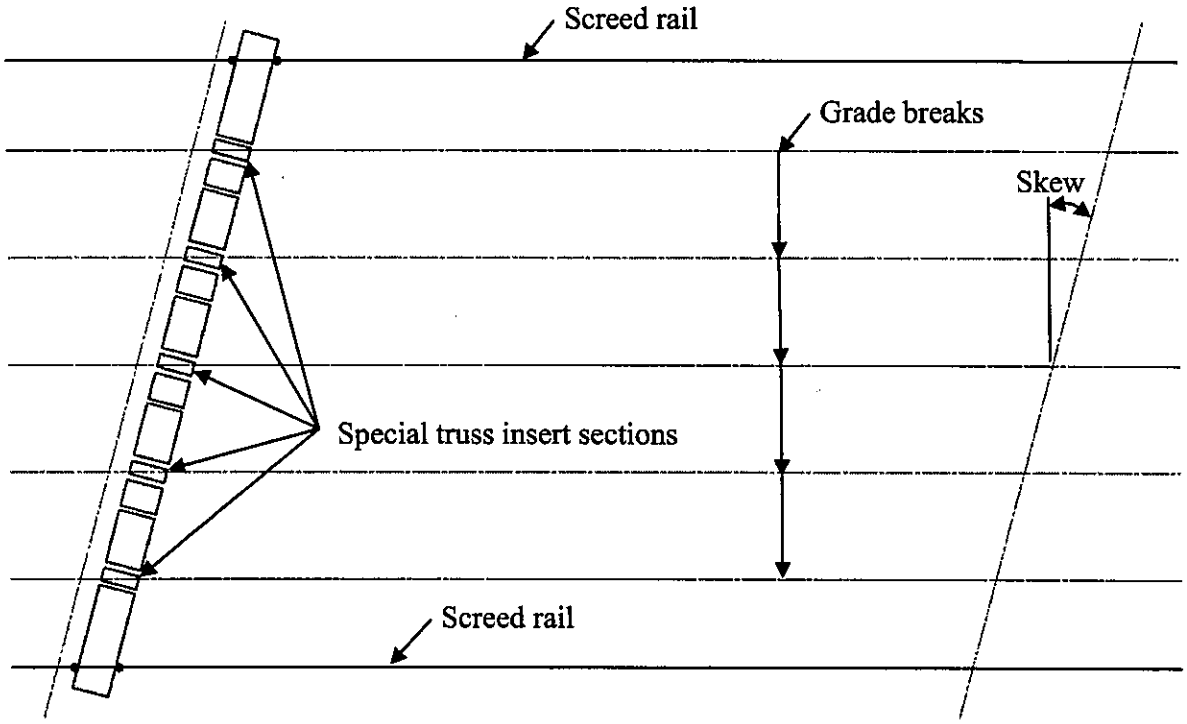
The carriage can also be skewed with respect to the truss sections. This feature allows the carriage to finish the concrete transverse to the bridge when the truss sections are placed at some other orientation (e.g. parallel to the substructure skew). In order to ensure a proper finish at transverse grade breaks (e.g. crown points), the carriage should always be oriented to finish the concrete transverse to the bridge. A special length truss section insert is required above the grade break locations such that the grade break line lies directly below opposite corners of the section.

For skewed bridges without transverse grade breaks, skewing the carriage with respect to the truss sections is not required.

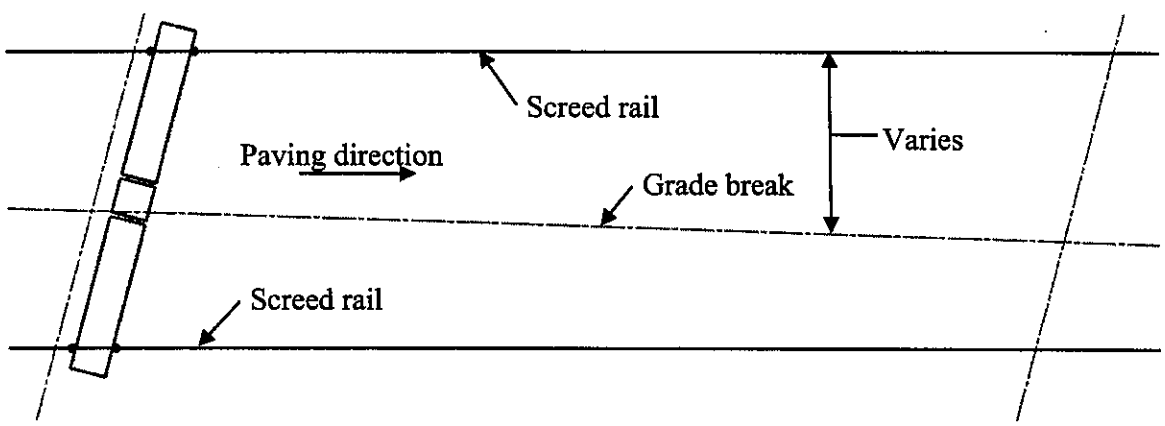


Most finishing machines do not easily accommodate non-parallel rails. The distance between the screed rails should be a fixed width. Designs that require tapered paving widths should be avoided.

The finishing machines can be hinged at the pin connections between truss sections in order to provide transverse grade breaks (e.g. crown points). In theory, multiple transverse grade breaks can be accommodated, but the grade breaks must remain at a fixed spacing in order to line up with a pin connection. The figure below illustrates the complexity of the machine set-up to accommodate multiple grade breaks in a transverse section placed on a skew. Note that the length of truss sections required between grade breaks must fit the standard truss section lengths.



Grade break locations that move laterally along the length of the bridge cannot be paved in a single operation using a mechanized finishing machine and should therefore be avoided. Note that as the machine progresses forward, the truss hinge locations and the grade break locations no longer coincide. See the figure below.



302.2.7.2 SOURCES OF GIRDER TWIST

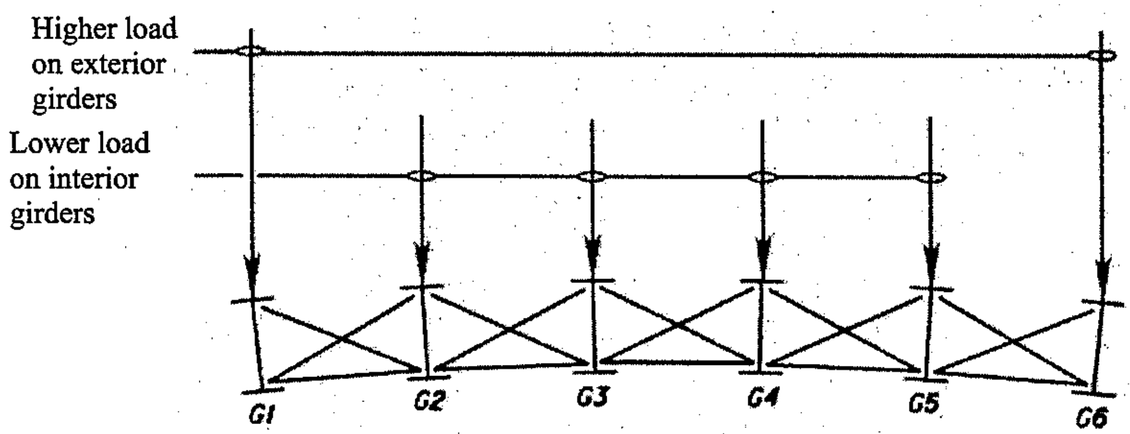
The interconnectivity between girders, intermediate crossframes/diaphragms and end crossframes/diaphragms is essential to a structure's stability throughout the construction process. Therefore, it is of utmost importance to ensure that all crossframes/diaphragms are fully installed

prior to deck placement. Failure to do so may lead to construction disputes, expensive repairs and lengthy construction delays or even impact project safety. One major drawback to this interconnectivity is that the deflection caused by the placement of the concrete deck will result in girder twisting.
There are primarily three independent sources of girder twist resulting from deck placement. This manual will refer to these sources as: global superstructure distortion, oil-canning and girder warping.

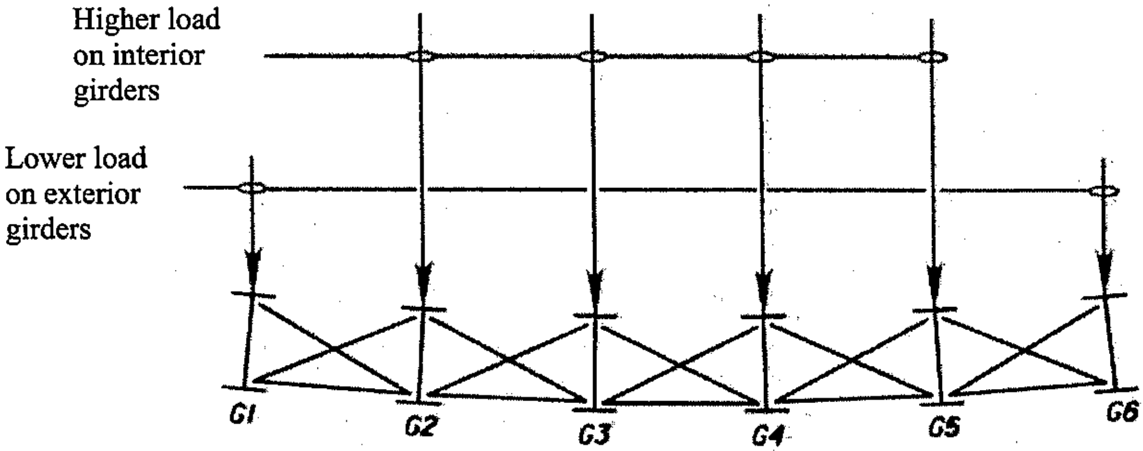
302.2.7.2.a GLOBAL SUPERSTRUCTURE DISTORTION

Global superstructure distortion is distortion of the bridge transverse section primarily caused by differential deflections between adjacent girders. As a girder deflects downward with respect to an adjacent girder, the rigidity of the cross framing between the two girders causes the deflecting girder to rotate as it deflects. This distortion may occur with both steel and prestressed concrete superstructures. The most common differential deflections occur between the exterior girders and adjacent interior girders for a given construction phase when the loaded tributary areas over the girders differ.

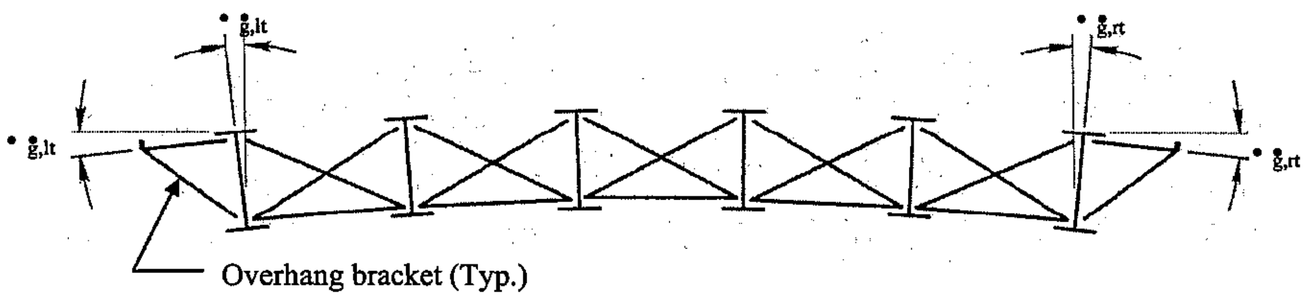
Transverse sections with more heavily loaded exterior girders distort in a convex shape.



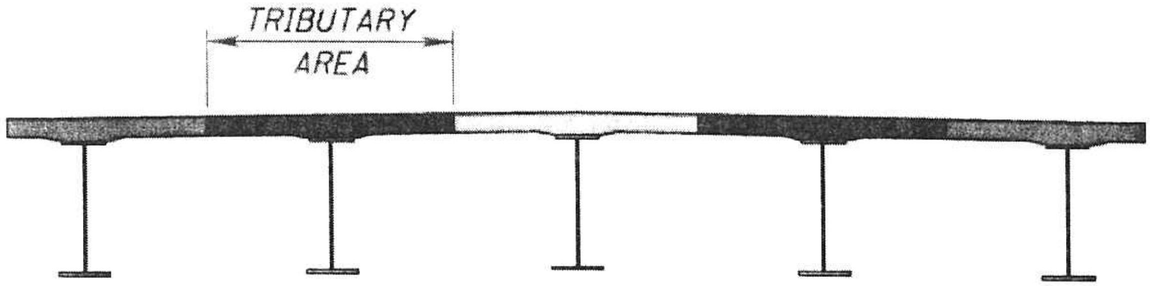
Transverse sections with more heavily loaded interior girders distort in a concave shape.



Twisting of the exterior girders can result in deck thickness and cover loss if the screed rails are supported on cantilevered falsework. The magnitude of girder twist (measured as • g) will vary over the length of the bridge and will be different for the left and right sides if loading or geometry is not symmetrical.



For bridges with tangent alignments and adjacent substructure skews that vary by no more than 15°, the magnitude of the girder twist can be reduced by utilizing transverse sections with balanced tributary deck loadings. For a new superstructure, the amount of girder twist due to global superstructure deformation can be neglected when the tributary deck load carried by the fascia girder does not exceed 110% of the average of the tributary deck load carried by the interior members for a given construction phase. For an existing superstructure, the amount of global deformation may be neglected when the tributary deck load carried by the fascia girder does not exceed 115% of the average of the tributary deck load carried by the interior members for a given construction phase.

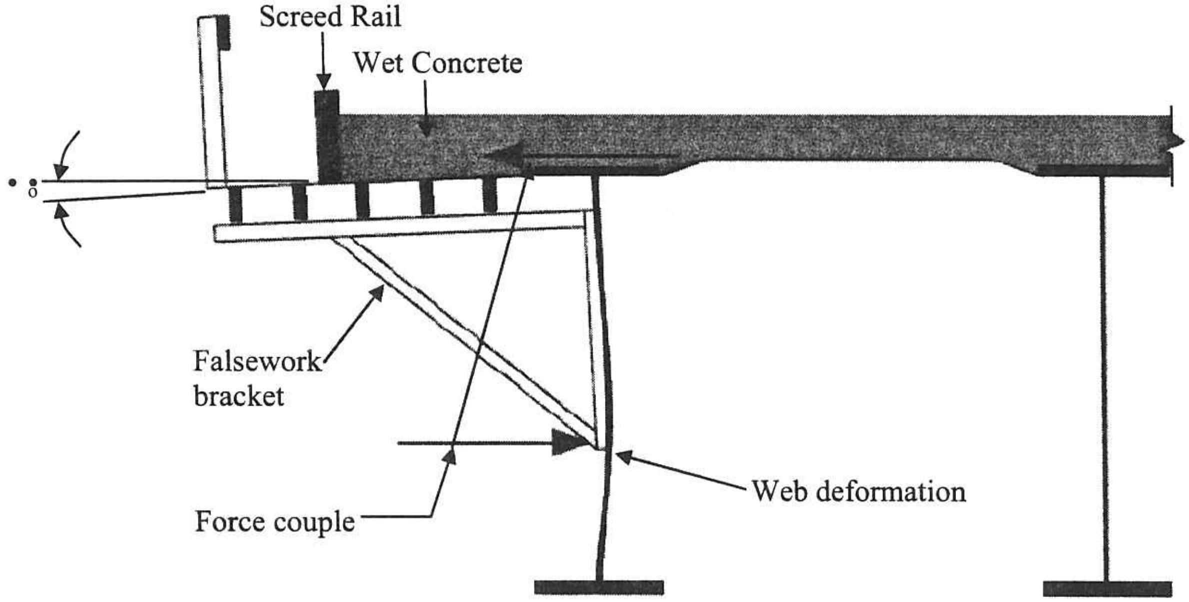


When the aforementioned tributary deck loading requirements of the fascia members cannot be met or, because of geometry, do not apply, the Designer shall perform a refined analysis of the superstructure system to determine the magnitude of fascia girder twist ($\bullet_g$) due to deck concrete placement. To properly calculate the effect of the twist angle on deck thickness, the analysis should be based on the deflection occurring due to the concrete present at the time that the finishing machine passes over the point under consideration. This degree of precision requires a separate refined analysis for each point of consideration. It is generally sufficient to calculate $\bullet_g$ based on the full wet concrete load placed over the entire structure. However, on complex structures with variable skews and/or curved girders, a higher degree of precision may be warranted to ensure proper deck thickness.

Additional measures to reduce global deformation include: adding or stiffening the crossframes/diaphragms; and increasing the stiffness of the girders. An increase in the crossframe stiffness results in better load distribution across the width of the structure and less distortion. An increase in the stiffness of the girders reduces the magnitude of vertical deflection resulting in less distortion of the transverse section.

302.2.7.2.b OIL-CANNING

Distortion due to oil-canning occurs when large lateral loads from the cantilevered deck slab falsework bracket deform the girder web.



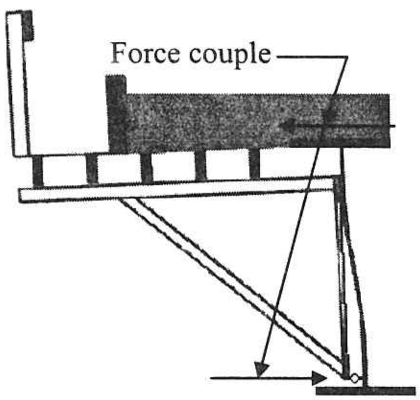
Locating the falsework bracket near the bottom flange will reduce the amount of web deformation. C&MS Item 508 requires the lower point of contact to be within 8" of the top of the bottom flange. Given this requirement and the geometric capabilities of the falsework brackets, the magnitude of girder twist (• ȸ) resulting from oil-canning may be neglected for girder webs 84" deep or less.

For web depths greater than 84", designers shall provide the location of the falsework bracket in the plans. Provide a General Note that removes the lower point of contact requirement of C&MS Item 508 (see BDM Section 600 for an example). The pay item for deck concrete shall be "as per plan". Using the plan bracket location, designers shall determine • ȸ. Designers may assume the lowest location of the falsework bracket to be 76" measured below the bottom of the top flange. The magnitude of twist can be predicted using finite element analysis of the web or by various approximate methods. If the magnitude results in excessive deck thickness loss, reducing the transverse stiffener spacing or adding temporary bracing on the inside of the web may be necessary. Any temporary bracing should be detailed in the plans.

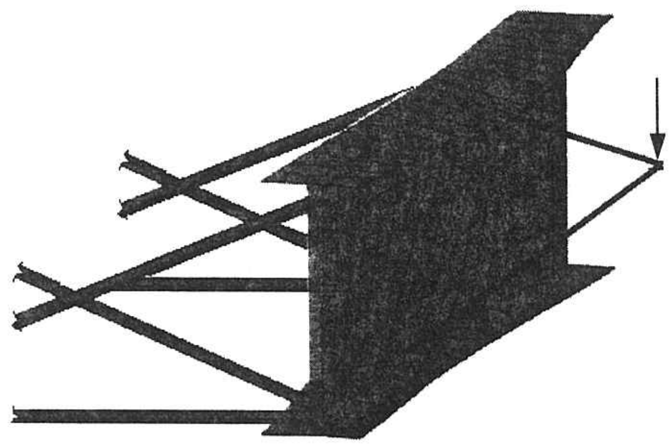
The magnitude of girder twist resulting from oil-canning may be neglected for prestressed I-beam superstructures.

302.2.7.2.c GIRDER WARPING

Distortion due to girder warping occurs as a result of deck slab overhang falsework loading on the fascia girder between points of lateral bracing (e.g. crossframes). The bracket loads produce twist between the crossframes due to a combination of girder warping and pure torsional distortion. The girder is restrained from warping at the crossframe locations. Due to the inherent torsional stiffness of prestressed I-beams, the distortion due to girder warping may be neglected. Other design considerations for I-beams due to the overhang bracket loadings are presented at the end of this section.



Girder warping



Torsional distortion

For steel superstructures, Designers should calculate the magnitude of twist ($\bullet_{w}$) due girder warping using the TAEG software developed by the Kansas Department of Transportation. TAEG ("Torsional Analysis of Exterior Girders") is available at no cost and can be downloaded at: http://www.ksdot.org/kart/.

Since most of the data input in TAEG is dependent upon the contractor's equipment and falsework design, designers should use conservative assumptions to accommodate most contractor resources. For design-build projects and value engineering change proposals (VECP's), data input for TAEG shall represent the actual falsework and equipment to be used by the contractor. Designers may use the following assumptions in lieu of actual contractor supplied information:

A. Girder Data:

   For bridges with constant web depths, designers may select the cross section with the least torsional resistance to represent the entire structure. For bridges with variable depth webs, designers may disregard the effect of girder warping in the web depth transition sections.

B. Bridge Lateral Data:

   Designers may select the largest crossframe spacing to represent the entire structure. For structures with variable beam spacings (i.e. flared girders) designers may select the largest spacing dimension to represent the entire structure. Designers should generally avoid utilizing temporary tie rods and timber blocks; however, if required these should be detailed in the contract plans.

C. Permanent Lateral Support Data:

The default crossframe type assumed by the TAEG software consists of a stiffener and diagonal x-bracing with top and bottom horizontal chords. In order to analyze the structure with a standard ODOT crossframe, designers should input stiffener dimensions and select the "Diaphragms (Inputted Ix)" option. For ODOT Type 1 crossframes, designers should assume a fictitious stiffener of dimensions: 5" x 3/8". Determine the diaphragm moment of inertia for all standard ODOT crossframes as follows:

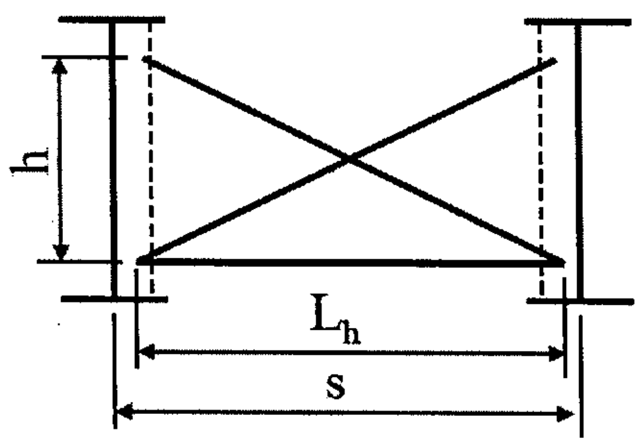
$$I_x = \frac{h^2 s}{4L_d^3\left(\frac{1}{A_d L_h^2} + \frac{L_h}{A_h L_d^3 + A_d L_h^3}\right)}$$

Where:

A_d = Area of the diagonal member (in^2)

A_h = Area of the horizontal member (in^2)

$L_d = \sqrt{L_h^2 + h^2}$



D. Temporary Lateral Support Data:

Designers should generally avoid utilizing temporary tie rods and timber blocks; however, if required these should be detailed in the contract plans.

E. Load Data:

1. Live Load on Walkway....50 lb/ft^2
2. Live Load on Slab....50 lb/ft^2
3. Dead Load of Formwork....10 lb/ft^2
4. Dead Load of Concrete....150(t_{avg}) lb/ft^2

   (t_{avg} = Average thickness [ft.] of deck slab overhang)
5. Wheel Spacing [1-2-3]....36" – 31" – 36"
6. Maximum Wheel Load:

   To estimate the total finishing machine length required for placement along the skew, add the rail-to-rail length and the extra end length from the following table using the plan specified skew rounded to the nearest 5 degrees. W is the rail-to-rail length as measured perpendicular to the centerline of the bridge.

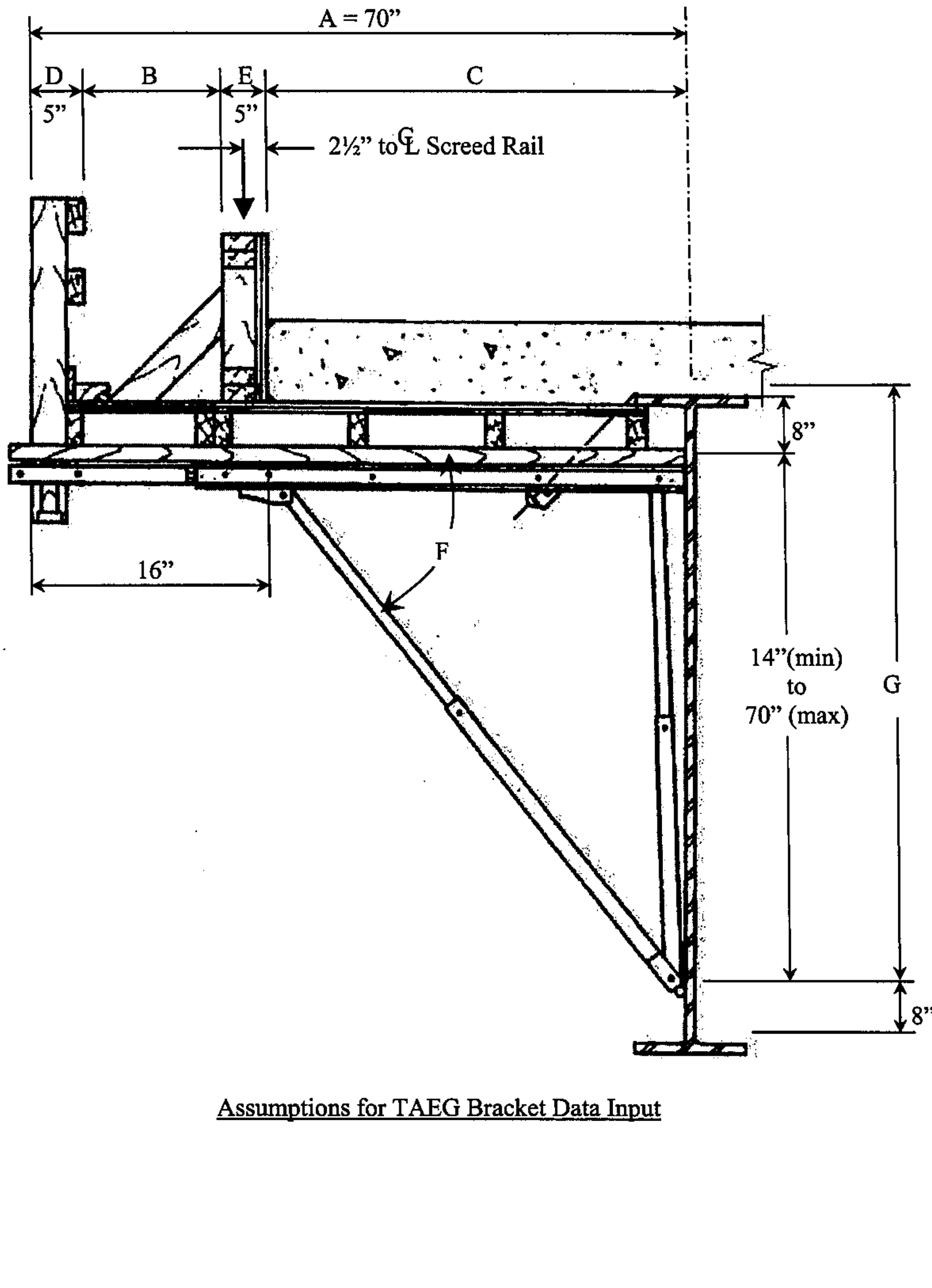
Skew Angle	Rail-to-Rail Length, ft.	Extra End Length, ft.
0	1.00 W	0.0
15	1.04 W	5.0
20	1.06 W	5.5
25	1.10 W	6.5
30	1.15 W	7.0
35	1.22 W	8.0
40	1.31 W	9.0
45	1.41 W	10.5
50	1.56 W	11.5
55	1.74 W	13.5

For total machine lengths of 36 ft. and less, assume a total machine weight of 7.6 kip. Add 0.09 kip for each additional foot of machine length required above 36 ft. The maximum total machine length shall not exceed 120 ft. If greater lengths are required, consult the Office of Structural Engineering for recommendations.

To determine the maximum wheel load, divide the total machine weight by 8.0.

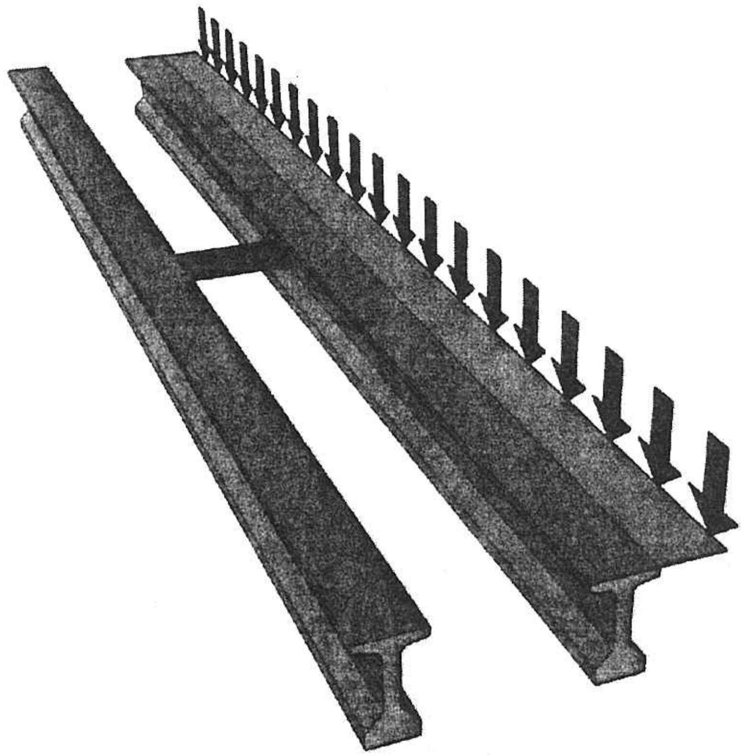
F. Bracket Data:

1. Refer to the following figure to determine TAEG dimensions A, B, C, D, E, F and G.
2. Designers may assume a center-to-center bracket spacing of 48.0 in.
3. Designers may assume a bracket weight of 50 lbs.



Assumptions for TAEG Bracket Data Input

For prestressed I-beam superstructures, Designers should verify that the intermediate crossframes/diaphragms in the exterior bay are capable of resisting the torsion caused by the cantilevered falsework.

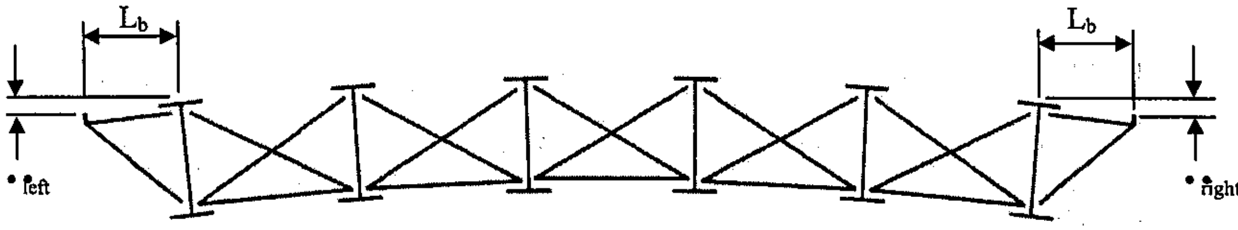


302.2.7.3 DETERMINING EFFECT OF GIRDER TWIST

Once all sources of girder twist are quantified, Designers should determine the total effect that girder twist has on the finished deck surface. The primary effect of greatest concern is the loss of concrete cover over the top mat of deck reinforcing steel and the subsequent loss of deck thickness. The maximum loss due to twisting shall not exceed 0.5 in.
The total amount of girder twist at both the left and right screed rail should be determined as follows:
$\phi_{left} = (\phi_g + \phi_o + \phi_w)_{left}$ and $\phi_{right} = (\phi_g + \phi_o + \phi_w)_{right}$
where:

- $_g$ = Girder twist due to global superstructure distortion (See BDM Section 302.2.7.2.a)
- $_o$ = Girder twist due to "oil-canning" (See BDM Section 302.2.7.2.b)
- $_w$ = Girder twist due to girder warping (See BDM Section 302.2.7.2.c)

The total amount of screed rail deflection at both the left and right screed rail should be determined as follows:



$$\delta_{left} = \tan(\phi_{left}) \times L_b \text{ and } \delta_{right} = \tan(\phi_{right}) \times L_b$$

where:

δ_{left}, δ_{right} = Deflection of the screed rail due to total girder twist (in.). Upward deflection is positive and downward deflection is negative.

L_b = Lateral distance from center of screed rail to centerline of fascia girder (in.)

The total loss of deck thickness should be determined as follows:

$\delta_{Total} = (\delta_{left} + \delta_{right})/2$

302.2.8 SLAB DEPTH OF CURVED BRIDGES

For a curved deck on straight steel beams, steel girders or prestressed I-beams, the distance from the top of the slab to the top of the beams or girders will vary from end to end. The slab depth dimension shall show this variation by giving the maximum and minimum depth dimensions with their respective location, over the piers, center of span, etc.

An alternate is to accommodate the differential depth by including it in the Camber Table as geometric camber.

302.2.9 STAGED CONSTRUCTION

For all bridge types, except non-composite concrete box beams, where the differential dead load deflection between adjacent beams, girders or structural slabs is greater than ¼ inch [6 mm], a deck closure is required if the bridge is constructed in stages.

For requirements regarding closure pours on bridge widenings or on existing structures with new concrete decks see Section 400 of this Manual.

The closure pour between the stages shall be a minimum width of 30 inches [800 mm] but should be wide enough to accommodate the required reinforcing steel lap splices. In special cases, this distance may be reduced when mechanical reinforcing steel connectors are used (see

C. BEAM DESIGN

Company:	KZFDESIGN				
Structure :	SCI-823-0837 (left bridge)	Design :	DAT	Date :	6/30/2009
Subject:	camber	Checked :		Date :	

compute beam camber (per ODOT BDM 302.5.1.5)

vertical curve data:

L =	1400	ft.
PVI Sta. =	442+00.000	
PVI Elev. =	704.890	
BVC Sta. =	435+00.000	
BVC Elev. =	736.390	
g1 =	-0.045	
g2 =	0.015	

A = (g2-g1)/2L
A = 0.00002143
B = g1
B = -0.045

sample calculation:

compute PGL elev. At the centerline bearing rear abutment

x = distance from BVC station to point
x = 584.25645
PGL Elev. = Ax^2 + Bx + (BVC Elev.)
PGL Elev. = 7.314763 - 26.2915 + 736.39
PGL Elev. = 717.413

span no.	centerline bearing substructure location	station	X (ft.)	PGL Elev.
1	Rear Abut.	440+84.256	584.25645	717.413
1	P1 (back)	441+89.173	689.17312	715.555
2	P1 (forward)	441+91.590	691.58978	715.518
2	P2 (back)	442+96.673	796.67312	714.140
3	P2 (forward)	442+99.090	799.08978	714.114
3	P3 (back)	444+04.173	904.17312	713.221
4	P3 (forward)	444+06.590	906.58978	713.206
5	Fwd. Abut.	445+11.506	1011.50645	712.797

compute vertical curve ordinate:

	station midspan	X (ft.)	PGL Elev.	tangent elev. At midspan	vertical curve ordinate (inches)
span 1	44136.71478	636.71478	716.425	716.4841	0.708
span 2	44244.13145	744.13145	714.770	714.8289	0.710
span 3	44351.63145	851.63145	713.608	713.6674	0.710
span 4	44459.04812	959.04812	712.942	713.0012	0.708

Company:	KZFDESIGN				
Structure :	SCI-823-0837 (left bridge)	Design :	DAT	Date :	6/30/2009
Subject:	camber	Checked :		Date :	

compute beam camber (per ODOT BDM 302.5.1.5), units in inches

[SPAN 1, BEAM 1]		
A =	8.75	design slab thickness
B =	2.757	camber due to prestress at release at mid-span
C =	1.101	mid-span deflection due to beam self weight
Dslab =	0.9	mid-span deflection due to deck slab + haunch
Ddiaphragm =	0.106	mid-span deflection due to diaphragms
Dsacrificial =	0	mid-span deflection due to sacrificial wearing surface (0 if included in slab deflection)
Dtotal =	1.006	total mid-span deflection
E =	0.009	mid-span deflection due to parapets
F =	-0.708	vertical curve ordinate (negative for sag vertical curve)
G =	2	haunch thickness
		H = A+1.8B-1.85C-D-E-F+G
		H = A+G (if F>1.8B-1.85C-(D+E)
		check F<>1.8B-1.85C-(D+E)
		1.8B-1.85C-(D+E) = 1.91075
H =	13.37	total topping thickness at beam bearings
		total topping thickness at mid-span
		I = A + G
		I = A-(1.8B-1.85C)+D+E+F+G
		check F<>1.8B-1.85C-(D+E)
		1.8B-1.85C-(D+E) = 1.91075
I =	10.75	total topping thickness at mid-span
(B-C) =	1.656	camber at release
1.8B-1.85C =	2.926	camber at erection
2.45B-2.4C =	4.112	long term camber

[SPAN 1, BEAM 2]		
A =	8.75	design slab thickness
B =	2.757	camber due to prestress at release at mid-span
C =	1.101	mid-span deflection due to beam self weight
Dslab =	1.051	mid-span deflection due to deck slab + haunch
Ddiaphragm =	0.211	mid-span deflection due to diaphragms
Dsacrificial =	0	mid-span deflection due to sacrificial wearing surface (0 if included in slab deflection)
Dtotal =	1.262	total mid-span deflection
E =	0.009	mid-span deflection due to parapets
F =	-0.708	vertical curve ordinate (negative for sag vertical curve)
G =	2	haunch thickness
		H = A+1.8B-1.85C-D-E-F+G
		H = A+G (if F>1.8B-1.85C-(D+E)
		check F<>1.8B-1.85C-(D+E)
		1.8B-1.85C-(D+E) = 1.91075
H =	13.11	total topping thickness at beam bearings
		total topping thickness at mid-span
		I = A + G
		I = A-(1.8B-1.85C)+D+E+F+G
		check F<>1.8B-1.85C-(D+E)
		1.8B-1.85C-(D+E) = 1.91075
I =	10.75	total topping thickness at mid-span
(B-C) =	1.656	camber at release
1.8B-1.85C =	2.926	camber at erection
2.45B-2.4C =	4.112	long term camber

Company:	KZF DESIGN				
Structure :	SCI-823-0837 (left bridge)	Design :	DAT	Date :	6/30/2009
Subject:	camber	Checked :		Date :	

[SPAN 2, BEAM 1]

A =	8.75	design slab thickness
B =	2.757	camber due to prestress at release at mid-span
C =	1.101	mid-span deflection due to beam self weight
Dslab =	0.906	mid-span deflection due to deck slab + haunch
Ddiaphragm =	0.106	mid-span deflection due to diaphragms
Dsacrificial =	0	mid-span deflection due to sacrificial wearing surface (0 if included in slab deflection)
Dtotal =	1.012	total mid-span deflection
E =	0.016	mid-span deflection due to parapets
F =	-0.710	vertical curve ordinate (negative for sag vertical curve)
G =	2	haunch thickness
		H = A+1.8B-1.85C-D-E-F+G
		H = A+G (if F>1.8B-1.85C-(D+E)
		check F<>1.8B-1.85C-(D+E)
		1.8B-1.85C-(D+E) = 1.91075
H =	13.36	total topping thickness at beam bearings
		total topping thickness at mid-span
		I = A + G
		I = A-(1.8B-1.85C)+D+E+F+G
		check F<>1.8B-1.85C-(D+E)
		1.8B-1.85C-(D+E) = 1.91075
I =	10.75	total topping thickness at mid-span
(B-C) =	1.656	camber at release
1.8B-1.85C =	2.926	camber at erection
2.45B-2.4C =	4.112	long term camber

[SPAN 2, BEAM 2]

A =	8.75	design slab thickness
B =	2.757	camber due to prestress at release at mid-span
C =	1.101	mid-span deflection due to beam self weight
Dslab =	1.051	mid-span deflection due to deck slab + haunch
Ddiaphragm =	0.211	mid-span deflection due to diaphragms
Dsacrificial =	0	mid-span deflection due to sacrificial wearing surface (0 if included in slab deflection)
Dtotal =	1.262	total mid-span deflection
E =	0.009	mid-span deflection due to parapets
F =	-0.710	vertical curve ordinate (negative for sag vertical curve)
G =	2	haunch thickness
		H = A+1.8B-1.85C-D-E-F+G
		H = A+G (if F>1.8B-1.85C-(D+E)
		check F<>1.8B-1.85C-(D+E)
		1.8B-1.85C-(D+E) = 1.91075
H =	13.11	total topping thickness at beam bearings
		total topping thickness at mid-span
		I = A + G
		I = A-(1.8B-1.85C)+D+E+F+G
		check F<>1.8B-1.85C-(D+E)
		1.8B-1.85C-(D+E) = 1.91075
I =	10.75	total topping thickness at mid-span
(B-C) =	1.656	camber at release
1.8B-1.85C =	2.926	camber at erection
2.45B-2.4C =	4.112	long term camber

Company:	KZFDESIGN				
Structure :	SCI-823-0837 (right bridge)	Design :	DAT	Date :	6/30/2009
Subject:	camber	Checked :		Date :	

compute beam camber (per ODOT BDM 302.5.1.5)

vertical curve data:

L =	1400	ft.
PVI Sta. =	442+00.000	
PVI Elev. =	704.890	
BVC Sta. =	435+00.000	
BVC Elev. =	736.390	
g1 =	-0.045	
g2 =	0.015	

A = (g2-g1)/2L

A = 0.00002143

B = g1

B = -0.045

sample calculation:

compute PGL elev. At the centerline bearing rear abutment

x = distance from BVC station to point

x = 589.33555

PGL Elev. = Ax^2 + Bx + (BVC Elev.)

PGL Elev. = 7.442494 - 26.5201 + 736.39

PGL Elev. = 717.312

span no.	centerline bearing substructure location	station	X (ft.)	PGL Elev.
1	Rear Abut.	440+89.336	589.33555	717.312
1	P1 (back)	441+94.252	694.25222	715.477
2	P1 (forward)	441+96.669	696.66888	715.440
2	P2 (back)	443+01.752	801.75222	714.086
3	P2 (forward)	443+04.169	804.16888	714.060
3	P3 (back)	444+09.252	909.25222	713.189
4	P3 (forward)	444+11.669	911.66888	713.175
5	Fwd. Abut.	445+16.586	1016.58555	712.789

compute vertical curve ordinate:

	station midspan	X (ft.)	PGL Elev.	tangent elev. At midspan	vertical curve ordinate (inches)
span 1	44141.79388	641.79388	716.336	716.3947	0.708
span 2	44249.21055	749.21055	714.704	714.7629	0.710
span 3	44356.71055	856.71055	713.566	713.6247	0.710
span 4	44464.12722	964.12722	712.923	712.982	0.708

PROJECT: Portsmouth Bypass

CAMBER AND DEFLECTIONS: SERVICE 1 (Span : 1, Beam : 1; Units: in)

	:	Release	Mult	Erection	Mult	Final
At 0.1 x L = 9.76 ft						
Prestress	:	0.933	1.80	1.680	2.20	2.053
Self Wt.	:	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch	:			-0.264	2.30	-0.606
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.031	3.00	-0.093
Comp. DL+ADL	:			-0.008	3.00	-0.023
Live Load(+I)	:					-0.105
Total	:	0.587		0.738		0.396
At 0.2 x L = 20.43 ft						
Prestress	:	1.701	1.80	3.061	2.20	3.742
Self Wt.	:	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch	:			-0.523	2.30	-1.202
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.061	3.00	-0.184
Comp. DL+ADL	:			-0.013	3.00	-0.040
Live Load(+I)	:					-0.197
Total	:	1.047		1.254		0.549
At 0.3 x L = 31.11 ft						
Prestress	:	2.277	1.80	4.098	2.20	5.009
Self Wt.	:	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch	:			-0.726	2.30	-1.671
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.085	3.00	-0.256
Comp. DL+ADL	:			-0.016	3.00	-0.047
Live Load(+I)	:					-0.268
Total	:	1.382		1.615		0.619
At 0.4 x L = 41.78 ft						
Prestress	:	2.636	1.80	4.745	2.20	5.799
Self Wt.	:	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch	:			-0.856	2.30	-1.969
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.100	3.00	-0.301
Comp. DL+ADL	:			-0.014	3.00	-0.043
Live Load(+I)	:					-0.309
Total	:	1.587		1.834		0.662
At 0.5 x L = 52.46 ft						
Prestress	:	2.757	1.80	4.963	2.20	6.066
Self Wt.	:	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch	:			-0.900	2.30	-2.071
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.106	3.00	-0.317
Comp. DL+ADL	:			-0.009	3.00	-0.028
Live Load(+I)	:					-0.314
Total	:	1.656		1.911		0.694
At 0.6 x L = 63.13 ft						
Prestress	:	2.636	1.80	4.745	2.20	5.799
Self Wt.	:	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch	:			-0.856	2.30	-1.969
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.100	3.00	-0.301
Comp. DL+ADL	:			-0.002	3.00	-0.006

$T_{DECK} = 8.75''$
NO FWS.

PROJECT: Portsmouth Bypass

Live Load(+I)	:					-0.286
Total	:	1.587		1.847		0.720

At 0.7 x L = 73.81 ft

Prestress	:	2.277	1.80	4.098	2.20	5.009
Self Wt.	:	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch	:			-0.726	2.30	-1.671
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.085	3.00	-0.256
Comp. DL+ADL	:			0.006	3.00	0.017
Live Load(+I)	:					-0.230
Total	:	1.382		1.636		0.721

At 0.8 x L = 84.48 ft

Prestress	:	1.701	1.80	3.061	2.20	3.742
Self Wt.	:	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch	:			-0.523	2.30	-1.202
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.061	3.00	-0.184
Comp. DL+ADL	:			0.011	3.00	0.033
Live Load(+I)	:					-0.155
Total	:	1.047		1.279		0.664

At 0.9 x L = 95.16 ft

Prestress	:	0.933	1.80	1.680	2.20	2.053
Self Wt.	:	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch	:			-0.264	2.30	-0.606
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.031	3.00	-0.093
Comp. DL+ADL	:			0.011	3.00	0.032
Live Load(+I)	:					-0.074
Total	:	0.587		0.756		0.482

Positive values indicate upward deflection.

PROJECT: Portsmouth Bypass

CAMBER AND DEFLECTIONS: SERVICE 1 (Span : 1, Beam : 2; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L = 9.76 ft					
Prestress :	0.933	1.80	1.680	2.20	2.053
Self Wt. :	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch :			-0.308	2.30	-0.708
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.062	3.00	-0.186
Comp. DL+ADL :			-0.008	3.00	-0.023
Live Load(+I) :					-0.130
Total :	0.587		0.663		0.176
At 0.2 x L = 20.43 ft					
Prestress :	1.701	1.80	3.061	2.20	3.742
Self Wt. :	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch :			-0.610	2.30	-1.404
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.123	3.00	-0.369
Comp. DL+ADL :			-0.013	3.00	-0.040
Live Load(+I) :					-0.246
Total :	1.047		1.105		0.114
At 0.3 x L = 31.11 ft					
Prestress :	2.277	1.80	4.098	2.20	5.009
Self Wt. :	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch :			-0.848	2.30	-1.951
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.171	3.00	-0.512
Comp. DL+ADL :			-0.016	3.00	-0.047
Live Load(+I) :					-0.334
Total :	1.382		1.408		0.017
At 0.4 x L = 41.78 ft					
Prestress :	2.636	1.80	4.745	2.20	5.799
Self Wt. :	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch :			-1.000	2.30	-2.299
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.201	3.00	-0.603
Comp. DL+ADL :			-0.014	3.00	-0.043
Live Load(+I) :					-0.384
Total :	1.587		1.590		-0.046
At 0.5 x L = 52.46 ft					
Prestress :	2.757	1.80	4.963	2.20	6.066
Self Wt. :	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch :			-1.051	2.30	-2.418
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.211	3.00	-0.634
Comp. DL+ADL :			-0.009	3.00	-0.028
Live Load(+I) :					-0.391
Total :	1.656		1.654		-0.048
At 0.6 x L = 63.13 ft					
Prestress :	2.636	1.80	4.745	2.20	5.799
Self Wt. :	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch :			-1.000	2.30	-2.299
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.201	3.00	-0.603
Comp. DL+ADL :			-0.002	3.00	-0.006

$T_{DECK} = 8.75''$
NO FWS

PROJECT: Portsmouth Bypass

Live Load(+I)	:					-0.357
Total	:	1.587		1.603		0.018

At 0.7 x L = 73.81 ft

Prestress	:	2.277	1.80	4.098	2.20	5.009
Self Wt.	:	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch	:			-0.848	2.30	-1.951
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.171	3.00	-0.512
Comp. DL+ADL	:			0.006	3.00	0.017
Live Load(+I)	:					-0.287
Total	:	1.382		1.429		0.129

At 0.8 x L = 84.48 ft

Prestress	:	1.701	1.80	3.061	2.20	3.742
Self Wt.	:	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch	:			-0.610	2.30	-1.404
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.123	3.00	-0.369
Comp. DL+ADL	:			0.011	3.00	0.033
Live Load(+I)	:					-0.193
Total	:	1.047		1.130		0.240

At 0.9 x L = 95.16 ft

Prestress	:	0.933	1.80	1.680	2.20	2.053
Self Wt.	:	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch	:			-0.308	2.30	-0.708
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.062	3.00	-0.186
Comp. DL+ADL	:			0.011	3.00	0.032
Live Load(+I)	:					-0.092
Total	:	0.587		0.681		0.269

Positive values indicate upward deflection.

PROJECT: Portsmouth Bypass

CAMBER AND DEFLECTIONS: SERVICE 1 (Span : 2, Beam : 1; Units: in)

:	Release	Mult	Erection	Mult	Final
At 0.1 x L = 9.84 ft					
Prestress :	0.933	1.80	1.680	2.20	2.053
Self Wt. :	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch :			-0.267	2.30	-0.614
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.031	3.00	-0.094
Comp. DL+ADL :			0.001	3.00	0.003
Live Load(+I) :					-0.066
Total :	0.587		0.743		0.451
At 0.2 x L = 20.52 ft					
Prestress :	1.701	1.80	3.061	2.20	3.742
Self Wt. :	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch :			-0.527	2.30	-1.212
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.062	3.00	-0.186
Comp. DL+ADL :			-0.003	3.00	-0.009
Live Load(+I) :					-0.134
Total :	1.047		1.260		0.631
At 0.3 x L = 31.19 ft					
Prestress :	2.277	1.80	4.098	2.20	5.009
Self Wt. :	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch :			-0.731	2.30	-1.682
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.086	3.00	-0.258
Comp. DL+ADL :			-0.008	3.00	-0.025
Live Load(+I) :					-0.192
Total :	1.382		1.616		0.703
At 0.4 x L = 41.87 ft					
Prestress :	2.636	1.80	4.745	2.20	5.799
Self Wt. :	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch :			-0.861	2.30	-1.981
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.101	3.00	-0.303
Comp. DL+ADL :			-0.013	3.00	-0.039
Live Load(+I) :					-0.231
Total :	1.587		1.829		0.727
At 0.5 x L = 52.54 ft					
Prestress :	2.757	1.80	4.963	2.20	6.066
Self Wt. :	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch :			-0.906	2.30	-2.084
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.106	3.00	-0.319
Comp. DL+ADL :			-0.016	3.00	-0.047
Live Load(+I) :					-0.244
Total :	1.656		1.898		0.729
At 0.6 x L = 63.22 ft					
Prestress :	2.636	1.80	4.745	2.20	5.799
Self Wt. :	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch :			-0.861	2.30	-1.981
Prec. DL+ADL :			0.000	3.00	0.000
Diaphragm :			-0.101	3.00	-0.303
Comp. DL+ADL :			-0.015	3.00	-0.046

$T_{DECK} = 8.75''$
NO FWS

PROJECT: Portsmouth Bypass

Live Load(+I)	:					-0.230
Total	:	1.587		1.827		0.722

At 0.7 x L = 73.89 ft

Prestress	:	2.277	1.80	4.098	2.20	5.009
Self Wt.	:	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch	:			-0.731	2.30	-1.682
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.086	3.00	-0.258
Comp. DL+ADL	:			-0.012	3.00	-0.037
Live Load(+I)	:					-0.190
Total	:	1.382		1.613		0.694

At 0.8 x L = 84.57 ft

Prestress	:	1.701	1.80	3.061	2.20	3.742
Self Wt.	:	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch	:			-0.527	2.30	-1.212
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.062	3.00	-0.186
Comp. DL+ADL	:			-0.007	3.00	-0.022
Live Load(+I)	:					-0.131
Total	:	1.047		1.255		0.621

At 0.9 x L = 95.24 ft

Prestress	:	0.933	1.80	1.680	2.20	2.053
Self Wt.	:	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch	:			-0.267	2.30	-0.614
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.031	3.00	-0.094
Comp. DL+ADL	:			-0.002	3.00	-0.007
Live Load(+I)	:					-0.064
Total	:	0.587		0.739		0.443

Positive values indicate upward deflection.

KZF Design Inc PHONE: 513-621-6211 | SHEET# 1
655 Eden Park Dr Cincinnati, OH 45202 | JOB NO. KZF #5355.02
PROGRAM: CONSPAN Rating-v8.0.0 Bentley Systems, Inc., Tampa, | BY RBK DATE May/1/2009
PHONE : TOLL-FREE 1-800-451-5327 TAMPA AREA: 813-985-9170 | CKD. DATE

PROJECT: Portsmouth Bypass

CAMBER AND DEFLECTIONS: SERVICE 1 (Span : 2, Beam : 2; Units: in)

At 0.1 x L = 9.84 ft	:	Release	Mult	Erection	Mult	Final
Prestress	:	0.933	1.80	1.680	2.20	2.053
Self Wt.	:	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch	:			-0.312	2.30	-0.717
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.063	3.00	-0.189
Comp. DL+ADL	:			0.001	3.00	0.003
Live Load(+I)	:					-0.083
Total	:	0.587		0.666		0.238

At 0.2 x L = 20.52 ft	:	Release	Mult	Erection	Mult	Final
Prestress	:	1.701	1.80	3.061	2.20	3.742
Self Wt.	:	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch	:			-0.616	2.30	-1.416
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.124	3.00	-0.372
Comp. DL+ADL	:			-0.003	3.00	-0.009
Live Load(+I)	:					-0.167
Total	:	1.047		1.109		0.209

At 0.3 x L = 31.19 ft	:	Release	Mult	Erection	Mult	Final
Prestress	:	2.277	1.80	4.098	2.20	5.009
Self Wt.	:	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch	:			-0.854	2.30	-1.965
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.172	3.00	-0.515
Comp. DL+ADL	:			-0.008	3.00	-0.025
Live Load(+I)	:					-0.240
Total	:	1.382		1.408		0.116

At 0.4 x L = 41.87 ft	:	Release	Mult	Erection	Mult	Final
Prestress	:	2.636	1.80	4.745	2.20	5.799
Self Wt.	:	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch	:			-1.006	2.30	-2.314
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.202	3.00	-0.607
Comp. DL+ADL	:			-0.013	3.00	-0.039
Live Load(+I)	:					-0.288
Total	:	1.587		1.584		0.035

At 0.5 x L = 52.54 ft	:	Release	Mult	Erection	Mult	Final
Prestress	:	2.757	1.80	4.963	2.20	6.066
Self Wt.	:	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch	:			-1.058	2.30	-2.434
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.213	3.00	-0.638
Comp. DL+ADL	:			-0.016	3.00	-0.047
Live Load(+I)	:					-0.304
Total	:	1.656		1.640		0.001

$T_{DECK} = 8.75''$
NO FWS

At 0.6 x L = 63.22 ft	:	Release	Mult	Erection	Mult	Final
Prestress	:	2.636	1.80	4.745	2.20	5.799
Self Wt.	:	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch	:			-1.006	2.30	-2.314
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.202	3.00	-0.607
Comp. DL+ADL	:			-0.015	3.00	-0.046

PROJECT: Portsmouth Bypass

Live Load(+I)	:					-0.286
Total	:	1.587		1.581		0.030
At 0.7 x L = 73.89 ft						
Prestress	:	2.277	1.80	4.098	2.20	5.009
Self Wt.	:	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch	:			-0.854	2.30	-1.965
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.172	3.00	-0.515
Comp. DL+ADL	:			-0.012	3.00	-0.037
Live Load(+I)	:					-0.236
Total	:	1.382		1.404		0.107
At 0.8 x L = 84.57 ft						
Prestress	:	1.701	1.80	3.061	2.20	3.742
Self Wt.	:	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch	:			-0.616	2.30	-1.416
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.124	3.00	-0.372
Comp. DL+ADL	:			-0.007	3.00	-0.022
Live Load(+I)	:					-0.163
Total	:	1.047		1.105		0.199
At 0.9 x L = 95.24 ft						
Prestress	:	0.933	1.80	1.680	2.20	2.053
Self Wt.	:	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch	:			-0.312	2.30	-0.717
Prec. DL+ADL	:			0.000	3.00	0.000
Diaphragm	:			-0.063	3.00	-0.189
Comp. DL+ADL	:			-0.002	3.00	-0.007
Live Load(+I)	:					-0.080
Total	:	0.587		0.663		0.230

Positive values indicate upward deflection.

No. of Draped Strands per Row	P_U/Strand (lb) [kN]	P_U/Unit (lb) [kN]
1	6000 [26.6]	48,000 [213.5]
2	4000 [17.7]	48,000 [213.5]
3	4000 [17.7]	48,000 [213.5]

Where:

~~$P_U/\text{Strand} = (1.05)0.75\ f'_s\ A_{PS}\ \text{Tan}\ \psi$~~

$$\boxed{P_U/\text{Strand} = (1.05)0.00075\ f'_s\ A_{PS}\ \text{Tan}\ \psi}$$

$$P_U/\text{Unit} = \sum_{i=1}^{n}(P_U/\text{Strand})_i$$

and, f'_s = 270,000 psi [1860 MPa]
A_{PS} = Area of single strand (in^2) [mm^2]
n = no. of strands
ψ = Angle of strand inclination measured from horizontal

To minimize the uplift force, locate the hold down point as close as allowed to the midspan and limit the height of the draped strands at the beam ends to only the height required to control stresses. It is not necessary for the angle of inclination for each row of draped strands to be the same. The height of draped strands at beam ends and at midspan shall be multiples of 2" [50 mm]. Do not place straight strands above draped strands in the same vertical column.

302.5.2.3 CAMBER

A variable depth haunch shall be required to account for the effects of camber due to the design prestressing. This haunch depth shall include an additional 2 inches [50 mm] that may be sacrificed to account for differences between actual and design camber. This sacrificial depth shall not be included when determining the composite section properties; however, its weight shall be included in the dead load of the slab. Haunch concrete shall be included in the total volume of superstructure concrete for payment.

In establishing bridge seat elevations and assuring a minimum design slab thickness, allowance shall be made for camber due to prestressing as per the following:

A = Design slab thickness

B = Anticipated total mid-span camber due to the design prestressing force at time of release.

C = Mid-span deflection due to the self-weight of the beam.

D = Mid-span deflection due to dead load of the slab, diaphragms and other non-composite loads.

E = Mid-span deflection due to dead load of railing, sidewalk and other composite dead loads not including future wearing surface.

F = Adjustment for vertical curve. Positive for crest vertical curves.

G = Sacrificial haunch depth (2" [50 mm]).

H = Total topping thickness at beam bearings = A + 1.8B - 1.85C - D - E - F + G. If F > 1.8B - 1.85C - (D + E) then H = A + G

I = Total topping thickness at mid-span = A + G. If F > 1.8B - 1.85C - (D + E) then I = A - (1.8B - 1.85C) + D + E + F + G.

The gross moment of inertia for the non-composite beam shall be used to calculate the camber and deflection values for B, C and D. The moment of inertia for the composite section should be used to calculate value E.

The designer shall show a longitudinal superstructure cross section in the plans detailing the total topping thickness, including the design slab thickness and the haunch thickness at the centerline of spans and bearings. Provide the camber at the time of release (B-C), camber at the time of erection (1.8B – 1.85C), long term camber (2.45B – 2.40C), and a screed elevation table according to Section 302.2.3.

302.5.2.4 ANCHORAGE

One inch [25 mm] diameter anchors shall be provided at each fixed pier as shown on standard bridge drawing PSID-1-99.

Minimum number of anchors shall be 2 for each beam line.

The anchors shall be a minimum of 2'-0" [600 mm] long. Anchors shall be embedded a minimum of 1'-0" [300 mm] into the pier cap and 1'-0" [300 mm] into the field cast-in-place concrete pour which connects any two discontinuous prestressed I-beams in the same beam line into a continuous member. The anchors should be drilled in place at the centerline of the pier between the ends of adjoining prestressed I-beams. The designer should confirm the pier cap has reinforcing steel clearance to accept these anchors.

Company:	KZFDESIGN				
Structure :	SCI-823-0837 (left/right bridge)	Design :	DAT	Date :	6/30/2009
Subject:	parabolic dead load deflections	Checked :		Date :	

Beam Length (brg. to brg.) = 109.75 ft
Total Deflection (in.) = 1.015 in. = 0.084583 ft

parabolic equation (x)(x)=-2(p)(y)
p = (x)(x)/-2(y) = 17800.58

Screed Point Locations
Format A
End Spaces = 13.71875 ft
No. of Equal Spaces = 8
Equal Space Distance = 10.0 ft
Total Spa. 10

SPAN 1, BEAM 1

Point No.	Location on Beam	x	y	Deflection (ft)	Deflection (in)
1	0	-54.88	0.0846	0.0000	0.0000
2	13.71875	-41.16	0.0476	0.0370	0.4441
3	27.4375	-27.44	0.0211	0.0634	0.7613
4	41.15625	-13.72	0.0053	0.0793	0.9516
5	54.875	0.00	0.0000	0.0846	1.0150
6	68.59375	13.72	0.0053	0.0793	0.9516
7	82.3125	27.44	0.0211	0.0634	0.7613
8	96.03125	41.16	0.0476	0.0370	0.4441
9	109.75	54.88	0.0846	0.0000	0.0000

Company:	KZFDESIGN				
Structure :	SCI-823-0837 (left/right bridge)	Design :	DAT	Date :	6/30/2009
Subject:	parabolic dead load deflections	Checked :		Date :	

Beam Length (brg. to brg.) = 109.75 ft
Total Deflection (in.) = 1.271 in. = 0.105917 ft

parabolic equation (x)(x)=-2(p)(y)
p = (x)(x)/-2(y) = 14215.26

Screed Point Locations
Format A
End Spaces = 13.71875 ft
No. of Equal Spaces = 8
Equal Space Distance = 10.0 ft
Total Spa. 10

SPAN 1, BEAM 2

Point No.	Location on Beam	x	y	Deflection (ft)	Deflection (in)
1	0	-54.88	0.1059	0.0000	0.0000
2	13.71875	-41.16	0.0596	0.0463	0.5561
3	27.4375	-27.44	0.0265	0.0794	0.9533
4	41.15625	-13.72	0.0066	0.0993	1.1916
5	54.875	0.00	0.0000	0.1059	1.2710
6	68.59375	13.72	0.0066	0.0993	1.1916
7	82.3125	27.44	0.0265	0.0794	0.9533
8	96.03125	41.16	0.0596	0.0463	0.5561
9	109.75	54.88	0.1059	0.0000	0.0000

Company:	KZFDESIGN				
Structure :	SCI-823-0837 (left/right bridge)	Design :	DAT	Date :	6/30/2009
Subject:	parabolic dead load deflections	Checked :		Date :	

Beam Length (brg. to brg.) = 109.75 ft
Total Deflection (in.) = 1.028 in. = 0.085667 ft

parabolic equation (x)(x)=-2(p)(y)
p = (x)(x)/-2(y) = 17575.48

Screed Point Locations
Format A
End Spaces = 13.71875 ft
No. of Equal Spaces = 8
Equal Space Distance = 10.0 ft
Total Spa. 10

SPAN 2, BEAM 1

Point No.	Location on Beam	x	y	Deflection (ft)	Deflection (in)
1	0	-54.88	0.0857	0.0000	0.0000
2	13.71875	-41.16	0.0482	0.0375	0.4498
3	27.4375	-27.44	0.0214	0.0643	0.7710
4	41.15625	-13.72	0.0054	0.0803	0.9638
5	54.875	0.00	0.0000	0.0857	1.0280
6	68.59375	13.72	0.0054	0.0803	0.9638
7	82.3125	27.44	0.0214	0.0643	0.7710
8	96.03125	41.16	0.0482	0.0375	0.4498
9	109.75	54.88	0.0857	0.0000	0.0000

Company:	KZFDESIGN				
Structure :	SCI-823-0837 (left/right bridge)	Design :	DAT	Date :	6/30/2009
Subject:	parabolic dead load deflections	Checked :		Date :	

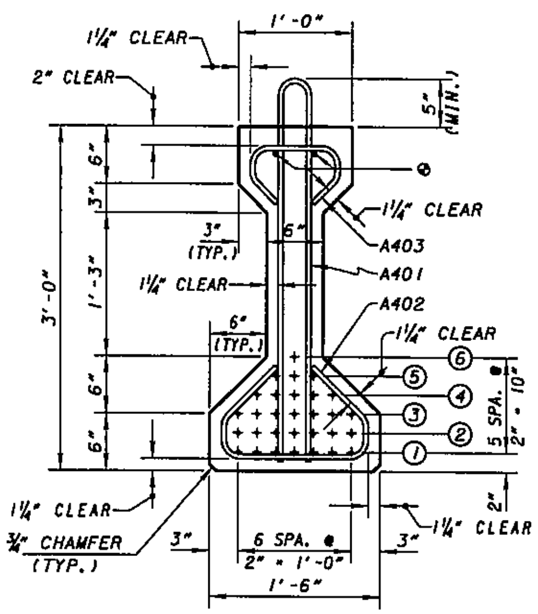
Beam Length (brg. to brg.) = 109.75 ft
Total Deflection (in.) = 1.287 in. = 0.10725 ft

parabolic equation (x)(x)=-2(p)(y)
p = (x)(x)/-2(y) = 14038.53

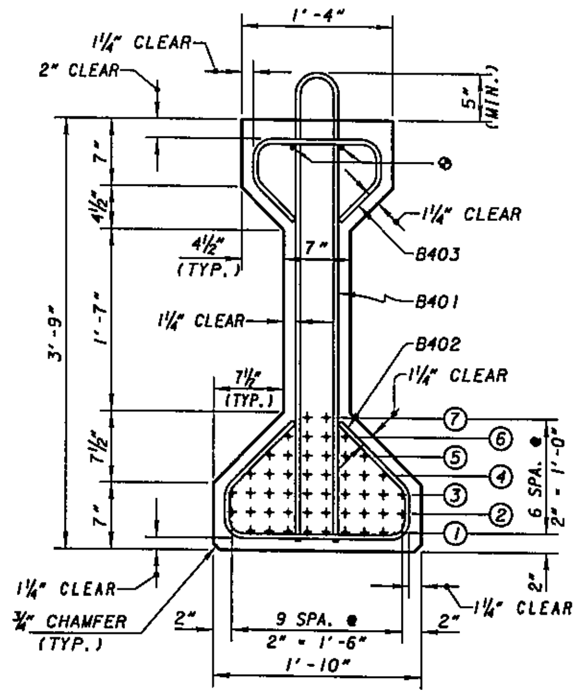
Screed Point Locations
Format A
End Spaces = 13.71875 ft
No. of Equal Spaces = 8
Equal Space Distance = 10.0 ft
Total Spa. 10

SPAN 2, BEAM 2

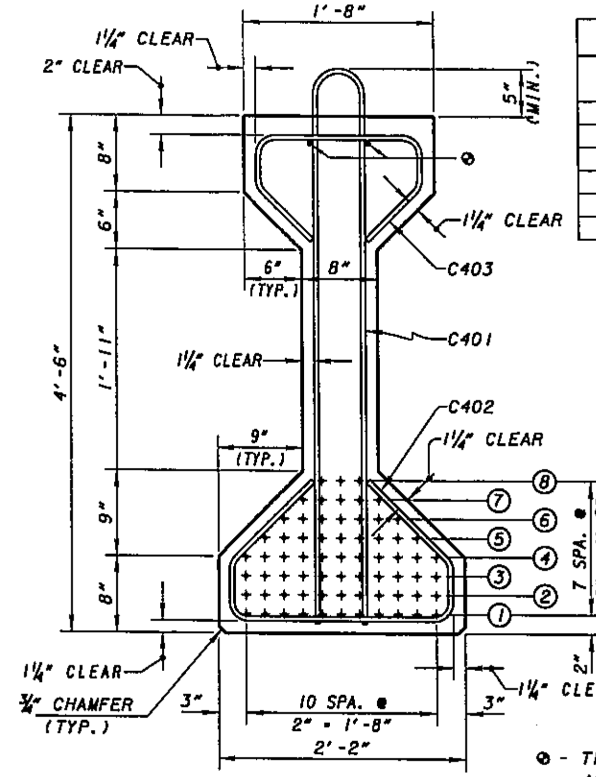
Point No.	Location on Beam	x	y	Deflection (ft)	Deflection (in)
1	0	-54.88	0.1073	0.0000	0.0000
2	13.71875	-41.16	0.0603	0.0469	0.5631
3	27.4375	-27.44	0.0268	0.0804	0.9653
4	41.15625	-13.72	0.0067	0.1005	1.2066
5	54.875	0.00	0.0000	0.1073	1.2870
6	68.59375	13.72	0.0067	0.1005	1.2066
7	82.3125	27.44	0.0268	0.0804	0.9653
8	96.03125	41.16	0.0603	0.0469	0.5631
9	109.75	54.88	0.1073	0.0000	0.0000



AASHTO TYPE 2
(30 STRANDS MAXIMUM)



AASHTO TYPE 3
(48 STRANDS MAXIMUM)



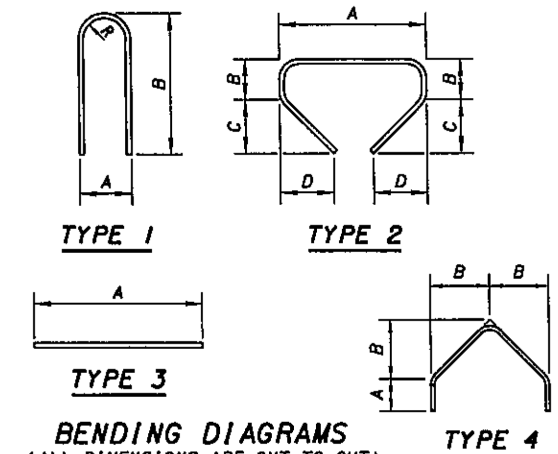
AASHTO TYPE 4
(68 STRANDS MAXIMUM)

⊗ - THE NUMBER OF BARS SHALL BE PROVIDED AS SHOWN. BAR SIZE SHALL BE DETERMINED BY ANALYSIS.

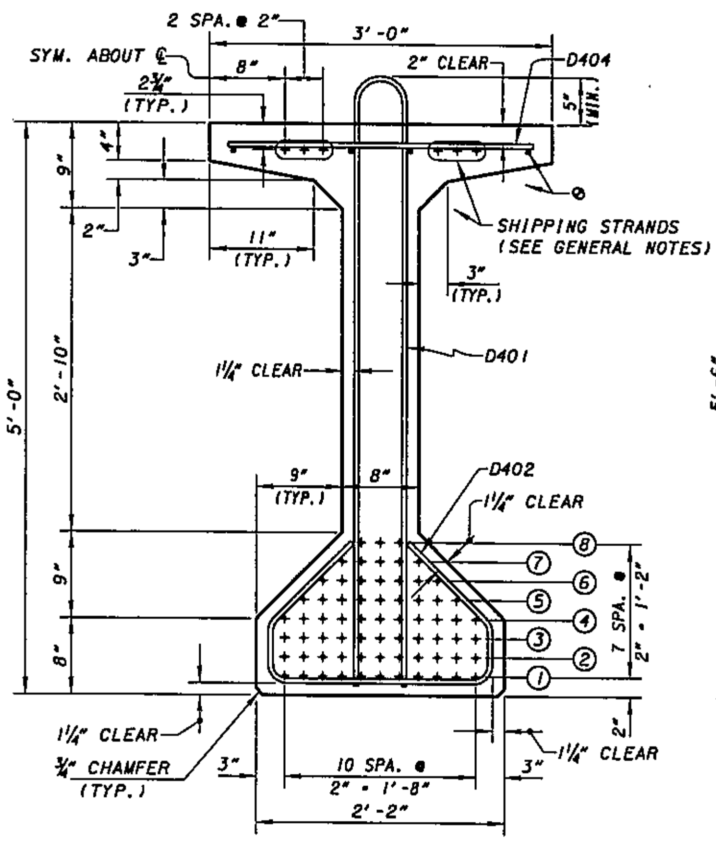
SECTION PROPERTIES								
SECTION	AREA (in^2)	WEIGHT (lb/ft)	Yb (in)	Yt (in)	I (in^4)	Sb (in^3)	St (in^3)	Vol/Sur (in)
AASHTO TYPE 2	369	384	15.83	20.17	50,979	3,221	2,527	3.371
AASHTO TYPE 3	560	583	20.27	24.73	125,390	6,185	5,071	4.056
AASHTO TYPE 4	789	822	24.73	29.27	260,741	10,542	8,909	4.741
MODIFIED AASHTO TYPE 4 (60")	860	896	28.74	31.26	384,705	13,385	12,307	4.089
MODIFIED AASHTO TYPE 4 (66")	908	946	31.58	34.42	492,212	15,588	14,299	4.085
MODIFIED AASHTO TYPE 4 (72")	956	996	34.43	37.57	616,018	17,893	16,396	4.080

NUMBER OF STRANDS PER ROW										CONCRETE STRENGTHS		401 BARS REQ'D	402 BARS REQ'D	403 BARS REQ'D	404 BARS REQ'D
BEAM MARK	ROW NUMBER ①	②	③	④	⑤	⑥	⑦	⑧	TOTAL STRANDS	f'ci	f'c				

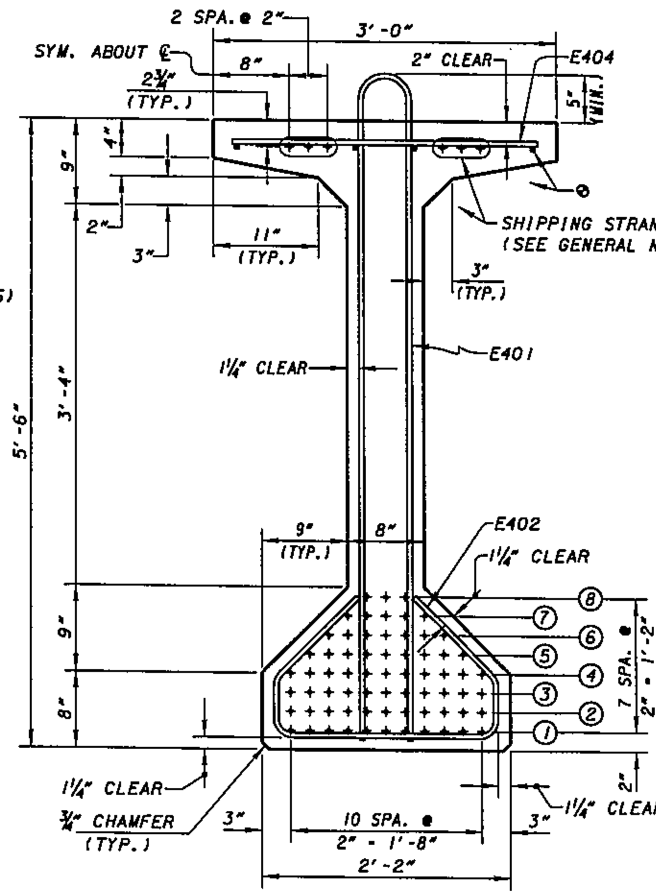
(THIS TABLE SHALL BE REPRODUCED IN THE PROJECT PLANS.)



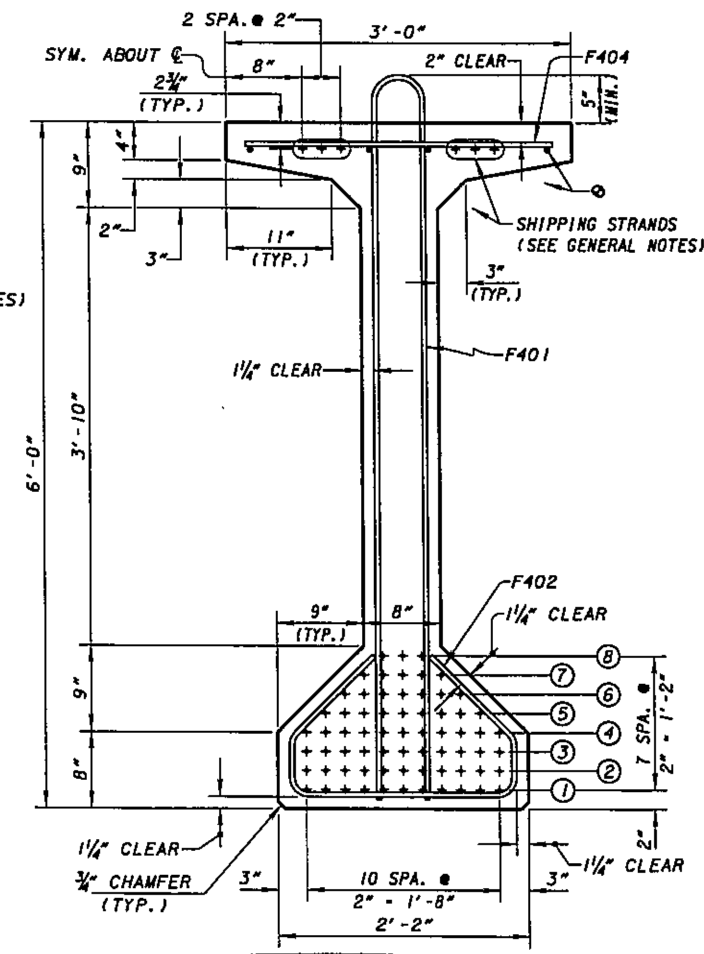
BENDING DIAGRAMS
(ALL DIMENSIONS ARE OUT-TO-OUT)



MODIFIED AASHTO TYPE 4 (60")
(68 STRANDS MAXIMUM)



MODIFIED AASHTO TYPE 4 (66")
(68 STRANDS MAXIMUM)



MODIFIED AASHTO TYPE 4 (72")
(68 STRANDS MAXIMUM)

MARK	TYPE	DIMENSIONS A	B	C	D	R
AASHTO TYPE 2						
A401	1	3½"	3'-4"			1¼"
A402	2	1'-3½"	4¼"	5½"	5½"	
A403	2	9½"	3½"	2½"	2½"	
A405	4	4¼"	7¾"			
AASHTO TYPE 3						
B401	1	4½"	4'-1"			1¾"
B402	2	1'-7½"	5¼"	7"	7"	
B403	2	1'-1½"	4½"	4"	4"	
B405	4	5¼"	9¾"			
AASHTO TYPE 4						
C401	1	5½"	4'-10"			2¼"
C402	2	1'-11½"	6¼"	8½"	8½"	.
C403	2	1'-5½"	5½"	5½"	5½"	
C405	4	6¼"	11¾"			
MODIFIED AASHTO TYPE 4 (60")						
D401	1	5½"	5'-4"			2¼"
D402	2	1'-11½"	6¼"	8½"	8½"	
D404	3	2'-8"				
D405	4	6¼"	11¾"			
MODIFIED AASHTO TYPE 4 (66")						
E401	1	5½"	5'-10"			2¼"
E402	2	1'-11½"	6¼"	8½"	8½"	
E404	3	2'-8"				
E405	4	6¼"	11¾"			
MODIFIED AASHTO TYPE 4 (72")						
F401	1	5½"	6'-4"			2¼"
F402	2	1'-11½"	6¼"	8½"	8½"	
F404	3	2'-8"				
F405	4	6¼"	11¾"			

BAR SIZE IS INDICATED IN THE BAR MARK. THE FIRST LETTER IDENTIFIES THE BAR LOCATION, THE NEXT DIGIT INDICATES THE INCH-POUND BAR SIZE AND THE REMAINING DIGITS ITS SEQUENCE NUMBER. ALL STEEL SHALL BE EPOXY COATED.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
09-07-99
DATE
Brad Fagrell
ADMINISTRATOR

REVIEWED LMW
CHECKED JS/WTL
DESIGNED SAM
DRAWN SAM
REVISIONS 10-20-00 07-19-02 07-18-03

PSID-1-99

STANDARD
PRESTRESSED CONCRETE I-BEAM BRIDGE DETAILS

PROJECT DATA

Project:	Portsmouth Bypass
Designer:	RBK
Date:	May/1/2009
User job number:	KZF #5355.02
State:	Ohio, State Job #:PID 19415
State Specification:	None
Design Mode:	AASHTO Standard (LFD)- US Units [17th Edition, 2003]
Flared Girder:	No
Comments:	Bridge No. SCI-823-0837 L/R
	SFN 7306458/7306466
	SR 823 Over Swauger Valley Minford Road (CR 31)
File Name:	F:\Projects\535502\19415\structures\SCI823_0837C\engapps\CONSPAN\535502_SCI-823-0837.csl

SPAN 1

EXTERIOR

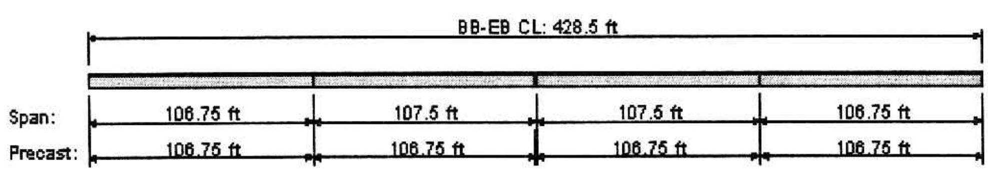
GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	48.458
Left curb (ft)	1.500
Right curb (ft)	1.458
curb-to-curb width (ft)	45.500
Number of spans	4
Number of lanes	2
Lane width (ft)	12.000
Topping thickness (in)	8.750
Haunch thickness (in)	2.000
Haunch width (in)	36.000

SPAN DATA

Span	Pier-to-pier ft	Precast ft	Brg-to-brg ft	Pier CL ft	Release ft	StartSkew	EndSkew
1	106.750	106.750	104.917	0.000	106.750	0.00	0.00
2	107.500	106.750	105.083	0.375	106.750	0.00	0.00
3	107.500	106.750	105.083	0.375	106.750	0.00	0.00
4	106.750	106.750	104.917	0.375	106.750	0.00	0.00



Bridge elevation section for all spans

BEAM DATA
Span: 1

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 2

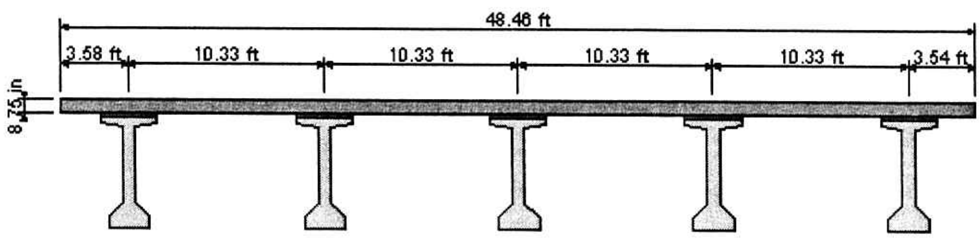
No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 3

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 4

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708



Bridge cross section for Span 1, Span 2, Span 3, Span 4

MATERIAL DATA

CONCRETE PROPERTIES

	Precast	C.I.P
f'c (ksi)	7000.000	4500.000
Wc (pcf)	150.000	150.000
Ec (ksi)	5072.240	4066.840
f'ci (psi)	5000.000	
Eci (ksi)	4286.830	

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:

1/2-270K-SP-1, Low relaxation strands
Depressed at 0.40L (42.70 ft from member end)
Strand Diameter = 0.500
Ult. Strength(f's) = 270.0 ksi
Strand Area = 0.167 in2
Use transformed strand and rebar: No

REINFORCING STEEL:

Tension steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

LOADS DATA

LOADS ON PRECAST

UNITS: (Point: kips, Location: ft, Line: klf)

Span	Beam	DL/ADL	Type	Mag.	Loc.	Description
1	1	DL	Line	0.109	-	Sacrificial Wearing Surface
1	2	DL	Line	0.129	-	Sacrificial Wearing Surface
1	3	DL	Line	0.129	-	Sacrificial Wearing Surface
1	4	DL	Line	0.129	-	Sacrificial Wearing Surface
1	5	DL	Line	0.109	-	Sacrificial Wearing Surface
2	1	DL	Line	0.109	-	Sacrificial Wearing Surface
2	2	DL	Line	0.129	-	Sacrificial Wearing Surface
2	3	DL	Line	0.129	-	Sacrificial Wearing Surface
2	4	DL	Line	0.129	-	Sacrificial Wearing Surface
2	5	DL	Line	0.109	-	Sacrificial Wearing Surface
3	1	DL	Line	0.109	-	Sacrificial Wearing Surface
3	2	DL	Line	0.129	-	Sacrificial Wearing Surface
3	3	DL	Line	0.129	-	Sacrificial Wearing Surface
3	4	DL	Line	0.129	-	Sacrificial Wearing Surface
3	5	DL	Line	0.109	-	Sacrificial Wearing Surface
4	1	DL	Line	0.109	-	Sacrificial Wearing Surface
4	2	DL	Line	0.129	-	Sacrificial Wearing Surface
4	3	DL	Line	0.129	-	Sacrificial Wearing Surface
4	4	DL	Line	0.129	-	Sacrificial Wearing Surface
4	5	DL	Line	0.109	-	Sacrificial Wearing Surface

DIAPHRAGM LOADS

(kips, ft)

Span	Beam	Mag.	Loc.
1	1	2.967	14.958
1	1	2.967	39.958
1	1	2.967	64.958
1	1	2.967	89.958
1	2	5.934	14.958
1	2	5.934	39.958
1	2	5.934	64.958
1	2	5.934	89.958
1	3	5.934	14.958
1	3	5.934	39.958
1	3	5.934	64.958
1	3	5.934	89.958
1	4	5.934	14.958
1	4	5.934	39.958
1	4	5.934	64.958
1	4	5.934	89.958
1	5	2.967	14.958
1	5	2.967	39.958
1	5	2.967	64.958
1	5	2.967	89.958

Span	Beam	Mag.	Loc.
2	1	2.967	15.042
2	1	2.967	40.042
2	1	2.967	65.042
2	1	2.967	90.042
2	2	5.934	15.042
2	2	5.934	40.042
2	2	5.934	65.042
2	2	5.934	90.042
2	3	5.934	15.042
2	3	5.934	40.042
2	3	5.934	65.042
2	3	5.934	90.042
2	4	5.934	15.042
2	4	5.934	40.042
2	4	5.934	65.042
2	4	5.934	90.042
2	5	2.967	15.042
2	5	2.967	40.042
2	5	2.967	65.042
2	5	2.967	90.042
3	1	2.967	15.042
3	1	2.967	40.042
3	1	2.967	65.042
3	1	2.967	90.042
3	2	5.934	15.042
3	2	5.934	40.042
3	2	5.934	65.042
3	2	5.934	90.042
3	3	5.934	15.042
3	3	5.934	40.042
3	3	5.934	65.042
3	3	5.934	90.042
3	4	5.934	15.042
3	4	5.934	40.042
3	4	5.934	65.042
3	4	5.934	90.042
3	5	2.967	15.042
3	5	2.967	40.042
3	5	2.967	65.042
3	5	2.967	90.042
4	1	2.967	14.958
4	1	2.967	39.958
4	1	2.967	64.958
4	1	2.967	89.958
4	2	5.934	14.958
4	2	5.934	39.958
4	2	5.934	65.958
4	2	5.934	89.958
4	3	5.934	14.958
4	3	5.934	39.958
4	3	5.934	65.958
4	3	5.934	89.958
4	4	5.934	14.958
4	4	5.934	39.958
4	4	5.934	65.958
4	4	5.934	89.958
4	5	2.967	14.958

Span	Beam	Mag.	Loc.
4	5	2.967	39.958
4	5	2.967	65.958
4	5	2.967	89.958

LOADS ON COMPOSITE

UNITS: (Point: kips, Location: ft, Line: klf, Area: ksf, Width: ft)

Span	DL/ADL	Type	Mag.	Loc.	Description
1	DL	Line	0.639	-	Left Barrier Weight
1	DL	Line	0.715	-	Right Barrier Weight
1	ADL	Area	0.060	45.500	Future Wearing Surface
2	DL	Line	0.639	-	Left Barrier Weight
2	DL	Line	0.715	-	Right Barrier Weight
2	ADL	Area	0.060	45.500	Future Wearing Surface
3	DL	Line	0.639	-	Left Barrier Weight
3	DL	Line	0.715	-	Right Barrier Weight
3	ADL	Area	0.060	45.500	Future Wearing Surface
4	DL	Line	0.639	-	Left Barrier Weight
4	DL	Line	0.715	-	Right Barrier Weight
4	ADL	Area	0.060	45.500	Future Wearing Surface

LIVE LOADS

Live load deflection: not included.

ID: H/HS25 Lane	(Type: Lane Load)
ID: HS25 Truck	(Type: Truck Load)
ID: Military Truck	(Type: Truck Load)

LIVE LOADS USED

LIVE LOAD LIBRARY: Default.cs4

1 ID: H/HS25 Lane

Description:	H25/HS25 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.80 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 22.50 k,	Shear = 32.50 k

2 ID: HS25 Truck

Description:	HS25 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	40.00	14.00	14.00	0.00
2	40.00	30.00	14.00	2.00

3 ID: Military Truck

Description:	Military Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 24.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	24.00	4.00	4.00	0.00

INVENTORY LIVE LOAD

1 ID: H20 Truck

Description:	H20 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 8.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00

2 ID: H/HS20 Lane

Description:	H20/HS20 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.64 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 18.00 k,	Shear = 26.00 k

OPERATING LIVE LOAD

1 ID: HS20 Truck

Description:	HS20 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 8.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00
2	32.00	30.00	14.00	2.00

2 ID: H/HS20 Lane

Description:	H20/HS20 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.64 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 18.00 k,	Shear = 26.00 k

3 ID: 2F1 Truck

Description:	2F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	20.00	10.00	10.00	0.00

4 ID: 3F1 Truck

Description:	3F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	10.00	10.00	0.00

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
2	17.00	4.00	4.00	0.00

5 ID: 4F1 Truck

Description:	4F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	10.00	10.00	0.00
2	17.00	4.00	4.00	0.00
3	17.00	4.00	4.00	0.00

6 ID: 5C1 Truck

Description:	5C1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	12.00	12.00	0.00
2	17.00	4.00	4.00	0.00
3	17.00	31.00	31.00	0.00
4	17.00	4.00	4.00	0.00

ANALYSIS DATA

ANALYSIS PARAMETERS DATA

Span#	Beam#	Moment impact	Shear impact
1	1	1.217	Calculated (AASHTO 3.8.2.2)
1	2	1.217	Calculated (AASHTO 3.8.2.2)
1	3	1.217	Calculated (AASHTO 3.8.2.2)
1	4	1.217	Calculated (AASHTO 3.8.2.2)
1	5	1.217	Calculated (AASHTO 3.8.2.2)
2	1	1.217	Calculated (AASHTO 3.8.2.2)
2	2	1.217	Calculated (AASHTO 3.8.2.2)
2	3	1.217	Calculated (AASHTO 3.8.2.2)
2	4	1.217	Calculated (AASHTO 3.8.2.2)
2	5	1.217	Calculated (AASHTO 3.8.2.2)
3	1	1.217	Calculated (AASHTO 3.8.2.2)
3	2	1.217	Calculated (AASHTO 3.8.2.2)
3	3	1.217	Calculated (AASHTO 3.8.2.2)
3	4	1.217	Calculated (AASHTO 3.8.2.2)
3	5	1.217	Calculated (AASHTO 3.8.2.2)
4	1	1.217	Calculated (AASHTO 3.8.2.2)
4	2	1.217	Calculated (AASHTO 3.8.2.2)
4	3	1.217	Calculated (AASHTO 3.8.2.2)
4	4	1.217	Calculated (AASHTO 3.8.2.2)
4	5	1.217	Calculated (AASHTO 3.8.2.2)

NOTE: Beam specific dead and live load DFs are printed in beam level reports.

GAMMA/BETA FACTORS: (Table 3.22.1A)

	Service		Factored	
Gamma:	1.00		1.30	
Beta-D:	1.00		1.00	
Beta-L:	1.00	(Group 1)	1.67	(Group 1)

PROJECT PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	=	1.00
	Debonded	=	1.00
Dev len mult:	Bonded	=	1.60
	Debonded	=	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
Self. Wt:	1.85	2.40
Deck + Haunch:		2.30
Diaphragm:		3.00
Prec.DL+ADL:		3.00
Comp.DL+ADL:		3.00

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	Strain Compatibility method.
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED
Negative Moment Design, Non-composite Moment effects in Mu:	INCLUDED

STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi

	PRECAST		DECK	
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.5.3)
Hours to release = 18.00
Rel. Humid.(RH) = 75.0 %

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-15 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

PROPERTIES

Span: 1, Beam: 1

PRECAST DATA:

Section Id	OHIO-MOD-72-TYPE-IV					
Type	I-Girder					
Flng width	Top	36.000	in	Bot	26.000	in
thick	Top	4.000	in	Bot	8.000	in
Stems	No	1				
	Top	8.000	in			
	Bot	8.000	in			
Shear width		8.000	in			
Wide top Flange	NO					

GENERAL BRIDGE DATA:

Bridge Width	48.46	ft
Curb-to-curb	45.50	ft
Beam Spac. Lt./Rt	3.58/ 10.33	ft
Lane width	12.00	ft
Number of lanes	2	
Interior/Exterior	Exterior	

TOPPING DATA:

?

Deck	Thickness	8.750	in	
Haunch:				
	Thickness	2.000	in	
	Width	36.000	in	
Effective	width	105.000	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.109	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
2.97	14.96
2.97	39.96
2.97	64.96
2.97	89.96

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length	106.750	ft
Release length	106.750	ft
Design length	104.917	ft

KERN POINTS:

Upper	53.16	in
Lower	17.26	in

DISTRIBUTION FACTORS (Art. 3.23):

Live Negative Moment (Group 1)	0.718	(Calculated)
Live Positive Moment (Group 1)	0.718	(Calculated)
Live Shear (Group 1)	0.718	(Calculated)

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian	0.200	(Calculated)
Comp. DL	0.200	(Calculated)
Comp. ADL	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

Span: 1, Beam: 1

SECTION PROPERTIES:

	PRECAST		COMPOSITE		
Area	955.4	in2	1749.8	in2	#
Total Height	72.00	in	82.75	in	
Mom. of Inertia (Ixx)	616109	in4	1445545	in4	#
Ht. of c.g.	34.42	in	54.20	in	#
Density	150.00	pcf	150.00	pcf	
Self-weight	995.2	plf	2027.2	plf	
Mom. of Inertia (Iyy)	37816.0	in4			
Poisson's Ratio	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 1, Beam: 1
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

Span: 1, Beam: 1

PRESTRESSED STEEL:

43 strands, 1/2-270K-SP-1, Low relaxation strands
Depressed at 0.40L (42.70 ft from member end)

END PATTERN (Ycg = 17.21 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	4 @ 8.000 in
3 @ 64.000 in	3 @ 66.000 in	3 @ 68.000 in	

MID PATTERN (Ycg = 5.07 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in	3 @ 10.000 in	

(B) Straight:

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	4 @ 8.000 in

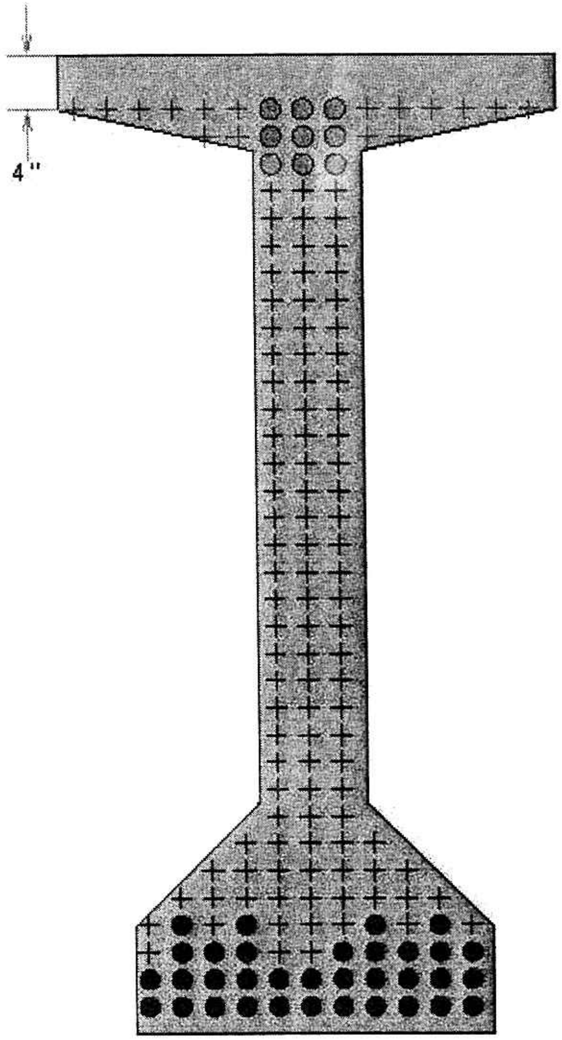
Strand Diameter	0.500	in
Strand Area	0.167	in2
Total Strand Area	7.181	in2

Trans. Len,bonded	2.083	ft
Trans. Len,debonded	2.083	ft
Dev. Len, bonded	10.888	ft
Dev. Len, debonded	13.610	ft
Holddown Force	34.232	kips
Holddown Force	270.0	ksi
Initial Prestress = 0.75f's	202.5	ksi
Initial Pull	1454.2	kips
Beam Shrtng (PL/AE)	0.415	in

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-20 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

File Name: 535502_SCI-823-0837.csl

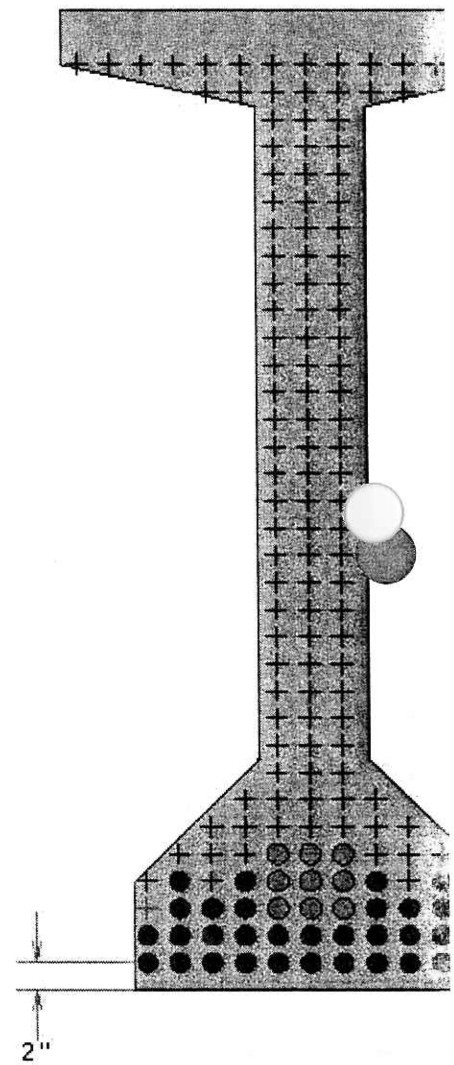
ENDS



No. Strands	Distance from bottom(in)
3	68
3	66
3	64

No. Strands	Distance from bottom(in)
4	8
8	6
11	4
11	2

MIDSPAN



NOTE: Debonded/Shielded strands or strands with reduced pull not marked.

Strand Pattern, Span 1, Beam 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-21 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

REINFORCING STEEL:

Tension	**steel:**	
fy	60.0	ksi
Es	29000	ksi
fs	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	5.2821
2	US#4[M13]	60.0	0.40	12.00	5.2821	9.7932
2	US#4[M13]	60.0	0.40	18.00	9.7932	18.5889
2	US#4[M13]	60.0	0.40	24.00	18.5889	22.5751
2	US#4[M13]	60.0	0.40	18.00	22.5751	28.3525
2	US#4[M13]	60.0	0.40	12.00	28.3525	37.7027
2	US#4[M13]	60.0	0.40	18.00	37.7027	44.7990
2	US#4[M13]	60.0	0.40	24.00	44.7990	61.9510
2	US#4[M13]	60.0	0.40	18.00	61.9510	69.0473
2	US#4[M13]	60.0	0.40	12.00	69.0473	78.3975
2	US#4[M13]	60.0	0.40	18.00	78.3975	84.1749
2	US#4[M13]	60.0	0.40	24.00	84.1749	88.1611
2	US#4[M13]	60.0	0.40	18.00	88.1611	96.9568
2	US#4[M13]	60.0	0.40	12.00	96.9568	101.4679
2	US#4[M13]	60.0	0.40	6.00	101.4679	106.7500

LOSSES

Note: Values are calculated at Midspan

Str. area	7.1810	in2
Ycg	5.07	in
P_init	1454.2	kips
Ecc	29.35	in
Hours to release	18.00	
Rel. Humid.(RH)	75.0	%
Es	28000.0	ksi
Eci	4287	ksi

AASHTO LOSSES

			Release			**Final**	**(Art. 9.16.2)**
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2099.68	psi	
Elastic Shortening		15919.13	psi	ES (Eq 9-6)	15919.13	psi	(Fcir=2437.24 psi)
Concrete shrinkage		0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep		0.00	psi	CRc (Eq 9-9)	20418.06	psi	(Fcds=-1261.25 psi)

		Release			**Final**	**(Art. 9.16.2)**
Total	17519.61	psi	(8.65 %)	44186.88	psi	(21.82 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

BENTLEY

Program:
CONSPAN® Rating
Version: 8.0.0
File Name: 535502_SCI-823-0837.csl

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

www.leapsoft.com
1-800-451-5327

Sheet: DS-23
Job No: **KZF #5355.02**

By: RBK
Date: May/1/2009
CKD:
Date:

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 1, SERVICE 1
Shears: kips, Moments: kft

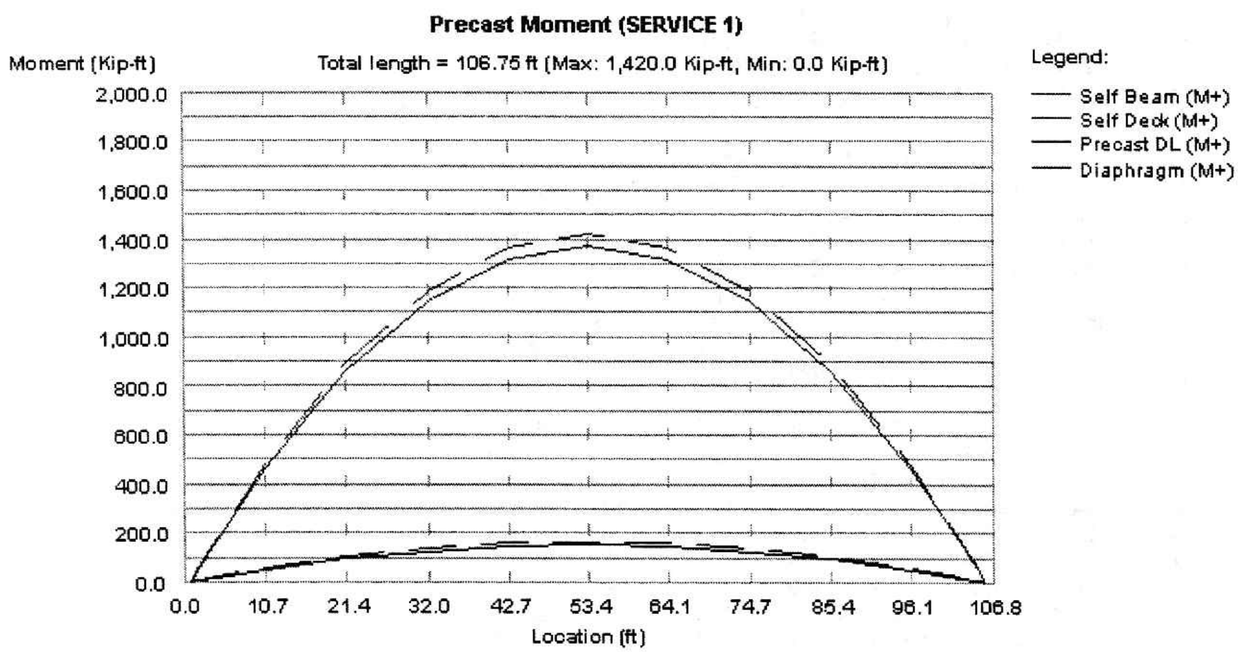
		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Self wt. :	M	0.0	60.2	174.1	462.1	859.0	1142.5	1312.6	1369.3
	V	52.2	51.0	48.8	42.5	31.9	21.2	10.6	0.0
Prec. :	M	0.0	6.6	19.1	50.8	94.4	125.6	144.3	150.5
DL+ADL	V	5.7	5.6	5.4	4.7	3.5	2.3	1.2	0.0
Deck :	M	0.0	62.5	180.5	479.2	890.8	1184.8	1361.2	1420.0
+ Haunch	V	54.1	52.9	50.6	44.1	33.1	22.0	11.0	0.0
Diaphragm :	M	-0.0	7.7	22.1	57.9	105.0	136.7	162.9	162.9
	V	5.9	5.9	5.9	5.9	3.0	3.0	0.0	0.0
Comp. :	M	31.0	69.5	141.6	318.7	544.4	676.9	716.4	662.8
DL+ADL	V	33.5	32.5	30.7	25.5	16.8	8.1	0.7	9.4
LL + I :	M+	63.2	141.4	287.4	642.7	1081.3	1331.8	1435.1	1400.2
	V	69.2	68.2	66.2	60.7	51.5	37.7	28.8	36.3
LL + I :	M-	-5.5	-12.6	-26.4	-64.5	-129.0	-193.5	-258.0	-322.5
	V	64.5	57.6	44.0	6.1	6.1	6.2	6.3	6.4
LL + I :	Vmx	69.2	68.2	66.2	60.7	51.5	42.6	34.0	41.5
	M	63.2	141.4	287.4	642.7	1081.3	1327.6	1398.4	1358.4
Total :	M+	94.2	347.9	824.8	2011.3	3574.9	4598.3	5132.5	5165.8
	V	220.6	216.2	207.5	183.3	139.7	94.3	52.3	45.7
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	219.9	215.6	207.0	183.3	139.7	99.3	57.5	50.9
	M	94.2	347.9	824.8	2011.3	3574.9	4594.1	5095.9	5124.0

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.13	73.81	84.48	95.16	101.47	103.75	104.92
Self wt. :	M	1312.6	1142.5	859.0	462.1	174.1	60.2	0.0
	V	10.6	21.2	31.9	42.5	48.8	51.0	52.2
Prec. :	M	144.3	125.6	94.4	50.8	19.1	6.6	0.0
DL+ADL	V	1.2	2.3	3.5	4.7	5.4	5.6	5.7
Deck :	M	1361.2	1184.8	890.8	479.2	180.5	62.5	0.0
+ Haunch	V	11.0	22.0	33.1	44.1	50.6	52.9	54.1
Diaphragm :	M	162.9	136.7	105.0	57.9	22.1	7.7	-0.0
	V	0.0	3.0	3.0	5.9	5.9	5.9	5.9
Comp. :	M	516.2	276.4	-56.4	-482.3	-777.9	-892.7	-953.1
DL+ADL	V	18.1	26.8	35.5	44.3	49.4	51.3	52.2
LL + I :	M+	1246.7	968.5	598.7	241.8	168.5	157.2	158.6
	V	44.5	51.8	58.2	24.4	10.8	5.9	6.9
LL + I :	M-	-387.0	-451.5	-516.0	-788.1	-1087.0	-1217.8	-1289.4
	V	6.3	6.2	6.1	43.8	54.4	58.3	60.2
LL + I :	Vmx	49.9	57.5	64.2	69.9	72.3	73.3	74.0
	M	1228.4	963.8	596.2	162.2	-86.7	-175.3	-910.9
Total :	M+	4743.9	3834.5	2491.5	809.4	0.0	0.0	0.0
	V	85.4	127.2	165.1	165.8	0.0	0.0	0.0
Total :	M-	0.0	0.0	0.0	-220.5	-1469.0	-1973.6	-2242.5
	V	0.0	0.0	0.0	185.3	214.5	225.1	230.4
Total :	Vmx	90.8	132.9	171.1	211.3	232.4	240.1	244.2
	M	4725.6	3829.8	2489.0	729.8	-468.8	-931.1	-1864.0

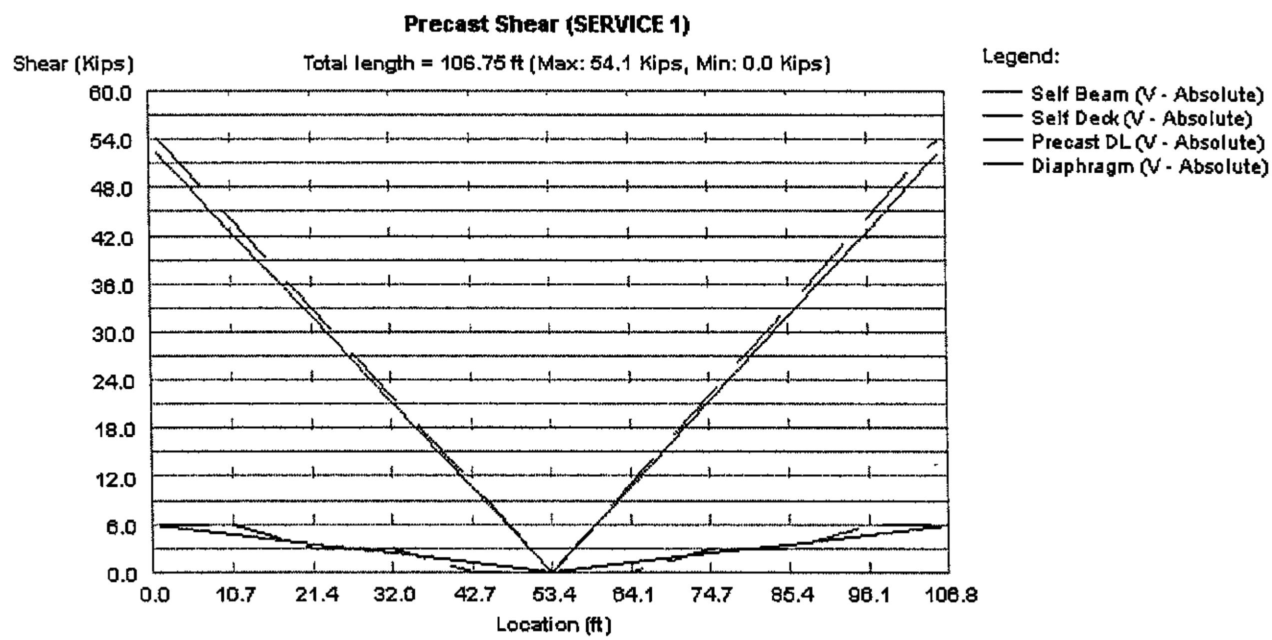
REACTIONS (kips), SERVICE 1

Load Type		Left Support	Right Support
Self Wt.		52.2	52.2
Deck+Haunch		54.1	54.1
Diaphragm		5.9	5.9
Prec.DL+ADL		5.7	5.7
Comp. DL+ADL		171.1	499.4
Live	(Max)	80.1	137.2
Live	(Min)	-7.2	-11.2
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

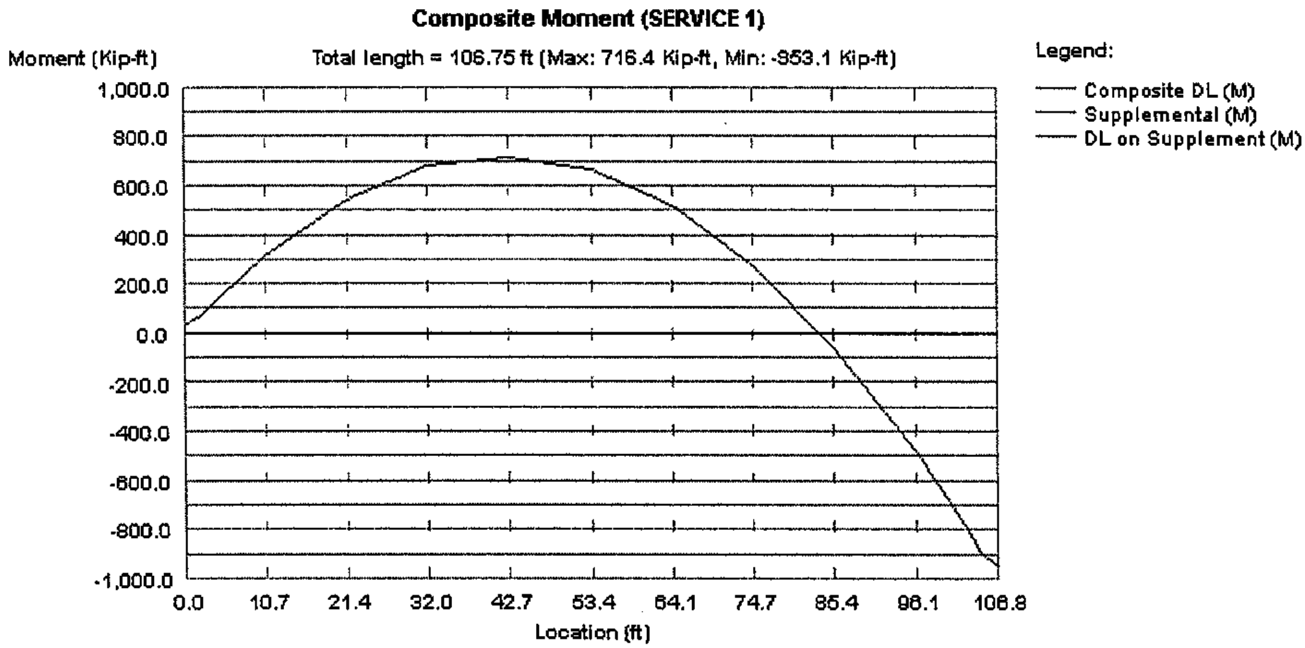
Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.



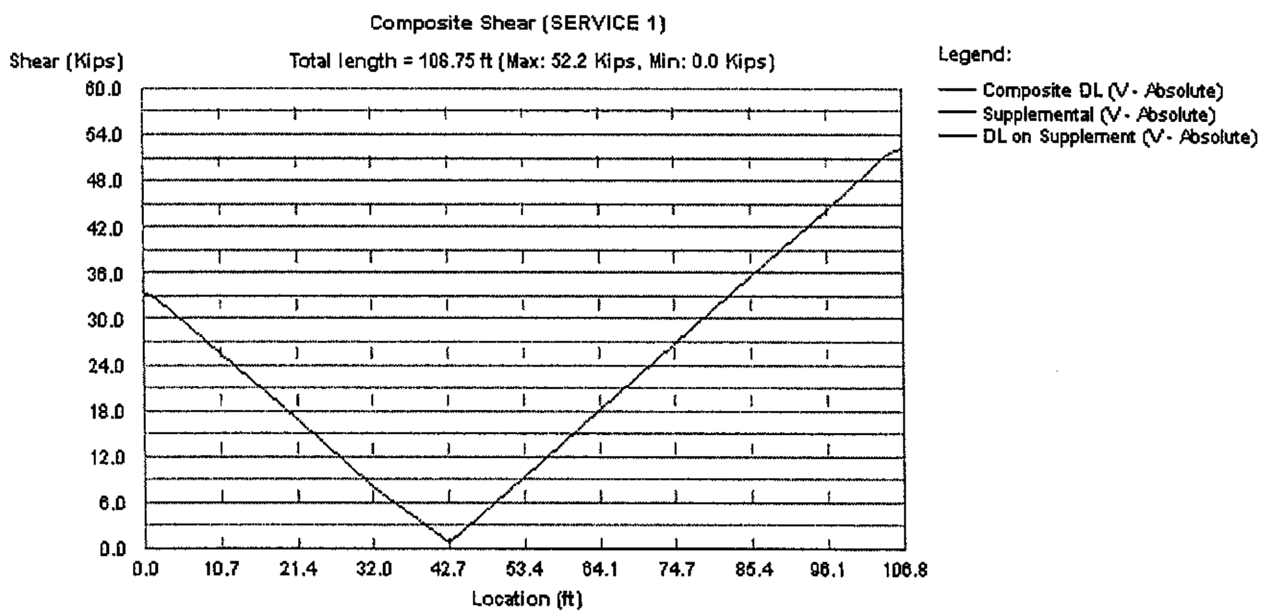
Precast Moment, Span 1, Beam 1, SERVICE 1



Precast Shear, Span 1, Beam 1, SERVICE 1

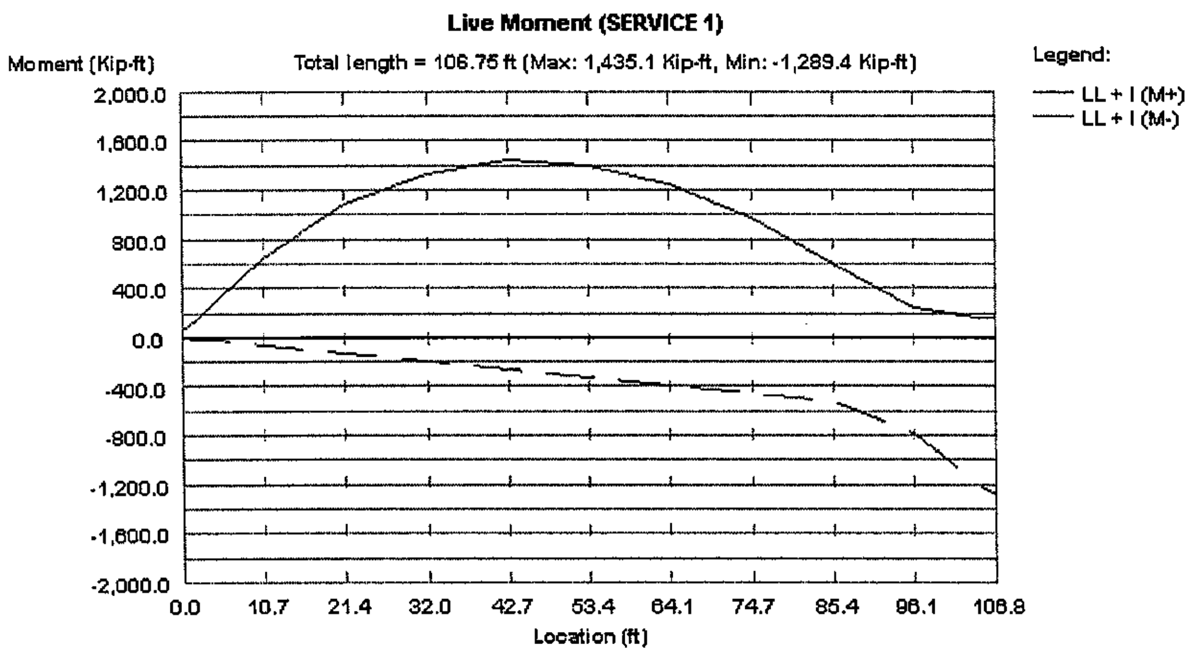


Composite Moment, Span 1, Beam 1, SERVICE 1



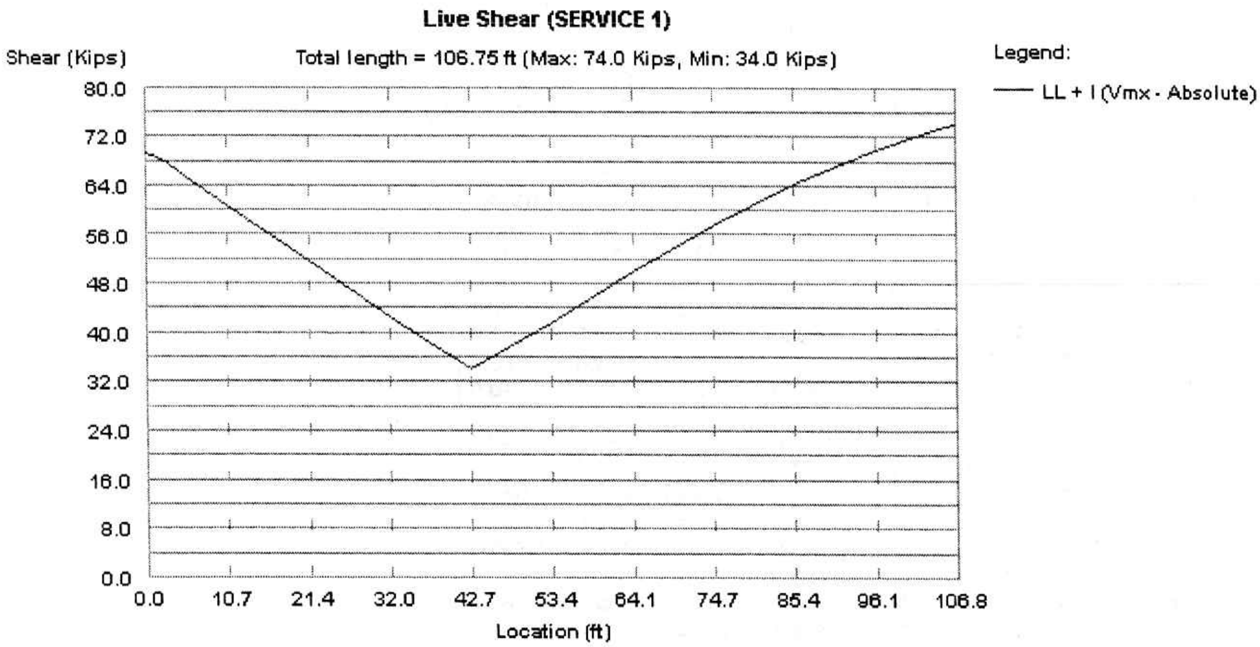
Composite Shear, Span 1, Beam 1, SERVICE 1

By: RBK
Date: May/1/2009
CKD:
Date:



Live Moment, Span 1, Beam 1, SERVICE 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-29 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Live Shear, Span 1, Beam 1, SERVICE 1

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 1, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Self wt. :	M	0.0	78.3	226.3	600.7	1116.7	1485.3	1706.4	1780.2
	V	67.9	66.4	63.4	55.2	41.4	27.6	13.8	0.0
Prec. :	M	0.0	8.6	24.9	66.0	122.7	163.2	187.5	195.6
DL+ADL	V	7.5	7.3	7.0	6.1	4.6	3.0	1.5	0.0
Deck :	M	0.0	81.2	234.7	622.9	1158.0	1540.2	1769.6	1846.0
+ Haunch	V	70.4	68.8	65.8	57.3	43.0	28.6	14.3	0.0
Diaphragm :	M	-0.0	10.0	28.7	75.3	136.5	177.7	211.8	211.8
	V	7.7	7.7	7.7	7.7	3.9	3.9	0.0	0.0
Comp. :	M	40.3	90.4	184.0	414.3	707.7	880.0	931.3	861.7
DL+ADL	V	43.5	42.3	39.8	33.1	21.8	10.5	0.9	12.2
LL + I :	M+	137.2	307.1	624.0	1395.3	2347.6	2891.4	3115.5	3039.8
	V	150.1	148.1	143.7	131.7	111.9	81.8	62.6	78.9
LL + I :	M-	-12.0	-27.3	-57.3	-140.0	-280.1	-420.1	-560.2	-700.2
	V	140.0	125.1	95.5	13.2	13.3	13.5	13.6	13.8
LL + I :	Vmx	150.1	148.1	143.7	131.7	111.9	92.5	73.9	90.2

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
	M	137.2	307.1	624.0	1395.3	2347.6	2882.2	3035.9	2949.0
Total :	M+	177.5	575.5	1322.6	3174.5	5589.2	7137.9	7922.2	7935.1
	V	347.1	340.5	327.4	291.2	226.5	155.5	93.1	91.1
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	345.4	339.0	326.3	291.2	226.5	166.1	104.4	102.3
	M	177.5	575.5	1322.6	3174.5	5589.2	7128.7	7842.6	7844.3

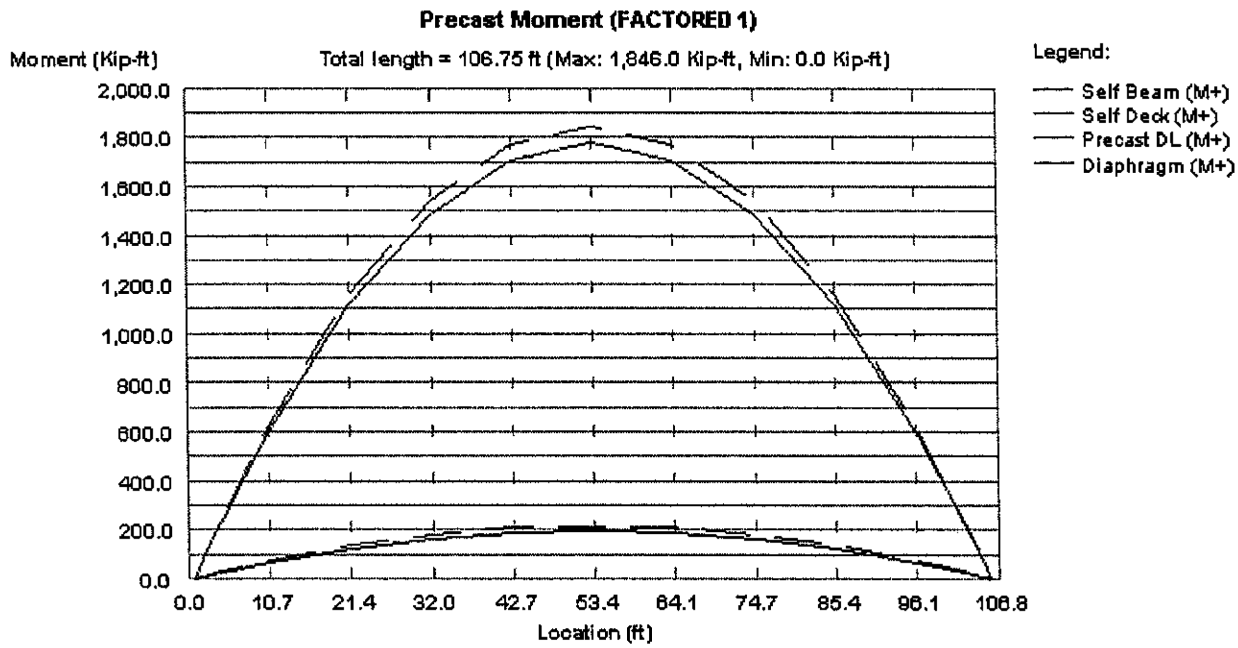
		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.13	73.81	84.48	95.16	101.47	103.75	104.92
Self wt. :	M	1706.4	1485.3	1116.7	600.7	226.3	78.3	0.0
	V	13.8	27.6	41.4	55.2	63.4	66.4	67.9
Prec. :	M	187.5	163.2	122.7	66.0	24.9	8.6	0.0
DL+ADL	V	1.5	3.0	4.6	6.1	7.0	7.3	7.5
Deck :	M	1769.6	1540.2	1158.0	622.9	234.7	81.2	0.0
+ Haunch	V	14.3	28.6	43.0	57.3	65.8	68.8	70.4
Diaphragm :	M	211.8	177.7	136.5	75.3	28.7	10.0	-0.0
	V	0.0	3.9	3.9	7.7	7.7	7.7	7.7
Comp. :	M	671.0	359.3	-73.3	-627.0	-1011.2	-1160.5	-1239.0
DL+ADL	V	23.5	34.9	46.2	57.5	64.2	66.7	67.9
LL + I :	M+	2706.6	2102.6	1299.8	525.0	365.7	341.2	344.4
	V	96.6	112.5	126.3	52.9	23.4	12.8	15.0
LL + I :	M-	-840.2	-980.3	-1120.3	-1711.0	-2359.8	-2643.9	-2799.3
	V	13.6	13.5	13.3	95.2	118.1	126.5	130.6
LL + I :	Vmx	108.4	124.8	139.3	151.7	157.0	159.1	160.7
	M	2666.8	2092.5	1294.3	352.1	-188.3	-380.7	-1977.5
Total :	M+	7253.0	5828.4	3760.5	1262.9	0.0	0.0	0.0
	V	149.8	210.5	265.3	236.8	0.0	0.0	0.0
Total :	M-	0.0	0.0	0.0	-973.2	-2856.4	-3626.3	-4038.4
	V	0.0	0.0	0.0	279.0	326.2	343.3	351.9
Total :	Vmx	161.5	222.8	278.3	335.5	365.1	375.9	382.0
	M	7213.2	5818.3	3754.9	1090.0	-685.0	-1363.1	-3216.5

REACTIONS (kips), FACTORED 1

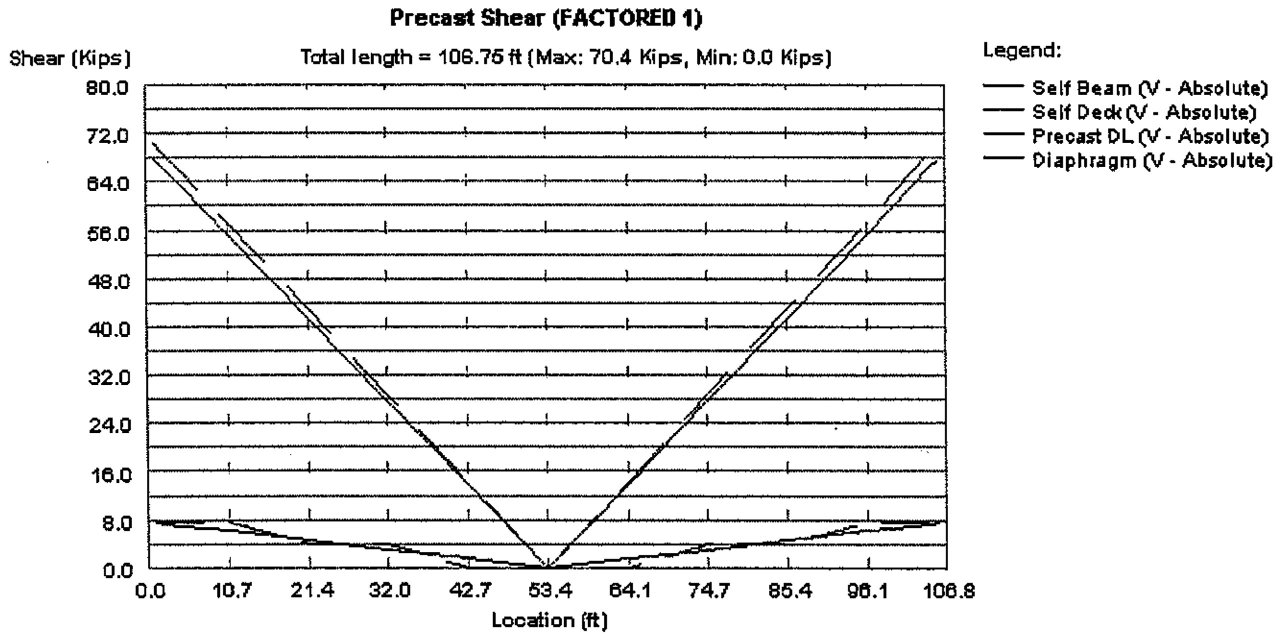
Load Type		Left Support	Right Support
Self Wt.		67.9	67.9
Deck+Haunch		70.4	70.4
Diaphragm		7.7	7.7
Prec.DL+ADL		7.5	7.5
Comp. DL+ADL		222.4	649.2
Live	(Max)	173.9	298.0
Live	(Min)	-15.7	-24.3
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

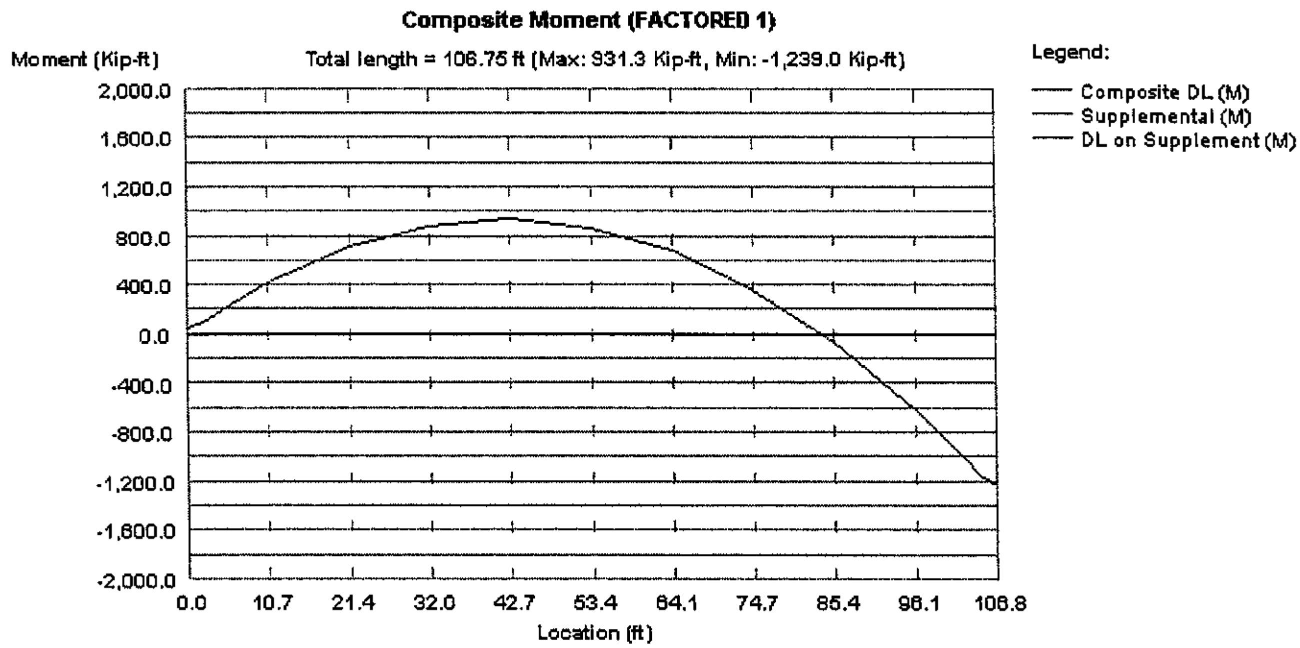
BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-31 Job No: **KZF #5355.02**
Program: CONSPAN® Rating V[illegible]n: 8.0.0	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD:
F[illegible]ame: 535502_SCI-823-0837.csl		Date:



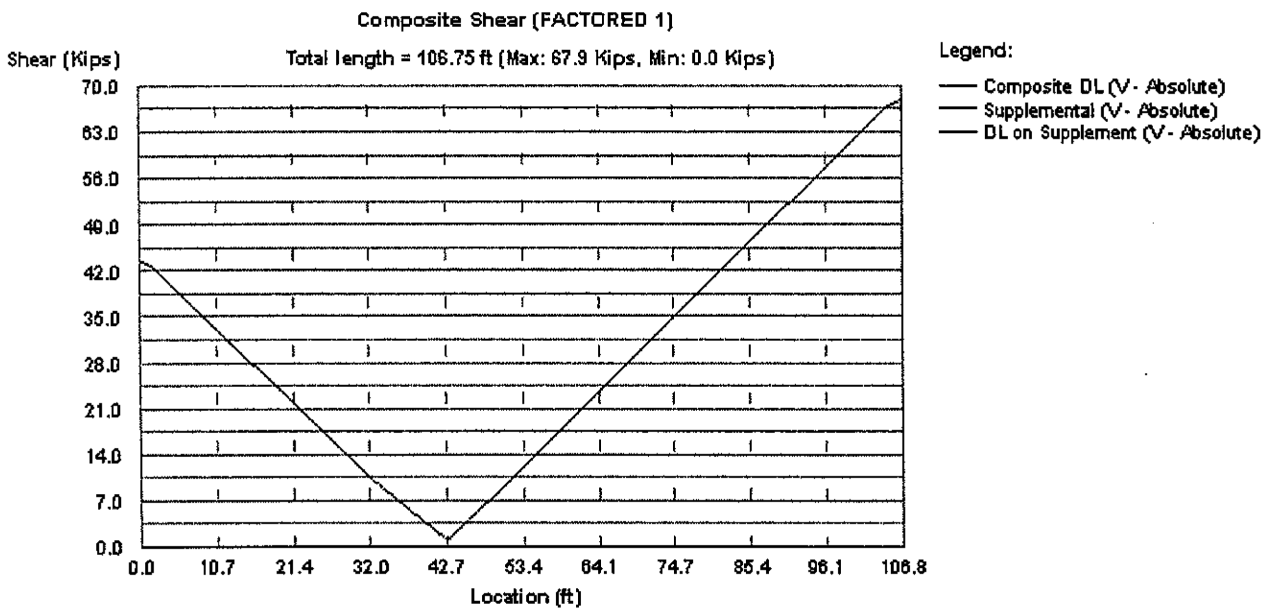
Precast Moment, Span 1, Beam 1, FACTORED 1



Precast Shear, Span 1, Beam 1, FACTORED 1



Composite Moment, Span 1, Beam 1, FACTORED 1



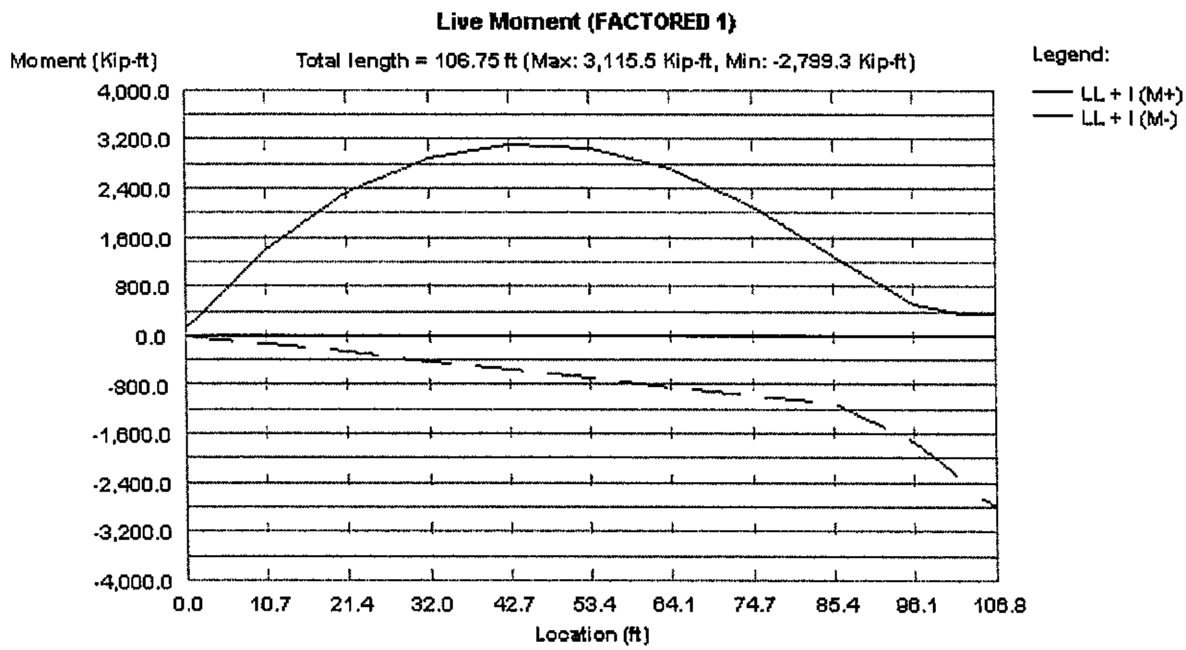
Composite Shear, Span 1, Beam 1, FACTORED 1

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

Sheet: DS-35
Job No: **KZF #5355.02**

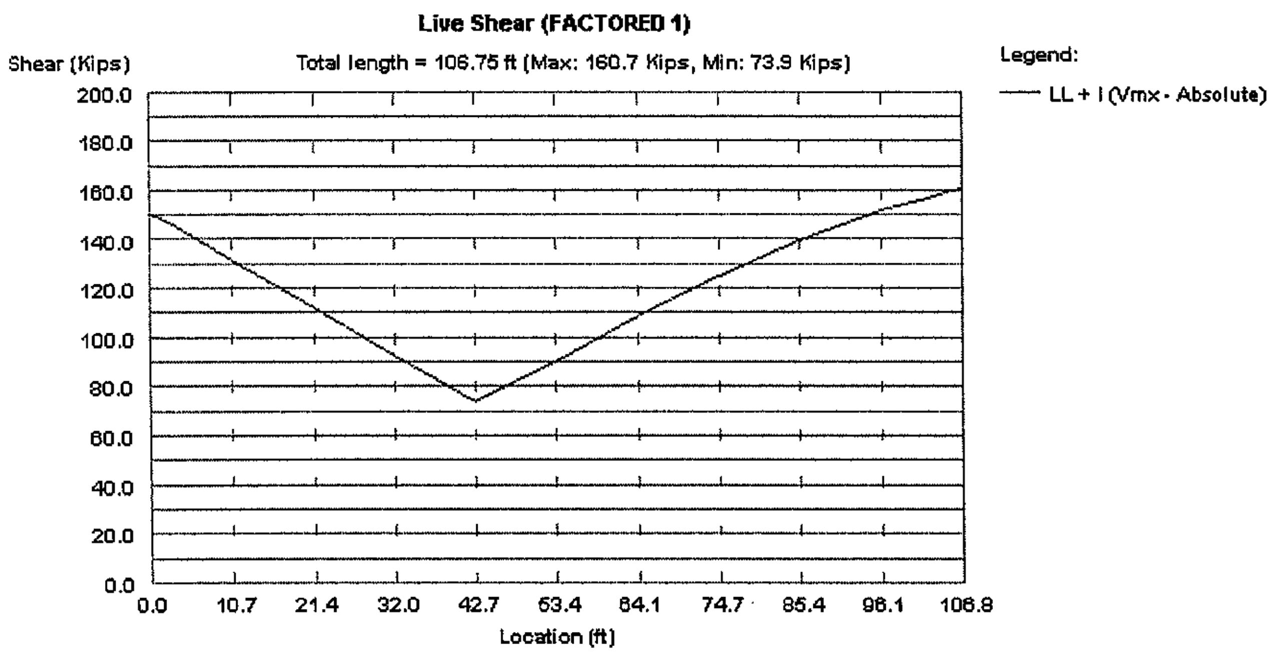
Program:
CONSPAN® Rating
Version: 8.0.0
File Name: 535502_SCI-823-0837.csl

By: RBK
Date: May/1/2009
CKD:
Date:



Live Moment, Span 1, Beam 1, FACTORED 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-36 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Live Shear, Span 1, Beam 1, FACTORED 1

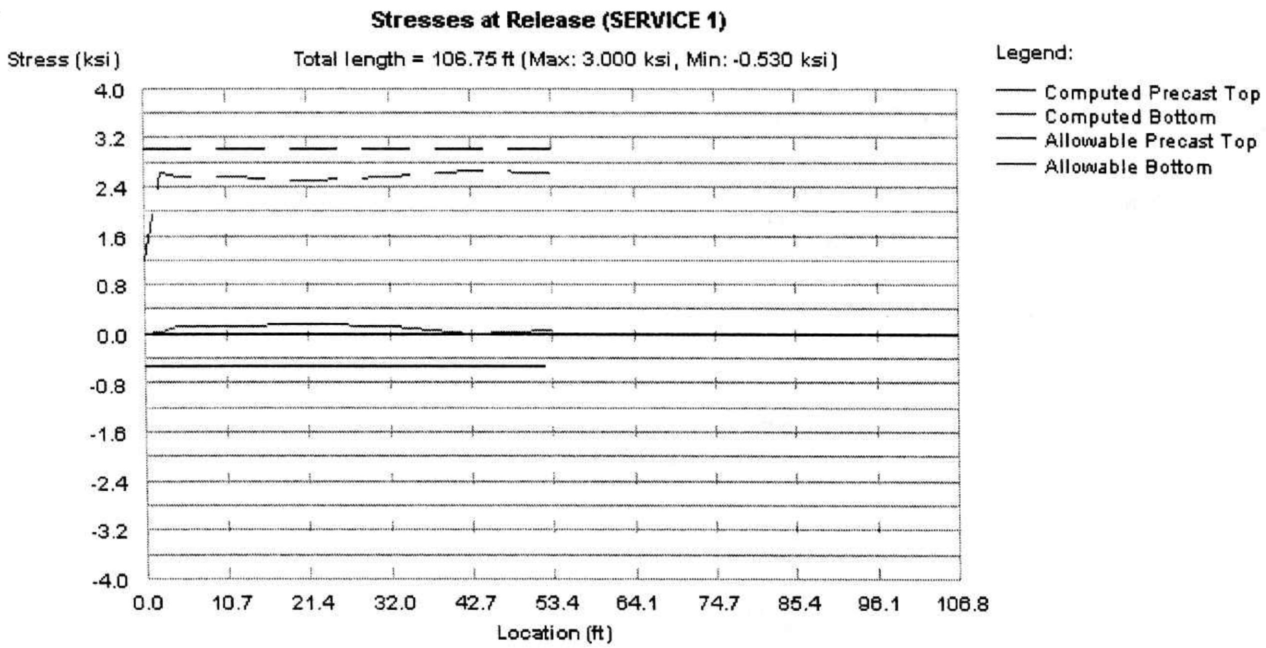
POSITIVE ENVELOPE STRESSES

Span : 1, Beam : 1, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.65 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	10.68	21.35	32.03	42.70	53.38
Self Wt.						
Precast-top	79.4	373.5	664.1	871.6	996.1	1037.6
Bottom	-72.7	-342.1	-608.2	-798.3	-912.4	-950.4
Prestress						
Precast-top	-52.1	-250.0	-495.9	-741.8	-987.7	-987.7
Bottom	2711.5	2892.8	3118.0	3343.2	3568.4	3568.4
Total						
Precast-top	27.3	123.5	168.2	129.8	8.4	49.9
Bottom	2638.8	2550.6	2509.8	2544.9	2656.1	2618.1
[illegible]op (in2)	0.000	0.000	0.000	0.000	0.000	0.000

Span : 1, Beam : 1, SERVICE 1



Stresses at Release, Span 1, Beam 1, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 21.82%)

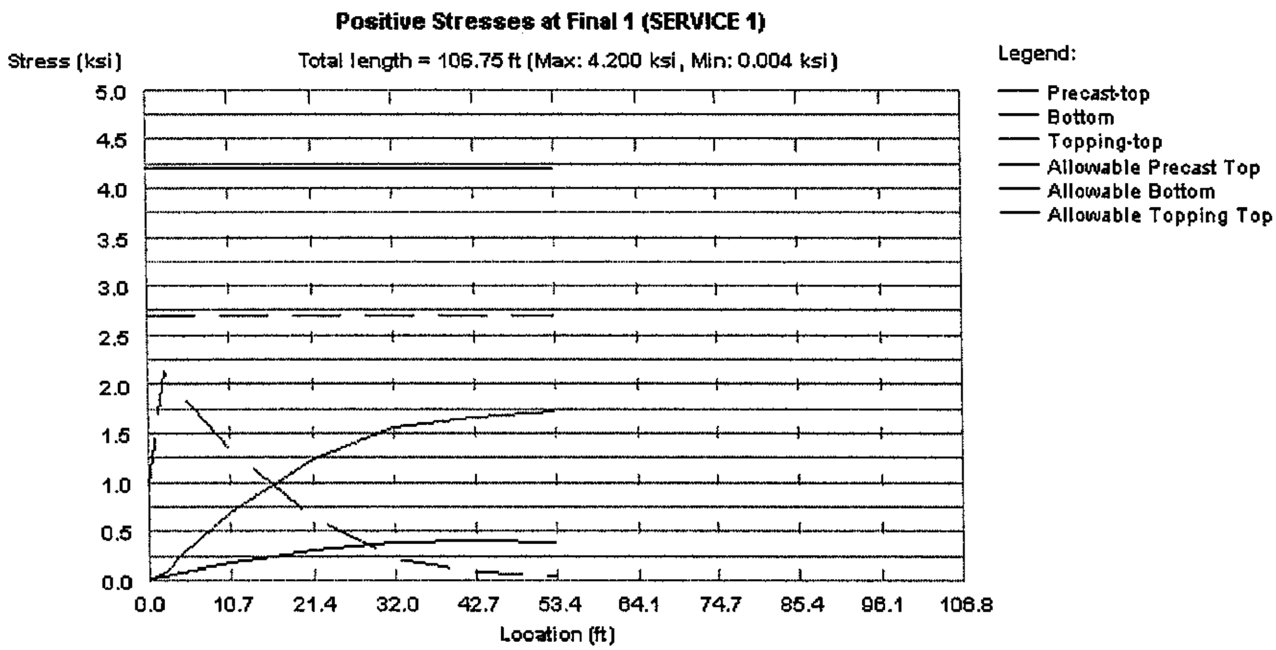
		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Prestress									
Precast-top		-9.5	-44.6	-89.6	-214.0	-424.4	-634.9	-845.3	-845.3
Bottom		1011.8	2320.6	2361.8	2475.8	2668.5	2861.3	3054.0	3054.0
Self wt.									
Precast-top		0.0	44.1	127.4	338.2	628.7	836.3	960.8	1002.3
Bottom		-0.0	-40.4	-116.7	-309.8	-575.9	-766.0	-880.0	-918.0
Prec. DL+ADL									
Precast-top		0.0	4.8	14.0	37.2	69.1	91.9	105.6	110.2
Bottom		-0.0	-4.4	-12.8	-34.0	-63.3	-84.2	-96.7	-100.9
Diaphragm									
Precast-top		-0.0	5.6	16.2	42.4	76.9	100.0	119.3	119.3
Bottom		-0.0	-5.1	-14.8	-38.8	-70.4	-91.6	-109.2	-109.2

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-39 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Deck + Haunch									
Precast-top		-0.0	45.7	132.1	350.7	652.0	867.2	996.3	1039.4
Bottom		-0.0	-41.9	-121.0	-321.2	-597.2	-794.3	-912.6	-952.0
Comp. DL+ADL									
Topping-top		5.9	13.2	26.9	60.6	103.5	128.6	136.2	126.0
Precast-top		4.6	10.3	20.9	47.1	80.4	100.0	105.9	98.0
Bottom		-14.0	-31.3	-63.7	-143.4	-244.9	-304.6	-322.3	-298.2
LL+I(+)									
Topping-top		12.0	26.9	54.6	122.1	205.5	253.1	272.7	266.1
Precast-top		9.3	20.9	42.5	95.0	159.8	196.8	212.1	206.9
Bottom		-28.4	-63.6	-129.3	-289.1	-486.5	-599.2	-645.7	-630.0
Final 1 (P/S + DL	+ LL)								
Topping-top		17.9	40.1	81.5	182.7	309.0	381.7	408.9	392.1
Precast-top		4.4	86.8	263.6	696.6	1242.6	1557.4	1654.6	1730.7
Bottom		969.4	2133.9	1903.4	1339.3	630.3	221.4	87.5	45.7
Final 2 (P/S + DL)									
Topping-top		5.9	13.2	26.9	60.6	103.5	128.6	136.2	126.0
Precast-top		-4.9	65.9	221.1	601.6	1082.7	1360.6	1442.5	1523.7
Bottom		997.8	2197.5	2032.8	1628.5	1116.8	820.6	733.2	675.7
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		15.0	33.5	68.1	152.4	257.2	317.4	340.8	329.1
Precast-top		6.9	53.9	153.0	395.8	701.2	877.1	933.3	968.8
Bottom		470.5	1035.1	887.1	525.1	71.9	-188.9	-279.1	-292.1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-40 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

File Name: 535502_SCI-823-0837.csl



Positive Stresses at Final 1, Span 1, Beam 1, SERVICE 1

Bentley	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-41 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File name: 535502_SCI-823-0837.csl**	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 1, Beam : 1, FACTORED 1

End Shear Design: Prestressed.

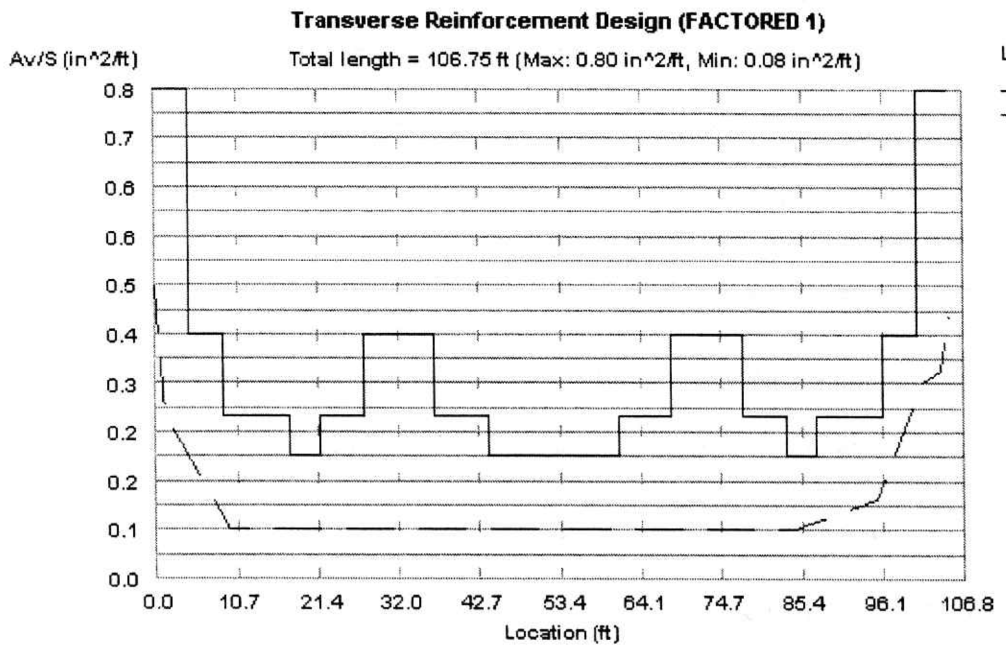
Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
Bearing :	0.92	151.5	31.0	63.2	327.4	177.5	347.1	146.5	195.6
1011.8	-14.0	3333.6	66.20	4628.5	75.3	4628.5	243.0	11.8	205.5
205.5	158.3	354.5	0.48	0.08	0.48	0.80	1.293	24.0	177.2
Transfer :	2.08	148.0	206.5	141.4	327.4	575.5	340.5	369.0	192.5
2320.6	-123.1	6000.1	66.20	3303.9	75.3	3303.9	593.0	26.8	276.1
276.1	87.7	354.5	0.26	0.08	0.26	0.80	1.487	24.0	177.2
	4.36	141.3	537.4	287.4	327.4	1322.6	327.4	785.2	186.0
2361.8	-329.1	5633.9	66.78	1503.0	76.0	1503.0	669.0	26.8	290.4
290.4	73.3	357.6	0.22	0.08	0.22	0.80	1.533	24.0	178.8
0.1L :	10.68	122.7	1368.6	642.7	291.2	3174.5	291.2	1805.8	168.5
2475.8	-847.3	4735.3	68.58	592.1	78.0	592.1	855.5	26.8	328.2
328.2	0.0	367.2	0.00	0.08	0.08	0.27	1.297	24.0	183.6
0.2L :	21.35	88.2	2493.6	1081.3	226.5	5589.2	226.5	3095.7	138.3
2668.5	-1551.7	3598.1	71.61	277.7	81.5	277.7	1091.2	26.8	382.1
277.7	0.0	383.4	0.00	0.08	0.08	0.20	1.388	24.0	191.7
0.3L :	32.03	56.6	3266.5	1331.8	166.1	7137.9	155.5	3871.4	98.8
2861.3	-2040.6	2939.8	74.65	161.7	84.9	161.7	1227.1	26.8	421.5
161.7	22.9	399.7	0.06	0.08	0.08	0.40	1.684	24.0	199.8
0.4L :	42.70	23.5	3697.5	1435.1	104.4	7922.2	93.1	4224.7	69.6
3054.0	-2320.8	2745.4	77.68	99.9	88.4	99.9	1267.1	0.0	418.2
99.9	16.1	415.9	0.04	0.08	0.08	0.27	1.754	24.0	208.0
0.5L :	53.38	9.4	3765.6	1400.2	102.3	7935.1	91.1	4169.5	81.7
3054.0	-2378.3	2617.6	77.68	91.9	88.4	91.9	1314.0	0.0	427.0
91.9	21.9	415.9	0.06	0.08	0.08	0.20	1.491	24.0	208.0
0.6L :	64.05	40.9	3497.2	1246.7	161.5	7253.0	149.8	3755.8	108.9
3054.0	-2230.7	2945.6	77.68	157.5	88.4	157.5	1267.1	0.0	418.2
157.5	22.0	415.9	0.06	0.08	0.08	0.27	1.455	24.0	208.0
0.7L :	74.72	75.4	2866.0	968.5	222.8	5828.4	210.5	2962.4	135.1
2861.3	-1860.4	3340.3	74.65	257.7	84.9	257.7	1227.1	26.8	421.5
257.7	0.0	399.7	0.00	0.08	0.08	0.40	1.644	24.0	199.8

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
0.8L :	85.40	106.9	1892.8	598.7	278.3	3760.5	265.3	1867.7	158.3
2668.5	-1281.4	4198.9	71.61	491.7	81.5	491.7	1091.2	26.8	382.1
382.1	0.0	383.4	0.00	0.08	0.08	0.20	1.467	24.0	191.7
0.9L :	96.08	141.4	567.6	241.8	335.5	1262.9	236.8	695.3	95.4
2475.8	-486.9	5536.4	68.58	928.3	78.0	928.3	855.5	26.8	328.2
328.2	44.6	367.2	0.13	0.08	0.13	0.27	1.126	24.0	183.6
H/2 :	102.39	160.1	-382.0	-1087.0	365.1	-2856.4	326.2	-2474.4	166.2
0.0	-147.8	-1340.0	77.38	281.1	88.0	281.1	669.0	26.8	332.3
281.1	124.6	414.3	0.32	0.08	0.32	0.80	1.456	24.0	207.2
Transfer :	104.67	166.8	-755.7	-1217.8	365.1	-3626.3	343.3	-2870.6	176.5
0.0	-169.7	-1225.2	77.38	273.2	88.0	273.2	593.0	26.8	318.1
273.2	132.5	414.3	0.34	0.08	0.34	0.80	1.436	24.0	207.2
Bearing :	105.83	170.2	-953.1	-1289.4	365.1	-4038.4	351.9	-3085.3	181.7
0.0	-181.1	-1164.8	77.38	269.9	88.0	269.9	243.0	11.8	238.2
238.2	167.5	414.3	0.43	0.08	0.43	0.80	1.350	24.0	207.2

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 1, Beam : 1

Fpi (kips)	fs (ksi)	d/4 (in)	Abrst_rqrd (in2)
1454.15	20.00	13.70	2.91

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-43 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Vertical Shear, Span 1, Beam 1, FACTORED 1

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 1, Beam : 1

(Beam and Slab effects are INCLUDED in Vu).

Location (ft)									
bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :	0.00								
36.00	60.00	347.1	162.79	65.80	432.00	24.00	0.360	1.850	0.360
Transfer :	1.17								
36.00	60.00	340.5	158.91	66.13	432.00	24.00	0.360	1.780	0.360
H/2 :	3.45								
36.00	60.00	327.4	151.29	66.78	432.00	24.00	0.360	1.643	0.360
0.1L :	9.76								
36.00	60.00	291.2	131.06	68.58	432.00	24.00	0.360	1.279	0.360

Location (ft)	bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
0.2L : 20.43	36.00	60.00	226.5	97.62	71.61	432.00	24.00	0.360	0.677	0.360
0.3L : 31.11	36.00	60.00	166.1	68.70	74.65	432.00	24.00	0.360	0.360	0.000
0.4L : 41.78	36.00	60.00	104.4	41.49	77.68	432.00	24.00	0.360	0.360	0.000
0.5L : 52.46	36.00	60.00	102.3	40.66	77.68	432.00	24.00	0.360	0.360	0.000
0.6L : 63.13	36.00	60.00	161.5	64.18	77.68	432.00	24.00	0.360	0.360	0.000
0.7L : 73.81	36.00	60.00	222.8	92.13	74.65	432.00	24.00	0.360	0.578	0.360
0.8L : 84.48	36.00	60.00	278.3	119.95	71.61	432.00	24.00	0.360	1.079	0.360
0.9L : 95.16	36.00	60.00	335.5	132.13	78.38	432.00	24.00	0.360	1.298	0.360
H/2 : 101.47	36.00	60.00	365.1	143.79	78.38	432.00	24.00	0.360	1.508	0.360
Transfer : 103.75	36.00	60.00	375.9	148.04	78.38	432.00	24.00	0.360	1.585	0.360
Bearing : 104.92	36.00	60.00	382.0	150.42	78.38	432.00	24.00	0.360	1.628	0.360

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 1; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.76 ft				
Prestress	0.933	1.80	1.680	2.20	2.053
Self Wt.	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch			-0.264	2.30	-0.606
Prec. DL+ADL			-0.028	3.00	-0.084
Diaphragm			-0.031	3.00	-0.093
Comp. DL+ADL			-0.056	3.00	-0.168
Live Load(+I)					-0.105
Total	0.587		0.662		0.167

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	20.43 ft				
Prestress	1.701	1.80	3.061	2.20	3.742
Self Wt.	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch			-0.523	2.30	-1.202
Prec. DL+ADL			-0.055	3.00	-0.166
Diaphragm			-0.061	3.00	-0.184
Comp. DL+ADL			-0.104	3.00	-0.312
Live Load(+I)					-0.197
Total	1.047		1.108		0.110

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	31.11 ft				
Prestress	2.277	1.80	4.098	2.20	5.009
Self Wt.	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch			-0.726	2.30	-1.671
Prec. DL+ADL			-0.077	3.00	-0.231
Diaphragm			-0.085	3.00	-0.256
Comp. DL+ADL			-0.138	3.00	-0.414
Live Load(+I)					-0.268
Total	1.382		1.416		0.021

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	41.78 ft				
Prestress	2.636	1.80	4.745	2.20	5.799
Self Wt.	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch			-0.856	2.30	-1.969
Prec. DL+ADL			-0.091	3.00	-0.272
Diaphragm			-0.100	3.00	-0.301
Comp. DL+ADL			-0.155	3.00	-0.464
Live Load(+I)					-0.309
Total	1.587		1.603		-0.032

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	52.46 ft				
Prestress	2.757	1.80	4.963	2.20	6.066
Self Wt.	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch			-0.900	2.30	-2.071

	Release	Mult	Erection	Mult	Final
Prec. DL+ADL			-0.095	3.00	-0.286
Diaphragm			-0.106	3.00	-0.317
Comp. DL+ADL			-0.153	3.00	-0.458
Live Load(+I)					-0.314
Total	1.656		1.672		-0.023

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	63.13 ft				
Prestress	2.636	1.80	4.745	2.20	5.799
Self Wt.	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch			-0.856	2.30	-1.969
Prec. DL+ADL			-0.091	3.00	-0.272
Diaphragm			-0.100	3.00	-0.301
Comp. DL+ADL			-0.134	3.00	-0.401
Live Load(+I)					-0.286
Total	1.587		1.624		0.053

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	73.81 ft				
Prestress	2.277	1.80	4.098	2.20	5.009
Self Wt.	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch			-0.726	2.30	-1.671
Prec. DL+ADL			-0.077	3.00	-0.231
Diaphragm			-0.085	3.00	-0.256
Comp. DL+ADL			-0.102	3.00	-0.305
Live Load(+I)					-0.230
Total	1.382		1.452		0.169

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	84.48 ft				
Prestress	1.701	1.80	3.061	2.20	3.742
Self Wt.	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch			-0.523	2.30	-1.202
Prec. DL+ADL			-0.055	3.00	-0.166
Diaphragm			-0.061	3.00	-0.184
Comp. DL+ADL			-0.062	3.00	-0.187
Live Load(+I)					-0.155
Total	1.047		1.150		0.278

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	95.16 ft				
Prestress	0.933	1.80	1.680	2.20	2.053
Self Wt.	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch			-0.264	2.30	-0.606
Prec. DL+ADL			-0.028	3.00	-0.084
Diaphragm			-0.031	3.00	-0.093
Comp. DL+ADL			-0.025	3.00	-0.074
Live Load(+I)					-0.074
Total	0.587		0.693		0.292

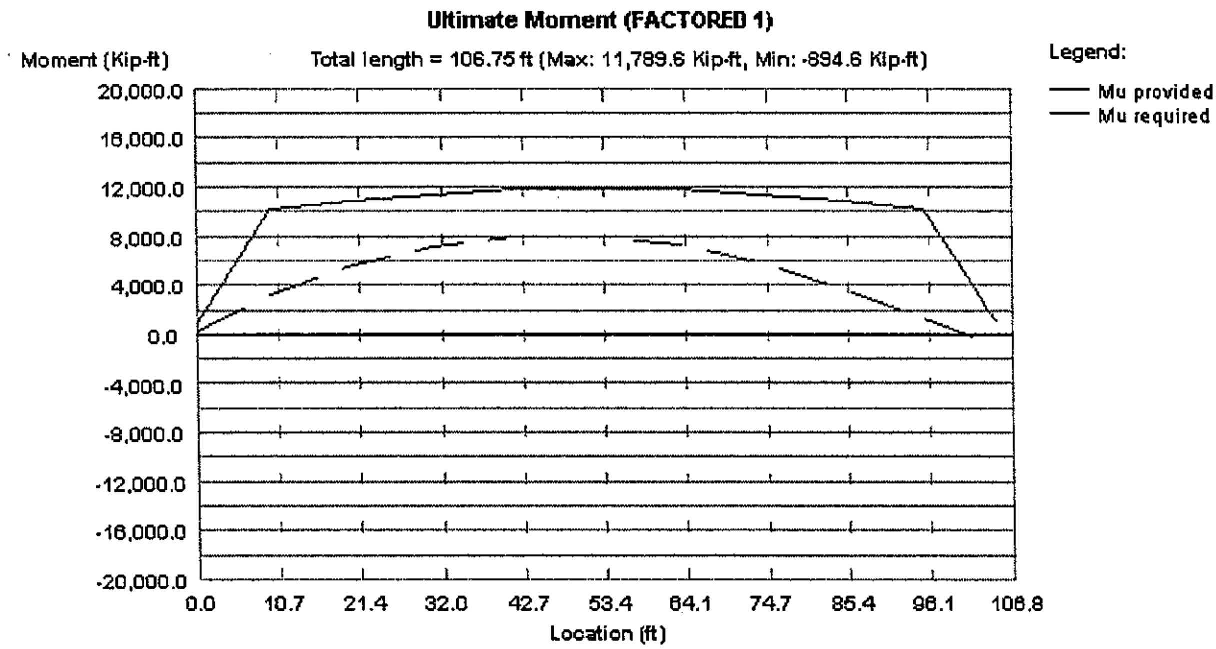
Positive values indicate upward deflection.

ULTIMATE MOMENT

ULTIMATE - Span : 1, Beam : 1, FACTORED 1
(Mu-prvd computed by Strain Compatibility method. Ult. Conc. Strain = 0.00300)

(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.17									
	1.374	16.62	0.00020	269.6	0.9	1966.7	575.5	6485.5	0.303	3.42
H/2	3.45									
	2.879	15.97	0.00042	269.3	1.9	4125.4	1322.6	6450.2	0.640	3.12
0.1L	9.76									
	7.041	14.17	0.00101	268.4	4.7	10124.2	3174.5	6382.9	1.586	-
0.2L	20.43									
	7.181	11.14	0.00098	268.7	4.8	10808.4	5589.2	6370.6	1.697	-
0.3L	31.11									
	7.181	8.10	0.00094	268.8	4.8	11299.0	7137.9	6485.2	1.742	-
0.4L	41.78									
	7.181	5.07	0.00090	268.9	4.8	11789.6	7922.2	6721.8	1.754	-
0.5L	52.46									
	7.181	5.07	0.00090	268.9	4.8	11789.6	7935.1	6662.1	1.770	-
[illegible]	63.13									
	7.181	5.07	0.00090	268.9	4.8	11789.6	7253.0	6721.8	1.754	-
[illegible]	73.81									
	7.181	8.10	0.00094	268.8	4.8	11299.0	5828.4	6485.2	1.742	-
0.8L	84.48									
	7.181	11.14	0.00098	268.7	4.8	10808.4	3760.5	6370.6	1.697	-
0.9L	95.16									
	7.041	14.17	0.00101	268.4	4.7	10124.2	1262.9	6382.9	1.586	-
H/2	101.47									
	2.879	15.97	0.00042	269.3	1.9	4125.4	-130.9	6450.2	0.640	31.51
Transfer	103.75									
	1.374	16.62	0.00020	269.6	0.9	1966.7	-641.2	6485.5	0.303	3.07



Ultimate Moment, Span 1, Beam 1, FACTORED 1

BENTLEY

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

Sheet: DS-49
Job No: **KZF #5355.02**

Program:
CONSPAN® Rating
Version: 8.0.0
File Name: 535502_SCI-823-0837.csl

www.leapsoft.com
1-800-451-5327

By: RBK
Date: May/1/2009
CKD:
Date:

DETENSIONING

Span : 1, Beam : 1; Groups 1-24; Units: psi

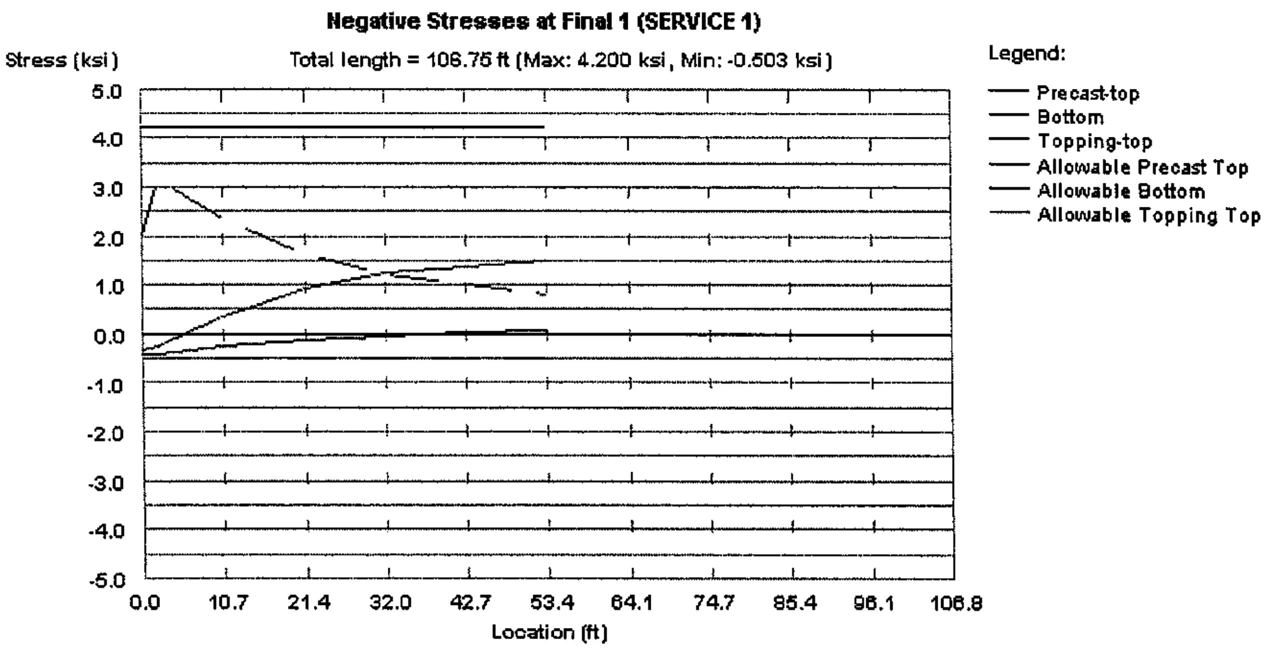
Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	22.010
		M	2.00	Fb	103.739
2	2	E	68.00	Ft	202.560
		M	10.00	Fb	62.268
3	1	E	68.00	Ft	292.835
		M	10.00	Fb	41.532
4	2	E	66.00	Ft	465.849
		M	8.00	Fb	6.965
5	1	E	66.00	Ft	552.356
		M	8.00	Fb	-10.32*
6	2	E	64.00	Ft	717.832
		M	6.00	Fb	-37.98*
7	1	E	64.00	Ft	800.570
		M	6.00	Fb	-51.82*
8	2	E	8.00	Ft	765.673
		M	8.00	Fb	104.044
9	2	E	8.00	Ft	730.776
		M	8.00	Fb	259.904
10	2	E	6.00	Ft	688.343
		M	6.00	Fb	422.667
11	2	E	6.00	Ft	645.909
		M	6.00	Fb	585.430
12	2	E	6.00	Ft	603.475
		M	6.00	Fb	748.194
13	2	E	6.00	Ft	561.041
		M	6.00	Fb	910.957
14	2	E	4.00	Ft	511.070
		M	4.00	Fb	1080.623
15	2	E	4.00	Ft	461.099
		M	4.00	Fb	1250.290
16	2	E	4.00	Ft	411.128
		M	4.00	Fb	1419.956
17	2	E	4.00	Ft	361.158
		M	4.00	Fb	1589.622
18	2	E	4.00	Ft	311.187
		M	4.00	Fb	1759.289
19	1	E	4.00	Ft	286.201
		M	4.00	Fb	1844.122
20	2	E	2.00	Ft	228.693
		M	2.00	Fb	2020.692
21	2	E	2.00	Ft	171.186
		M	2.00	Fb	2197.262
22	2	E	2.00	Ft	113.678
		M	2.00	Fb	2373.831
23	2	E	2.00	Ft	56.170
		M	2.00	Fb	2550.401
24	1	E	2.00	Ft	27.416
		M	2.00	Fb	2638.686

NEGATIVE ENVELOPE STRESSES

Span : 1, Beam : 1, SERVICE 1
NEGATIVE ENVELOPE STRESSES, (psi) (LOSS = 21.82%)

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Prestress									
Precast-top		-9.5	-44.6	-89.6	-214.0	-424.4	-634.9	-845.3	-845.3
Bottom		1011.8	2320.6	2361.8	2475.8	2668.5	2861.3	3054.0	3054.0
Self wt.									
Precast-top		0.0	44.1	127.4	338.2	628.7	836.3	960.8	1002.3
Bottom		-0.0	-40.4	-116.7	-309.8	-575.9	-766.0	-880.0	-918.0
Prec. DL+ADL									
Precast-top		0.0	4.8	14.0	37.2	69.1	91.9	105.6	110.2
Bottom		-0.0	-4.4	-12.8	-34.0	-63.3	-84.2	-96.7	-100.9
Diaphragm									
Precast-top		-0.0	5.6	16.2	42.4	76.9	100.0	119.3	119.3
Bottom		-0.0	-5.1	-14.8	-38.8	-70.4	-91.6	-109.2	-109.2
Deck + Haunch									
Precast-top		-0.0	45.7	132.1	350.7	652.0	867.2	996.3	1039.4
Bottom		-0.0	-41.9	-121.0	-321.2	-597.2	-794.3	-912.6	-952.0
Comp. DL+ADL									
Topping-top		-181.1	-169.7	-147.8	-91.7	-10.7	52.5	98.1	126.0
Precast-top		-140.9	-131.9	-115.0	-71.3	-8.3	40.8	76.3	98.0
Bottom		428.8	401.6	350.0	217.0	25.4	-124.4	-232.2	-298.2
LL+I(-)									
Topping-top		-245.0	-231.4	-206.6	-149.8	-98.1	-85.8	-73.6	-61.3
Precast-top		-190.6	-180.0	-160.6	-116.5	-76.3	-66.7	-57.2	-47.7
Bottom		580.1	547.9	489.0	354.6	232.2	203.1	174.1	145.1
Final 1 (P/S + DL	+ LL)								
Topping-top		-426.2	-401.1	-354.4	-241.4	-108.8	-33.3	24.5	64.7
Precast-top		-340.9	-256.2	-75.4	366.8	917.7	1234.7	1355.7	1476.1
Bottom		2020.7	3178.3	2935.5	2343.5	1619.3	1204.0	997.4	820.8
Final 2 (P/S + DL)									
Topping-top		-181.1	-169.7	-147.8	-91.7	-10.7	52.5	98.1	126.0
Precast-top		-150.4	-76.3	85.2	483.2	994.0	1301.4	1412.9	1523.7
Bottom		1440.6	2630.4	2446.4	1988.9	1387.1	1000.8	823.3	675.7
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		-335.6	-316.3	-280.5	-195.6	-103.4	-59.5	-24.5	1.7
Precast-top		-265.7	-218.1	-118.0	125.1	420.7	584.0	649.3	714.2
Bottom		1300.4	1863.1	1712.2	1349.0	925.7	703.6	585.8	482.9

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-51 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Negative Stresses at Final 1, Span 1, Beam 1, SERVICE 1

REINFORCED DESIGN

REINFORCED DESIGN - Span : 1, Beam : 1, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
2	10.68	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
3	21.35	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
4	32.03	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
5	42.70	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
6	53.38	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
7	64.05	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
8	74.72	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
9	85.40	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
10	96.08	-973.2	8.00	78.37	2.00	-3176.9	0.000	3.704	0.000*	-0.0
11	106.75	-4228.0	8.00	78.37	2.00	-3176.9	0.000	12.366	0.000*	-0.0

(b) POSITIVE MOMENTS AT PIERS

NONE

DESIGN SUMMARY

Span: 1, Beam: 1, Exterior beam

Beam type:	I-Girder,	OHIO-MOD-72-TYPE-IV
Precast Length,	ft	106.75
Release Length,	ft	106.75
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-SP-1	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28000.0
No. of strands:	43	
	Draped:	9
	Straight:	34
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.65 %	
Final losses:	21.82 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00	8.42	
Precast Top w/ reinf.	-530.33		
Precast Bot (compression)	3000.00	2656.08	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	11789.56	7935.10	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	408.9 / 17.9	1800.0	136.2	1800.0	340.8

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1730.7 / 4.4	2800.0	1523.7	2800.0	968.8
Precast Bot	4200.0/-502.0	2133.9 / 45.7	2800.0	2197.5	2800.0	1035.1

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	64.7 /-426.2	1800.0	126.0	1800.0	1.7
Precast Top	4200.0/-502.0	1476.1 /-340.9	2800.0	1523.7	2800.0	714.2
Precast Bot	4200.0/-502.0	3178.3 / 820.8	2800.0	2630.4	2800.0	1863.1

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 52.46 ft

	Release	Mult	Erection	Mult	Final
Prestress	2.757	1.80	4.963	2.20	6.066
Self Wt.	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch			-0.900	2.30	-2.071
Prec. DL+ADL			-0.095	3.00	-0.286
Diaphragm			-0.106	3.00	-0.317
Comp. DL+ADL			-0.153	3.00	-0.458
Live Load					-0.314
Total	1.656		1.672		-0.023

Positive values indicate upward deflection.

PROJECT DATA

Project:	Portsmouth Bypass
Designer:	RBK
Date:	May/1/2009
User job number:	KZF #5355.02
State:	Ohio, State Job #:PID 19415
State Specification:	None
Design Mode:	AASHTO Standard (LFD)- US Units [17th Edition, 2003]
Flared Girder:	No
Comments:	Bridge No. SCI-823-0837 L/R SFN 7306458/7306466 SR 823 Over Swauger Valley Minford Road (CR 31)
File Name:	F:\Projects\535502\19415\structures\SCI823_0837C\engapps\CONSPAN\535502_SCI-823-0837.csl

SPAN 1

INTERIOR

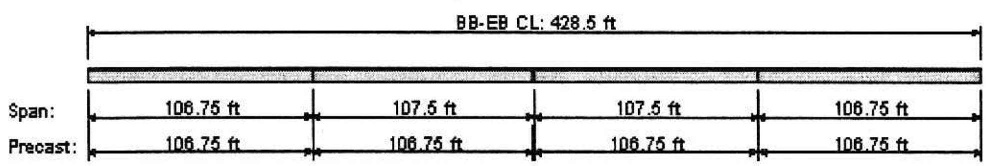
GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	48.458
Left curb (ft)	1.500
Right curb (ft)	1.458
curb-to-curb width (ft)	45.500
Number of spans	4
Number of lanes	2
Lane width (ft)	12.000
Topping thickness (in)	8.750
Haunch thickness (in)	2.000
Haunch width (in)	36.000

SPAN DATA

Span	Pier-to-pier ft	Precast ft	Brg-to-brg ft	Pier CL ft	Release ft	StartSkew	EndSkew
1	106.750	106.750	104.917	0.000	106.750	0.00	0.00
2	107.500	106.750	105.083	0.375	106.750	0.00	0.00
3	107.500	106.750	105.083	0.375	106.750	0.00	0.00
4	106.750	106.750	104.917	0.375	106.750	0.00	0.00



Bridge elevation section for all spans

BEAM DATA
Span: 1

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 2

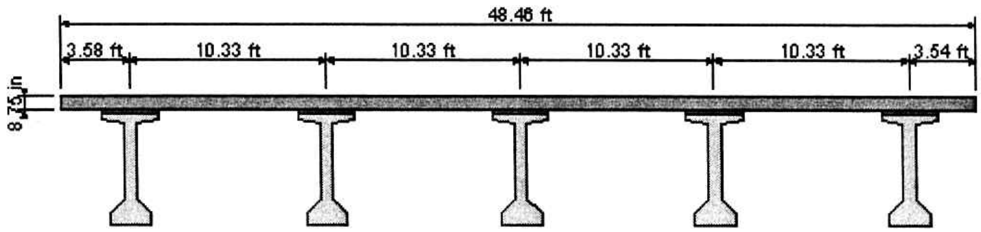
No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 3

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 4

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708



Bridge cross section for Span 1, Span 2, Span 3, Span 4

MATERIAL DATA

CONCRETE PROPERTIES

	Precast	C.I.P
f'c (ksi)	7000.000	4500.000
Wc (pcf)	150.000	150.000
Ec (ksi)	5072.240	4066.840
f'ci (psi)	5000.000	
Eci (ksi)	4286.830	

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:

1/2-270K-SP-1, Low relaxation strands
Depressed at 0.40L (42.70 ft from member end)
Strand Diameter = 0.500
Ult. Strength(f's) = 270.0 ksi
Strand Area = 0.167 in2
Use transformed strand and rebar: No

REINFORCING STEEL:

Tension steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

LOADS DATA

LOADS ON PRECAST

UNITS: (Point: kips, Location: ft, Line: klf)

Span	Beam	DL/ADL	Type	Mag.	Loc.	Description
1	1	DL	Line	0.109	-	Sacrificial Wearing Surface
1	2	DL	Line	0.129	-	Sacrificial Wearing Surface
1	3	DL	Line	0.129	-	Sacrificial Wearing Surface
1	4	DL	Line	0.129	-	Sacrificial Wearing Surface
1	5	DL	Line	0.109	-	Sacrificial Wearing Surface
2	1	DL	Line	0.109	-	Sacrificial Wearing Surface
2	2	DL	Line	0.129	-	Sacrificial Wearing Surface
2	3	DL	Line	0.129	-	Sacrificial Wearing Surface
2	4	DL	Line	0.129	-	Sacrificial Wearing Surface
2	5	DL	Line	0.109	-	Sacrificial Wearing Surface
3	1	DL	Line	0.109	-	Sacrificial Wearing Surface
3	2	DL	Line	0.129	-	Sacrificial Wearing Surface
3	3	DL	Line	0.129	-	Sacrificial Wearing Surface
3	4	DL	Line	0.129	-	Sacrificial Wearing Surface
3	5	DL	Line	0.109	-	Sacrificial Wearing Surface
4	1	DL	Line	0.109	-	Sacrificial Wearing Surface
4	2	DL	Line	0.129	-	Sacrificial Wearing Surface
4	3	DL	Line	0.129	-	Sacrificial Wearing Surface
4	4	DL	Line	0.129	-	Sacrificial Wearing Surface
4	5	DL	Line	0.109	-	Sacrificial Wearing Surface

DIAPHRAGM LOADS

(kips, ft)

Span	Beam	Mag.	Loc.
1	1	2.967	14.958
1	1	2.967	39.958
1	1	2.967	64.958
1	1	2.967	89.958
1	2	5.934	14.958
1	2	5.934	39.958
1	2	5.934	64.958
1	2	5.934	89.958
1	3	5.934	14.958
1	3	5.934	39.958
1	3	5.934	64.958
1	3	5.934	89.958
1	4	5.934	14.958
1	4	5.934	39.958
1	4	5.934	64.958
1	4	5.934	89.958
1	5	2.967	14.958
1	5	2.967	39.958
1	5	2.967	64.958
1	5	2.967	89.958

Span	Beam	Mag.	Loc.
2	1	2.967	15.042
2	1	2.967	40.042
2	1	2.967	65.042
2	1	2.967	90.042
2	2	5.934	15.042
2	2	5.934	40.042
2	2	5.934	65.042
2	2	5.934	90.042
2	3	5.934	15.042
2	3	5.934	40.042
2	3	5.934	65.042
2	3	5.934	90.042
2	4	5.934	15.042
2	4	5.934	40.042
2	4	5.934	65.042
2	4	5.934	90.042
2	5	2.967	15.042
2	5	2.967	40.042
2	5	2.967	65.042
2	5	2.967	90.042
3	1	2.967	15.042
3	1	2.967	40.042
3	1	2.967	65.042
3	1	2.967	90.042
3	2	5.934	15.042
3	2	5.934	40.042
3	2	5.934	65.042
3	2	5.934	90.042
3	3	5.934	15.042
3	3	5.934	40.042
3	3	5.934	65.042
3	3	5.934	90.042
3	4	5.934	15.042
3	4	5.934	40.042
3	4	5.934	65.042
3	4	5.934	90.042
3	5	2.967	15.042
3	5	2.967	40.042
3	5	2.967	65.042
3	5	2.967	90.042
4	1	2.967	14.958
4	1	2.967	39.958
4	1	2.967	64.958
4	1	2.967	89.958
4	2	5.934	14.958
4	2	5.934	39.958
4	2	5.934	65.958
4	2	5.934	89.958
4	3	5.934	14.958
4	3	5.934	39.958
4	3	5.934	65.958
4	3	5.934	89.958
4	4	5.934	14.958
4	4	5.934	39.958
4	4	5.934	65.958
4	4	5.934	89.958
4	5	2.967	14.958

Span	Beam	Mag.	Loc.
4	5	2.967	39.958
4	5	2.967	65.958
4	5	2.967	89.958

LOADS ON COMPOSITE

UNITS: (Point: kips, Location: ft, Line: klf, Area: ksf, Width: ft)

Span	DL/ADL	Type	Mag.	Loc.	Description
1	DL	Line	0.639	-	Left Barrier Weight
1	DL	Line	0.715	-	Right Barrier Weight
1	ADL	Area	0.060	45.500	Future Wearing Surface
2	DL	Line	0.639	-	Left Barrier Weight
2	DL	Line	0.715	-	Right Barrier Weight
2	ADL	Area	0.060	45.500	Future Wearing Surface
3	DL	Line	0.639	-	Left Barrier Weight
3	DL	Line	0.715	-	Right Barrier Weight
3	ADL	Area	0.060	45.500	Future Wearing Surface
4	DL	Line	0.639	-	Left Barrier Weight
4	DL	Line	0.715	-	Right Barrier Weight
4	ADL	Area	0.060	45.500	Future Wearing Surface

LIVE LOADS

Live load deflection: not included.

ID: H/HS25 Lane	(Type: Lane Load)
ID: HS25 Truck	(Type: Truck Load)
ID: Military Truck	(Type: Truck Load)

LIVE LOADS USED

LIVE LOAD LIBRARY: Default.cs4

1 ID: H/HS25 Lane

Description:	H25/HS25 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.80 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 22.50 k,	Shear = 32.50 k

2 ID: HS25 Truck

Description:	HS25 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	40.00	14.00	14.00	0.00
2	40.00	30.00	14.00	2.00

3 ID: Military Truck

Description:	Military Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 24.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	24.00	4.00	4.00	0.00

INVENTORY LIVE LOAD

1 ID: H20 Truck

Description:	H20 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 8.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00

2 ID: H/HS20 Lane

Description:	H20/HS20 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.64 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 18.00 k,	Shear = 26.00 k

OPERATING LIVE LOAD

1 ID: HS20 Truck

Description:	HS20 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 8.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00
2	32.00	30.00	14.00	2.00

2 ID: H/HS20 Lane

Description:	H20/HS20 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.64 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 18.00 k,	Shear = 26.00 k

3 ID: 2F1 Truck

Description:	2F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	20.00	10.00	10.00	0.00

4 ID: 3F1 Truck

Description:	3F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	10.00	10.00	0.00

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
2	17.00	4.00	4.00	0.00

5 ID: 4F1 Truck

Description:	4F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	10.00	10.00	0.00
2	17.00	4.00	4.00	0.00
3	17.00	4.00	4.00	0.00

6 ID: 5C1 Truck

Description:	5C1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	12.00	12.00	0.00
2	17.00	4.00	4.00	0.00
3	17.00	31.00	31.00	0.00
4	17.00	4.00	4.00	0.00

ANALYSIS DATA

ANALYSIS PARAMETERS DATA

Span#	Beam#	Moment impact	Shear impact
1	1	1.217	Calculated (AASHTO 3.8.2.2)
1	2	1.217	Calculated (AASHTO 3.8.2.2)
1	3	1.217	Calculated (AASHTO 3.8.2.2)
1	4	1.217	Calculated (AASHTO 3.8.2.2)
1	5	1.217	Calculated (AASHTO 3.8.2.2)
2	1	1.217	Calculated (AASHTO 3.8.2.2)
2	2	1.217	Calculated (AASHTO 3.8.2.2)
2	3	1.217	Calculated (AASHTO 3.8.2.2)
2	4	1.217	Calculated (AASHTO 3.8.2.2)
2	5	1.217	Calculated (AASHTO 3.8.2.2)
3	1	1.217	Calculated (AASHTO 3.8.2.2)
3	2	1.217	Calculated (AASHTO 3.8.2.2)
3	3	1.217	Calculated (AASHTO 3.8.2.2)
3	4	1.217	Calculated (AASHTO 3.8.2.2)
3	5	1.217	Calculated (AASHTO 3.8.2.2)
4	1	1.217	Calculated (AASHTO 3.8.2.2)
4	2	1.217	Calculated (AASHTO 3.8.2.2)
4	3	1.217	Calculated (AASHTO 3.8.2.2)
4	4	1.217	Calculated (AASHTO 3.8.2.2)
4	5	1.217	Calculated (AASHTO 3.8.2.2)

NOTE: Beam specific dead and live load DFs are printed in beam level reports.

GAMMA/BETA FACTORS: (Table 3.22.1A)

	Service		Factored	
Gamma:	1.00		1.30	
Beta-D:	1.00		1.00	
Beta-L:	1.00	(Group 1)	1.67	(Group 1)

BENTLEY

Program:
CONSPAN® Rating
Version: 8.0.0
File Name: 535502_SCI-823-0837.csl

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

www.leapsoft.com
1-800-451-5327

Sheet: DS-13
Job No: **KZF #5355.02**

By: RBK
Date: May/1/2009
CKD:
Date:

PROJECT PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	=	1.00
	Debonded	=	1.00
Dev len mult:	Bonded	=	1.60
	Debonded	=	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
Self. Wt:	1.85	2.40
Deck + Haunch:		2.30
Diaphragm:		3.00
Prec.DL+ADL:		3.00
Comp.DL+ADL:		3.00

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	Strain Compatibility method.
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED
Negative Moment Design, Non-composite Moment effects in Mu:	INCLUDED

STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi

	PRECAST		DECK	
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.5.3)
Hours to release = 18.00
Rel. Humid.(RH) = 75.0 %

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-15 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

PROPERTIES

Span: 1, Beam: 2

PRECAST DATA:

Section Id	OHIO-MOD-72-TYPE-IV						
Type	I-Girder						
Flng width	Top	36.000	in	Bot	26.000	in	
thick	Top	4.000	in	Bot	8.000	in	
Stems	No	1					
	Top	8.000	in				
	Bot	8.000	in				
Shear width		8.000	in				
Wide top Flange	NO						

GENERAL BRIDGE DATA:

Bridge Width	48.46	ft
Curb-to-curb	45.50	ft
Beam Spac. Lt./Rt	10.33/ 10.33	ft
Lane width	12.00	ft
Number of lanes	2	
Interior/Exterior	Interior	

TOPPING DATA:

Deck	Thickness	8.750	in	
Haunch:				
	Thickness	2.000	in	
	Width	36.000	in	
Effective	width	124.000	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.129	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
5.93	14.96
5.93	39.96
5.93	64.96
5.93	89.96

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length	106.750	ft
Release length	106.750	ft
Design length	104.917	ft

KERN POINTS:

Upper	53.16	in
Lower	17.26	in

DISTRIBUTION FACTORS (Art. 3.23):

Live Negative Moment (Group 1)	0.939	(Calculated)
Live Positive Moment (Group 1)	0.939	(Calculated)
Live Shear (Group 1)	0.939	(Calculated)

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian	0.200	(Calculated)
Comp. DL	0.200	(Calculated)
Comp. ADL	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

Span: 1, Beam: 2

SECTION PROPERTIES:

	PRECAST		COMPOSITE		
Area	955.4	in2	1883.1	in2	#
Total Height	72.00	in	82.75	in	
Mom. of Inertia (Ixx)	616109	in4	1518798	in4	#
Ht. of c.g.	34.42	in	55.91	in	#
Density	150.00	pcf	150.00	pcf	
Self-weight	995.2	plf	2200.4	plf	
Mom. of Inertia (Iyy)	37816.0	in4			
Poisson's Ratio	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 1, Beam: 2
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

Span: 1, Beam: 2

PRESTRESSED STEEL:

43 strands, 1/2-270K-SP-1, Low relaxation strands
Depressed at 0.40L (42.70 ft from member end)

END PATTERN (Ycg = 17.21 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	4 @ 8.000 in
3 @ 64.000 in	3 @ 66.000 in	3 @ 68.000 in	

MID PATTERN (Ycg = 5.07 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in	3 @ 10.000 in	

(B) Straight:

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	4 @ 8.000 in

Strand Diameter	0.500	in
Strand Area	0.167	in2
Total Strand Area	7.181	in2

Trans. Len,bonded	2.083	ft
Trans. Len,debonded	2.083	ft
Dev. Len, bonded	10.829	ft
Dev. Len, debonded	13.537	ft
Holddown Force	34.232	kips
Holddown Force	270.0	ksi
Initial Prestress = 0.75f's	202.5	ksi
Initial Pull	1454.2	kips
Beam Shrtng (PL/AE)	0.415	in

BENTLEY

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

Sheet: DS-20
Job No: **KZF #5355.02**

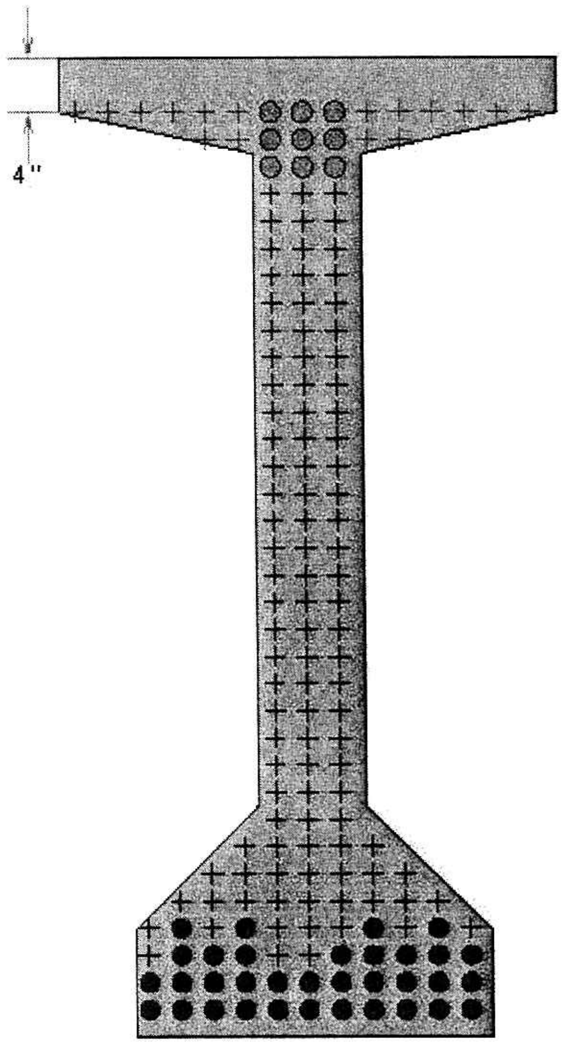
Program:
CONSPAN® Rating
Version: 8.0.0
File Name: 535502_SCI-823-0837.csl

www.leapsoft.com
1-800-451-5327

By: RBK
Date: May/1/2009
CKD:
Date:

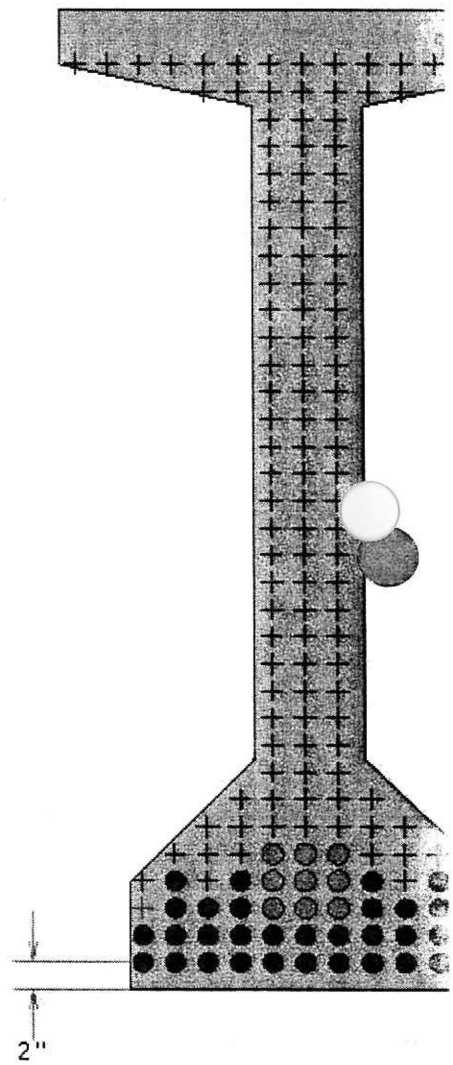
ENDS

MIDSPAN



No. Strands	Distance from bottom(in)
3	68
3	66
3	64

No. Strands	Distance from bottom(in)
4	8
8	6
11	4
11	2



NOTE: Debonded/Shielded strands or strands with reduced pull not marked.

Strand Pattern, Span 1, Beam 2

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi
fs	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	5.2821
2	US#4[M13]	60.0	0.40	12.00	5.2821	9.7932
2	US#4[M13]	60.0	0.40	18.00	9.7932	18.5889
2	US#4[M13]	60.0	0.40	24.00	18.5889	22.5751
2	US#4[M13]	60.0	0.40	18.00	22.5751	28.3525
2	US#4[M13]	60.0	0.40	12.00	28.3525	37.7027
2	US#4[M13]	60.0	0.40	18.00	37.7027	44.7990
2	US#4[M13]	60.0	0.40	24.00	44.7990	61.9510
2	US#4[M13]	60.0	0.40	18.00	61.9510	69.0473
2	US#4[M13]	60.0	0.40	12.00	69.0473	78.3975
2	US#4[M13]	60.0	0.40	18.00	78.3975	84.1749
2	US#4[M13]	60.0	0.40	24.00	84.1749	88.1611
2	US#4[M13]	60.0	0.40	18.00	88.1611	96.9568
2	US#4[M13]	60.0	0.40	12.00	96.9568	101.4679
2	US#4[M13]	60.0	0.40	6.00	101.4679	106.7500

LOSSES

Note: Values are calculated at Midspan

Str. area	7.1810	in2
Ycg	5.07	in
P_init	1454.2	kips
Ecc	29.35	in
Hours to release	18.00	
Rel. Humid.(RH)	75.0	%
Es	28000.0	ksi
Eci	4287	ksi

AASHTO LOSSES

		Release				Final	(Art. 9.16.2)
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2183.98	psi	
Elastic Shortening		15919.13	psi	ES (Eq 9-6)	15919.13	psi	(Fcir=2437.24 psi)
Concrete shrinkage		0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep		0.00	psi	CRc (Eq 9-9)	18732.10	psi	(Fcds=-1502.11 psi)

		Release			**Final**	**(Art. 9.16.2)**
Total	17519.61	psi	(8.65 %)	42585.21	psi	(21.03 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 2, SERVICE 1
Shears: kips, Moments: kft

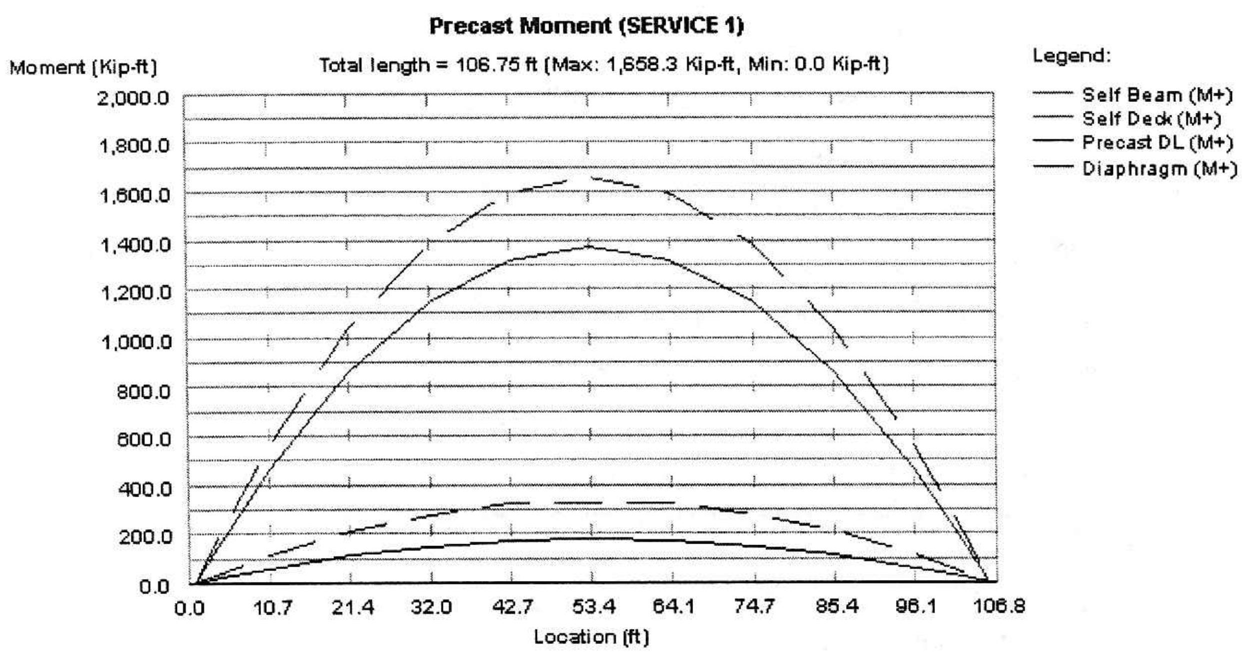
		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Self wt. :	M	0.0	60.2	174.1	462.1	859.0	1142.5	1312.6	1369.3
	V	52.2	51.0	48.8	42.5	31.9	21.2	10.6	0.0
Prec. :	M	-0.0	7.8	22.6	60.0	111.5	148.3	170.4	177.7
DL+ADL	V	6.8	6.6	6.3	5.5	4.1	2.8	1.4	0.0
Deck :	M	0.0	72.9	210.8	559.6	1040.3	1383.6	1589.6	1658.3
+ Haunch	V	63.2	61.8	59.1	51.5	38.6	25.7	12.9	0.0
Diaphragm :	M	-0.0	15.3	44.2	115.8	210.0	273.4	325.9	325.9
	V	11.9	11.9	11.9	11.9	5.9	5.9	0.0	0.0
Comp. :	M	31.0	69.5	141.6	318.7	544.4	676.9	716.4	662.8
DL+ADL	V	33.5	32.5	30.7	25.5	16.8	8.1	0.7	9.4
LL + I :	M+	82.7	185.1	376.2	841.1	1415.3	1743.1	1878.2	1832.6
	V	90.5	89.3	86.6	79.4	67.4	49.3	37.7	47.5
LL + I :	M-	-7.2	-16.5	-34.5	-84.4	-168.8	-253.3	-337.7	-422.1
	V	84.4	75.4	57.5	8.0	8.0	8.1	8.2	8.3
LL + I :	Vmx	90.5	89.3	86.6	79.4	67.4	55.8	44.6	54.3
	M	82.7	185.1	376.2	841.1	1415.3	1737.6	1830.2	1777.9
Total :	M+	113.7	411.0	969.4	2357.3	4180.4	5367.8	5993.2	6026.7
	V	258.1	253.1	243.3	216.3	164.8	113.1	63.3	56.9
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	257.0	252.2	242.6	216.3	164.8	119.5	70.1	63.7
	M	113.7	411.0	969.4	2357.3	4180.4	5362.3	5945.2	5971.9

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.13	73.81	84.48	95.16	101.47	103.75	104.92
Self wt. :	M	1312.6	1142.5	859.0	462.1	174.1	60.2	0.0
	V	10.6	21.2	31.9	42.5	48.8	51.0	52.2
Prec. :	M	170.4	148.3	111.5	60.0	22.6	7.8	-0.0
DL+ADL	V	1.4	2.8	4.1	5.5	6.3	6.6	6.8
Deck :	M	1589.6	1383.6	1040.3	559.6	210.8	72.9	0.0
+ Haunch	V	12.9	25.7	38.6	51.5	59.1	61.8	63.2
Diaphragm :	M	325.9	273.4	210.0	115.8	44.2	15.3	-0.0
	V	0.0	5.9	5.9	11.9	11.9	11.9	11.9
Comp. :	M	516.2	276.4	-56.4	-482.3	-777.9	-892.7	-953.1
DL+ADL	V	18.1	26.8	35.5	44.3	49.4	51.3	52.2
LL + I :	M+	1631.7	1267.6	783.6	316.5	220.5	205.7	207.6
	V	58.2	67.8	76.1	31.9	14.1	7.7	9.0
LL + I :	M-	-506.5	-591.0	-675.4	-1031.5	-1422.6	-1593.9	-1687.6
	V	8.2	8.1	8.0	57.4	71.2	76.2	78.7
LL + I :	Vmx	65.3	75.2	84.0	91.4	94.7	95.9	96.9
	M	1607.7	1261.5	780.3	212.3	-113.5	-229.5	-1192.1
Total :	M+	5546.4	4491.8	2948.0	1031.6	0.0	0.0	0.0
	V	101.2	150.3	192.2	187.5	0.0	0.0	0.0
Total :	M-	0.0	0.0	0.0	-316.4	-1748.8	-2330.3	-2640.7
	V	0.0	0.0	0.0	213.0	246.7	258.9	265.0
Total :	Vmx	108.3	157.7	200.1	247.0	270.1	278.5	283.2
	M	5522.4	4485.7	2944.6	927.4	-439.7	-965.9	-2145.2

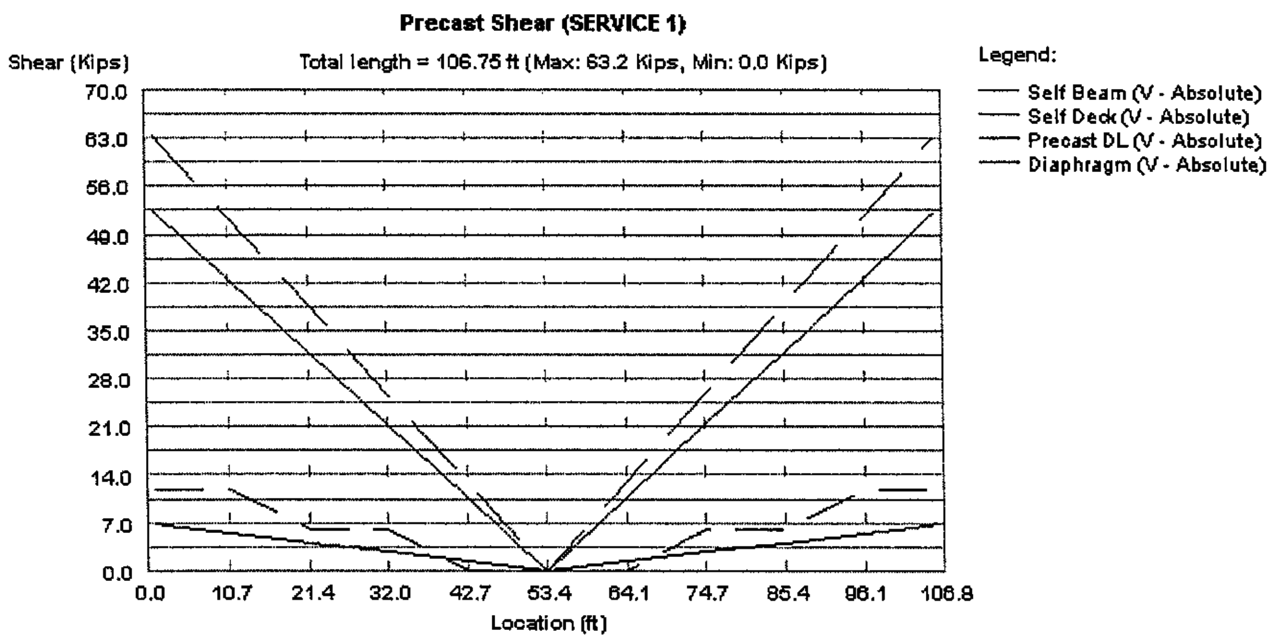
REACTIONS (kips), SERVICE 1

Load Type		Left Support	Right Support
Self Wt.		52.2	52.2
Deck+Haunch		63.2	63.2
Diaphragm		11.9	11.9
Prec.DL+ADL		6.8	6.8
Comp. DL+ADL		171.1	499.4
Live	(Max)	80.1	137.2
Live	(Min)	-7.2	-11.2
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

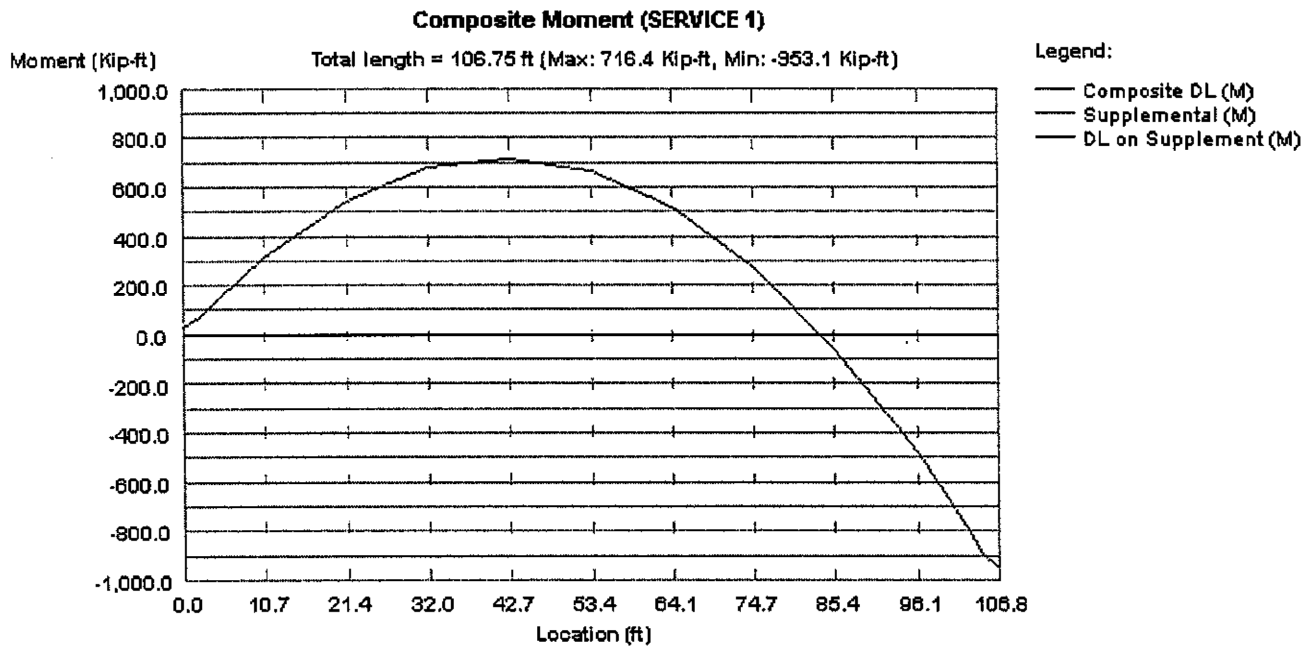
Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.



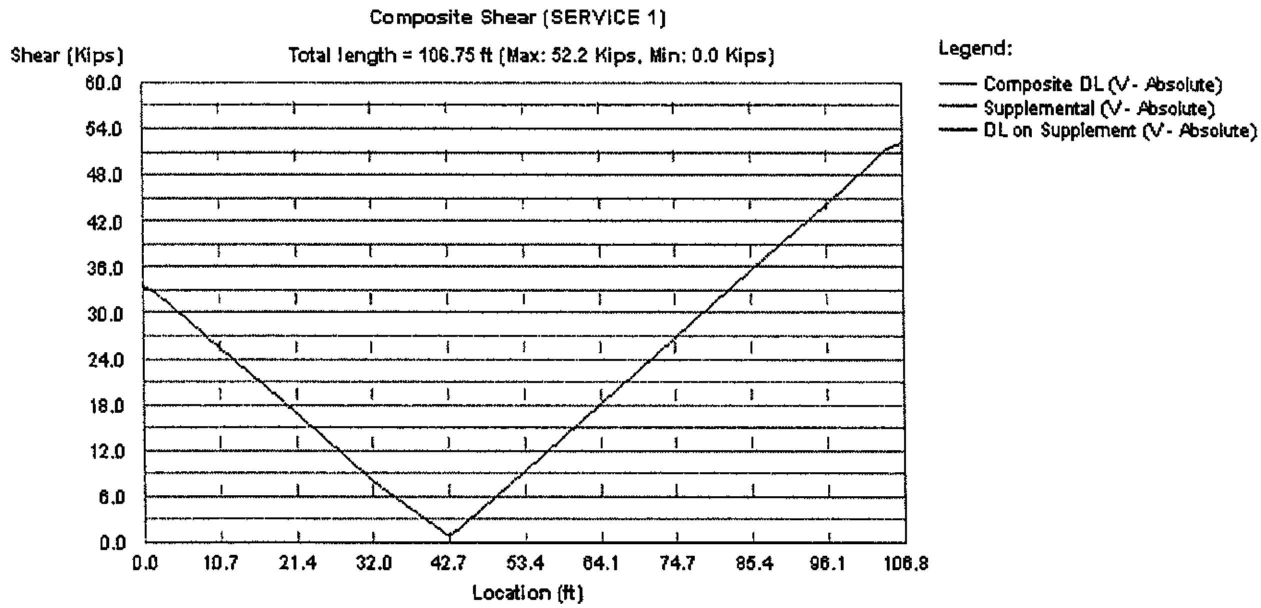
Precast Moment, Span 1, Beam 2, SERVICE 1



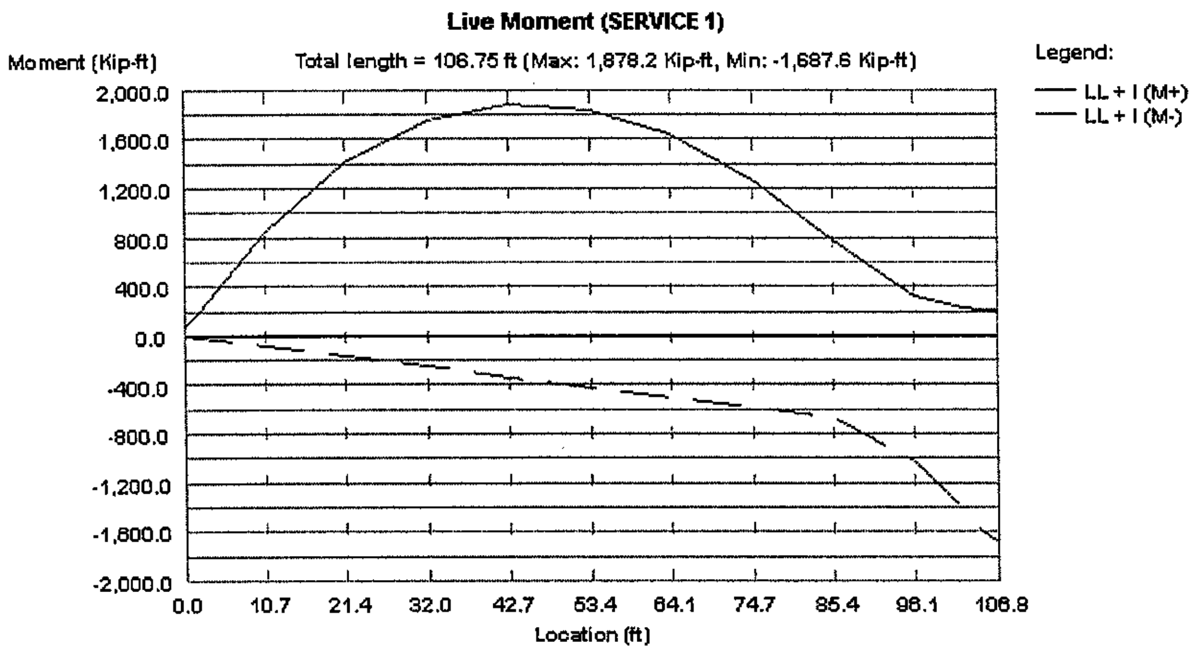
Precast Shear, Span 1, Beam 2, SERVICE 1



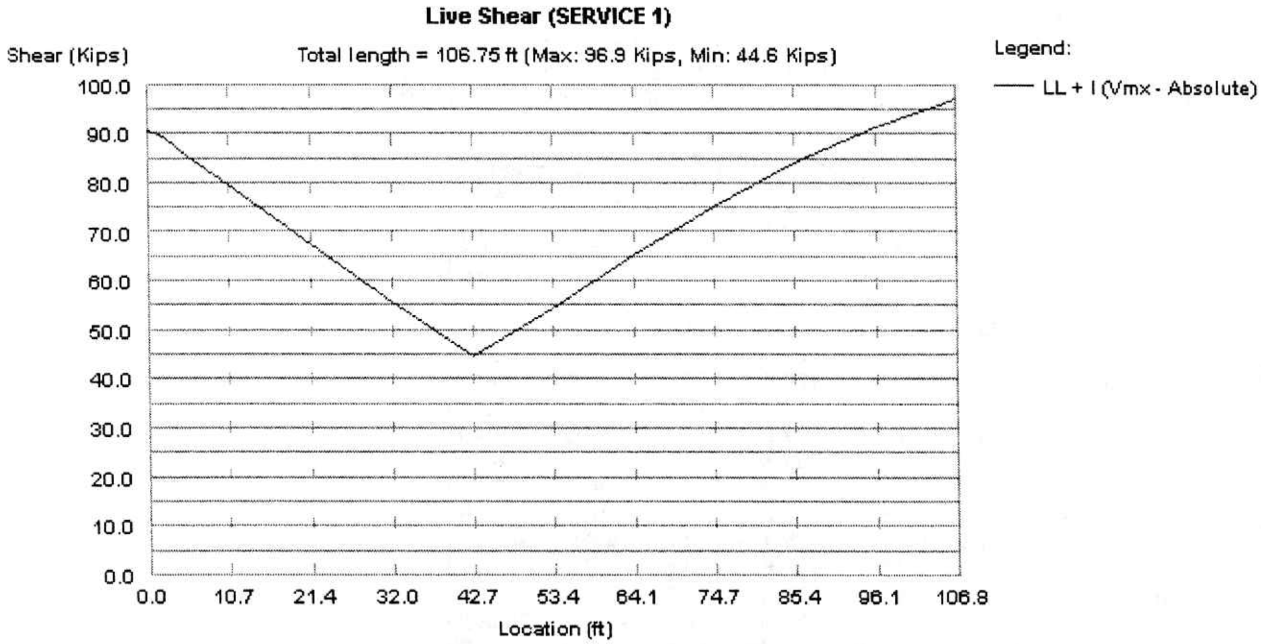
Composite Moment, Span 1, Beam 2, SERVICE 1



Composite Shear, Span 1, Beam 2, SERVICE 1



Live Moment, Span 1, Beam 2, SERVICE 1



Live Shear, Span 1, Beam 2, SERVICE 1

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 2, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Self wt. :	M	0.0	78.3	226.3	600.7	1116.7	1485.3	1706.4	1780.2
	V	67.9	66.4	63.4	55.2	41.4	27.6	13.8	0.0
Prec. :	M	-0.0	10.2	29.4	78.0	144.9	192.8	221.5	231.0
DL+ADL	V	8.8	8.6	8.2	7.2	5.4	3.6	1.8	0.0
Deck :	M	0.0	94.8	274.1	727.4	1352.3	1798.7	2066.5	2155.8
+ Haunch	V	82.2	80.4	76.8	66.9	50.2	33.5	16.7	0.0
Diaphragm :	M	-0.0	19.9	57.4	150.6	273.0	355.4	423.6	423.6
	V	15.4	15.4	15.4	15.4	7.7	7.7	0.0	0.0
Comp. :	M	40.3	90.4	184.0	414.3	707.7	880.0	931.3	861.7
DL+ADL	V	43.5	42.3	39.8	33.1	21.8	10.5	0.9	12.2
LL + I :	M+	179.6	401.9	816.7	1826.1	3072.6	3784.3	4077.6	3978.5
	V	196.5	193.8	188.0	172.4	146.4	107.1	81.9	103.2
LL + I :	M-	-15.7	-35.8	-74.9	-183.3	-366.6	-549.9	-733.1	-916.4
	V	183.3	163.7	124.9	17.3	17.5	17.6	17.9	18.1
LL + I :	Vmx	196.5	193.8	188.0	172.4	146.4	121.1	96.7	118.0

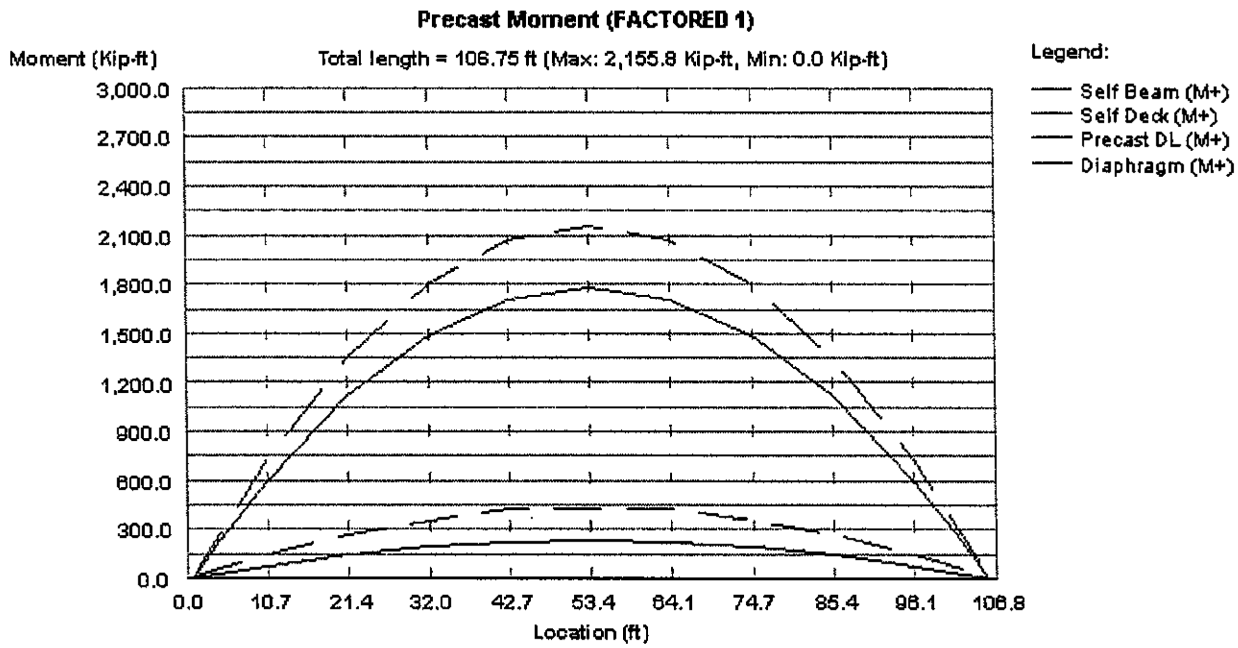
		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
	M	179.6	401.9	816.7	1826.1	3072.6	3772.3	3973.5	3859.7
Total :	M+	219.9	695.5	1587.9	3797.1	6667.3	8496.5	9427.0	9430.8
	V	414.3	406.8	391.7	350.3	272.9	190.0	115.1	115.4
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	412.1	404.9	390.3	350.3	272.9	203.9	129.9	130.2
	M	219.9	695.5	1587.9	3797.1	6667.3	8484.4	9322.9	9312.0

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.13	73.81	84.48	95.16	101.47	103.75	104.92
Self wt. :	M	1706.4	1485.3	1116.7	600.7	226.3	78.3	0.0
	V	13.8	27.6	41.4	55.2	63.4	66.4	67.9
Prec. :	M	221.5	192.8	144.9	78.0	29.4	10.2	-0.0
DL+ADL	V	1.8	3.6	5.4	7.2	8.2	8.6	8.8
Deck :	M	2066.5	1798.7	1352.3	727.4	274.1	94.8	0.0
+ Haunch	V	16.7	33.5	50.2	66.9	76.8	80.4	82.2
Diaphragm :	M	423.6	355.4	273.0	150.6	57.4	19.9	-0.0
	V	0.0	7.7	7.7	15.4	15.4	15.4	15.4
Comp. :	M	671.0	359.3	-73.3	-627.0	-1011.2	-1160.5	-1239.0
DL+ADL	V	23.5	34.9	46.2	57.5	64.2	66.7	67.9
LL + I :	M+	3542.5	2751.9	1701.3	687.2	478.7	446.6	450.8
	V	126.4	147.2	165.3	69.3	30.6	16.7	19.6
LL + I :	M-	-1099.7	-1283.0	-1466.3	-2239.4	-3088.5	-3460.4	-3663.8
	V	17.9	17.6	17.5	124.6	154.6	165.5	170.9
LL + I :	Vmx	141.8	163.3	182.3	198.5	205.5	208.2	210.3
	M	3490.4	2738.7	1694.0	460.9	-246.5	-498.2	-2588.2
Total :	M+	8631.5	6943.4	4514.9	1616.8	54.6	0.0	0.0
	V	182.3	254.4	316.2	271.6	258.7	0.0	0.0
Total :	M-	0.0	0.0	0.0	-1309.8	-3512.6	-4417.7	-4902.9
	V	0.0	0.0	0.0	326.8	382.7	403.0	413.1
Total :	Vmx	197.7	270.6	333.2	400.8	433.6	445.6	452.5
	M	8579.5	6930.2	4507.7	1390.5	-670.5	-1455.5	-3827.2

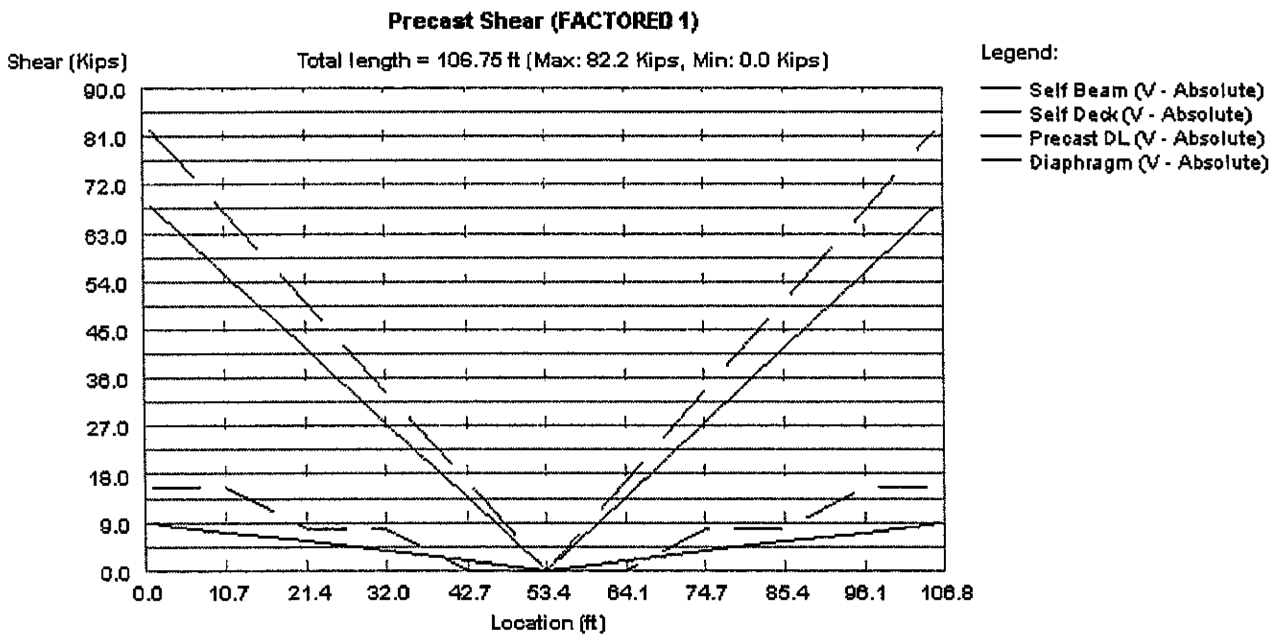
REACTIONS (kips), FACTORED 1

Load Type		Left Support	Right Support
Self Wt.		67.9	67.9
Deck+Haunch		82.2	82.2
Diaphragm		15.4	15.4
Prec.DL+ADL		8.8	8.8
Comp. DL+ADL		222.4	649.2
Live	(Max)	173.9	298.0
Live	(Min)	-15.7	-24.3
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

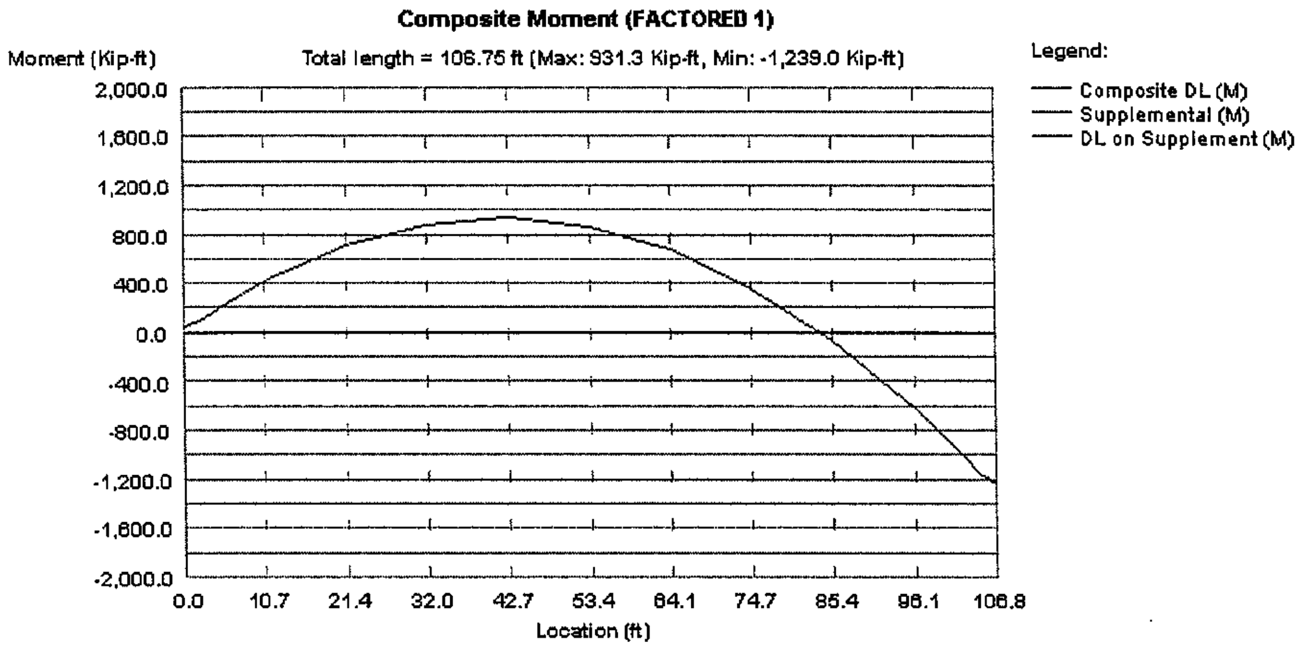
Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.



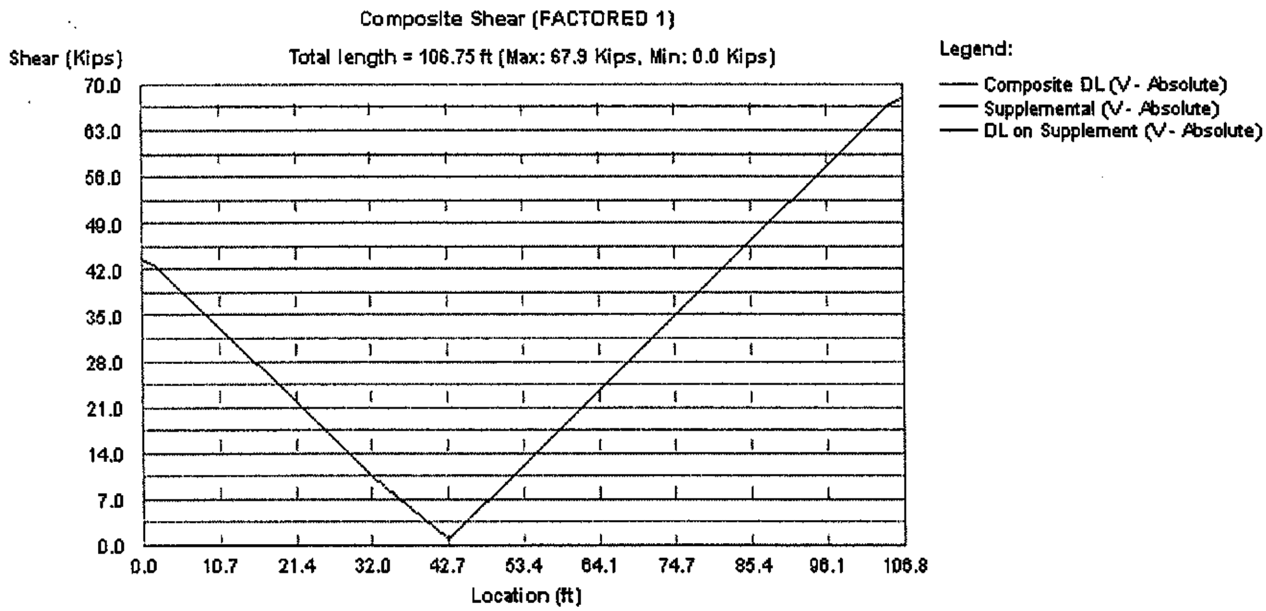
Precast Moment, Span 1, Beam 2, FACTORED 1



Precast Shear, Span 1, Beam 2, FACTORED 1



Composite Moment, Span 1, Beam 2, FACTORED 1



Composite Shear, Span 1, Beam 2, FACTORED 1

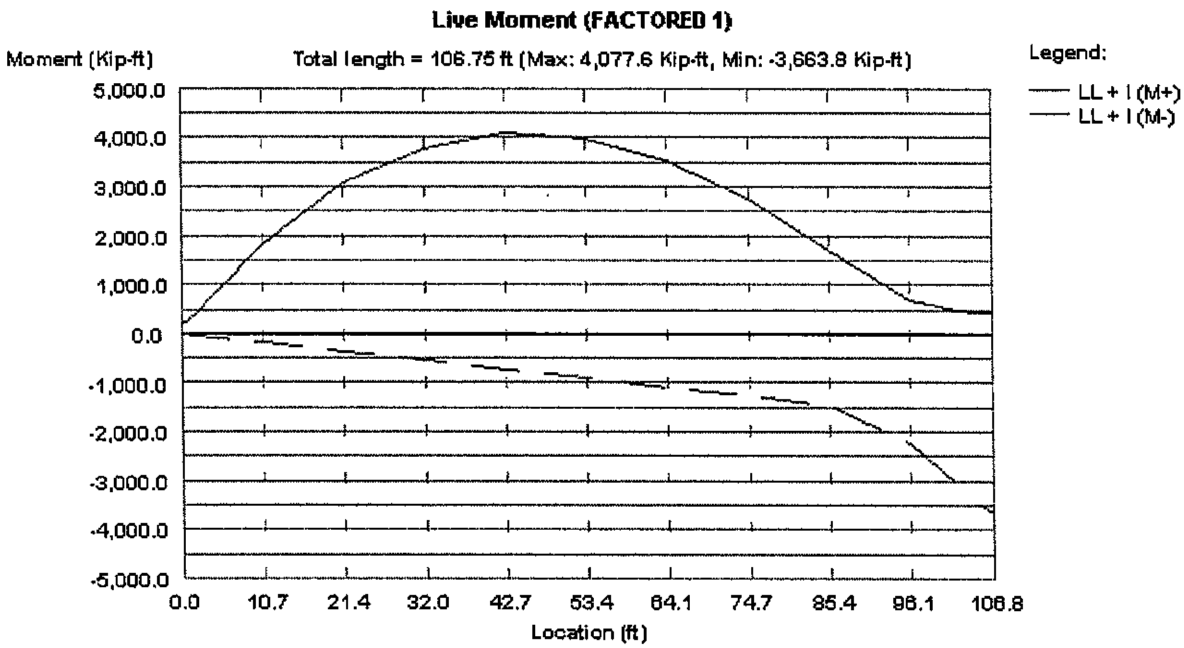
BENTLEY

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

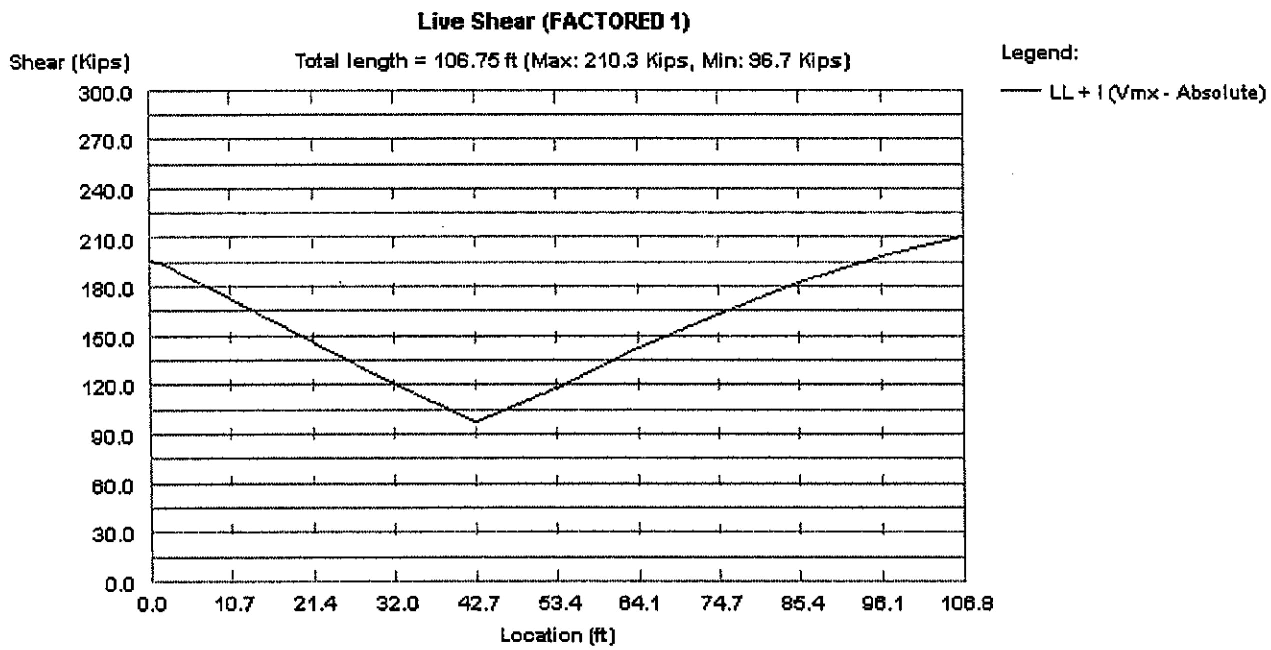
Sheet: DS-35
Job No: **KZF #5355.02**

Program:
CONSPAN® Rating
Version: 8.0.0
File Name: 535502_SCI-823-0837.csl

By: RBK
Date: May/1/2009
CKD:
Date:



Live Moment, Span 1, Beam 2, FACTORED 1



Live Shear, Span 1, Beam 2, FACTORED 1

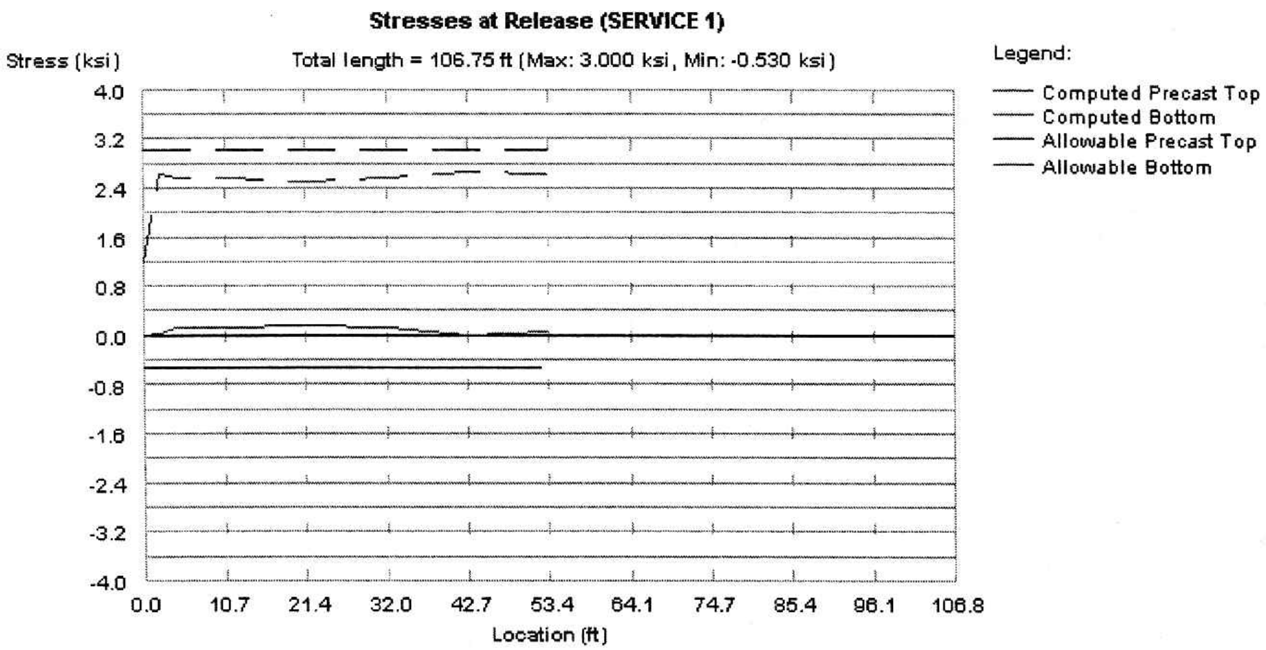
POSITIVE ENVELOPE STRESSES

Span : 1, Beam : 2, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.65 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	10.68	21.35	32.03	42.70	53.38
Self Wt.						
Precast-top	79.4	373.5	664.1	871.6	996.1	1037.6
Bottom	-72.7	-342.1	-608.2	-798.3	-912.4	-950.4
Prestress						
Precast-top	-52.1	-250.0	-495.9	-741.8	-987.7	-987.7
Bottom	2711.5	2892.8	3118.0	3343.2	3568.4	3568.4
Total						
Precast-top	27.3	123.5	168.2	129.8	8.4	49.9
Bottom	2638.8	2550.6	2509.8	2544.9	2656.1	2618.1
...top (in2)	0.000	0.000	0.000	0.000	0.000	0.000

Span : 1, Beam : 2, SERVICE 1



Stresses at Release, Span 1, Beam 2, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 21.03%)

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Prestress									
Precast-top		-9.6	-45.0	-90.5	-216.1	-428.7	-641.3	-853.9	-853.9
Bottom		1022.0	2344.1	2385.7	2500.8	2695.5	2890.2	3084.9	3084.9
Self wt.									
Precast-top		0.0	44.1	127.4	338.2	628.7	836.3	960.8	1002.3
Bottom		-0.0	-40.4	-116.7	-309.8	-575.9	-766.0	-880.0	-918.0
Prec. DL+ADL									
Precast-top		-0.0	5.7	16.5	43.9	81.6	108.5	124.7	130.1
Bottom		0.0	-5.2	-15.1	-40.2	-74.7	-99.4	-114.2	-119.1
Diaphragm									
Precast-top		-0.0	11.2	32.3	84.8	153.7	200.1	238.5	238.5
Bottom		-0.0	-10.3	-29.6	-77.6	-140.8	-183.3	-218.5	-218.5

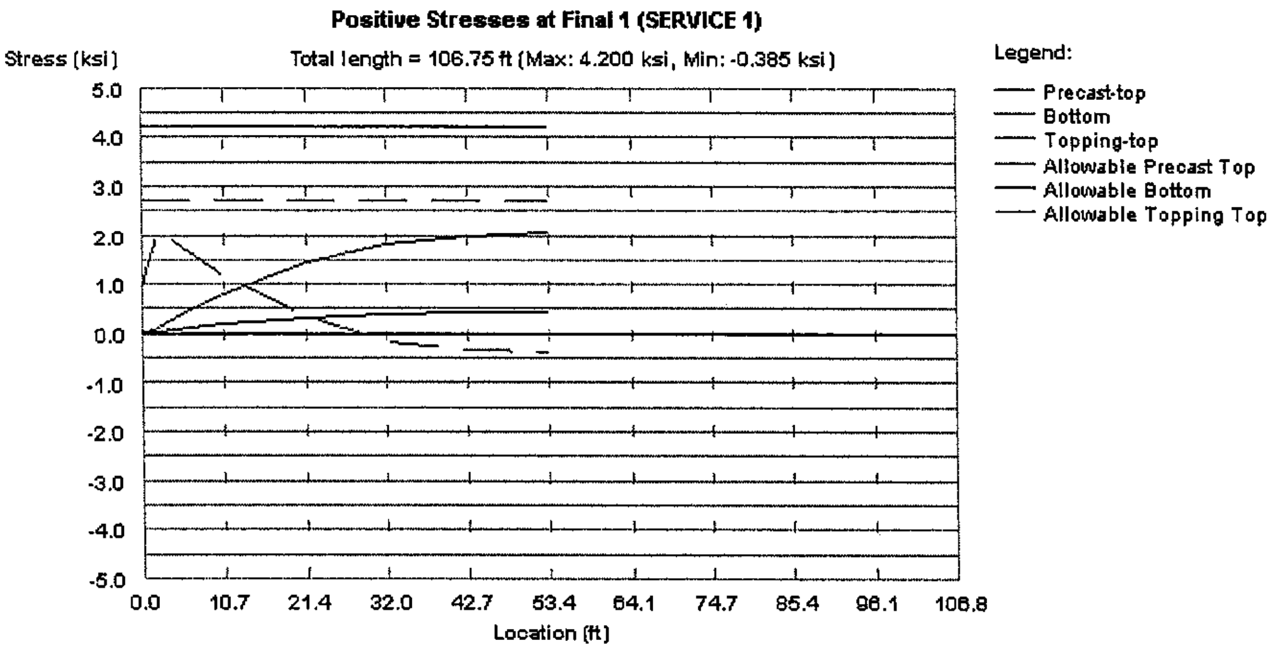
	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Deck + Haunch								
Precast-top	0.0	53.4	154.3	409.6	761.4	1012.7	1163.5	1213.8
Bottom	-0.0	-48.9	-141.3	-375.1	-697.4	-927.6	-1065.7	-1111.7
Comp. DL+ADL								
Topping-top	5.3	11.8	24.1	54.2	92.6	115.1	121.8	112.7
Precast-top	3.9	8.8	18.0	40.5	69.2	86.1	91.1	84.3
Bottom	-13.7	-30.7	-62.5	-140.8	-240.5	-299.0	-316.5	-292.8
LL+I(+)								
Topping-top	14.1	31.5	64.0	143.0	240.6	296.4	319.4	311.6
Precast-top	10.5	23.5	47.8	106.9	179.9	221.6	238.8	233.0
Bottom	-36.5	-81.8	-166.2	-371.6	-625.2	-770.0	-829.7	-809.5
Final 1 (P/S + DL + LL)								
Topping-top	19.3	43.3	88.0	197.2	333.2	411.5	441.2	424.3
Precast-top	4.9	101.8	306.0	807.8	1445.9	1824.0	1963.5	2048.1
Bottom	971.8	2126.8	1854.2	1185.7	341.0	-155.0	-339.6	-384.8
Final 2 (P/S + DL)								
Topping-top	5.3	11.8	24.1	54.2	92.6	115.1	121.8	112.7
Precast-top	-5.7	78.2	258.1	700.8	1266.0	1602.4	1724.8	1815.1
Bottom	1008.3	2208.6	2020.4	1557.3	966.2	615.0	490.1	424.8
Final 3 (50% P/S + 50% DL + LL)								
Topping-top	16.7	37.4	76.0	170.1	286.9	353.9	380.3	368.0
Precast-top	7.7	62.6	176.9	457.4	812.9	1022.8	1101.2	1140.5
Bottom	467.6	1022.5	844.0	407.1	-142.1	-462.5	-584.6	-597.1

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

Sheet: DS-40
Job No: **KZF #5355.02**

Program:
CONSPAN® Rating
Version: 8.0.0
File Name: 535502_SCI-823-0837.csl

By: RBK
Date: May/1/2009
CKD:
Date:



Positive Stresses at Final 1, Span 1, Beam 2, SERVICE 1

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 1, Beam : 2, FACTORED 1

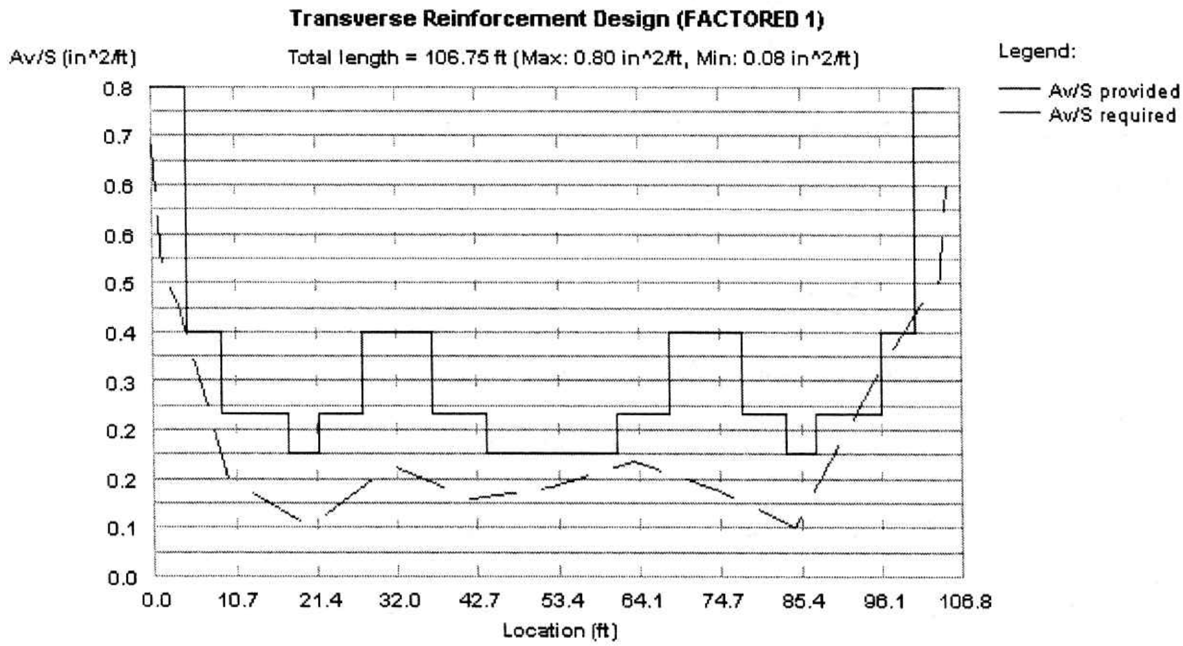
End Shear Design: Prestressed.

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
Bearing :	0.92	167.5	31.0	82.7	391.7	219.9	414.3	188.9	246.8
1022.0	-13.7	3419.0	66.20	4661.3	75.3	4661.3	221.0	11.9	202.1
202.1	233.2	354.5	0.70	0.08	0.70	0.80	1.073	12.0	177.2
Transfer :	2.08	163.9	225.8	185.1	391.7	695.5	406.8	469.7	242.9
2344.1	-135.5	6136.2	66.20	3364.4	75.3	3364.4	554.3	27.0	270.2
270.2	165.1	354.5	0.50	0.08	0.50	0.80	1.229	24.0	177.2
[illegible]	4.36	156.7	593.2	376.2	391.7	1587.9	391.7	994.7	235.0
2385.7	-365.3	5710.1	66.78	1532.8	76.0	1532.8	652.0	27.0	288.0
288.0	147.3	357.6	0.44	0.08	0.44	0.80	1.275	24.0	178.8
0.1L :	10.68	136.8	1516.1	841.1	350.3	3797.1	350.3	2281.0	213.5
2500.8	-943.5	4661.7	68.58	600.7	78.0	600.7	892.2	27.0	334.5
334.5	54.7	367.2	0.16	0.08	0.16	0.27	1.094	24.0	183.6
0.2L :	21.35	97.3	2765.1	1415.3	272.9	6667.3	272.9	3902.1	175.6
2695.5	-1729.3	3323.8	71.61	275.7	81.5	275.7	1199.0	27.0	400.9
275.7	27.6	383.4	0.08	0.08	0.08	0.20	1.145	24.0	191.7
0.3L :	32.03	63.7	3624.7	1743.1	203.9	8496.5	190.0	4871.7	126.2
2890.2	-2275.2	2528.6	74.65	159.2	84.9	159.2	1381.7	27.0	449.4
159.2	67.4	399.7	0.18	0.08	0.18	0.40	1.362	24.0	199.8
0.4L :	42.70	25.5	4114.9	1878.2	129.9	9427.0	115.1	5312.1	89.6
3084.9	-2594.8	2245.8	77.68	94.6	88.4	94.6	1448.8	0.0	452.1
94.6	49.8	415.9	0.13	0.08	0.13	0.27	1.373	24.0	208.0
0.5L :	53.38	9.4	4194.1	1832.6	130.2	9430.8	115.4	5236.8	106.0
3084.9	-2660.1	2098.0	77.68	83.1	88.4	88.4	1504.4	0.0	462.4
88.4	56.3	415.9	0.14	0.08	0.14	0.20	1.148	24.0	208.0
0.6L :	64.05	43.0	3914.7	1631.7	197.7	8631.5	182.3	4716.9	139.3
3084.9	-2506.4	2446.1	77.68	146.4	88.4	146.4	1448.8	0.0	452.1
146.4	73.2	415.9	0.19	0.08	0.19	0.27	1.138	24.0	208.0
0.7L :	74.72	82.5	3224.2	1267.6	270.6	6943.4	254.4	3719.2	171.9
2890.2	-2098.3	2929.1	74.65	247.9	84.9	247.9	1381.7	27.0	449.4
247.9	52.8	399.7	0.14	0.08	0.14	0.40	1.321	24.0	199.8

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
0.8L :	85.40	116.1	2164.3	783.6	333.2	4514.9	316.2	2350.6	200.1
2695.5	-1463.9	3924.6	71.61	478.9	81.5	478.9	1199.0	27.0	400.9
400.9	0.0	383.4	0.00	0.08	0.08	0.20	1.276	24.0	191.7
0.9L :	96.08	155.6	715.1	316.5	400.8	1616.8	271.6	901.7	116.0
2500.8	-589.7	5462.8	68.58	885.7	78.0	885.7	892.2	27.0	334.5
334.5	110.8	367.2	0.32	0.08	0.32	0.27	0.957*	24.0	183.6
H/2 :	102.39	175.5	-326.2	-1422.6	433.6	-3512.6	382.7	-3186.4	207.3
0.0	-132.3	-1589.2	77.38	309.9	88.0	309.9	652.0	27.0	329.4
309.9	171.9	414.3	0.44	0.08	0.44	0.80	1.286	24.0	207.2
Transfer :	104.67	182.6	-736.4	-1593.9	433.6	-4417.7	403.0	-3681.3	220.3
0.0	-151.8	-1474.4	77.38	301.9	88.0	301.9	554.3	27.0	311.2
301.9	179.9	414.3	0.46	0.08	0.46	0.80	1.269	24.0	207.2
Bearing :	105.83	186.3	-953.1	-1687.6	433.6	-4902.9	413.1	-3949.8	226.8
0.0	-162.1	-1414.0	77.38	298.6	88.0	298.6	221.0	11.9	234.2
234.2	247.6	414.3	0.64	0.08	0.64	0.80	1.128	12.0	207.2

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 1, Beam : 2

Fpi (kips)	fs (ksi)	d/4 (in)	Abrst_rqrd (in2)
1454.15	20.00	13.70	2.91



Vertical Shear, Span 1, Beam 2, FACTORED 1

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 1, Beam : 2

(Beam and Slab effects are INCLUDED in Vu).

Location (ft) bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing : 0.00									
36.00	60.00	414.3	194.33	65.80	432.00	24.00	0.360	2.418	0.360
Transfer : 1.17									
36.00	60.00	406.8	189.86	66.13	432.00	24.00	0.360	2.337	0.360
H/2 : 3.45									
36.00	60.00	391.7	181.04	66.78	432.00	24.00	0.360	2.179	0.360
0.1L : 9.76									
36.00	60.00	350.3	157.67	68.58	432.00	24.00	0.360	1.758	0.360

Location (ft)										
bv (in)	**fsy (ksi)**	**Vu (kips)**	**Vnh-req (psi)**	**d (in)**	**Surf (in2/ft)**	**s_max (in)**	**Avh-min (in2/ft)**	**Avh-sm (in2/ft)**	**Avh-rg (in2/ft)**	
0.2L :	20.43									
36.00	60.00	272.9	117.63	71.61	432.00	24.00	0.360	1.037	0.360	
0.3L :	31.11									
36.00	60.00	203.9	84.32	74.65	432.00	24.00	0.360	0.438	0.360	
0.4L :	41.78									
36.00	60.00	129.9	51.63	77.68	432.00	24.00	0.360	0.360	0.000	
0.5L :	52.46									
36.00	60.00	130.2	51.73	77.68	432.00	24.00	0.360	0.360	0.000	
0.6L :	63.13									
36.00	60.00	197.7	78.54	77.68	432.00	24.00	0.360	0.360	0.000	
0.7L :	73.81									
36.00	60.00	270.6	111.88	74.65	432.00	24.00	0.360	0.934	0.360	
0.8L :	84.48									
36.00	60.00	333.2	143.62	71.61	432.00	24.00	0.360	1.505	0.360	
0.9L :	95.16									
36.00	60.00	400.8	157.83	78.38	432.00	24.00	0.360	1.761	0.360	
H/2 :	101.47									
36.00	60.00	433.6	170.76	78.38	432.00	24.00	0.360	1.994	0.360	
Transfer :	103.75									
36.00	60.00	445.6	175.49	78.38	432.00	24.00	0.360	2.079	0.360	
Bearing :	104.92									
36.00	60.00	452.5	178.18	78.38	432.00	24.00	0.360	2.127	0.360	

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 2; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.76 ft				
Prestress	0.933	1.80	1.680	2.20	2.053
Self Wt.	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch			-0.308	2.30	-0.708
Prec. DL+ADL			-0.033	3.00	-0.099
Diaphragm			-0.062	3.00	-0.186
Comp. DL+ADL			-0.056	3.00	-0.168
Live Load(+I)					-0.130
Total	0.587		0.581		-0.068

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	20.43 ft				
Prestress	1.701	1.80	3.061	2.20	3.742
Self Wt.	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch			-0.610	2.30	-1.404
Prec. DL+ADL			-0.065	3.00	-0.196
Diaphragm			-0.123	3.00	-0.369
Comp. DL+ADL			-0.104	3.00	-0.312
Live Load(+I)					-0.246
Total	1.047		0.949		-0.354

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	31.11 ft				
Prestress	2.277	1.80	4.098	2.20	5.009
Self Wt.	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch			-0.848	2.30	-1.951
Prec. DL+ADL			-0.091	3.00	-0.273
Diaphragm			-0.171	3.00	-0.512
Comp. DL+ADL			-0.138	3.00	-0.414
Live Load(+I)					-0.334
Total	1.382		1.194		-0.623

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	41.78 ft				
Prestress	2.636	1.80	4.745	2.20	5.799
Self Wt.	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch			-1.000	2.30	-2.299
Prec. DL+ADL			-0.107	3.00	-0.321
Diaphragm			-0.201	3.00	-0.603
Comp. DL+ADL			-0.155	3.00	-0.464
Live Load(+I)					-0.384
Total	1.587		1.343		-0.788

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	52.46 ft				
Prestress	2.757	1.80	4.963	2.20	6.066
Self Wt.	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch			-1.051	2.30	-2.418

	Release	Mult	Erection	Mult	Final
Prec. DL+ADL			-0.113	3.00	-0.338
Diaphragm			-0.211	3.00	-0.634
Comp. DL+ADL			-0.153	3.00	-0.458
Live Load(+I)					-0.391
Total	1.656		1.398		-0.816

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	63.13 ft				
Prestress	2.636	1.80	4.745	2.20	5.799
Self Wt.	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch			-1.000	2.30	-2.299
Prec. DL+ADL			-0.107	3.00	-0.321
Diaphragm			-0.201	3.00	-0.603
Comp. DL+ADL			-0.134	3.00	-0.401
Live Load(+I)					-0.357
Total	1.587		1.364		-0.698

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	73.81 ft				
Prestress	2.277	1.80	4.098	2.20	5.009
Self Wt.	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch			-0.848	2.30	-1.951
Prec. DL+ADL			-0.091	3.00	-0.273
Diaphragm			-0.171	3.00	-0.512
Comp. DL+ADL			-0.102	3.00	-0.305
Live Load(+I)					-0.287
Total	1.382		1.231		-0.466

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	84.48 ft				
Prestress	1.701	1.80	3.061	2.20	3.742
Self Wt.	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch			-0.610	2.30	-1.404
Prec. DL+ADL			-0.065	3.00	-0.196
Diaphragm			-0.123	3.00	-0.369
Comp. DL+ADL			-0.062	3.00	-0.187
Live Load(+I)					-0.193
Total	1.047		0.991		-0.177

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	95.16 ft				
Prestress	0.933	1.80	1.680	2.20	2.053
Self Wt.	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch			-0.308	2.30	-0.708
Prec. DL+ADL			-0.033	3.00	-0.099
Diaphragm			-0.062	3.00	-0.186
Comp. DL+ADL			-0.025	3.00	-0.074
Live Load(+I)					-0.092
Total	0.587		0.613		0.064

Positive values indicate upward deflection.

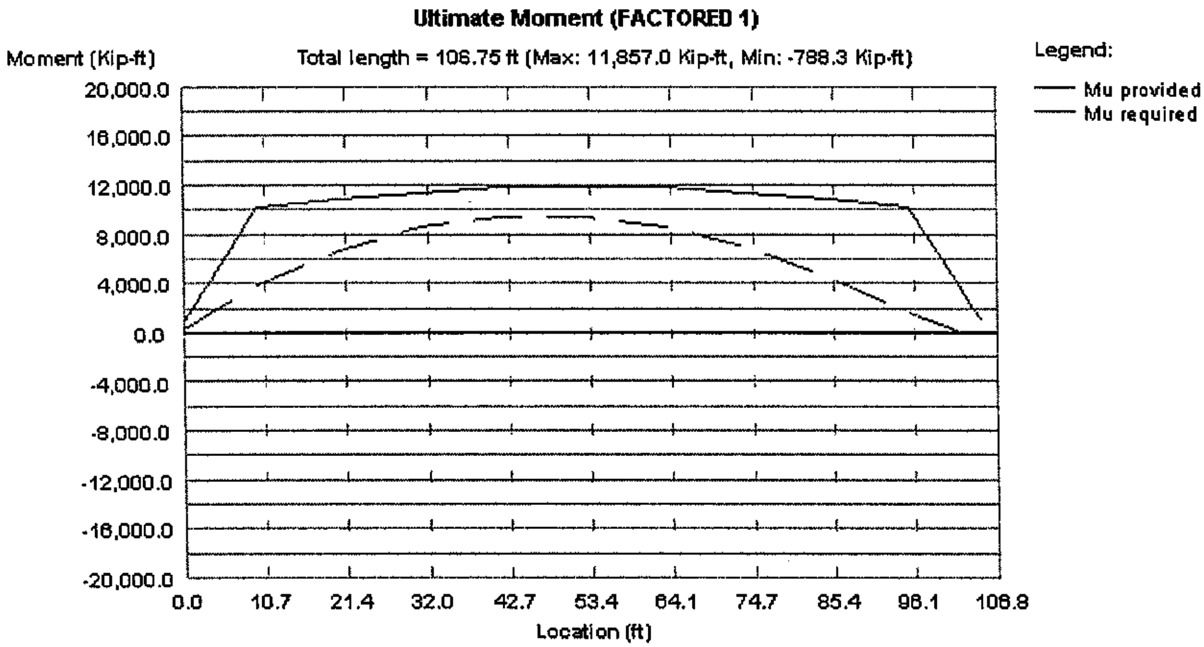
ULTIMATE MOMENT

ULTIMATE - Span : 1, Beam : 2, FACTORED 1
(Mu-prvd computed by Strain Compatibility method. Ult. Conc. Strain = 0.00300)
(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.17									
	1.381	16.62	0.00017	269.7	0.8	1979.7	695.5	6646.2	0.298	2.85
H/2	3.45									
	2.894	15.97	0.00036	269.4	1.6	4158.3	1587.9	6587.5	0.631	2.62
0.1L	9.76									
	7.079	14.17	0.00086	268.7	4.0	10242.4	3797.1	6462.0	1.585	-
0.2L	20.43									
	7.181	11.14	0.00083	268.9	4.1	10876.0	6667.3	6373.0	1.707	-
0.3L	31.11									
	7.181	8.10	0.00080	269.0	4.1	11366.5	8496.5	6437.4	1.766	-
0.4L	41.78									
	7.181	5.07	0.00077	269.1	4.1	11857.0	9427.0	6644.9	1.784	-
0.5L	52.46									
	7.181	5.07	0.00077	269.1	4.1	11857.0	9430.8	6576.2	1.803	-
[illegible]	63.13									
	7.181	5.07	0.00077	269.1	4.1	11857.0	8631.5	6644.9	1.784	-
[illegible]	73.81									
	7.181	8.10	0.00080	269.0	4.1	11366.5	6943.4	6437.4	1.766	-
0.8L	84.48									
	7.181	11.14	0.00083	268.9	4.1	10876.0	4514.9	6373.0	1.707	-
0.9L	95.16									
	7.079	14.17	0.00086	268.7	4.0	10242.4	1616.8	6462.0	1.585	-
H/2	101.47									
	2.894	15.97	0.00036	269.4	1.6	4158.3	54.6	6587.5	0.631	76.11
Transfer	103.75									
	1.381	16.62	0.00017	269.7	0.8	1979.7	-510.7	6646.2	0.298	3.88

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-48 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

File Name: 535502_SCI-823-0837.csi



Ultimate Moment, Span 1, Beam 2, FACTORED 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-49 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

DETENSIONING

Span : 1, Beam : 2; Groups 1-24; Units: psi

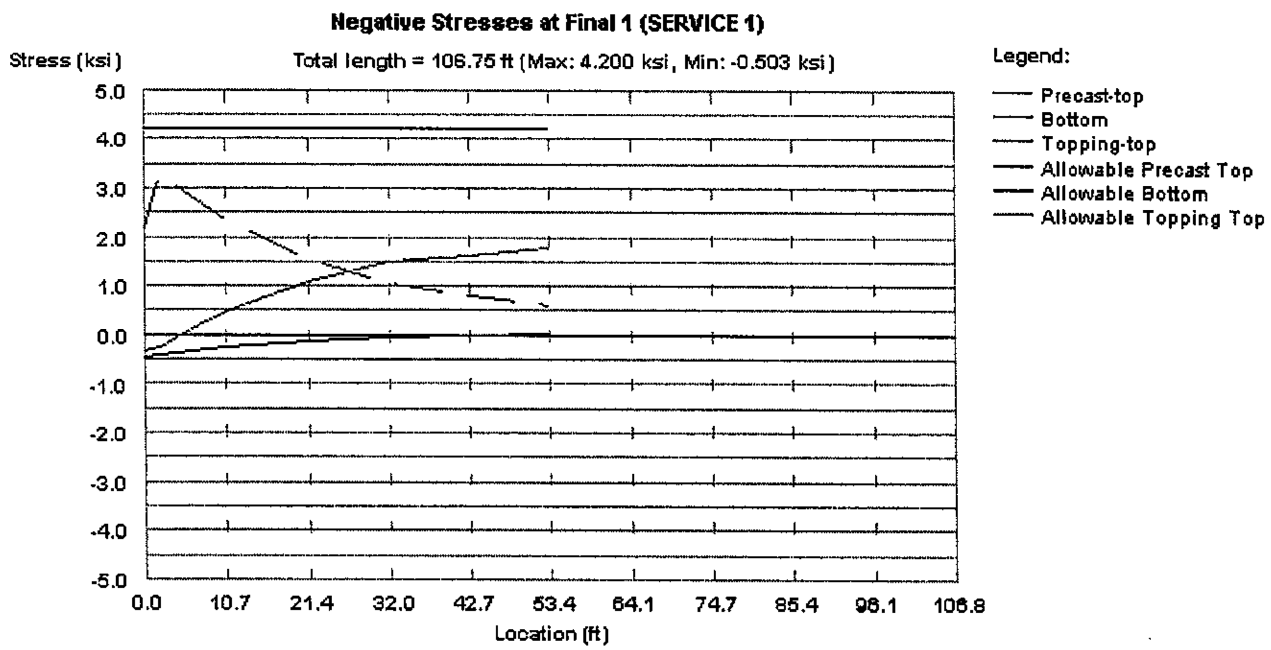
Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	22.010
		M	2.00	Fb	103.739
2	2	E	68.00	Ft	202.560
		M	10.00	Fb	62.268
3	1	E	68.00	Ft	292.835
		M	10.00	Fb	41.532
4	2	E	66.00	Ft	465.849
		M	8.00	Fb	6.965
5	1	E	66.00	Ft	552.356
		M	8.00	Fb	-10.32*
6	2	E	64.00	Ft	717.832
		M	6.00	Fb	-37.98*
7	1	E	64.00	Ft	800.570
		M	6.00	Fb	-51.82*
8	2	E	8.00	Ft	765.673
		M	8.00	Fb	104.044
9	2	E	8.00	Ft	730.776
		M	8.00	Fb	259.904
10	2	E	6.00	Ft	688.343
		M	6.00	Fb	422.667
[illegible]	2	E	6.00	Ft	645.909
		M	6.00	Fb	585.430
12	2	E	6.00	Ft	603.475
		M	6.00	Fb	748.194
13	2	E	6.00	Ft	561.041
		M	6.00	Fb	910.957
14	2	E	4.00	Ft	511.070
		M	4.00	Fb	1080.623
15	2	E	4.00	Ft	461.099
		M	4.00	Fb	1250.290
16	2	E	4.00	Ft	411.128
		M	4.00	Fb	1419.956
17	2	E	4.00	Ft	361.158
		M	4.00	Fb	1589.622
18	2	E	4.00	Ft	311.187
		M	4.00	Fb	1759.289
19	1	E	4.00	Ft	286.201
		M	4.00	Fb	1844.122
20	2	E	2.00	Ft	228.693
		M	2.00	Fb	2020.692
21	2	E	2.00	Ft	171.186
		M	2.00	Fb	2197.262
22	2	E	2.00	Ft	113.678
		M	2.00	Fb	2373.831
23	2	E	2.00	Ft	56.170
		M	2.00	Fb	2550.401
24	1	E	2.00	Ft	27.416
		M	2.00	Fb	2638.686

NEGATIVE ENVELOPE STRESSES

Span : 1, Beam : 2, SERVICE 1
NEGATIVE ENVELOPE STRESSES, (psi) (LOSS = 21.03%)

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Prestress									
Precast-top		-9.6	-45.0	-90.5	-216.1	-428.7	-641.3	-853.9	-853.9
Bottom		1022.0	2344.1	2385.7	2500.8	2695.5	2890.2	3084.9	3084.9
Self wt.									
Precast-top		0.0	44.1	127.4	338.2	628.7	836.3	960.8	1002.3
Bottom		-0.0	-40.4	-116.7	-309.8	-575.9	-766.0	-880.0	-918.0
Prec. DL+ADL									
Precast-top		-0.0	5.7	16.5	43.9	81.6	108.5	124.7	130.1
Bottom		0.0	-5.2	-15.1	-40.2	-74.7	-99.4	-114.2	-119.1
Diaphragm									
Precast-top		-0.0	11.2	32.3	84.8	153.7	200.1	238.5	238.5
Bottom		-0.0	-10.3	-29.6	-77.6	-140.8	-183.3	-218.5	-218.5
Deck + Haunch									
Precast-top		0.0	53.4	154.3	409.6	761.4	1012.7	1163.5	1213.8
Bottom		-0.0	-48.9	-141.3	-375.1	-697.4	-927.6	-1065.7	-1111.7
Comp. DL+ADL									
Topping-top		-162.1	-151.8	-132.3	-82.0	-9.6	47.0	87.8	112.7
Precast-top		-121.2	-113.5	-98.9	-61.3	-7.2	35.1	65.6	84.3
Bottom		421.0	394.3	343.6	213.1	24.9	-122.1	-228.0	-292.8
LL+I(-)									
Topping-top		-287.0	-271.0	-241.9	-175.4	-114.8	-100.5	-86.1	-71.8
Precast-top		-214.6	-202.6	-180.9	-131.1	-85.9	-75.1	-64.4	-53.7
Bottom		745.5	704.1	628.4	455.7	298.3	261.1	223.8	186.5
Final 1 (P/S + DL	+ LL)								
Topping-top		-449.0	-422.8	-374.2	-257.4	-124.4	-53.5	1.6	40.9
Precast-top		-345.3	-246.8	-39.6	467.9	1103.7	1476.4	1634.9	1761.4
Bottom		2188.5	3337.7	3054.9	2366.8	1530.0	1053.0	802.3	611.2
Final 2 (P/S + DL)									
Topping-top		-162.1	-151.8	-132.3	-82.0	-9.6	47.0	87.8	112.7
Precast-top		-130.8	-44.1	141.2	599.0	1189.6	1551.5	1699.3	1815.1
Bottom		1443.0	2633.6	2426.5	1911.1	1231.6	791.9	578.5	424.8
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		-368.0	-346.9	-308.0	-216.4	-119.6	-77.0	-42.2	-15.4
Precast-top		-279.9	-224.7	-110.2	168.4	508.9	700.6	785.2	853.9
Bottom		1467.0	2020.9	1841.7	1411.2	914.2	657.0	513.0	398.8

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-51 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File name: 535502_SCI-823-0837.csl**	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Negative Stresses at Final 1, Span 1, Beam 2, SERVICE 1

REINFORCED DESIGN

REINFORCED DESIGN - Span : 1, Beam : 2, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
2	10.68	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
3	21.35	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
4	32.03	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
5	42.70	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
6	53.38	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
7	64.05	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
8	74.72	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
9	85.40	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
10	96.08	-1309.8	8.00	78.37	2.00	-3550.7	0.000	5.001	0.000*	-0.0
11	106.75	-5131.7	8.00	78.37	2.00	-3550.7	0.000	15.116	0.000*	-0.0

(b) POSITIVE MOMENTS AT PIERS

NONE

DESIGN SUMMARY

Span: 1, Beam: 2, Interior beam

Beam type:	I-Girder,	OHIO-MOD-72-TYPE-IV
Precast Length,	ft	106.75
Release Length,	ft	106.75
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-SP-1	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28000.0
No. of strands:	43	
	Draped:	9
	Straight:	34
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
losses:	8.65 %	
losses:	21.03 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00	8.42	
Precast Top w/ reinf.	-530.33		
Precast Bot (compression)	3000.00	2656.08	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	11857.00	9430.83	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
ice 1						
ping Top	2700.0/-503.1	441.2 / 19.3	1800.0	121.8	1800.0	380.3

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	2048.1 / 4.9	2800.0	1815.1	2800.0	1140.5
Precast Bot	4200.0/-502.0	2126.8 /-384.8	2800.0	2208.6	2800.0	1022.5

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	40.9 /-449.0	1800.0	112.7	1800.0	-15.4
Precast Top	4200.0/-502.0	1761.4 /-345.3	2800.0	1815.1	2800.0	853.9
Precast Bot	4200.0/-502.0	3337.7 / 611.2	2800.0	2633.6	2800.0	2020.9

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 52.46 ft

	Release	Mult	Erection	Mult	Final
Prestress	2.757	1.80	4.963	2.20	6.066
Self Wt.	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch			-1.051	2.30	-2.418
Prec. DL+ADL			-0.113	3.00	-0.338
Diaphragm			-0.211	3.00	-0.634
Comp. DL+ADL			-0.153	3.00	-0.458
Live Load					-0.391
Total	1.656		1.398		-0.816

Positive values indicate upward deflection.

PROJECT DATA

Project:	Portsmouth Bypass
Designer:	RBK
Date:	May/1/2009
User job number:	KZF #5355.02
State:	Ohio, State Job #:PID 19415
State Specification:	None
Design Mode:	AASHTO Standard (LFD)- US Units [17th Edition, 2003]
Flared Girder:	No
Comments:	Bridge No. SCI-823-0837 L/R SFN 7306458/7306466 SR 823 Over Swauger Valley Minford Road (CR 31)
File Name:	F:\Projects\535502\19415\structures\SCI823_0837C\engapps\CONSPAN\535502_SCI-823-0837.csl

SPAN 2

INTERIOR

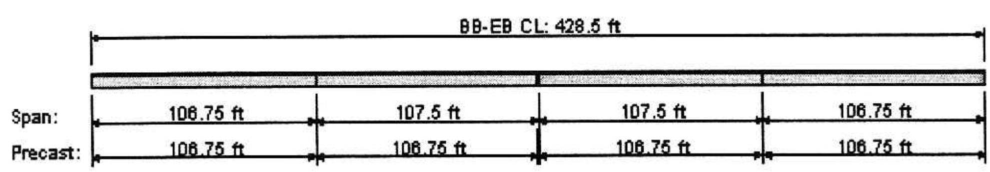
GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	48.458
Left curb (ft)	1.500
Right curb (ft)	1.458
curb-to-curb width (ft)	45.500
Number of spans	4
Number of lanes	2
Lane width (ft)	12.000
Topping thickness (in)	8.750
Haunch thickness (in)	2.000
Haunch width (in)	36.000

SPAN DATA

Span	Pier-to-pier ft	Precast ft	Brg-to-brg ft	Pier CL ft	Release ft	StartSkew	EndSkew
1	106.750	106.750	104.917	0.000	106.750	0.00	0.00
2	107.500	106.750	105.083	0.375	106.750	0.00	0.00
3	107.500	106.750	105.083	0.375	106.750	0.00	0.00
4	106.750	106.750	104.917	0.375	106.750	0.00	0.00



Bridge elevation section for all spans

BEAM DATA
Span: 1

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 2

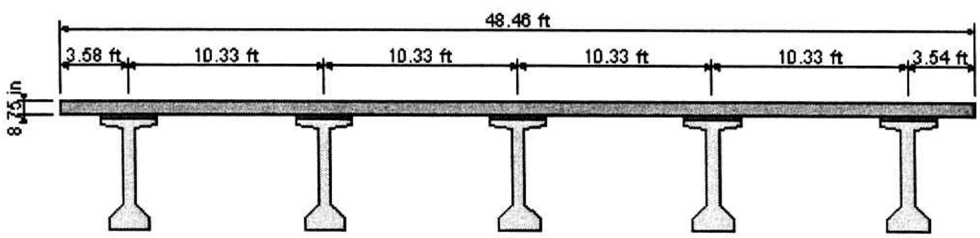
No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 3

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 4

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708



Bridge cross section for Span 1, Span 2, Span 3, Span 4

MATERIAL DATA

CONCRETE PROPERTIES

	Precast	C.I.P
f'c (ksi)	7000.000	4500.000
Wc (pcf)	150.000	150.000
Ec (ksi)	5072.240	4066.840
f'ci (psi)	5000.000	
Eci (ksi)	4286.830	

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:

1/2-270K-SP-1, Low relaxation strands
Depressed at 0.40L (42.70 ft from member end)
Strand Diameter = 0.500
Ult. Strength(f's) = 270.0 ksi
Strand Area = 0.167 in2
Use transformed strand and rebar: No

REINFORCING STEEL:

Tension steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

LOADS DATA

LOADS ON PRECAST

UNITS: (Point: kips, Location: ft, Line: klf)

Span	Beam	DL/ADL	Type	Mag.	Loc.	Description
1	1	DL	Line	0.109	-	Sacrificial Wearing Surface
1	2	DL	Line	0.129	-	Sacrificial Wearing Surface
1	3	DL	Line	0.129	-	Sacrificial Wearing Surface
1	4	DL	Line	0.129	-	Sacrificial Wearing Surface
1	5	DL	Line	0.109	-	Sacrificial Wearing Surface
2	1	DL	Line	0.109	-	Sacrificial Wearing Surface
2	2	DL	Line	0.129	-	Sacrificial Wearing Surface
2	3	DL	Line	0.129	-	Sacrificial Wearing Surface
2	4	DL	Line	0.129	-	Sacrificial Wearing Surface
2	5	DL	Line	0.109	-	Sacrificial Wearing Surface
3	1	DL	Line	0.109	-	Sacrificial Wearing Surface
3	2	DL	Line	0.129	-	Sacrificial Wearing Surface
3	3	DL	Line	0.129	-	Sacrificial Wearing Surface
3	4	DL	Line	0.129	-	Sacrificial Wearing Surface
3	5	DL	Line	0.109	-	Sacrificial Wearing Surface
4	1	DL	Line	0.109	-	Sacrificial Wearing Surface
4	2	DL	Line	0.129	-	Sacrificial Wearing Surface
4	3	DL	Line	0.129	-	Sacrificial Wearing Surface
4	4	DL	Line	0.129	-	Sacrificial Wearing Surface
4	5	DL	Line	0.109	-	Sacrificial Wearing Surface

DIAPHRAGM LOADS

(kips, ft)

Span	Beam	Mag.	Loc.
1	1	2.967	14.958
1	1	2.967	39.958
1	1	2.967	64.958
1	1	2.967	89.958
1	2	5.934	14.958
1	2	5.934	39.958
1	2	5.934	64.958
1	2	5.934	89.958
1	3	5.934	14.958
1	3	5.934	39.958
1	3	5.934	64.958
1	3	5.934	89.958
1	4	5.934	14.958
1	4	5.934	39.958
1	4	5.934	64.958
1	4	5.934	89.958
1	5	2.967	14.958
1	5	2.967	39.958
1	5	2.967	64.958
1	5	2.967	89.958

Span	Beam	Mag.	Loc.
2	1	2.967	15.042
2	1	2.967	40.042
2	1	2.967	65.042
2	1	2.967	90.042
2	2	5.934	15.042
2	2	5.934	40.042
2	2	5.934	65.042
2	2	5.934	90.042
2	3	5.934	15.042
2	3	5.934	40.042
2	3	5.934	65.042
2	3	5.934	90.042
2	4	5.934	15.042
2	4	5.934	40.042
2	4	5.934	65.042
2	4	5.934	90.042
2	5	2.967	15.042
2	5	2.967	40.042
2	5	2.967	65.042
2	5	2.967	90.042
3	1	2.967	15.042
3	1	2.967	40.042
3	1	2.967	65.042
3	1	2.967	90.042
3	2	5.934	15.042
3	2	5.934	40.042
3	2	5.934	65.042
3	2	5.934	90.042
3	3	5.934	15.042
3	3	5.934	40.042
3	3	5.934	65.042
3	3	5.934	90.042
3	4	5.934	15.042
3	4	5.934	40.042
3	4	5.934	65.042
3	4	5.934	90.042
3	5	2.967	15.042
3	5	2.967	40.042
3	5	2.967	65.042
3	5	2.967	90.042
4	1	2.967	14.958
4	1	2.967	39.958
4	1	2.967	64.958
4	1	2.967	89.958
4	2	5.934	14.958
4	2	5.934	39.958
4	2	5.934	65.958
4	2	5.934	89.958
4	3	5.934	14.958
4	3	5.934	39.958
4	3	5.934	65.958
4	3	5.934	89.958
4	4	5.934	14.958
4	4	5.934	39.958
4	4	5.934	65.958
4	4	5.934	89.958
4	5	2.967	14.958

Span	Beam	Mag.	Loc.
4	5	2.967	39.958
4	5	2.967	65.958
4	5	2.967	89.958

LOADS ON COMPOSITE

UNITS: (Point: kips, Location: ft, Line: klf, Area: ksf, Width: ft)

Span	DL/ADL	Type	Mag.	Loc.	Description
1	DL	Line	0.639	-	Left Barrier Weight
1	DL	Line	0.715	-	Right Barrier Weight
1	ADL	Area	0.060	45.500	Future Wearing Surface
2	DL	Line	0.639	-	Left Barrier Weight
2	DL	Line	0.715	-	Right Barrier Weight
2	ADL	Area	0.060	45.500	Future Wearing Surface
3	DL	Line	0.639	-	Left Barrier Weight
3	DL	Line	0.715	-	Right Barrier Weight
3	ADL	Area	0.060	45.500	Future Wearing Surface
4	DL	Line	0.639	-	Left Barrier Weight
4	DL	Line	0.715	-	Right Barrier Weight
4	ADL	Area	0.060	45.500	Future Wearing Surface

LIVE LOADS

Live load deflection: not included.

ID: H/HS25 Lane	(Type: Lane Load)
ID: HS25 Truck	(Type: Truck Load)
ID: Military Truck	(Type: Truck Load)

LIVE LOADS USED

LIVE LOAD LIBRARY: Default.cs4

1 ID: H/HS25 Lane

Description:	H25/HS25 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.80 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 22.50 k,	Shear = 32.50 k

2 ID: HS25 Truck

Description:	HS25 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	40.00	14.00	14.00	0.00
2	40.00	30.00	14.00	2.00

3 ID: Military Truck

Description:	Military Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 24.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	24.00	4.00	4.00	0.00

INVENTORY LIVE LOAD

1 ID: H20 Truck

Description:	H20 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 8.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00

2 ID: H/HS20 Lane

Description:	H20/HS20 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.64 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 18.00 k,	Shear = 26.00 k

OPERATING LIVE LOAD

1 ID: HS20 Truck

Description:	HS20 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 8.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00
2	32.00	30.00	14.00	2.00

2 ID: H/HS20 Lane

Description:	H20/HS20 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.64 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 18.00 k,	Shear = 26.00 k

3 ID: 2F1 Truck

Description:	2F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	20.00	10.00	10.00	0.00

4 ID: 3F1 Truck

Description:	3F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	10.00	10.00	0.00

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
2	17.00	4.00	4.00	0.00

5 ID: 4F1 Truck

Description:	4F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	10.00	10.00	0.00
2	17.00	4.00	4.00	0.00
3	17.00	4.00	4.00	0.00

6 ID: 5C1 Truck

Description:	5C1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	12.00	12.00	0.00
2	17.00	4.00	4.00	0.00
3	17.00	31.00	31.00	0.00
4	17.00	4.00	4.00	0.00

ANALYSIS DATA

ANALYSIS PARAMETERS DATA

Span#	Beam#	Moment impact	Shear impact
1	1	1.217	Calculated (AASHTO 3.8.2.2)
1	2	1.217	Calculated (AASHTO 3.8.2.2)
1	3	1.217	Calculated (AASHTO 3.8.2.2)
1	4	1.217	Calculated (AASHTO 3.8.2.2)
1	5	1.217	Calculated (AASHTO 3.8.2.2)
2	1	1.217	Calculated (AASHTO 3.8.2.2)
2	2	1.217	Calculated (AASHTO 3.8.2.2)
2	3	1.217	Calculated (AASHTO 3.8.2.2)
2	4	1.217	Calculated (AASHTO 3.8.2.2)
2	5	1.217	Calculated (AASHTO 3.8.2.2)
3	1	1.217	Calculated (AASHTO 3.8.2.2)
3	2	1.217	Calculated (AASHTO 3.8.2.2)
3	3	1.217	Calculated (AASHTO 3.8.2.2)
3	4	1.217	Calculated (AASHTO 3.8.2.2)
3	5	1.217	Calculated (AASHTO 3.8.2.2)
4	1	1.217	Calculated (AASHTO 3.8.2.2)
4	2	1.217	Calculated (AASHTO 3.8.2.2)
4	3	1.217	Calculated (AASHTO 3.8.2.2)
4	4	1.217	Calculated (AASHTO 3.8.2.2)
4	5	1.217	Calculated (AASHTO 3.8.2.2)

NOTE: Beam specific dead and live load DFs are printed in beam level reports.

GAMMA/BETA FACTORS: (Table 3.22.1A)

	Service		Factored	
Gamma:	1.00		1.30	
Beta-D:	1.00		1.00	
Beta-L:	1.00	(Group 1)	1.67	(Group 1)

PROJECT PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	=	1.00
	Debonded	=	1.00
Dev len mult:	Bonded	=	1.60
	Debonded	=	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
Self. Wt:	1.85	2.40
Deck + Haunch:		2.30
Diaphragm:		3.00
Prec.DL+ADL:		3.00
Comp.DL+ADL:		3.00

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	Strain Compatibility method.
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED
Negative Moment Design, Non-composite Moment effects in Mu:	INCLUDED

STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi

	PRECAST		DECK	
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.5.3)
Hours to release = 18.00
Rel. Humid.(RH) = 75.0 %

PROPERTIES

Span: 2, Beam: 2

PRECAST DATA:

Section Id	OHIO-MOD-72-TYPE-IV						
Type	I-Girder						
Flng width		Top	36.000	in	Bot	26.000	in
thick		Top	4.000	in	Bot	8.000	in
Stems		No	1				
		Top	8.000	in			
		Bot	8.000	in			
Shear width			8.000	in			
Wide top Flange		NO					

GENERAL BRIDGE DATA:

Bridge Width	48.46	ft
Curb-to-curb	45.50	ft
Beam Spac. Lt./Rt	10.33/ 10.33	ft
Lane width	12.00	ft
Number of lanes	2	
Interior/Exterior	Interior	

TOPPING DATA:

Deck	Thickness	8.750	in	
Haunch:				
	Thickness	2.000	in	
	Width	36.000	in	
Effective	width	124.000	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.129	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
5.93	15.04
5.93	40.04
5.93	65.04
5.93	90.04

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length	106.750	ft
Release length	106.750	ft
Design length	105.083	ft

KERN POINTS:

Upper	53.16	in
Lower	17.26	in

DISTRIBUTION FACTORS (Art. 3.23):

Live Negative Moment (Group 1)	0.939	(Calculated)
Live Positive Moment (Group 1)	0.939	(Calculated)
Live Shear (Group 1)	0.939	(Calculated)

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian	0.200	(Calculated)
Comp. DL	0.200	(Calculated)
Comp. ADL	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

Span: 2, Beam: 2

SECTION PROPERTIES:

	PRECAST		COMPOSITE		
Area	955.4	in2	1883.1	in2	#
Total Height	72.00	in	82.75	in	
Mom. of Inertia (Ixx)	616109	in4	1518798	in4	#
Ht. of c.g.	34.42	in	55.91	in	#
Density	150.00	pcf	150.00	pcf	
Self-weight	995.2	plf	2200.4	plf	
Mom. of Inertia (Iyy)	37816.0	in4			
Poisson's Ratio	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 2, Beam: 2
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

Span: 2, Beam: 2

PRESTRESSED STEEL:

43 strands, 1/2-270K-SP-1, Low relaxation strands
Depressed at 0.40L (42.70 ft from member end)

END PATTERN (Ycg = 17.21 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	4 @ 8.000 in
3 @ 64.000 in	3 @ 66.000 in	3 @ 68.000 in	

MID PATTERN (Ycg = 5.07 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in	3 @ 10.000 in

(B) Straight:

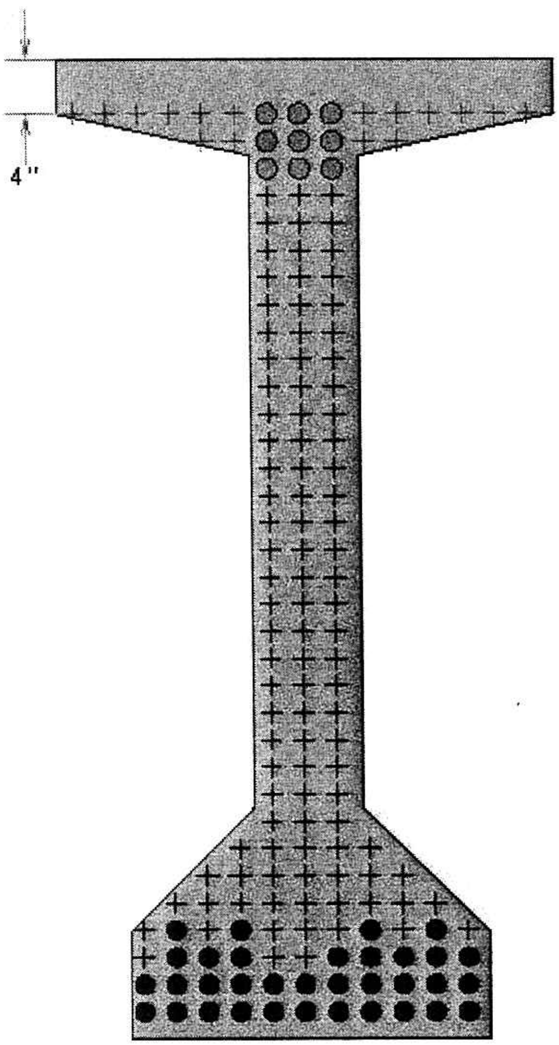
11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	4 @ 8.000 in

Strand Diameter	0.500	in
Strand Area	0.167	in2
Total Strand Area	7.181	in2

Trans. Len,bonded	2.083	ft
Trans. Len,debonded	2.083	ft
Dev. Len, bonded	10.867	ft
Dev. Len, debonded	13.583	ft
Holddown Force	34.232	kips
Holddown Force	270.0	ksi
Initial Prestress = 0.75f's	202.5	ksi
Initial Pull	1454.2	kips
Beam Shrtng (PL/AE)	0.415	in

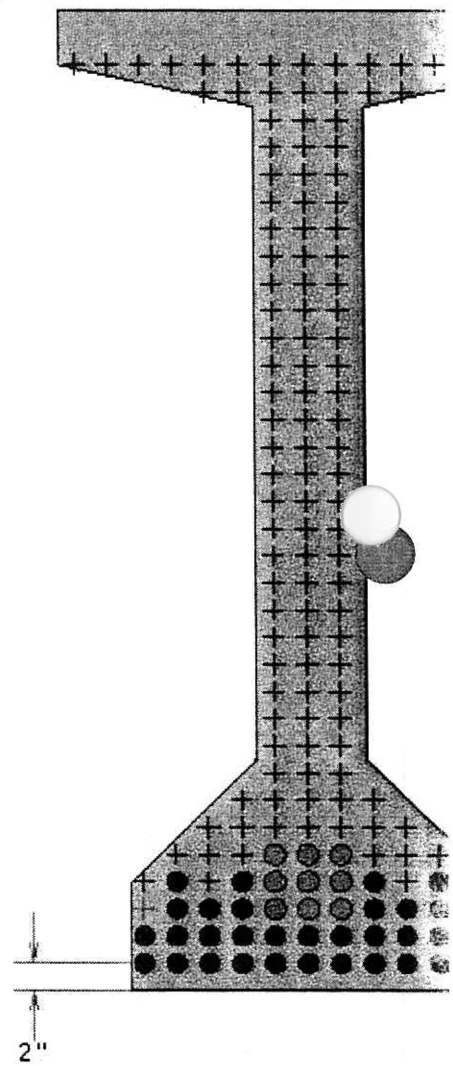
ENDS

MIDSPAN



No. Strands	Distance from bottom(in)
3	68
3	66
3	64

No. Strands	Distance from bottom(in)
4	8
8	6
11	4
11	2



NOTE: Debonded/Shielded strands or strands with reduced pull not marked.

Strand Pattern, Span 2, Beam 2

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi
fs	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	5.2821
2	US#4[M13]	60.0	0.40	12.00	5.2821	9.7932
2	US#4[M13]	60.0	0.40	18.00	9.7932	18.5889
2	US#4[M13]	60.0	0.40	24.00	18.5889	22.5751
2	US#4[M13]	60.0	0.40	18.00	22.5751	28.3525
2	US#4[M13]	60.0	0.40	12.00	28.3525	37.7027
2	US#4[M13]	60.0	0.40	18.00	37.7027	44.7990
2	US#4[M13]	60.0	0.40	24.00	44.7990	61.9510
2	US#4[M13]	60.0	0.40	18.00	61.9510	69.0473
2	US#4[M13]	60.0	0.40	12.00	69.0473	78.3975
2	US#4[M13]	60.0	0.40	18.00	78.3975	84.1749
2	US#4[M13]	60.0	0.40	24.00	84.1749	88.1611
2	US#4[M13]	60.0	0.40	18.00	88.1611	96.9568
2	US#4[M13]	60.0	0.40	12.00	96.9568	101.4679
2	US#4[M13]	60.0	0.40	6.00	101.4679	106.7500

LOSSES

Note: Values are calculated at Midspan

Str. area	7.1810	in2
Ycg	5.07	in
P_init	1454.2	kips
Ecc	29.35	in
Hours to release	18.00	
Rel. Humid.(RH)	75.0	%
Es	28000.0	ksi
Eci	4287	ksi

AASHTO LOSSES

			Release			Final	(Art. 9.16.2)
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2139.91	psi	
Elastic Shortening		15919.13	psi	ES (Eq 9-6)	15919.13	psi	(Fcir=2437.24 psi)
Concrete shrinkage		0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep		0.00	psi	CRc (Eq 9-9)	19613.58	psi	(Fcds=-1376.18 psi)

		Release			**Final**	**(Art. 9.16.2)**
Total	17519.61	psi	(8.65 %)	43422.62	psi	(21.44 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 2, SERVICE 1
Shears: kips, Moments: kft

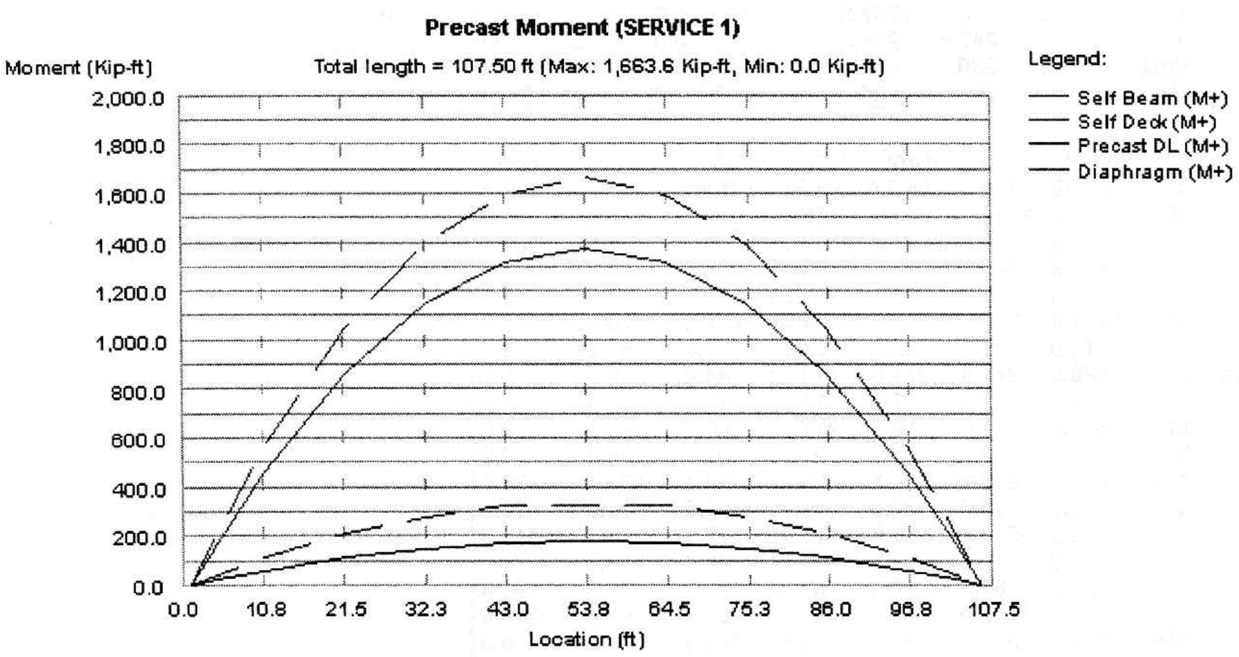
		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Self wt. :	M	0.0	64.6	174.4	466.4	863.4	1146.9	1317.0	1373.7
	V	52.3	51.0	48.9	42.5	31.9	21.2	10.6	0.0
Prec. :	M	0.0	8.4	22.6	60.5	112.1	148.9	170.9	178.3
DL+ADL	V	6.8	6.6	6.3	5.5	4.1	2.8	1.4	0.0
Deck :	M	0.0	78.2	211.2	564.8	1045.5	1388.9	1594.9	1663.6
+ Haunch	V	63.3	61.8	59.2	51.5	38.6	25.7	12.9	0.0
Diaphragm :	M	0.0	16.4	44.2	116.8	211.0	274.3	326.9	326.9
	V	11.9	11.9	11.9	11.9	5.9	5.9	0.0	0.0
Comp. :	M	-945.2	-888.5	-791.8	-532.9	-175.2	89.5	261.1	339.6
DL+ADL	V	45.9	44.9	43.1	37.9	29.2	20.4	11.7	3.0
LL + I :	M+	215.4	207.0	212.1	313.1	842.1	1243.9	1484.9	1545.6
	V	13.9	17.3	10.1	40.8	30.5	12.4	0.4	37.3
LL + I :	M-	-1667.8	-1573.1	-1418.4	-1053.9	-811.9	-705.6	-682.3	-659.1
	V	74.6	71.1	64.9	46.7	13.1	2.2	2.3	2.3
LL + I :	Vmx	94.5	92.9	89.8	83.6	74.3	63.2	51.7	44.0
	M	-1189.3	-1113.1	-980.6	235.1	790.3	1164.5	1364.8	1485.6
Total :	M+	0.0	0.0	0.0	988.7	2898.9	4292.3	5155.7	5427.6
	V	0.0	0.0	0.0	190.0	140.2	88.5	37.0	40.3
Total :	M-	-2613.0	-2294.0	-1757.8	-378.2	0.0	0.0	0.0	0.0
	V	254.8	247.4	234.2	195.9	0.0	0.0	0.0	0.0
Total :	Vmx	274.7	269.1	259.1	232.9	184.0	139.3	88.2	47.0
	M	-2134.5	-1834.0	-1320.0	910.8	2847.0	4213.0	5035.6	5367.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.22	73.89	84.57	95.24	101.64	103.83	105.08
Self wt. :	M	1317.0	1146.9	863.4	466.4	174.4	64.6	0.0
	V	10.6	21.2	31.9	42.5	48.9	51.0	52.3
Prec. :	M	170.9	148.9	112.1	60.5	22.6	8.4	0.0
DL+ADL	V	1.4	2.8	4.1	5.5	6.3	6.6	6.8
Deck :	M	1594.9	1388.9	1045.5	564.8	211.2	78.2	0.0
+ Haunch	V	12.9	25.7	38.6	51.5	59.2	61.8	63.3
Diaphragm :	M	326.9	274.3	211.0	116.8	44.2	16.4	0.0
	V	0.0	5.9	5.9	11.9	11.9	11.9	11.9
Comp. :	M	325.1	217.4	16.7	-277.1	-495.5	-579.6	-629.5
DL+ADL	V	5.7	14.4	23.2	31.9	37.1	38.9	39.9
LL + I :	M+	1469.2	1213.6	802.6	465.3	424.4	429.3	436.5
	V	1.7	13.6	24.5	7.4	11.0	12.3	13.0
LL + I :	M-	-635.9	-612.7	-682.6	-919.4	-1272.2	-1421.6	-1513.0
	V	2.3	2.2	10.8	43.5	61.7	68.0	71.5
LL + I :	Vmx	53.0	64.5	75.4	84.5	90.3	92.3	93.4
	M	1351.8	1135.0	749.6	191.3	-100.0	-192.6	-243.6
Total :	M+	5203.9	4390.0	3051.2	1396.8	381.3	17.3	0.0
	V	32.3	83.7	128.2	150.6	174.4	182.5	0.0
Total :	M-	0.0	0.0	0.0	0.0	-1315.3	-1833.7	-2142.6
	V	0.0	0.0	0.0	0.0	225.1	238.3	245.7
Total :	Vmx	83.6	134.6	179.1	227.7	253.6	262.6	267.6
	M	5086.5	4311.4	2998.2	1122.8	350.3	-26.5	-244.5

REACTIONS (kips), SERVICE 1

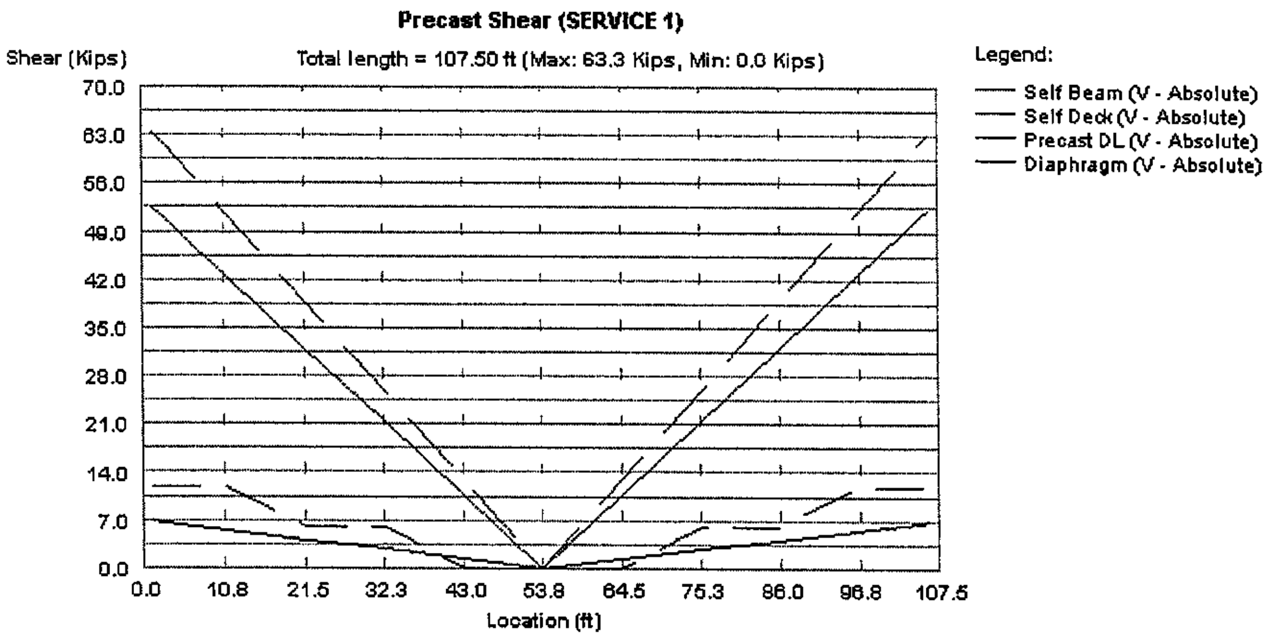
Load Type		Left Support	Right Support
Self Wt.		52.3	52.3
Deck+Haunch		63.3	63.3
Diaphragm		11.9	11.9
Prec.DL+ADL		6.8	6.8
Comp. DL+ADL		499.4	409.1
Live	(Max)	137.2	130.7
Live	(Min)	-11.2	-23.4
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

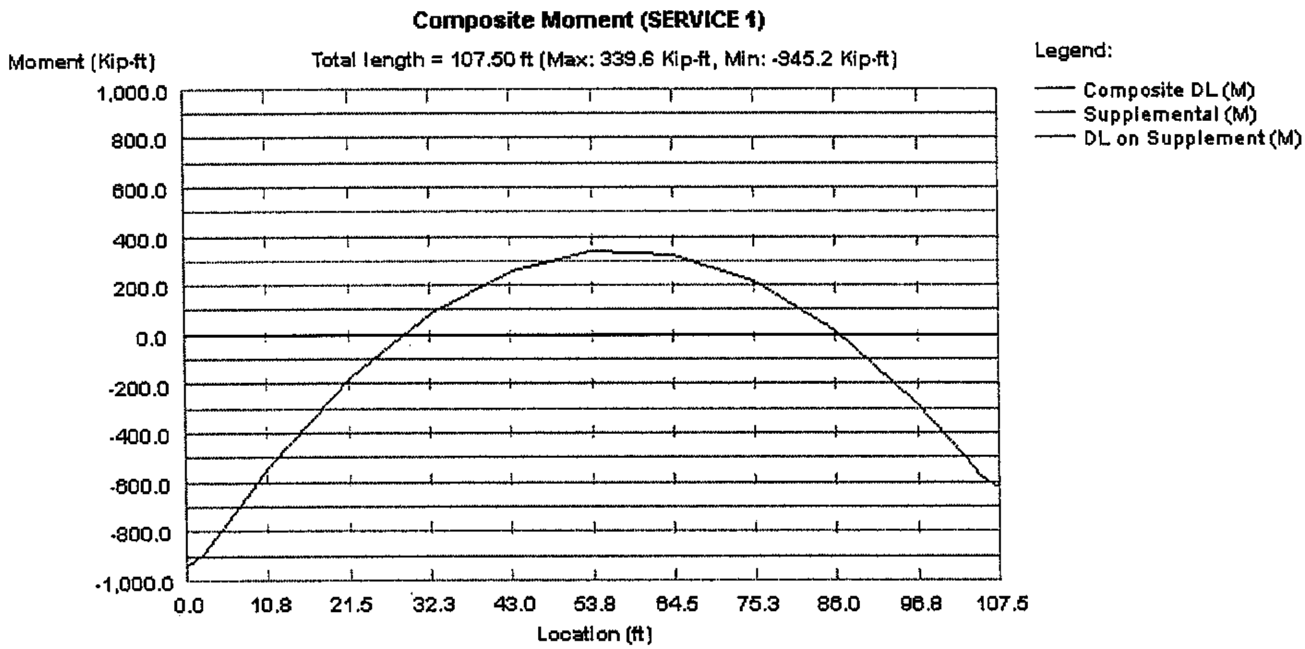


Precast Moment, Span 2, Beam 2, SERVICE 1

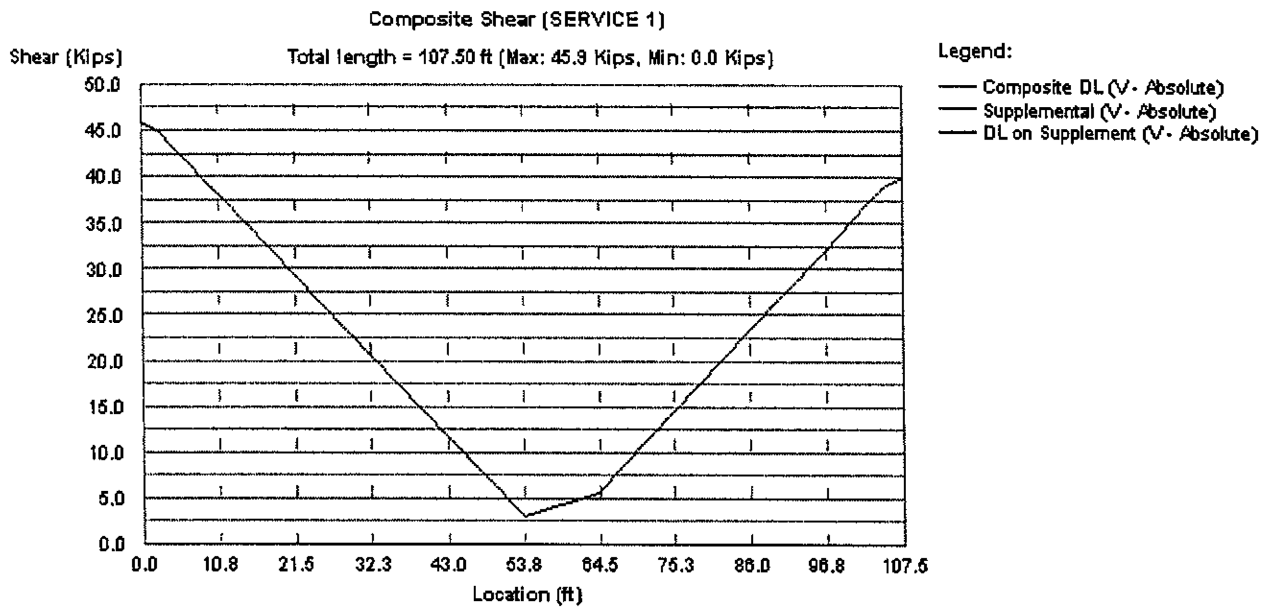
BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-25 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



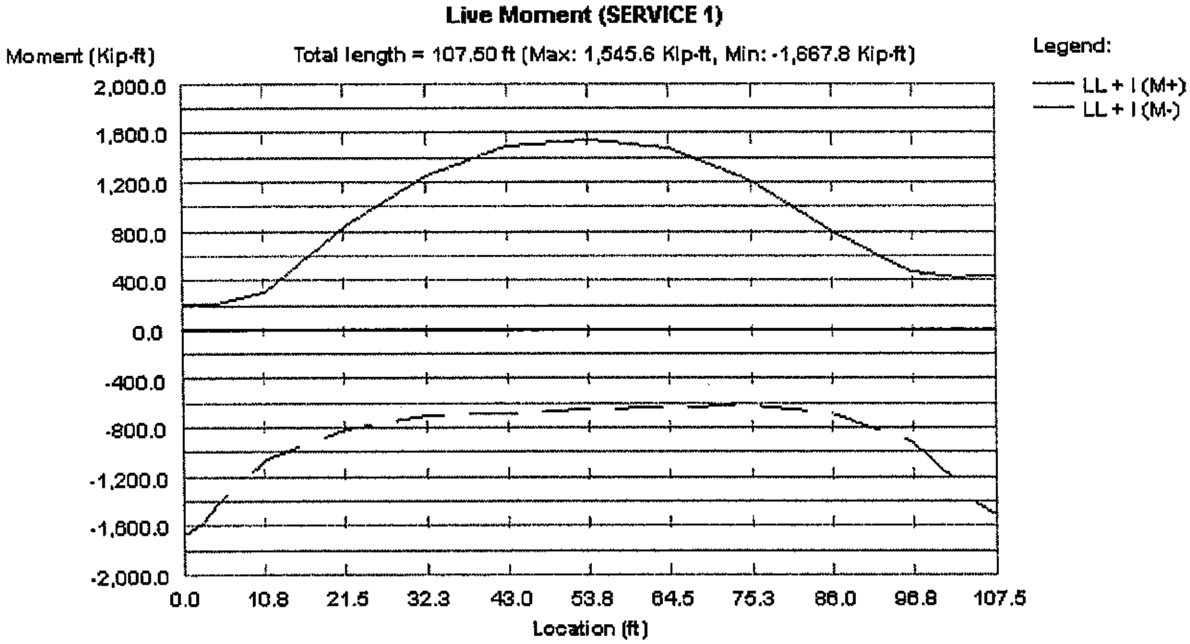
Precast Shear, Span 2, Beam 2, SERVICE 1



Composite Moment, Span 2, Beam 2, SERVICE 1

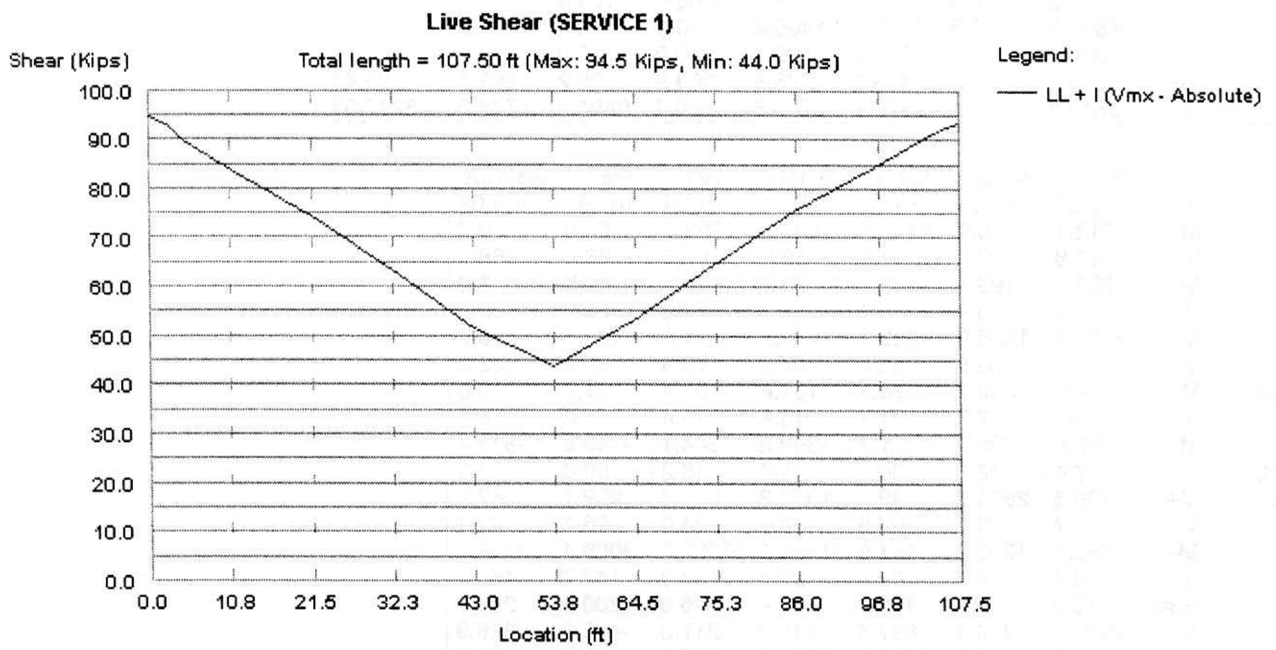


Composite Shear, Span 2, Beam 2, SERVICE 1



Live Moment, Span 2, Beam 2, SERVICE 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-29 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Live Shear, Span 2, Beam 2, SERVICE 1

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 2, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Self wt. :	M	0.0	84.0	226.7	606.3	1122.4	1490.9	1712.1	1785.8
	V	68.0	66.4	63.5	55.2	41.4	27.6	13.8	0.0
Prec. :	M	0.0	10.9	29.4	78.7	145.7	193.5	222.2	231.8
DL+ADL	V	8.8	8.6	8.2	7.2	5.4	3.6	1.8	0.0
Deck :	M	0.0	101.7	274.5	734.3	1359.2	1805.5	2073.4	2162.6
+ Haunch	V	82.3	80.4	76.9	66.9	50.2	33.5	16.7	0.0
Diaphragm :	M	0.0	21.4	57.4	151.8	274.3	356.7	424.9	424.9
	V	15.4	15.4	15.4	15.4	7.7	7.7	0.0	0.0
Comp. :	M	-1228.8	-1155.0	-1029.3	-692.8	-227.7	116.3	339.4	441.5
DL+ADL	V	59.7	58.4	56.0	49.2	37.9	26.6	15.2	3.9
LL + I :	M+	467.6	449.5	460.4	679.7	1828.3	2700.5	3223.8	3355.5
	V	30.2	37.6	21.9	88.6	66.2	27.0	0.8	81.1
LL + I :	M-	-3620.8	-3415.2	-3079.3	-2287.9	-1762.7	-1531.8	-1481.3	-1430.9
	V	162.0	154.4	140.8	101.4	28.4	4.9	4.9	5.0
LL + I :	Vmx	205.2	201.6	194.9	181.6	161.3	137.3	112.2	95.5

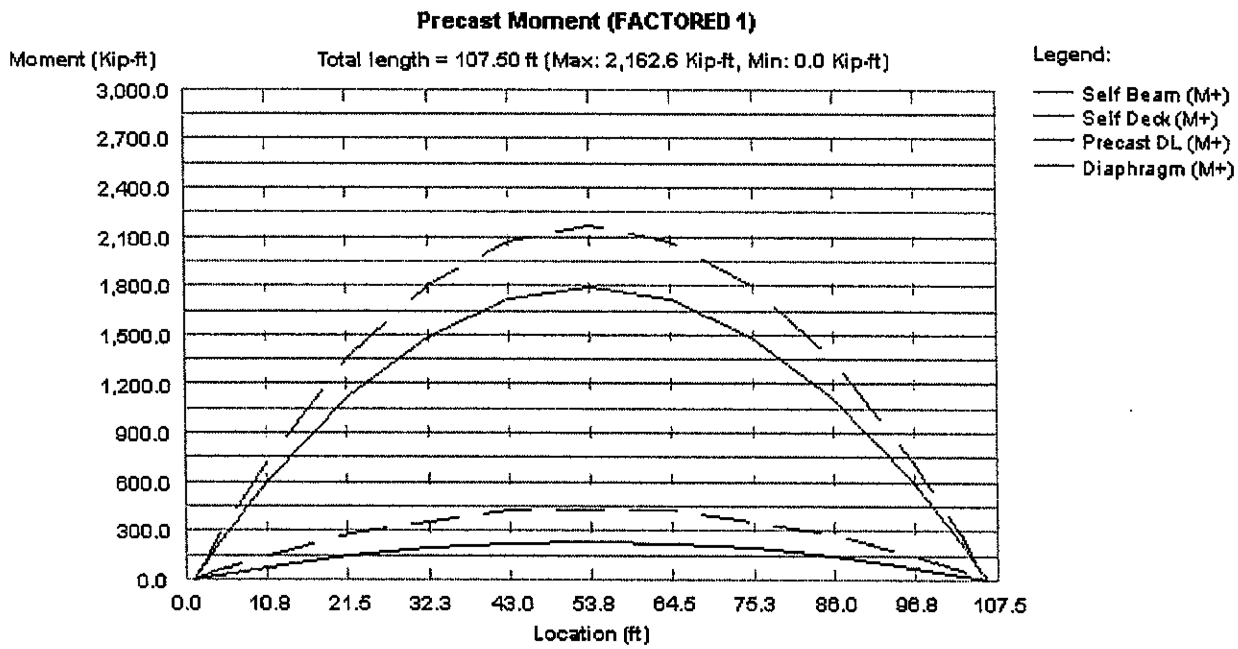
		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
	M	-2581.9	-2416.6	-2128.9	510.4	1715.7	2528.1	2963.0	3225.3
Total :	M+	0.0	0.0	19.1	1558.0	4502.1	6663.5	7995.8	8402.1
	V	0.0	0.0	242.0	282.6	208.8	125.9	48.4	84.9
Total :	M-	-4849.6	-4352.3	-3520.6	-1409.6	0.0	0.0	0.0	0.0
	V	396.2	383.5	361.0	295.3	0.0	0.0	0.0	0.0
Total :	Vmx	439.4	430.7	415.0	375.6	303.9	236.2	159.7	99.4
	M	-3810.8	-3353.7	-2570.2	1388.8	4389.4	6491.1	7735.0	8272.0

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.22	73.89	84.57	95.24	101.64	103.83	105.08
Self wt. :	M	1712.1	1490.9	1122.4	606.3	226.7	84.0	0.0
	V	13.8	27.6	41.4	55.2	63.5	66.4	68.0
Prec. :	M	222.2	193.5	145.7	78.7	29.4	10.9	0.0
DL+ADL	V	1.8	3.6	5.4	7.2	8.2	8.6	8.8
Deck :	M	2073.4	1805.5	1359.2	734.3	274.5	101.7	0.0
+ Haunch	V	16.7	33.5	50.2	66.9	76.9	80.4	82.3
Diaphragm :	M	424.9	356.7	274.3	151.8	57.4	21.4	0.0
	V	0.0	7.7	7.7	15.4	15.4	15.4	15.4
Comp. :	M	422.6	282.7	21.7	-360.2	-644.1	-753.5	-818.4
DL+ADL	V	7.4	18.8	30.1	41.4	48.2	50.6	51.9
LL + I :	M+	3189.6	2634.7	1742.4	1010.2	921.4	932.1	947.6
	V	3.7	29.5	53.3	16.1	24.0	26.7	28.2
LL + I :	M-	-1380.6	-1330.2	-1481.9	-1996.0	-2762.0	-3086.4	-3284.8
	V	4.9	4.9	23.5	94.5	134.0	147.7	155.2
LL + I :	Vmx	115.0	140.0	163.6	183.4	196.0	200.4	202.7
	M	2934.7	2464.1	1627.4	415.3	-217.0	-418.2	-528.9
Total :	M+	8044.8	6764.0	4665.6	2221.2	865.4	396.5	129.2
	V	43.4	120.7	188.1	202.3	236.3	248.0	254.6
Total :	M-	0.0	0.0	0.0	-785.0	-2818.0	-3622.0	-4103.2
	V	0.0	0.0	0.0	280.6	346.4	369.0	381.7
Total :	Vmx	154.8	231.1	298.4	369.6	408.3	421.8	429.2
	M	7789.8	6593.4	4550.6	1626.2	368.3	-202.3	-530.0

REACTIONS (kips), FACTORED 1

Load Type		Left Support	Right Support
Self Wt.		68.0	68.0
Deck+Haunch		82.3	82.3
Diaphragm		15.4	15.4
Prec.DL+ADL		8.8	8.8
Comp. DL+ADL		649.2	531.8
Live	(Max)	298.0	283.9
Live	(Min)	-24.3	-50.8
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

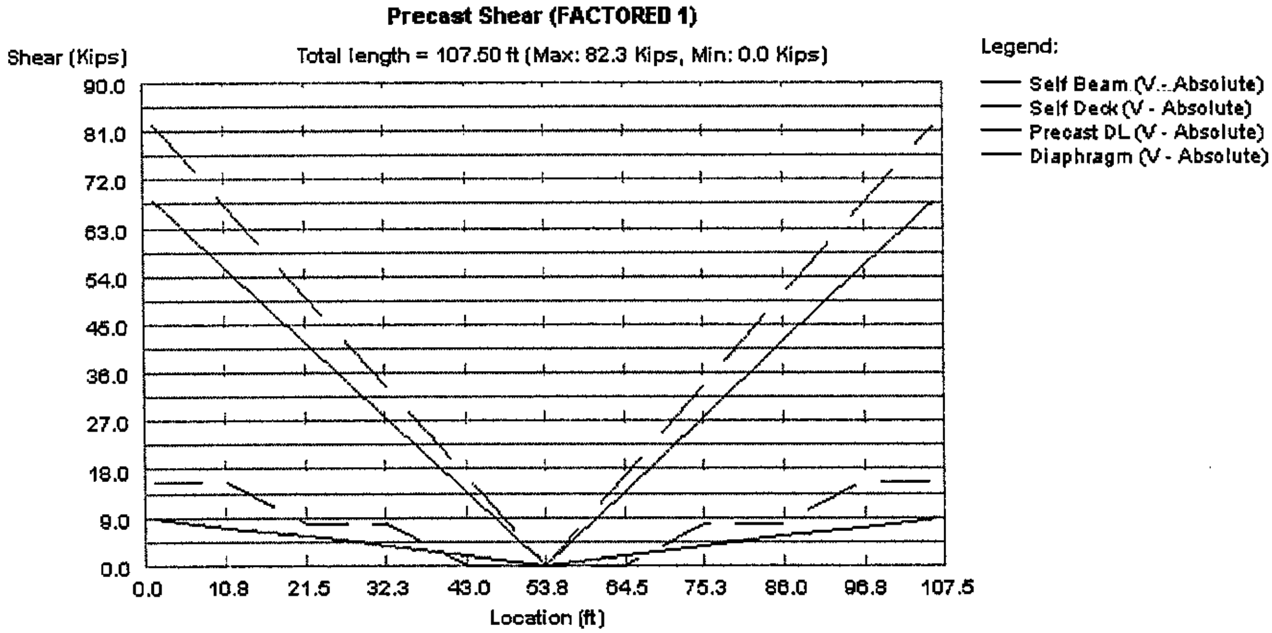
Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.



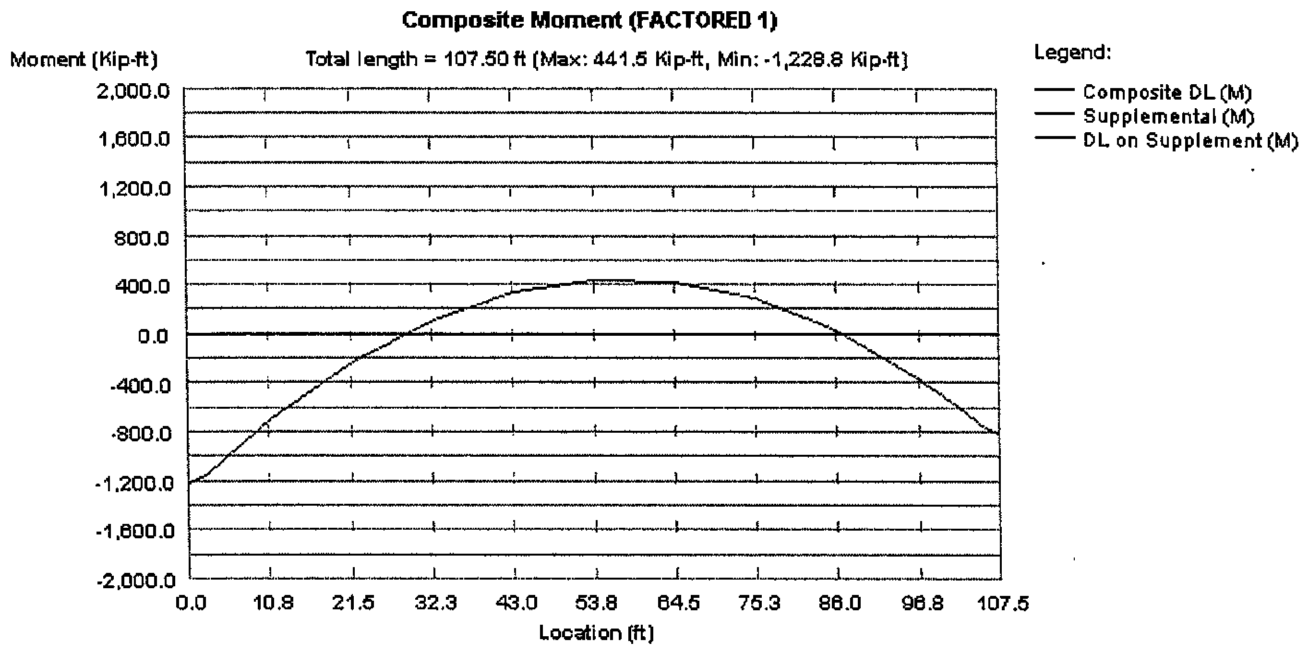
Precast Moment, Span 2, Beam 2, FACTORED 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-32 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

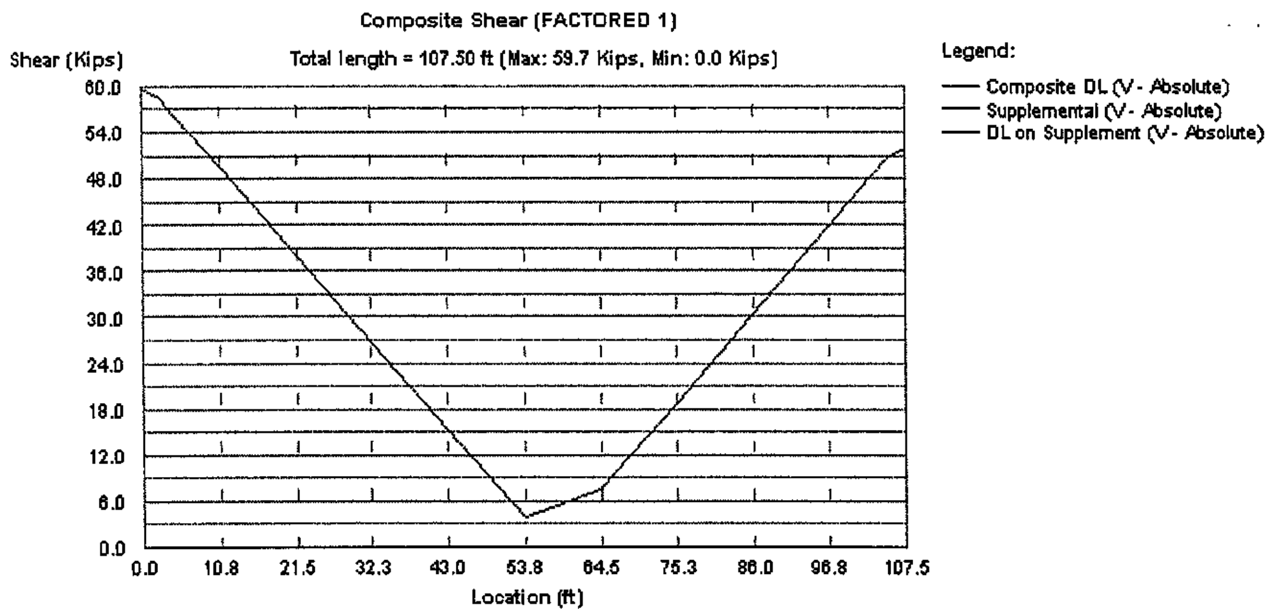
File Name: 535502_SCI-823-0837.csl



Precast Shear, Span 2, Beam 2, FACTORED 1

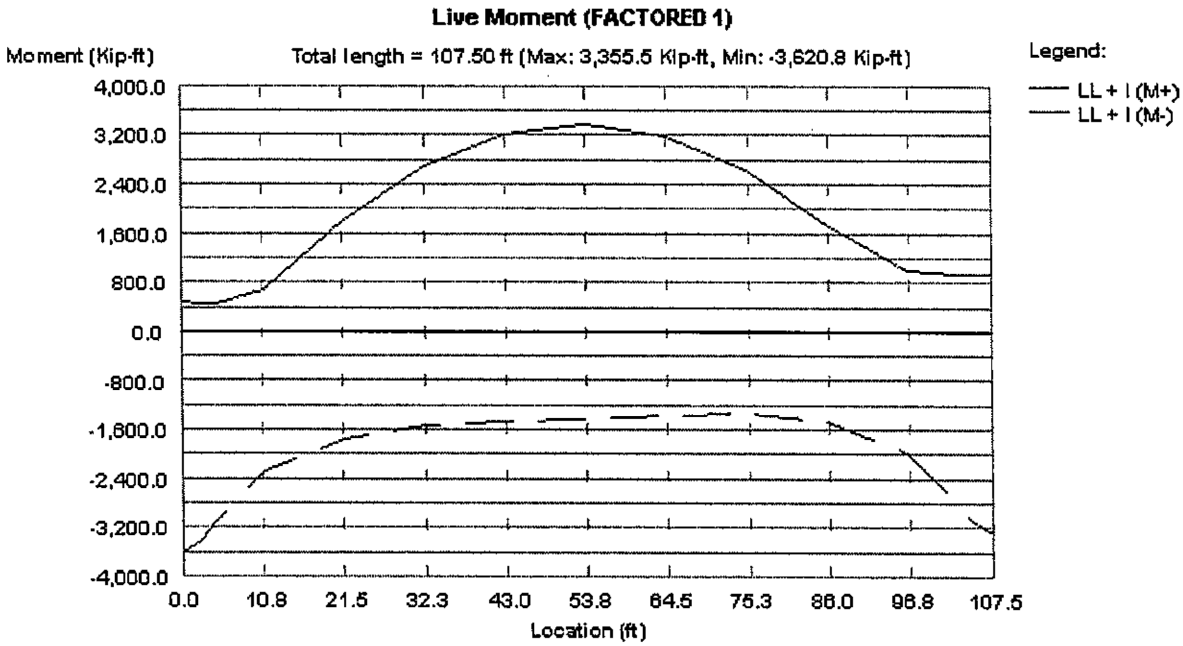


Composite Moment, Span 2, Beam 2, FACTORED 1



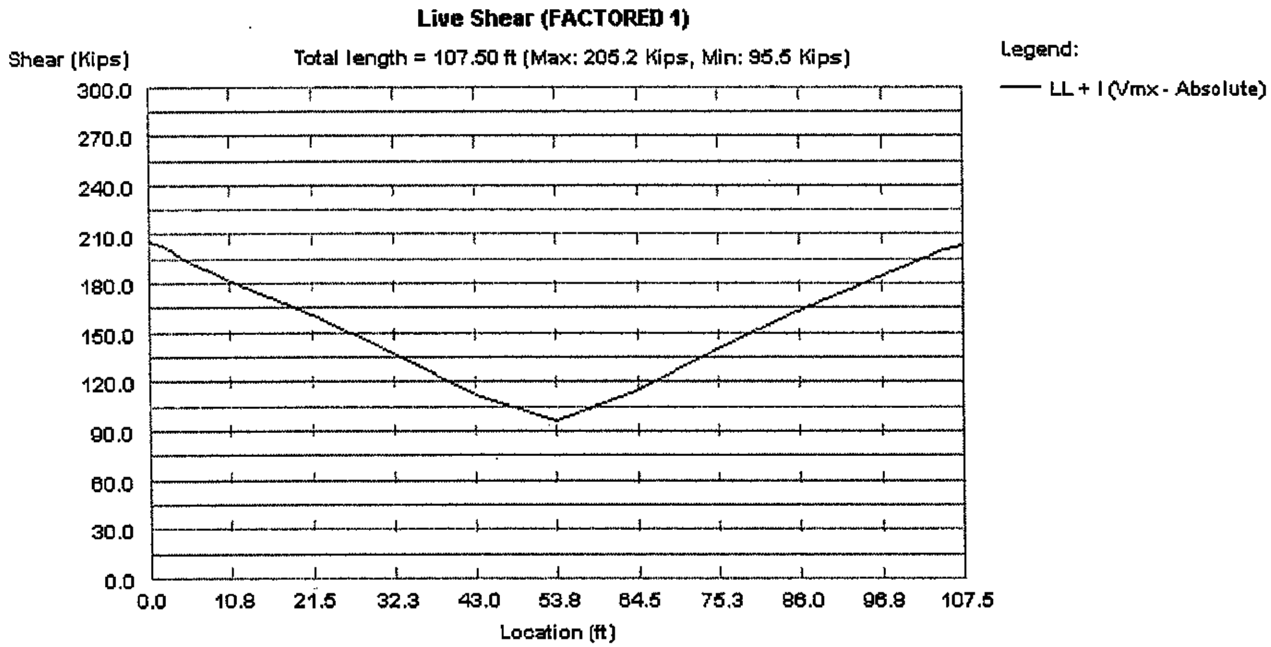
Composite Shear, Span 2, Beam 2, FACTORED 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-35 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File name: 535502_SCI-823-0837.csl**	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Live Moment, Span 2, Beam 2, FACTORED 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-36 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Live Shear, Span 2, Beam 2, FACTORED 1

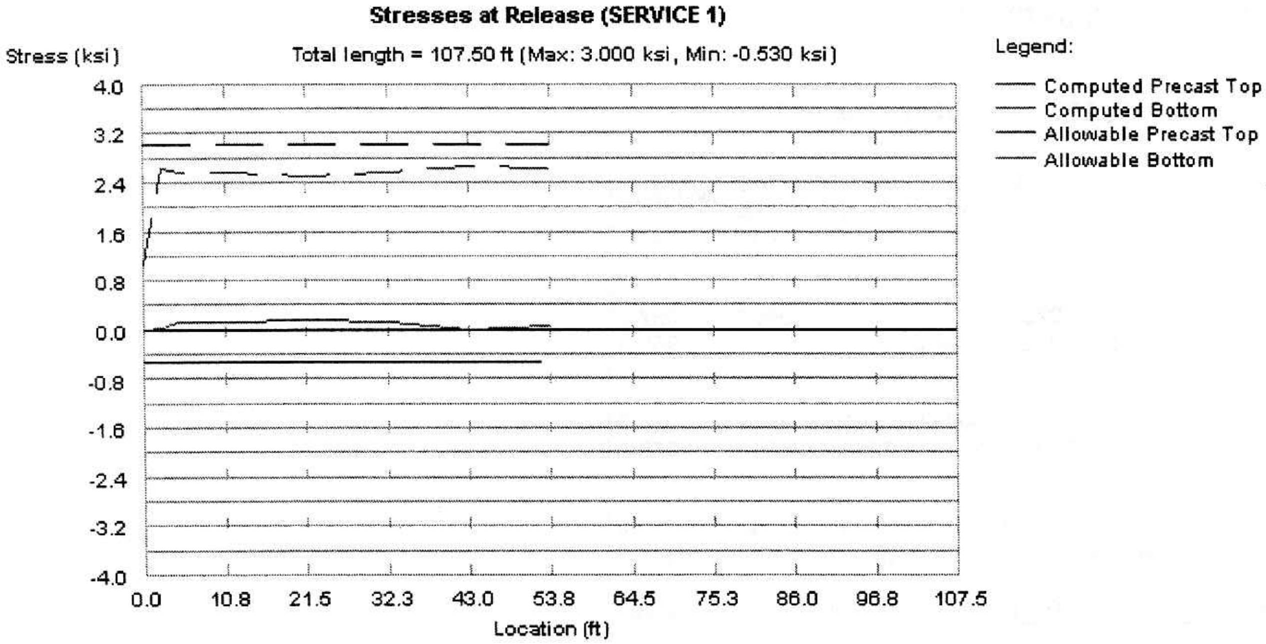
POSITIVE ENVELOPE STRESSES

Span : 2, Beam : 2, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.65 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	10.68	21.35	32.03	42.70	53.38
Self Wt.						
Precast-top	79.4	373.5	664.1	871.6	996.1	1037.6
Bottom	-72.7	-342.1	-608.2	-798.3	-912.4	-950.4
Prestress						
Precast-top	-52.1	-250.0	-495.9	-741.8	-987.7	-987.7
Bottom	2711.5	2892.8	3118.0	3343.2	3568.4	3568.4
Total						
Precast-top	27.3	123.5	168.2	129.8	8.4	49.9
Bottom	2638.8	2550.6	2509.8	2544.9	2656.1	2618.1
…top (in2)	0.000	0.000	0.000	0.000	0.000	0.000

Span : 2, Beam : 2, SERVICE 1

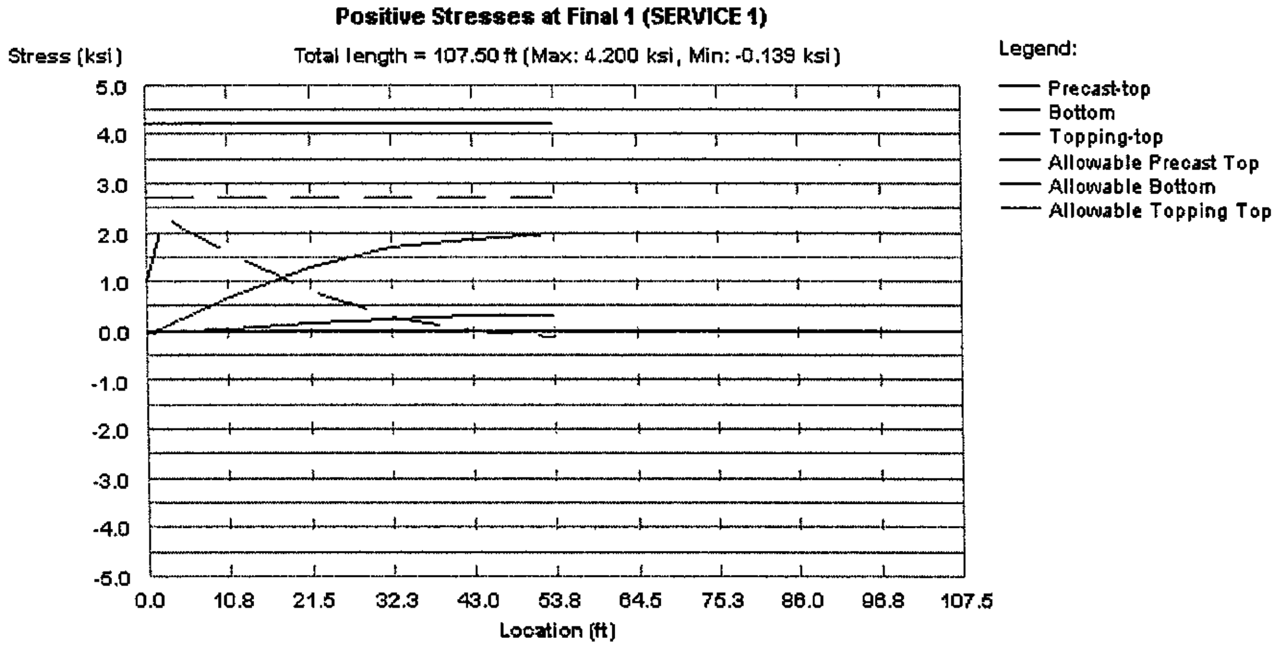


Stresses at Release, Span 2, Beam 2, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 21.44%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Prestress								
Precast-top	-8.0	-44.8	-88.3	-215.0	-426.5	-637.9	-849.4	-849.4
Bottom	923.7	2331.8	2371.7	2487.7	2681.4	2875.1	3068.7	3068.7
Self wt.								
Precast-top	-0.0	47.3	127.6	341.4	631.9	839.5	964.0	1005.5
Bottom	-0.0	-43.3	-116.9	-312.7	-578.8	-768.9	-882.9	-920.9
Prec. DL+ADL								
Precast-top	0.0	6.1	16.6	44.3	82.0	109.0	125.1	130.5
Bottom	-0.0	-5.6	-15.2	-40.6	-75.1	-99.8	-114.6	-119.5
Diaphragm								
Precast-top	0.0	12.0	32.3	85.5	154.4	200.8	239.2	239.2
Bottom	-0.0	-11.0	-29.6	-78.3	-141.5	-183.9	-219.1	-219.1

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Deck + Haunch									
Precast-top		-0.0	57.2	154.6	413.4	765.3	1016.6	1167.4	1217.6
Bottom		-0.0	-52.4	-141.6	-378.7	-700.9	-931.1	-1069.2	-1115.3
Comp. DL+ADL									
Topping-top		-107.0	-98.6	-84.2	-47.1	2.8	37.0	55.3	57.7
Precast-top		-80.0	-73.7	-63.0	-35.2	2.1	27.6	41.3	43.2
Bottom		278.1	256.0	218.9	122.4	-7.4	-96.0	-143.6	-150.0
LL+I(+)									
Topping-top		74.2	73.0	72.2	79.1	136.5	206.3	249.8	262.8
Precast-top		55.5	54.6	54.0	59.2	102.0	154.3	186.8	196.5
Bottom		-192.8	-189.7	-187.5	-205.5	-354.5	-536.1	-649.0	-682.7
Final 1 (P/S + DL	+ LL)								
Topping-top		-32.8	-25.6	-12.1	32.0	139.3	243.3	305.1	320.6
Precast-top		-32.6	58.8	233.7	693.6	1311.4	1709.8	1874.4	1983.2
Bottom		1009.0	2285.8	2099.8	1594.3	823.2	259.3	-9.7	-138.9
Final 2 (P/S + DL)									
Topping-top		-107.0	-98.6	-84.2	-47.1	2.8	37.0	55.3	57.7
Precast-top		-88.1	4.2	179.8	634.4	1209.3	1555.5	1687.6	1786.7
Bottom		1201.8	2475.5	2287.3	1799.9	1177.7	795.3	639.3	543.9
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		20.7	23.7	30.0	55.6	137.9	224.8	277.4	291.7
Precast-top		11.5	56.7	143.8	376.4	706.7	932.0	1030.6	1089.8
Bottom		408.1	1048.1	956.2	694.4	234.3	-138.4	-329.3	-410.8



Positive Stresses at Final 1, Span 2, Beam 2, SERVICE 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-41 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 2, Beam : 2, FACTORED 1

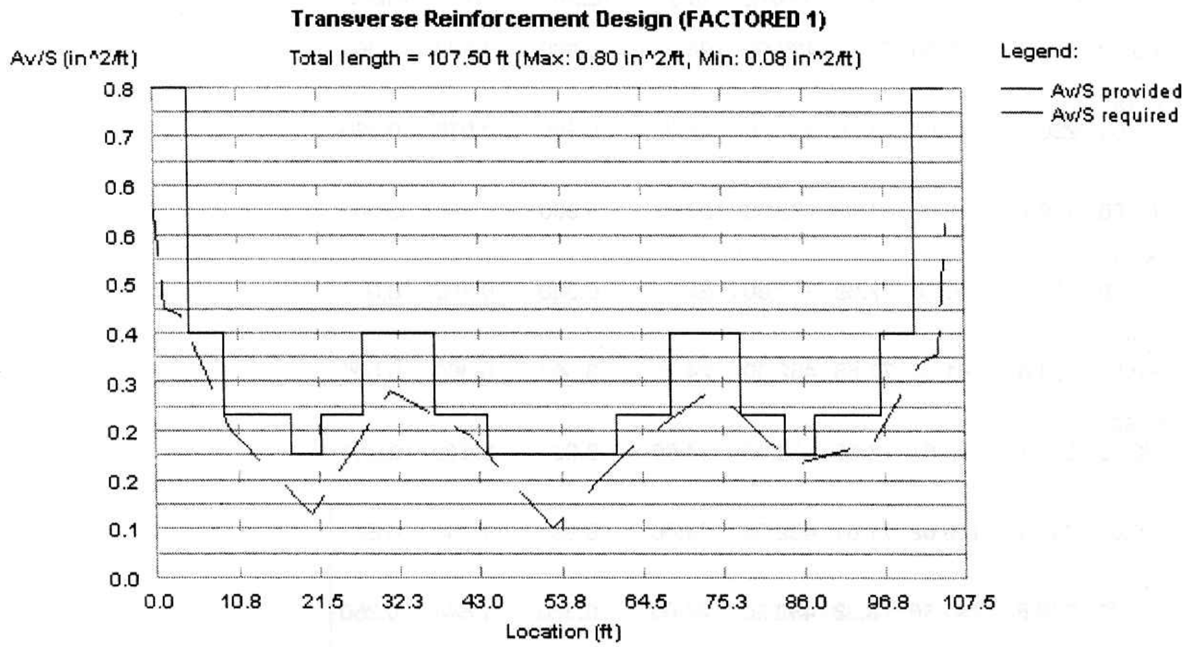
End Shear Design: Prestressed.

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
Bearing :	0.83	180.2	-945.2	-1667.8	415.0	-4849.6	396.2	-3904.3	216.0
0.0	-160.7	-1421.9	77.38	289.9	88.0	289.9	200.2	10.8	229.2
229.2	231.9	414.3	0.60	0.08	0.60	0.80	1.168	12.0	207.2
Transfer :	2.08	176.2	-720.9	-1573.1	415.0	-4352.3	383.5	-3631.5	207.3
0.0	-151.1	-1478.6	77.38	291.7	88.0	291.7	556.5	26.9	311.5
291.7	169.4	414.3	0.44	0.08	0.44	0.80	1.304	24.0	207.2
[illegible] :	4.28	169.3	-339.4	-1418.4	415.0	-3520.6	361.0	-3181.2	191.6
0.0	-134.6	-1575.3	77.38	295.3	88.0	295.3	650.8	26.9	329.0
295.3	165.8	414.3	0.43	0.08	0.43	0.80	1.312	24.0	207.2
0.1L :	10.68	149.2	675.7	313.1	375.6	1558.0	282.6	882.4	133.4
2487.7	-574.8	5466.8	68.58	1003.2	78.0	1003.2	894.9	26.9	334.8
334.8	82.5	367.2	0.24	0.08	0.24	0.27	1.021	24.0	183.6
0.2L :	21.35	109.7	2056.8	842.1	303.9	4502.1	208.8	2445.3	99.1
2681.4	-1418.9	3994.4	71.61	300.3	81.5	300.3	1202.3	26.9	401.3
300.3	37.3	383.4	0.10	0.08	0.10	0.20	1.101	24.0	191.7
0.3L :	32.03	76.1	3048.5	1243.9	236.2	6663.5	125.9	3615.0	49.8
2875.1	-2023.2	3064.8	74.65	148.3	84.9	148.3	1385.6	26.9	450.0
148.3	114.2	399.7	0.31	0.08	0.31	0.40	1.134	24.0	199.8
0.4L :	42.70	36.6	3670.8	1484.9	159.7	7995.8	48.4	4325.0	11.8
3068.7	-2401.2	2647.6	77.68	75.0	88.4	88.4	1453.4	0.0	452.9
88.4	89.1	415.9	0.23	0.08	0.23	0.27	1.082	24.0	208.0
0.5L :	53.38	3.0	3882.0	1545.6	99.4	8402.1	84.9	4520.1	81.9
3068.7	-2524.9	2367.7	77.68	77.1	88.4	88.4	1508.9	0.0	463.3
88.4	22.1	415.9	0.06	0.08	0.08	0.20	1.503	24.0	208.0
0.6L :	64.05	30.6	3734.7	1469.2	154.8	8044.8	43.4	4310.0	12.8
3068.7	-2429.4	2583.7	77.68	69.5	88.4	88.4	1453.4	0.0	452.9
88.4	83.6	415.9	0.22	0.08	0.22	0.27	1.116	24.0	208.0
0.7L :	74.72	70.1	3176.4	1213.6	231.1	6764.0	120.7	3587.6	50.6
2875.1	-2079.7	2936.9	74.65	141.5	84.9	141.5	1385.6	26.9	450.0
141.5	115.3	399.7	0.31	0.08	0.31	0.40	1.132	24.0	199.8

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
0.8L :	85.40	103.7	2248.7	802.6	298.4	4665.6	188.1	2417.0	84.4
2681.4	-1503.7	3802.5	71.61	265.2	81.5	265.2	1202.3	26.9	401.3
265.2	66.4	383.4	0.19	0.08	0.19	0.20	1.016	24.0	191.7
0.9L :	96.08	143.2	931.5	465.3	369.6	2221.2	202.3	1289.6	59.0
2487.7	-687.8	5210.9	68.58	409.3	78.0	409.3	894.9	26.9	334.8
334.8	75.9	367.2	0.22	0.08	0.22	0.27	1.038	24.0	183.6
H/2 :	102.47	163.3	-43.1	-1272.2	408.3	-2818.0	346.4	-2774.9	183.0
0.0	-84.2	-1871.7	77.38	317.9	88.0	317.9	650.8	26.9	329.0
317.9	135.8	414.3	0.35	0.08	0.35	0.80	1.383	24.0	207.2
Transfer :	104.67	170.3	-412.0	-1421.6	408.3	-3622.0	369.0	-3210.0	198.7
0.0	-98.6	-1787.5	77.38	312.0	88.0	312.0	556.5	26.9	311.5
311.5	142.2	414.3	0.37	0.08	0.37	0.80	1.369	24.0	207.2
Bearing :	105.92	174.2	-629.5	-1513.0	408.3	-4103.2	381.7	-3473.7	207.5
0.0	-107.0	-1737.6	77.38	309.1	88.0	309.1	200.2	10.8	229.2
229.2	224.5	414.3	0.58	0.08	0.58	0.80	1.187	12.0	207.2

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 2, Beam : 2

Fpi (kips)	fs (ksi)	d/4 (in)	Abrst_rqrd (in2)
1454.15	20.00	13.70	2.91



Vertical Shear, Span 2, Beam 2, FACTORED 1

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 2, Beam : 2

(Beam and Slab effects are INCLUDED in Vu).

Location (ft) bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing : 0.00									
36.00	60.00	439.4	173.05	78.38	432.00	24.00	0.360	2.035	0.360
Transfer : 1.25									
36.00	60.00	430.7	169.62	78.38	432.00	24.00	0.360	1.973	0.360
H/2 : 3.45									
36.00	60.00	415.0	163.43	78.38	432.00	24.00	0.360	1.862	0.360
0.1L : 9.84									
36.00	60.00	375.6	147.90	78.38	432.00	24.00	0.360	1.582	0.360

Location (ft)									
bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
0.2L :	20.52								
36.00	60.00	303.9	130.96	71.61	432.00	24.00	0.360	1.277	0.360
0.3L :	31.19								
36.00	60.00	236.2	97.67	74.65	432.00	24.00	0.360	0.678	0.360
0.4L :	41.87								
36.00	60.00	159.7	63.46	77.68	432.00	24.00	0.360	0.360	0.000
0.5L :	52.54								
36.00	60.00	99.4	39.50	77.68	432.00	24.00	0.360	0.360	0.000
0.6L :	63.22								
36.00	60.00	154.8	61.49	77.68	432.00	24.00	0.360	0.360	0.000
0.7L :	73.89								
36.00	60.00	231.1	95.57	74.65	432.00	24.00	0.360	0.640	0.360
0.8L :	84.57								
36.00	60.00	298.4	128.62	71.61	432.00	24.00	0.360	1.235	0.360
0.9L :	95.24								
36.00	60.00	369.6	145.56	78.38	432.00	24.00	0.360	1.540	0.360
H/2 :	101.64								
36.00	60.00	408.3	160.80	78.38	432.00	24.00	0.360	1.814	0.360
Transfer :	103.83								
36.00	60.00	421.8	166.09	78.38	432.00	24.00	0.360	1.910	0.360
Bearing :	105.08								
36.00	60.00	429.2	169.01	78.38	432.00	24.00	0.360	1.962	0.360

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 2, Beam : 2; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.84 ft				
Prestress	0.933	1.80	1.680	2.20	2.053
Self Wt.	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch			-0.312	2.30	-0.717
Prec. DL+ADL			-0.033	3.00	-0.100
Diaphragm			-0.063	3.00	-0.189
Comp. DL+ADL			0.003	3.00	0.009
Live Load(+I)					-0.083
Total	0.587		0.635		0.143

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	20.52 ft				
Prestress	1.701	1.80	3.061	2.20	3.742
Self Wt.	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch			-0.616	2.30	-1.416
Prec. DL+ADL			-0.066	3.00	-0.198
Diaphragm			-0.124	3.00	-0.372
np. DL+ADL			-0.009	3.00	-0.026
Load(+I)					-0.167
	1.047		1.037		-0.006

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	31.19 ft				
Prestress	2.277	1.80	4.098	2.20	5.009
Self Wt.	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch			-0.854	2.30	-1.965
Prec. DL+ADL			-0.092	3.00	-0.275
Diaphragm			-0.172	3.00	-0.515
Comp. DL+ADL			-0.025	3.00	-0.076
Live Load(+I)					-0.240
Total	1.382		1.299		-0.209

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	41.87 ft				
Prestress	2.636	1.80	4.745	2.20	5.799
Self Wt.	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch			-1.006	2.30	-2.314
Prec. DL+ADL			-0.108	3.00	-0.323
Diaphragm			-0.202	3.00	-0.607
Comp. DL+ADL			-0.040	3.00	-0.119
Live Load(+I)					-0.288
Total	1.587		1.449		-0.368

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	52.54 ft				
Prestress	2.757	1.80	4.963	2.20	6.066
Wt.	-1.101	1.85	-2.037	2.40	-2.642
k + Haunch			-1.058	2.30	-2.434

	Release	Mult	Erection	Mult	Final
Prec. DL+ADL			-0.113	3.00	-0.340
Diaphragm			-0.213	3.00	-0.638
Comp. DL+ADL			-0.047	3.00	-0.142
Live Load(+I)					-0.304
Total	1.656		1.495		-0.434

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	63.22 ft				
Prestress	2.636	1.80	4.745	2.20	5.799
Self Wt.	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch			-1.006	2.30	-2.314
Prec. DL+ADL			-0.108	3.00	-0.323
Diaphragm			-0.202	3.00	-0.607
Comp. DL+ADL			-0.046	3.00	-0.139
Live Load(+I)					-0.286
Total	1.587		1.443		-0.386

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	73.89 ft				
Prestress	2.277	1.80	4.098	2.20	5.009
Self Wt.	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch			-0.854	2.30	-1.965
Prec. DL+ADL			-0.092	3.00	-0.275
Diaphragm			-0.172	3.00	-0.515
Comp. DL+ADL			-0.037	3.00	-0.111
Live Load(+I)					-0.236
Total	1.382		1.288		-0.242

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	84.57 ft				
Prestress	1.701	1.80	3.061	2.20	3.742
Self Wt.	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch			-0.616	2.30	-1.416
Prec. DL+ADL			-0.066	3.00	-0.198
Diaphragm			-0.124	3.00	-0.372
Comp. DL+ADL			-0.022	3.00	-0.067
Live Load(+I)					-0.163
Total	1.047		1.024		-0.044

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	95.24 ft				
Prestress	0.933	1.80	1.680	2.20	2.053
Self Wt.	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch			-0.312	2.30	-0.717
Prec. DL+ADL			-0.033	3.00	-0.100
Diaphragm			-0.063	3.00	-0.189
Comp. DL+ADL			-0.007	3.00	-0.022
Live Load(+I)					-0.080
Total	0.587		0.625		0.115

Positive values indicate upward deflection.

ULTIMATE MOMENT

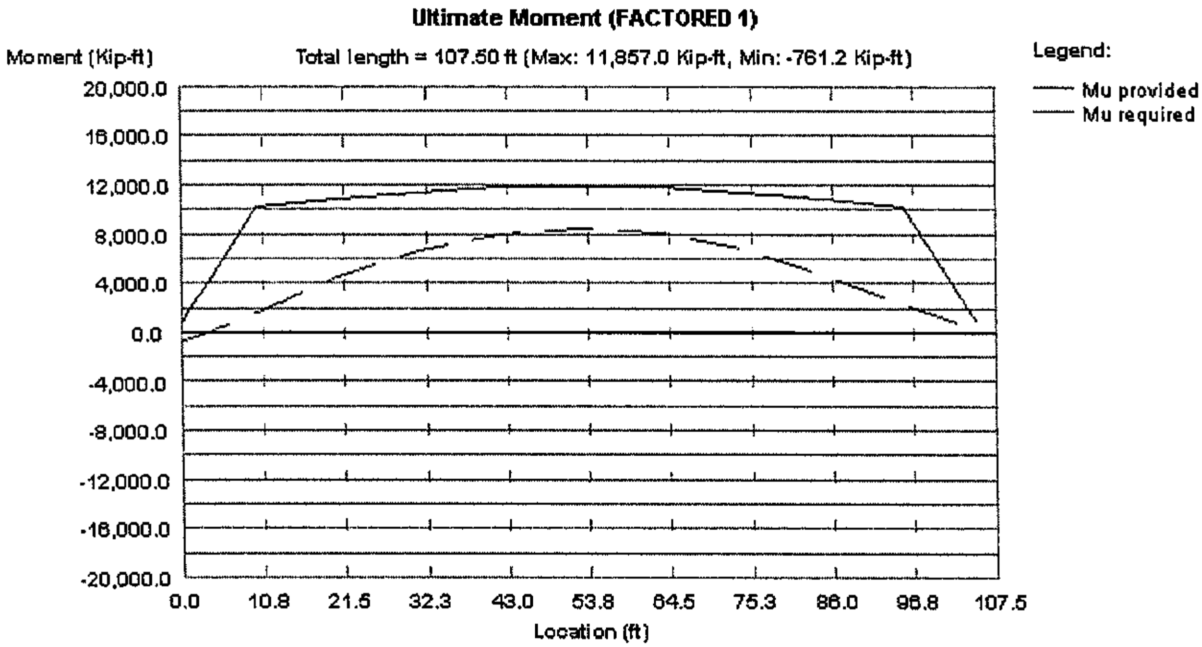
ULTIMATE - Span : 2, Beam : 2, FACTORED 1
(Mu-prvd computed by Strain Compatibility method. Ult. Conc. Strain = 0.00300)

(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.25									
	1.377	16.62	0.00017	269.7	0.8	1973.0	-487.7	6612.5	0.298	4.05
H/2	3.45									
	2.829	15.99	0.00035	269.4	1.6	4064.8	19.1	6555.4	0.620	212.53
0.1L	9.84									
	7.054	14.17	0.00085	268.7	4.0	10208.5	1558.0	6426.5	1.588	-
0.2L	20.52									
	7.181	11.14	0.00083	268.9	4.1	10875.9	4502.1	6335.3	1.717	-
0.3L	31.19									
	7.181	8.10	0.00080	269.0	4.1	11366.5	6663.5	6397.4	1.777	-
0.4L	41.87									
	7.181	5.07	0.00077	269.1	4.1	11857.0	7995.8	6602.5	1.796	-
0.5L	52.54									
	7.181	5.07	0.00077	269.1	4.1	11857.0	8402.1	6533.8	1.815	-
[illegible]	63.22									
	7.181	5.07	0.00077	269.1	4.1	11857.0	8044.8	6602.5	1.796	-
[illegible]	73.89									
	7.181	8.10	0.00080	269.0	4.1	11366.5	6764.0	6397.4	1.777	-
0.8L	84.57									
	7.181	11.14	0.00083	268.9	4.1	10875.9	4665.6	6335.3	1.717	-
0.9L	95.24									
	7.054	14.17	0.00085	268.7	4.0	10208.5	2221.2	6426.5	1.588	-
H/2	101.64									
	2.829	15.99	0.00035	269.4	1.6	4064.8	865.4	6555.4	0.620	4.70
Transfer	103.83									
	1.377	16.62	0.00017	269.7	0.8	1973.0	396.5	6612.5	0.298	4.98

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-48 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

File Name: 535502_SCI-823-0837.csl



Ultimate Moment, Span 2, Beam 2, FACTORED 1

DETENSIONING

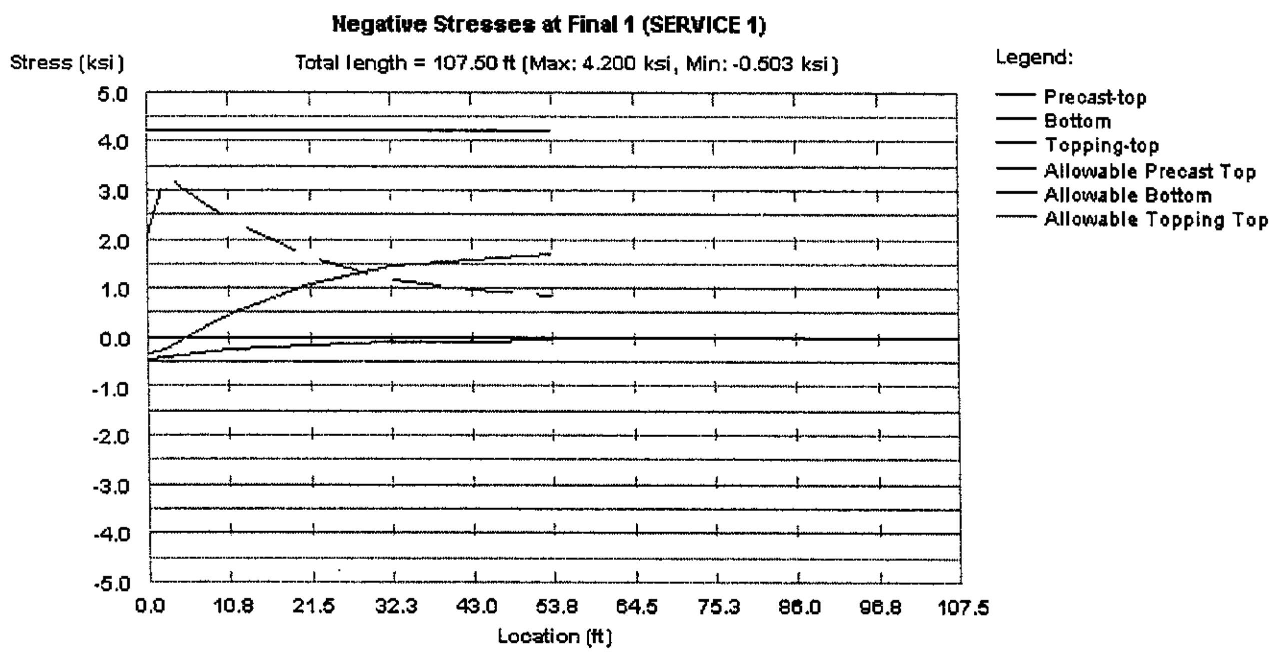
Span : 2, Beam : 2; Groups 1-24; Units: psi

Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	22.010
		M	2.00	Fb	103.739
2	2	E	68.00	Ft	202.560
		M	10.00	Fb	62.268
3	1	E	68.00	Ft	292.835
		M	10.00	Fb	41.532
4	2	E	66.00	Ft	465.849
		M	8.00	Fb	6.965
5	1	E	66.00	Ft	552.356
		M	8.00	Fb	-10.32*
6	2	E	64.00	Ft	717.832
		M	6.00	Fb	-37.98*
7	1	E	64.00	Ft	800.570
		M	6.00	Fb	-51.82*
8	2	E	8.00	Ft	765.673
		M	8.00	Fb	104.044
9	2	E	8.00	Ft	730.776
		M	8.00	Fb	259.904
10	2	E	6.00	Ft	688.343
		M	6.00	Fb	422.667
[illegible]	2	E	6.00	Ft	645.909
		M	6.00	Fb	585.430
12	2	E	6.00	Ft	603.475
		M	6.00	Fb	748.194
13	2	E	6.00	Ft	561.041
		M	6.00	Fb	910.957
14	2	E	4.00	Ft	511.070
		M	4.00	Fb	1080.623
15	2	E	4.00	Ft	461.099
		M	4.00	Fb	1250.290
16	2	E	4.00	Ft	411.128
		M	4.00	Fb	1419.956
17	2	E	4.00	Ft	361.158
		M	4.00	Fb	1589.622
18	2	E	4.00	Ft	311.187
		M	4.00	Fb	1759.289
19	1	E	4.00	Ft	286.201
		M	4.00	Fb	1844.122
20	2	E	2.00	Ft	228.693
		M	2.00	Fb	2020.692
21	2	E	2.00	Ft	171.186
		M	2.00	Fb	2197.262
22	2	E	2.00	Ft	113.678
		M	2.00	Fb	2373.831
23	2	E	2.00	Ft	56.170
		M	2.00	Fb	2550.401
24	1	E	2.00	Ft	27.416
		M	2.00	Fb	2638.686

NEGATIVE ENVELOPE STRESSES

Span : 2, Beam : 2, SERVICE 1
NEGATIVE ENVELOPE STRESSES, (psi) (LOSS = 21.44%)

			Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft			0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Prestress										
Precast-top			-8.0	-44.8	-88.3	-215.0	-426.5	-637.9	-849.4	-849.4
Bottom			923.7	2331.8	2371.7	2487.7	2681.4	2875.1	3068.7	3068.7
Self wt.										
Precast-top			-0.0	47.3	127.6	341.4	631.9	839.5	964.0	1005.5
Bottom			-0.0	-43.3	-116.9	-312.7	-578.8	-768.9	-882.9	-920.9
Prec. DL+ADL										
Precast-top			0.0	6.1	16.6	44.3	82.0	109.0	125.1	130.5
Bottom			-0.0	-5.6	-15.2	-40.6	-75.1	-99.8	-114.6	-119.5
Diaphragm										
Precast-top			-0.0	12.0	32.3	85.5	154.4	200.8	239.2	239.2
Bottom			-0.0	-11.0	-29.6	-78.3	-141.5	-183.9	-219.1	-219.1
Deck + Haunch										
Precast-top			-0.0	57.2	154.6	413.4	765.3	1016.6	1167.4	1217.6
Bottom			-0.0	-52.4	-141.6	-378.7	-700.9	-931.1	-1069.2	-1115.3
Comp. DL+ADL										
Topping-top			-160.7	-151.1	-134.6	-90.6	-29.8	15.2	44.4	57.7
Precast-top			-120.2	-113.0	-100.7	-67.8	-22.3	11.4	33.2	43.2
Bottom			417.5	392.5	349.8	235.4	77.4	-39.5	-115.3	-150.0
LL+I(-)										
Topping-top			-283.6	-267.5	-241.2	-179.2	-138.1	-120.0	-116.0	-112.1
Precast-top			-212.0	-200.0	-180.3	-134.0	-103.2	-89.7	-86.7	-83.8
Bottom			736.7	694.9	626.6	465.5	358.7	311.7	301.4	291.1
Final 1 (P/S + DL	+ LL)									
Topping-top			-444.3	-418.6	-375.8	-269.8	-167.8	-104.8	-71.6	-54.3
Precast-top			-340.2	-235.1	-38.2	467.9	1081.7	1449.6	1592.8	1702.9
Bottom			2077.9	3306.8	3044.8	2378.4	1621.1	1163.5	969.0	835.0
Final 2 (P/S + DL)										
Topping-top			-160.7	-151.1	-134.6	-90.6	-29.8	15.2	44.4	57.7
Precast-top			-128.2	-35.1	142.1	601.9	1184.9	1539.3	1679.5	1786.7
Bottom			1341.2	2611.9	2418.2	1912.9	1262.5	851.8	667.6	543.9
Final 3 (50% P/S	+ 50%	DL + LL)								
Topping-top			-363.9	-343.0	-308.5	-224.5	-153.0	-112.4	-93.8	-83.2
Precast-top			-276.1	-217.5	-109.3	167.0	489.2	679.9	753.0	809.5
Bottom			1407.3	2000.9	1835.7	1422.0	989.9	737.6	635.2	563.1



Negative Stresses at Final 1, Span 2, Beam 2, SERVICE 1

REINFORCED DESIGN

REINFORCED DESIGN - Span : 2, Beam : 2, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	-5131.2	8.00	78.37	2.00	-3550.7	0.000	15.114	0.000*	-0.0
2	11.05	-1409.6	8.00	78.37	2.00	-3550.7	0.000	5.387	0.000*	-0.0
3	21.73	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
4	32.40	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
5	43.08	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
6	53.75	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
7	64.43	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
8	75.10	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
9	85.78	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
10	96.45	-785.0	8.00	78.37	2.00	-3550.7	0.000	2.982	0.000*	-0.0
11	107.50	-4369.3	8.00	78.37	2.00	-3550.7	0.000	12.793	0.000*	-0.0

(b) POSITIVE MOMENTS AT PIERS

NONE

DESIGN SUMMARY

Span: 2, Beam: 2, Interior beam

Beam type:	I-Girder,	OHIO-MOD-72-TYPE-IV
Precast Length,	ft	106.75
Release Length,	ft	106.75
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-SP-1	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28000.0
No. of strands:	43	
	Draped:	9
	Straight:	34
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.65 %	
Final losses:	21.44 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00	8.42	
Precast Top w/ reinf.	-530.33		
Precast Bot (compression)	3000.00	2656.08	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	11856.97	8402.12	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	320.6 / -32.8	1800.0	57.7	1800.0	291.7

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1983.2 / -32.6	2800.0	1786.7	2800.0	1089.8
Precast Bot	4200.0/-502.0	2285.8 /-138.9	2800.0	2475.5	2800.0	1048.1

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	-54.3 /-444.3	1800.0	57.7	1800.0	-83.2
Precast Top	4200.0/-502.0	1702.9 /-340.2	2800.0	1786.7	2800.0	809.5
Precast Bot	4200.0/-502.0	3306.8 / 835.0	2800.0	2611.9	2800.0	2000.9

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 52.54 ft

	Release	Mult	Erection	Mult	Final
Prestress	2.757	1.80	4.963	2.20	6.066
Self Wt.	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch			-1.058	2.30	-2.434
Prec. DL+ADL			-0.113	3.00	-0.340
Diaphragm			-0.213	3.00	-0.638
Comp. DL+ADL			-0.047	3.00	-0.142
Live Load					-0.304
Total	1.656		1.495		-0.434

Positive values indicate upward deflection.

PROJECT DATA

Project:	Portsmouth Bypass
Designer:	RBK
Date:	May/1/2009
User job number:	**KZF #5355.02**
State:	Ohio, State Job #:PID 19415
State Specification:	**None**
Design Mode:	AASHTO Standard (LFD)- US Units [17th Edition, 2003]
Flared Girder:	**No**
Comments:	Bridge No. SCI-823-0837 L/R **SFN 7306458/7306466** SR 823 Over Swauger Valley Minford Road (CR 31)
File Name:	**F:\Projects\535502\19415\structures\SCI823_0837C\engapps\CONSPAN\535502_SCI-823-0837.csl**

SPAN 2

EXTERIOR

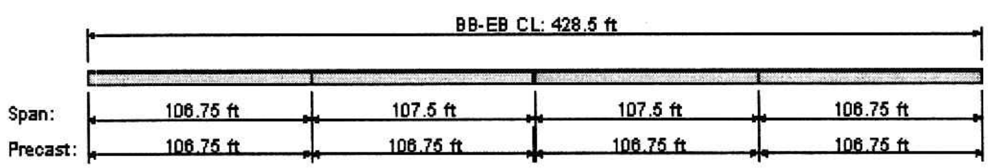
GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	48.458
Left curb (ft)	1.500
Right curb (ft)	1.458
curb-to-curb width (ft)	45.500
Number of spans	4
Number of lanes	2
Lane width (ft)	12.000
Topping thickness (in)	8.750
Haunch thickness (in)	2.000
Haunch width (in)	36.000

SPAN DATA

Span	Pier-to-pier ft	Precast ft	Brg-to-brg ft	Pier CL ft	Release ft	StartSkew	EndSkew
1	106.750	106.750	104.917	0.000	106.750	0.00	0.00
2	107.500	106.750	105.083	0.375	106.750	0.00	0.00
3	107.500	106.750	105.083	0.375	106.750	0.00	0.00
4	106.750	106.750	104.917	0.375	106.750	0.00	0.00



Bridge elevation section for all spans

BEAM DATA
Span: 1

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 2

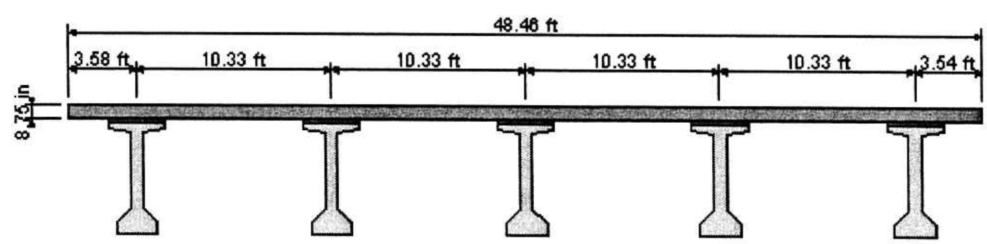
No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 3

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708

Span: 4

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	OHIO-MOD-72-TYPE-IV	3.583	955.4	616109.0	72.00	34.42	36.00	8.750
2	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
3	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
4	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	10.333
5	OHIO-MOD-72-TYPE-IV	10.333	955.4	616109.0	72.00	34.42	36.00	8.708



Bridge cross section for Span 1, Span 2, Span 3, Span 4

MATERIAL DATA

CONCRETE PROPERTIES

	Precast	C.I.P
f'c (ksi)	7000.000	4500.000
Wc (pcf)	150.000	150.000
Ec (ksi)	5072.240	4066.840
f'ci (psi)	5000.000	
Eci (ksi)	4286.830	

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:

1/2-270K-SP-1, Low relaxation strands
Depressed at 0.40L (42.70 ft from member end)
Strand Diameter = 0.500
Ult. Strength(f's) = 270.0 ksi
Strand Area = 0.167 in2
Use transformed strand and rebar: No

REINFORCING STEEL:

Tension steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

LOADS DATA

LOADS ON PRECAST

UNITS: (Point: kips, Location: ft, Line: klf)

Span	Beam	DL/ADL	Type	Mag.	Loc.	Description
1	1	DL	Line	0.109	-	Sacrificial Wearing Surface
1	2	DL	Line	0.129	-	Sacrificial Wearing Surface
1	3	DL	Line	0.129	-	Sacrificial Wearing Surface
1	4	DL	Line	0.129	-	Sacrificial Wearing Surface
1	5	DL	Line	0.109	-	Sacrificial Wearing Surface
2	1	DL	Line	0.109	-	Sacrificial Wearing Surface
2	2	DL	Line	0.129	-	Sacrificial Wearing Surface
2	3	DL	Line	0.129	-	Sacrificial Wearing Surface
2	4	DL	Line	0.129	-	Sacrificial Wearing Surface
2	5	DL	Line	0.109	-	Sacrificial Wearing Surface
3	1	DL	Line	0.109	-	Sacrificial Wearing Surface
3	2	DL	Line	0.129	-	Sacrificial Wearing Surface
3	3	DL	Line	0.129	-	Sacrificial Wearing Surface
3	4	DL	Line	0.129	-	Sacrificial Wearing Surface
3	5	DL	Line	0.109	-	Sacrificial Wearing Surface
4	1	DL	Line	0.109	-	Sacrificial Wearing Surface
4	2	DL	Line	0.129	-	Sacrificial Wearing Surface
4	3	DL	Line	0.129	-	Sacrificial Wearing Surface
4	4	DL	Line	0.129	-	Sacrificial Wearing Surface
4	5	DL	Line	0.109	-	Sacrificial Wearing Surface

DIAPHRAGM LOADS

(kips, ft)

Span	Beam	Mag.	Loc.
1	1	2.967	14.958
1	1	2.967	39.958
1	1	2.967	64.958
1	1	2.967	89.958
1	2	5.934	14.958
1	2	5.934	39.958
1	2	5.934	64.958
1	2	5.934	89.958
1	3	5.934	14.958
1	3	5.934	39.958
1	3	5.934	64.958
1	3	5.934	89.958
1	4	5.934	14.958
1	4	5.934	39.958
1	4	5.934	64.958
1	4	5.934	89.958
1	5	2.967	14.958
1	5	2.967	39.958
1	5	2.967	64.958
1	5	2.967	89.958

Span	Beam	Mag.	Loc.
2	1	2.967	15.042
2	1	2.967	40.042
2	1	2.967	65.042
2	1	2.967	90.042
2	2	5.934	15.042
2	2	5.934	40.042
2	2	5.934	65.042
2	2	5.934	90.042
2	3	5.934	15.042
2	3	5.934	40.042
2	3	5.934	65.042
2	3	5.934	90.042
2	4	5.934	15.042
2	4	5.934	40.042
2	4	5.934	65.042
2	4	5.934	90.042
2	5	2.967	15.042
2	5	2.967	40.042
2	5	2.967	65.042
2	5	2.967	90.042
3	1	2.967	15.042
3	1	2.967	40.042
3	1	2.967	65.042
3	1	2.967	90.042
3	2	5.934	15.042
3	2	5.934	40.042
3	2	5.934	65.042
3	2	5.934	90.042
3	3	5.934	15.042
3	3	5.934	40.042
3	3	5.934	65.042
3	3	5.934	90.042
3	4	5.934	15.042
3	4	5.934	40.042
3	4	5.934	65.042
3	4	5.934	90.042
3	5	2.967	15.042
3	5	2.967	40.042
3	5	2.967	65.042
3	5	2.967	90.042
4	1	2.967	14.958
4	1	2.967	39.958
4	1	2.967	64.958
4	1	2.967	89.958
4	2	5.934	14.958
4	2	5.934	39.958
4	2	5.934	65.958
4	2	5.934	89.958
4	3	5.934	14.958
4	3	5.934	39.958
4	3	5.934	65.958
4	3	5.934	89.958
4	4	5.934	14.958
4	4	5.934	39.958
4	4	5.934	65.958
4	4	5.934	89.958
4	5	2.967	14.958

Span	Beam	Mag.	Loc.
4	5	2.967	39.958
4	5	2.967	65.958
4	5	2.967	89.958

LOADS ON COMPOSITE

UNITS: (Point: kips, Location: ft, Line: klf, Area: ksf, Width: ft)

Span	DL/ADL	Type	Mag.	Loc.	Description
1	DL	Line	0.639	-	Left Barrier Weight
1	DL	Line	0.715	-	Right Barrier Weight
1	ADL	Area	0.060	45.500	Future Wearing Surface
2	DL	Line	0.639	-	Left Barrier Weight
2	DL	Line	0.715	-	Right Barrier Weight
2	ADL	Area	0.060	45.500	Future Wearing Surface
3	DL	Line	0.639	-	Left Barrier Weight
3	DL	Line	0.715	-	Right Barrier Weight
3	ADL	Area	0.060	45.500	Future Wearing Surface
4	DL	Line	0.639	-	Left Barrier Weight
4	DL	Line	0.715	-	Right Barrier Weight
4	ADL	Area	0.060	45.500	Future Wearing Surface

LIVE LOADS

Live load deflection: not included.

ID: H/HS25 Lane	(Type: Lane Load)
ID: HS25 Truck	(Type: Truck Load)
ID: Military Truck	(Type: Truck Load)

LIVE LOADS USED

LIVE LOAD LIBRARY: Default.cs4

1 ID: H/HS25 Lane

Description:	H25/HS25 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.80 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 22.50 k,	Shear = 32.50 k

2 ID: HS25 Truck

Description:	HS25 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	40.00	14.00	14.00	0.00
2	40.00	30.00	14.00	2.00

3 ID: Military Truck

Description:	Military Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 24.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	24.00	4.00	4.00	0.00

INVENTORY LIVE LOAD

1 ID: H20 Truck

Description:	H20 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 8.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00

2 ID: H/HS20 Lane

Description:	H20/HS20 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.64 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 18.00 k,	Shear = 26.00 k

OPERATING LIVE LOAD

1 ID: HS20 Truck

Description:	HS20 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 8.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00
2	32.00	30.00	14.00	2.00

2 ID: H/HS20 Lane

Description:	H20/HS20 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.64 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 18.00 k,	Shear = 26.00 k

3 ID: 2F1 Truck

Description:	2F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	20.00	10.00	10.00	0.00

4 ID: 3F1 Truck

Description:	3F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	10.00	10.00	0.00

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
2	17.00	4.00	4.00	0.00

5 ID: 4F1 Truck

Description:	4F1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	10.00	10.00	0.00
2	17.00	4.00	4.00	0.00
3	17.00	4.00	4.00	0.00

6 ID: 5C1 Truck

Description:	5C1 Truck Ohio Legal Loads
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 12.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	17.00	12.00	12.00	0.00
2	17.00	4.00	4.00	0.00
3	17.00	31.00	31.00	0.00
4	17.00	4.00	4.00	0.00

ANALYSIS DATA

ANALYSIS PARAMETERS DATA

Span#	Beam#	Moment impact	Shear impact
1	1	1.217	Calculated (AASHTO 3.8.2.2)
1	2	1.217	Calculated (AASHTO 3.8.2.2)
1	3	1.217	Calculated (AASHTO 3.8.2.2)
1	4	1.217	Calculated (AASHTO 3.8.2.2)
1	5	1.217	Calculated (AASHTO 3.8.2.2)
2	1	1.217	Calculated (AASHTO 3.8.2.2)
2	2	1.217	Calculated (AASHTO 3.8.2.2)
2	3	1.217	Calculated (AASHTO 3.8.2.2)
2	4	1.217	Calculated (AASHTO 3.8.2.2)
2	5	1.217	Calculated (AASHTO 3.8.2.2)
3	1	1.217	Calculated (AASHTO 3.8.2.2)
3	2	1.217	Calculated (AASHTO 3.8.2.2)
3	3	1.217	Calculated (AASHTO 3.8.2.2)
3	4	1.217	Calculated (AASHTO 3.8.2.2)
3	5	1.217	Calculated (AASHTO 3.8.2.2)
4	1	1.217	Calculated (AASHTO 3.8.2.2)
4	2	1.217	Calculated (AASHTO 3.8.2.2)
4	3	1.217	Calculated (AASHTO 3.8.2.2)
4	4	1.217	Calculated (AASHTO 3.8.2.2)
4	5	1.217	Calculated (AASHTO 3.8.2.2)

NOTE: Beam specific dead and live load DFs are printed in beam level reports.

GAMMA/BETA FACTORS: (Table 3.22.1A)

	Service		Factored	
Gamma:	1.00		1.30	
Beta-D:	1.00		1.00	
Beta-L:	1.00	(Group 1)	1.67	(Group 1)

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-13 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD:
File Name: 535502_SCI-823-0837.csl		Date:

PROJECT PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	=	1.00
	Debonded	=	1.00
Dev len mult:	Bonded	=	1.60
	Debonded	=	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
Self. Wt:	1.85	2.40
Deck + Haunch:		2.30
Diaphragm:		3.00
Prec.DL+ADL:		3.00
Comp.DL+ADL:		3.00

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	Strain Compatibility method.
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED
Negative Moment Design, Non-composite Moment effects in Mu:	INCLUDED

STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi

	PRECAST		DECK	
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.5.3)
Hours to release = 18.00
Rel. Humid.(RH) = 75.0 %

PROPERTIES

Span: 2, Beam: 1

PRECAST DATA:

Section Id	OHIO-MOD-72-TYPE-IV					
Type	I-Girder					
Flng width	Top	36.000	in	Bot	26.000	in
thick	Top	4.000	in	Bot	8.000	in
Stems	No	1				
	Top	8.000	in			
	Bot	8.000	in			
Shear width		8.000	in			
Wide top Flange	NO					

GENERAL BRIDGE DATA:

Bridge Width	48.46	ft
Curb-to-curb	45.50	ft
Beam Spac. Lt./Rt	3.58/ 10.33	ft
Lane width	12.00	ft
Number of lanes	2	
Interior/Exterior	Exterior	

TOPPING DATA:

Deck	Thickness	8.750	in	
Haunch:				
	Thickness	2.000	in	
	Width	36.000	in	
Effective	width	105.000	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.109	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
2.97	15.04
2.97	40.04
2.97	65.04
2.97	90.04

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length	106.750	ft
Release length	106.750	ft
Design length	105.083	ft

KERN POINTS:

Upper	53.16	in
Lower	17.26	in

DISTRIBUTION FACTORS (Art. 3.23):

Live Negative Moment (Group 1)	0.718	(Calculated)	
Live Positive Moment (Group 1)	0.718	(Calculated)	
Live Shear (Group 1)	0.718	(Calculated)	

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian	0.200	(Calculated)
Comp. DL	0.200	(Calculated)
Comp. ADL	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

Span: 2, Beam: 1

SECTION PROPERTIES:

	PRECAST		COMPOSITE		
Area	955.4	in2	1749.8	in2	#
Total Height	72.00	in	82.75	in	
Mom. of Inertia (Ixx)	616109	in4	1445545	in4	#
Ht. of c.g.	34.42	in	54.20	in	#
Density	150.00	pcf	150.00	pcf	
Self-weight	995.2	plf	2027.2	plf	
Mom. of Inertia (Iyy)	37816.0	in4			
Poisson's Ratio	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 2, Beam: 1
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

Span: 2, Beam: 1

PRESTRESSED STEEL:

43 strands, 1/2-270K-SP-1, Low relaxation strands
Depressed at 0.40L (42.70 ft from member end)

END PATTERN (Ycg = 17.21 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	4 @ 8.000 in
3 @ 64.000 in	3 @ 66.000 in	3 @ 68.000 in	

MID PATTERN (Ycg = 5.07 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in	3 @ 10.000 in	

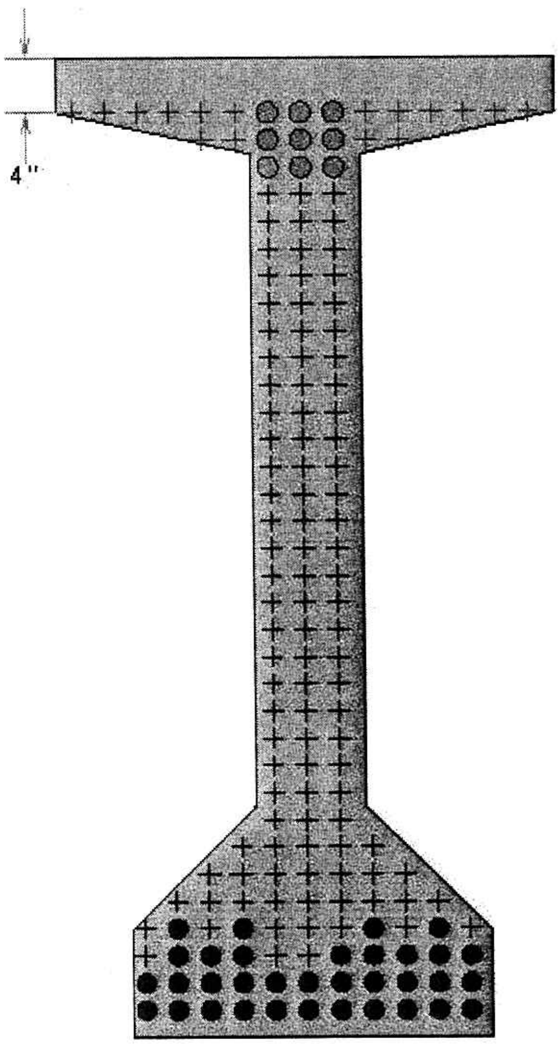
(B) Straight:

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	4 @ 8.000 in

Strand Diameter	0.500	in
Strand Area	0.167	in2
Total Strand Area	7.181	in2

Trans. Len,bonded	2.083	ft
Trans. Len,debonded	2.083	ft
Dev. Len, bonded	10.926	ft
Dev. Len, debonded	13.657	ft
Holddown Force	34.232	kips
Holddown Force	270.0	ksi
Initial Prestress = 0.75f's	202.5	ksi
Initial Pull	1454.2	kips
Beam Shrtng (PL/AE)	0.415	in

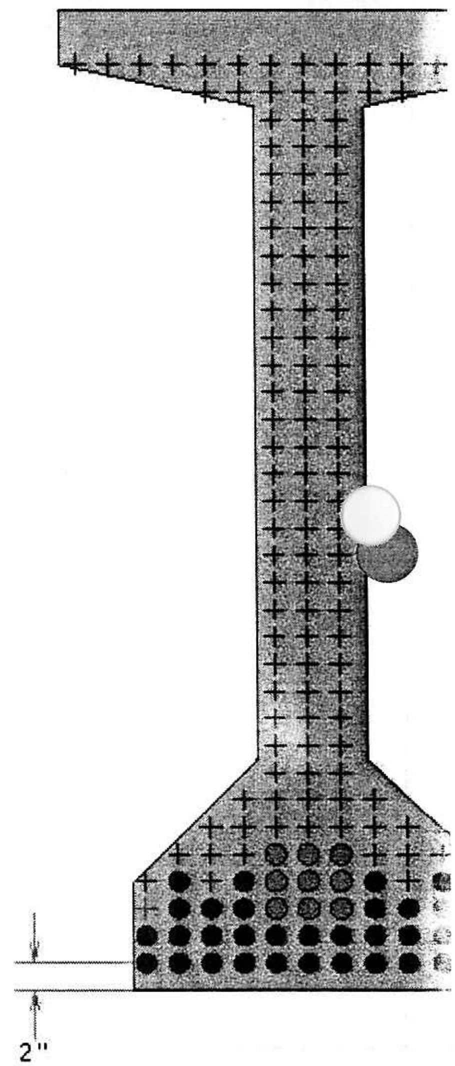
ENDS



No. Strands	Distance from bottom(in)
3	68
3	66
3	64

No. Strands	Distance from bottom(in)
4	8
8	6
11	4
11	2

MIDSPAN



NOTE: Debonded/Shielded strands or strands with reduced pull not marked.

Strand Pattern, Span 2, Beam 1

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi
fs	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	5.2821
2	US#4[M13]	60.0	0.40	12.00	5.2821	9.7932
2	US#4[M13]	60.0	0.40	18.00	9.7932	18.5889
2	US#4[M13]	60.0	0.40	24.00	18.5889	22.5751
2	US#4[M13]	60.0	0.40	18.00	22.5751	28.3525
2	US#4[M13]	60.0	0.40	12.00	28.3525	37.7027
2	US#4[M13]	60.0	0.40	18.00	37.7027	44.7990
2	US#4[M13]	60.0	0.40	24.00	44.7990	61.9510
2	US#4[M13]	60.0	0.40	18.00	61.9510	69.0473
2	US#4[M13]	60.0	0.40	12.00	69.0473	78.3975
2	US#4[M13]	60.0	0.40	18.00	78.3975	84.1749
2	US#4[M13]	60.0	0.40	24.00	84.1749	88.1611
2	US#4[M13]	60.0	0.40	18.00	88.1611	96.9568
2	US#4[M13]	60.0	0.40	12.00	96.9568	101.4679
2	US#4[M13]	60.0	0.40	6.00	101.4679	106.7500

LOSSES

Note: Values are calculated at Midspan

Str. area	7.1810	in2
Ycg	5.07	in
P_init	1454.2	kips
Ecc	29.35	in
Hours to release	18.00	
Rel. Humid.(RH)	75.0	%
Es	28000.0	ksi
Eci	4287	ksi

AASHTO LOSSES

		Release			Final		(Art. 9.16.2)
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2054.65	psi	
Elastic Shortening		15919.13	psi	ES (Eq 9-6)	15919.13	psi	(Fcir=2437.24 psi)
Concrete shrinkage		0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep		0.00	psi	CRc (Eq 9-9)	21318.81	psi	(Fcds=-1132.58 psi)

		Release			Final	(Art. 9.16.2)
Total	17519.61	psi	(8.65 %)	45042.59	psi	(22.24 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 1, SERVICE 1
Shears: kips, Moments: kft

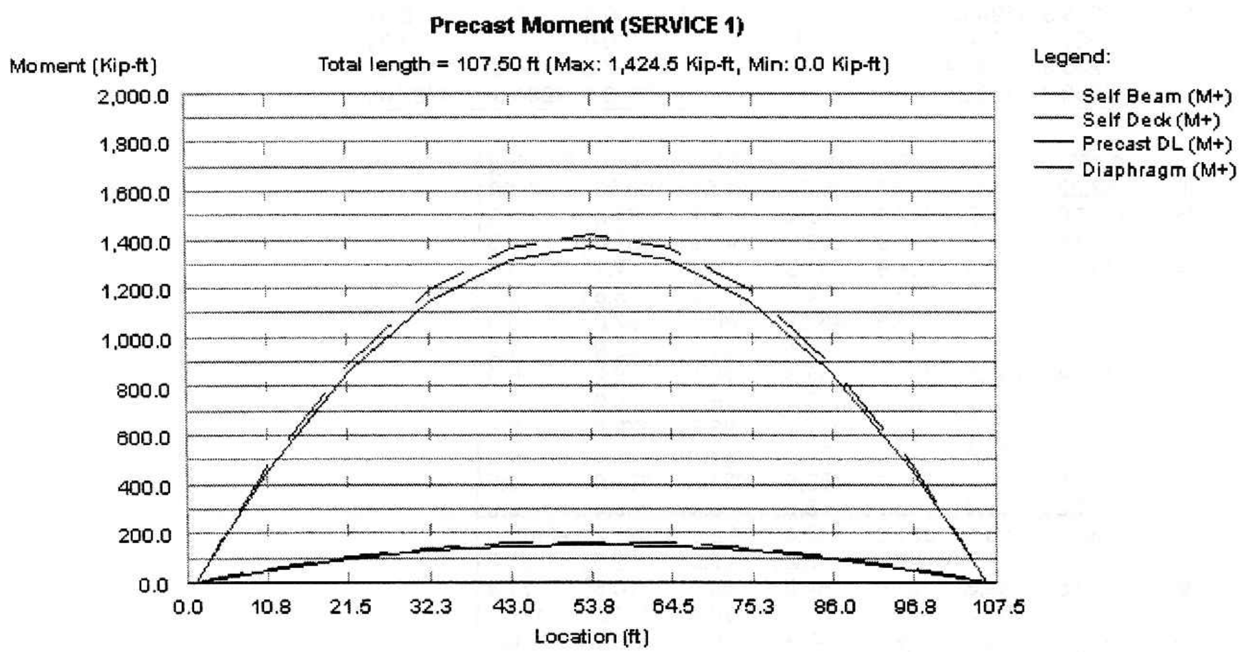
		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Self wt. :	M	0.0	64.6	174.4	466.4	863.4	1146.9	1317.0	1373.7
	V	52.3	51.0	48.9	42.5	31.9	21.2	10.6	0.0
Prec. :	M	-0.0	7.1	19.2	51.3	94.9	126.0	144.7	151.0
DL+ADL	V	5.7	5.6	5.4	4.7	3.5	2.3	1.2	0.0
Deck :	M	0.0	67.0	180.8	483.7	895.3	1189.3	1365.7	1424.5
+ Haunch	V	54.2	52.9	50.7	44.1	33.1	22.0	11.0	0.0
Diaphragm :	M	0.0	8.2	22.1	58.4	105.5	137.2	163.4	163.4
	V	5.9	5.9	5.9	5.9	3.0	3.0	0.0	0.0
Comp. :	M	-945.2	-888.5	-791.8	-532.9	-175.2	89.5	261.1	339.6
DL+ADL	V	45.9	44.9	43.1	37.9	29.2	20.4	11.7	3.0
LL + I :	M+	164.6	158.2	162.0	239.2	643.4	950.4	1134.5	1180.9
	V	10.6	13.2	7.7	31.2	23.3	9.5	0.3	28.5
LL + I :	M-	-1274.3	-1201.9	-1083.7	-805.2	-620.4	-539.1	-521.3	-503.6
	V	57.0	54.3	49.6	35.7	10.0	1.7	1.7	1.8
LL + I :	Vmx	72.2	70.9	68.6	63.9	56.8	48.3	39.5	33.6
	M	-908.7	-850.5	-749.2	179.6	603.8	889.7	1042.8	1135.1
Total :	M+	0.0	0.0	0.0	766.0	2427.3	3639.3	4386.5	4633.2
	V	0.0	0.0	0.0	166.2	123.8	78.5	34.8	31.5
Total :	M-	-2219.5	-1943.5	-1479.1	-278.4	0.0	0.0	0.0	0.0
	V	221.1	214.8	203.5	170.7	0.0	0.0	0.0	0.0
Total :	Vmx	236.3	231.4	222.5	198.9	157.3	117.3	74.0	36.6
	M	-1853.9	-1592.1	-1144.6	706.4	2387.7	3578.6	4294.8	4587.4

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.22	73.89	84.57	95.24	101.64	103.83	105.08
Self wt. :	M	1317.0	1146.9	863.4	466.4	174.4	64.6	0.0
	V	10.6	21.2	31.9	42.5	48.9	51.0	52.3
Prec. :	M	144.7	126.0	94.9	51.3	19.2	7.1	0.0
DL+ADL	V	1.2	2.3	3.5	4.7	5.4	5.6	5.7
Deck :	M	1365.7	1189.3	895.3	483.7	180.8	67.0	0.0
+ Haunch	V	11.0	22.0	33.1	44.1	50.7	52.9	54.2
Diaphragm :	M	163.4	137.2	105.5	58.4	22.1	8.2	-0.0
	V	0.0	3.0	3.0	5.9	5.9	5.9	5.9
Comp. :	M	325.1	217.4	16.7	-277.1	-495.5	-579.6	-629.5
DL+ADL	V	5.7	14.4	23.2	31.9	37.1	38.9	39.9
LL + I :	M+	1122.5	927.2	613.2	355.5	324.3	328.0	333.5
	V	1.3	10.4	18.7	5.7	8.4	9.4	9.9
LL + I :	M-	-485.9	-468.1	-521.5	-702.4	-972.0	-1086.2	-1156.0
	V	1.7	1.7	8.3	33.2	47.2	52.0	54.6
LL + I :	Vmx	40.5	49.3	57.6	64.6	69.0	70.5	71.4
	M	1032.8	867.2	572.7	146.1	-76.4	-147.2	-186.1
Total :	M+	4438.5	3744.1	2589.0	1138.2	225.3	0.0	0.0
	V	29.8	73.4	113.3	134.7	156.4	0.0	0.0
Total :	M-	0.0	0.0	0.0	0.0	-1071.0	-1519.0	-1785.6
	V	0.0	0.0	0.0	0.0	195.1	206.4	212.7
Total :	Vmx	69.0	112.3	152.1	193.6	216.9	225.0	229.5
	M	4348.8	3684.0	2548.5	928.8	317.9	-1.8	-187.0

REACTIONS (kips), SERVICE 1

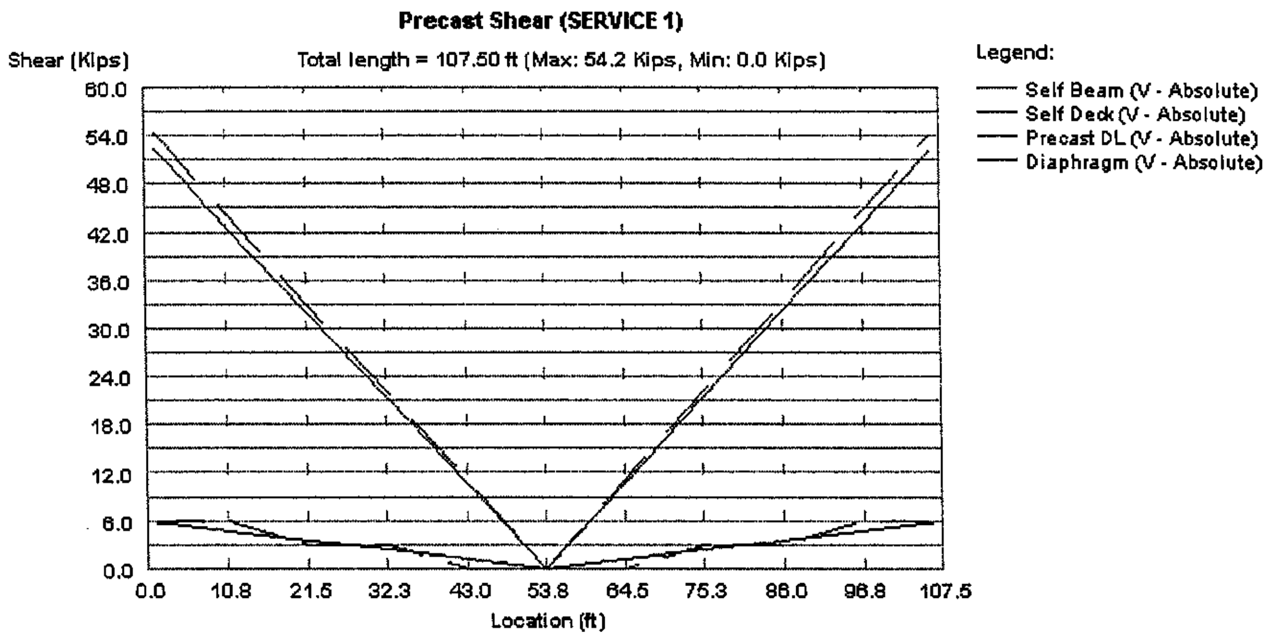
Load Type		Left Support	Right Support
Self Wt.		52.3	52.3
Deck+Haunch		54.2	54.2
Diaphragm		5.9	5.9
Prec.DL+ADL		5.7	5.7
Comp. DL+ADL		499.4	409.1
Live	(Max)	137.2	130.7
Live	(Min)	-11.2	-23.4
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

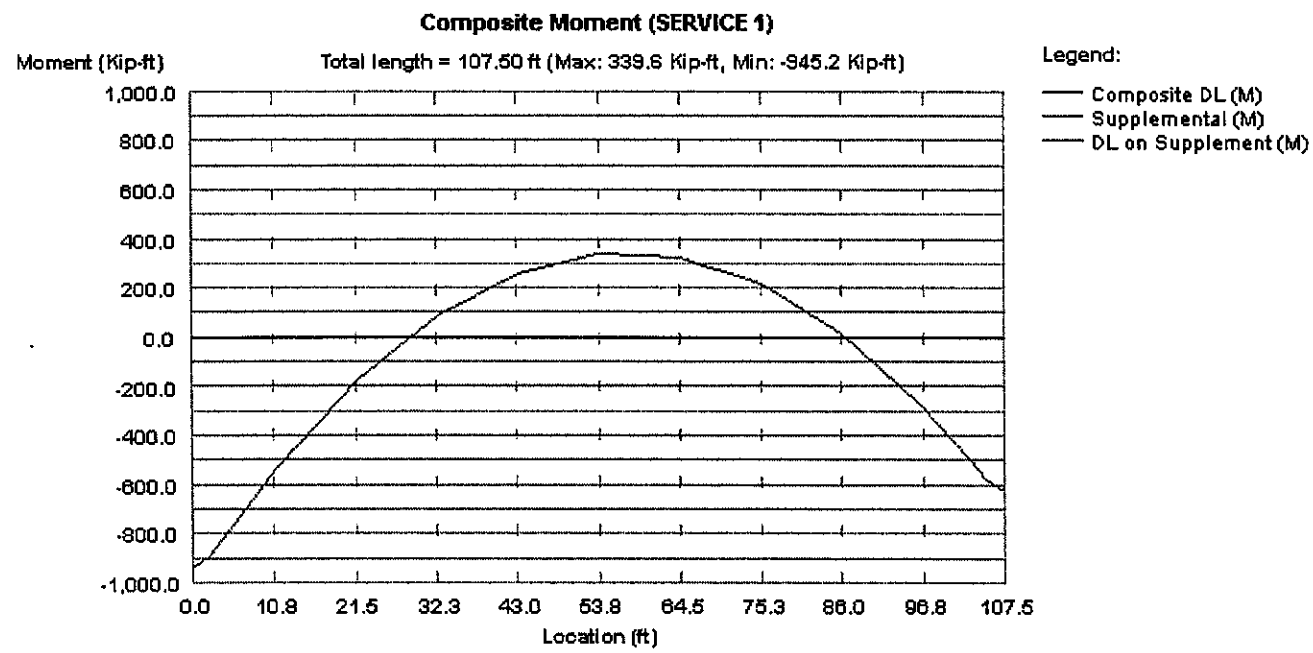


Precast Moment, Span 2, Beam 1, SERVICE 1

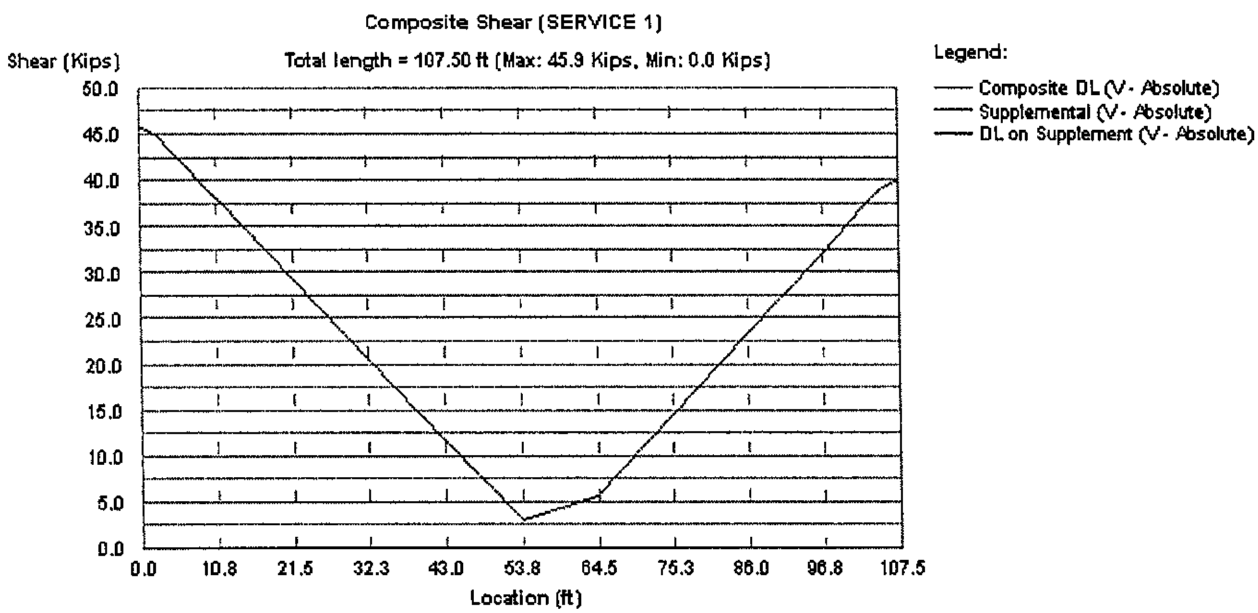
BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-25 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD:
File Name: 535502_SCI-823-0837.csl		Date:



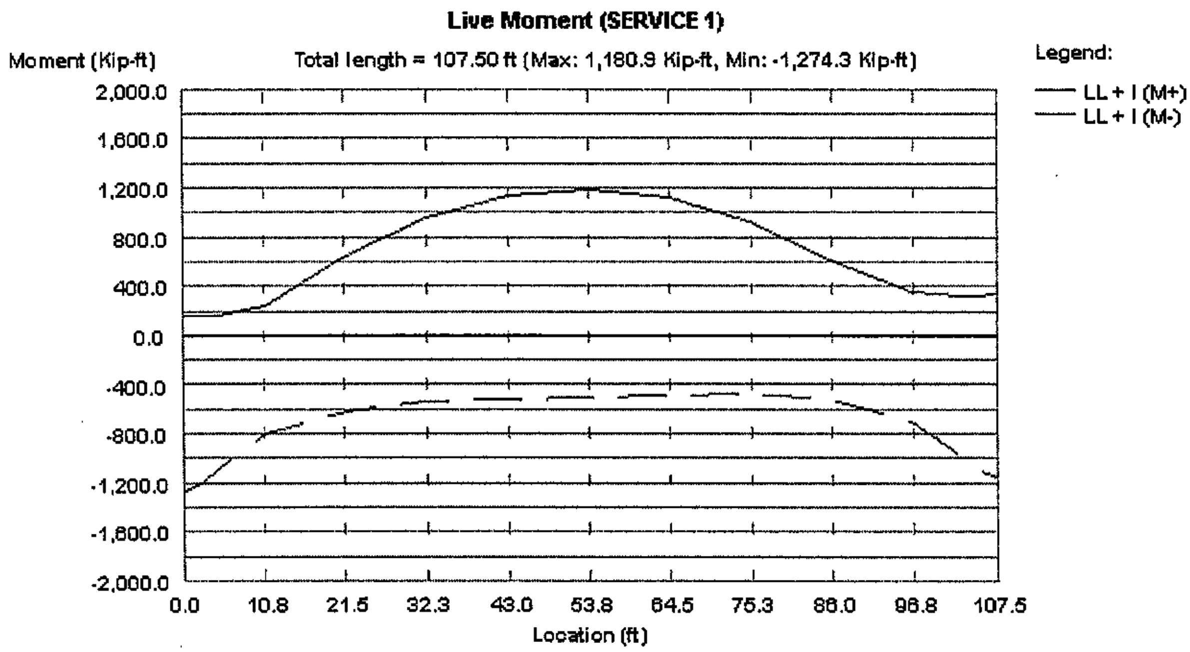
Precast Shear, Span 2, Beam 1, SERVICE 1



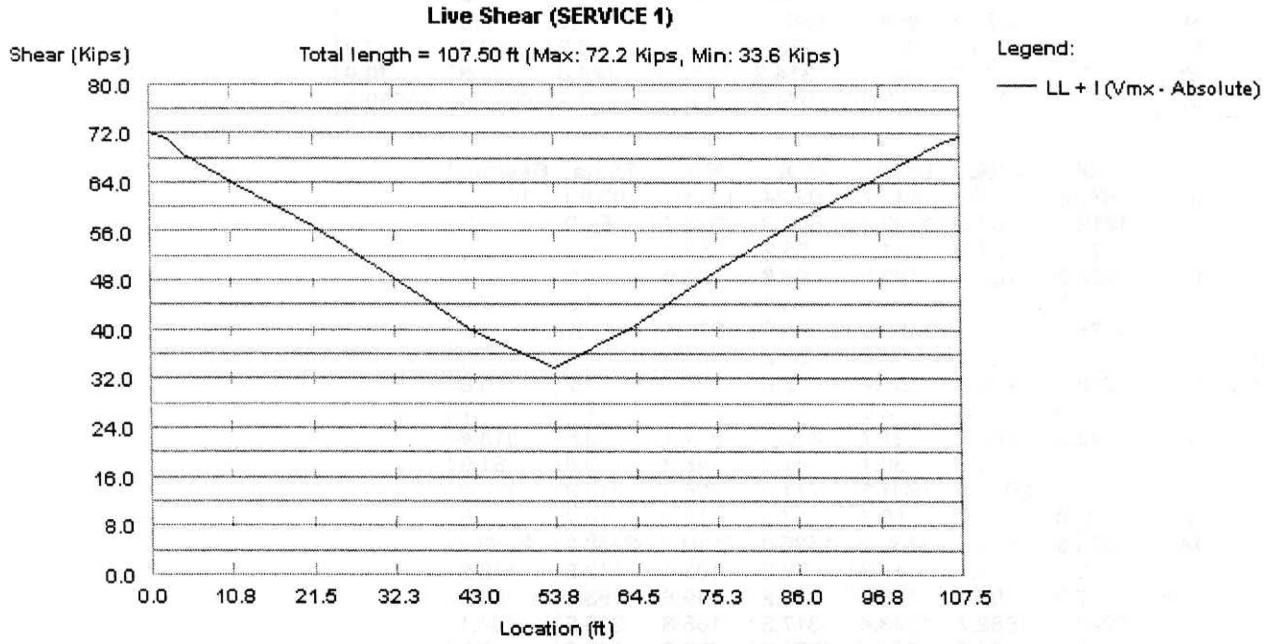
Composite Moment, Span 2, Beam 1, SERVICE 1



Composite Shear, Span 2, Beam 1, SERVICE 1



Live Moment, Span 2, Beam 1, SERVICE 1



Live Shear, Span 2, Beam 1, SERVICE 1

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 1, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Self wt. :	M	0.0	84.0	226.7	606.3	1122.4	1490.9	1712.1	1785.8
	V	68.0	66.4	63.5	55.2	41.4	27.6	13.8	0.0
Prec. :	M	-0.0	9.2	24.9	66.6	123.3	163.9	188.2	196.3
DL+ADL	V	7.5	7.3	7.0	6.1	4.6	3.0	1.5	0.0
Deck :	M	0.0	87.1	235.1	628.8	1163.9	1546.1	1775.4	1851.9
+ Haunch	V	70.5	68.8	65.9	57.3	43.0	28.6	14.3	0.0
Diaphragm :	M	0.0	10.7	28.7	75.9	137.2	178.3	212.5	212.5
	V	7.7	7.7	7.7	7.7	3.9	3.9	0.0	0.0
Comp. :	M	-1228.8	-1155.0	-1029.3	-692.8	-227.7	116.3	339.4	441.5
DL+ADL	V	59.7	58.4	56.0	49.2	37.9	26.6	15.2	3.9
LL + I :	M+	357.3	343.4	351.8	519.3	1396.9	2063.3	2463.1	2563.7
	V	23.1	28.7	16.7	67.7	50.5	20.6	0.6	61.9
LL + I :	M-	-2766.4	-2609.4	-2352.8	-1748.1	-1346.8	-1170.4	-1131.8	-1093.3
	V	123.7	118.0	107.6	77.5	21.7	3.7	3.8	3.8
LL + I :	Vmx	156.8	154.0	148.9	138.7	123.2	104.9	85.7	73.0

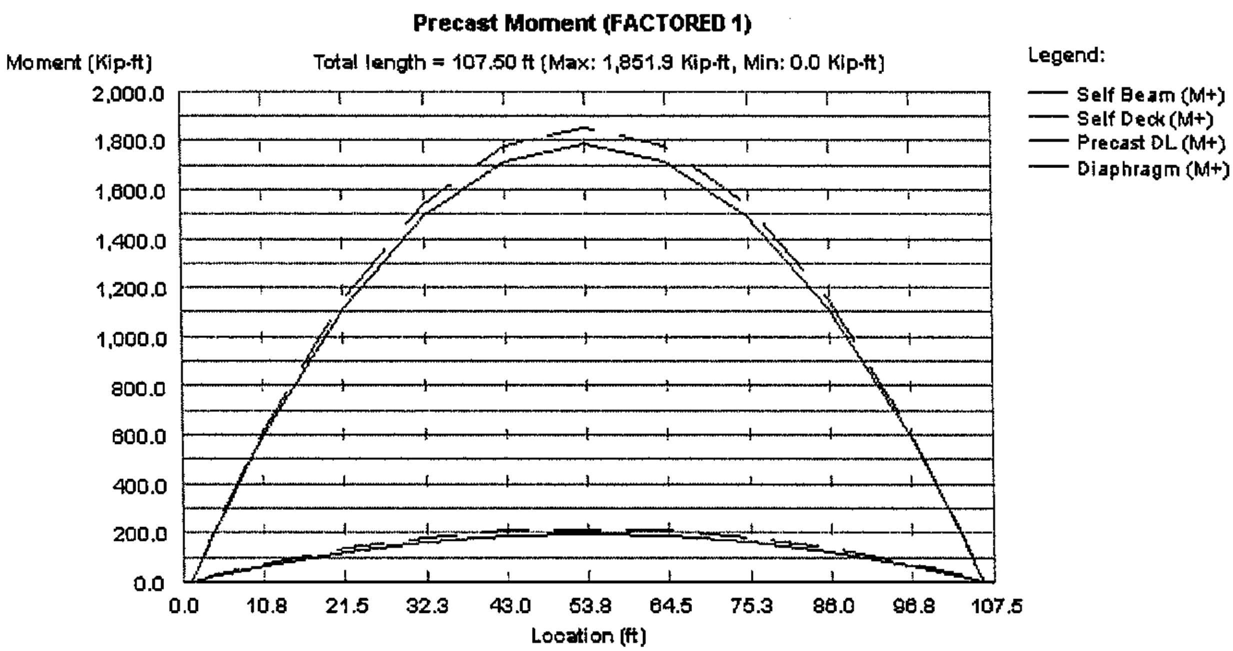
		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
	M	-1972.7	-1846.4	-1626.6	390.0	1310.8	1931.6	2263.9	2464.3
Total :	M+	0.0	0.0	0.0	1204.2	3715.9	5558.9	6690.7	7051.7
	V	0.0	0.0	0.0	243.3	181.3	110.3	45.5	65.8
Total :	M-	-3995.3	-3573.5	-2866.7	-1063.2	0.0	0.0	0.0	0.0
	V	337.1	326.5	307.7	253.0	0.0	0.0	0.0	0.0
Total :	Vmx	370.1	362.6	349.0	314.3	253.9	194.6	130.6	76.9
	M	-3201.5	-2810.5	-2140.5	1074.8	3629.9	5427.2	6491.5	6952.2

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.22	73.89	84.57	95.24	101.64	103.83	105.08
Self wt. :	M	1712.1	1490.9	1122.4	606.3	226.7	84.0	0.0
	V	13.8	27.6	41.4	55.2	63.5	66.4	68.0
Prec. :	M	188.2	163.9	123.3	66.6	24.9	9.2	0.0
DL+ADL	V	1.5	3.0	4.6	6.1	7.0	7.3	7.5
Deck :	M	1775.4	1546.1	1163.9	628.8	235.1	87.1	0.0
+ Haunch	V	14.3	28.6	43.0	57.3	65.9	68.8	70.5
Diaphragm :	M	212.5	178.3	137.2	75.9	28.7	10.7	-0.0
	V	0.0	3.9	3.9	7.7	7.7	7.7	7.7
Comp. :	M	422.6	282.7	21.7	-360.2	-644.1	-753.5	-818.4
DL+ADL	V	7.4	18.8	30.1	41.4	48.2	50.6	51.9
LL + I :	M+	2437.0	2013.0	1331.3	771.8	704.0	712.2	724.0
	V	2.8	22.6	40.7	12.3	18.3	20.4	21.5
LL + I :	M-	-1054.9	-1016.3	-1132.2	-1525.0	-2110.3	-2358.1	-2509.8
	V	3.8	3.7	17.9	72.2	102.4	112.8	118.6
LL + I :	Vmx	87.9	107.0	125.0	140.2	149.8	153.1	154.9
	M	2242.2	1882.7	1243.4	317.3	-165.8	-319.5	-404.1
Total :	M+	6747.8	5674.9	3899.7	1789.3	575.3	149.6	0.0
	V	39.9	104.5	163.6	180.0	210.6	221.1	0.0
Total :	M-	0.0	0.0	0.0	-507.5	-2239.0	-2920.7	-3328.2
	V	0.0	0.0	0.0	239.9	294.7	313.6	324.2
Total :	Vmx	125.0	188.9	247.9	307.9	342.1	353.9	360.5
	M	6553.0	5544.6	3811.9	1334.8	346.8	-130.5	-405.2

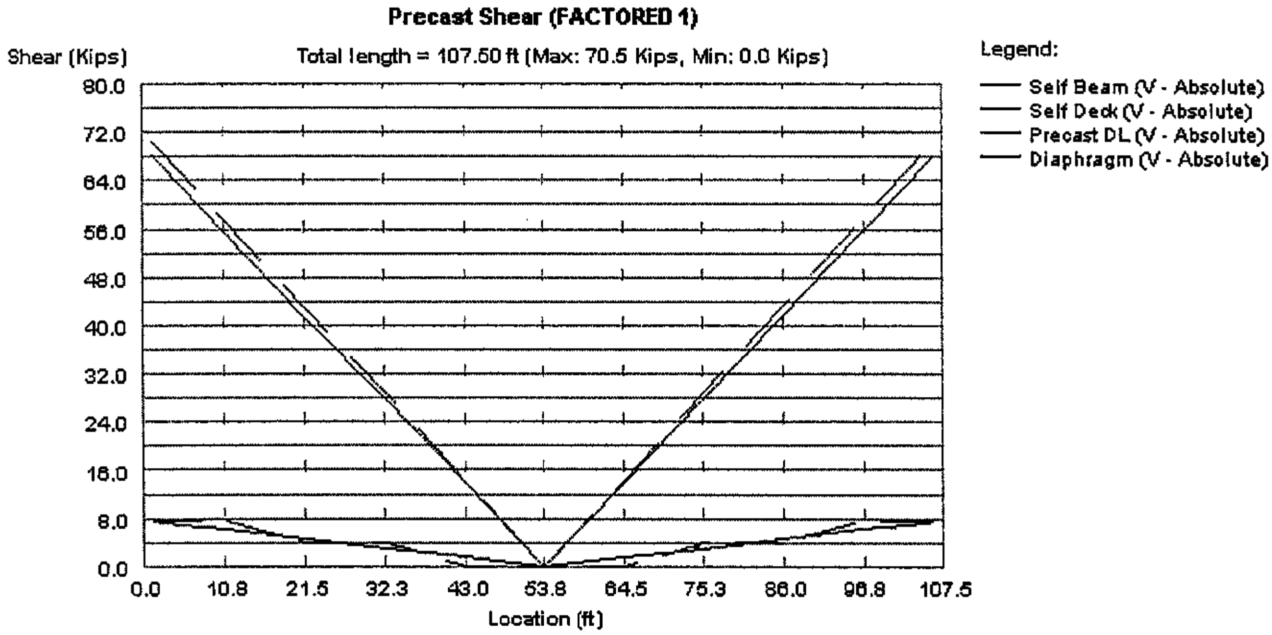
REACTIONS (kips), FACTORED 1

Load Type		Left Support	Right Support
Self Wt.		68.0	68.0
Deck+Haunch		70.5	70.5
Diaphragm		7.7	7.7
Prec.DL+ADL		7.5	7.5
Comp. DL+ADL		649.2	531.8
Live	(Max)	298.0	283.9
Live	(Min)	-24.3	-50.8
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

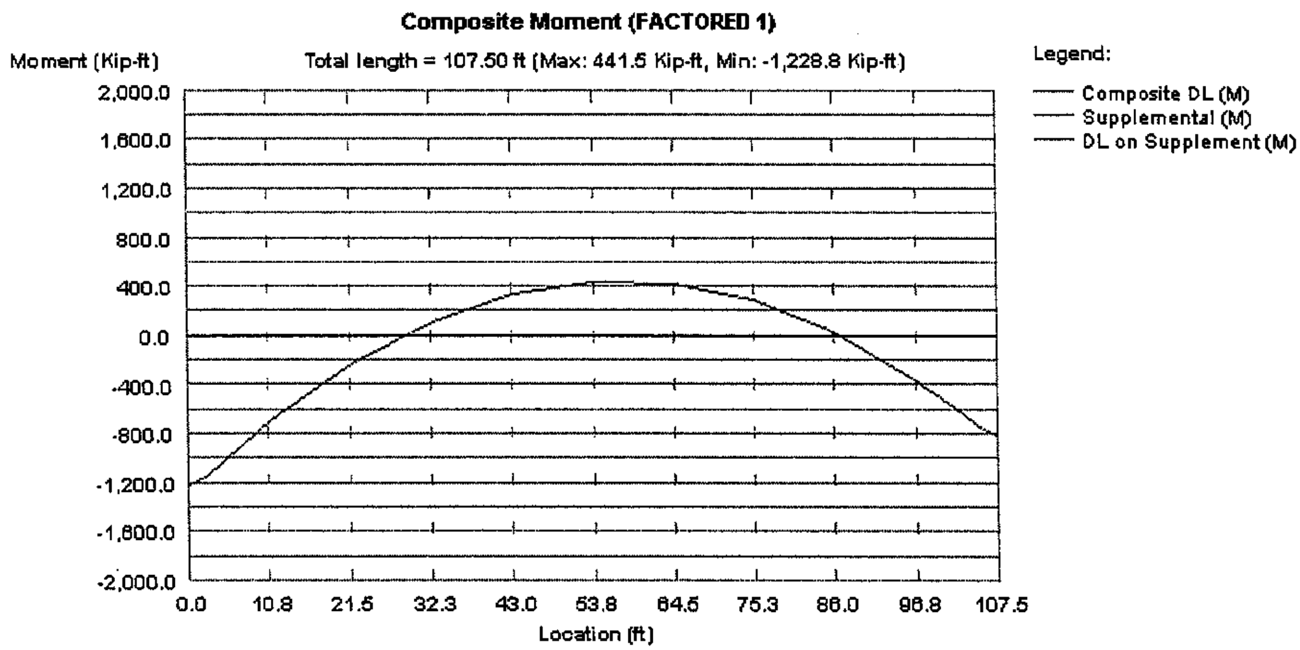
Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.



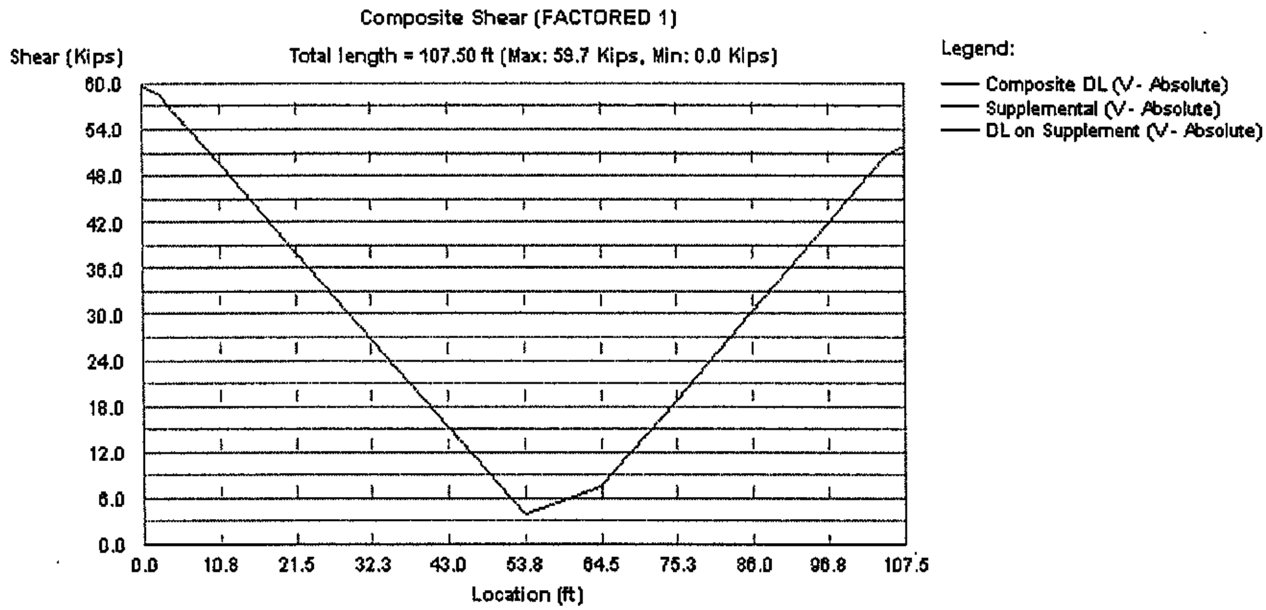
Precast Moment, Span 2, Beam 1, FACTORED 1



Precast Shear, Span 2, Beam 1, FACTORED 1

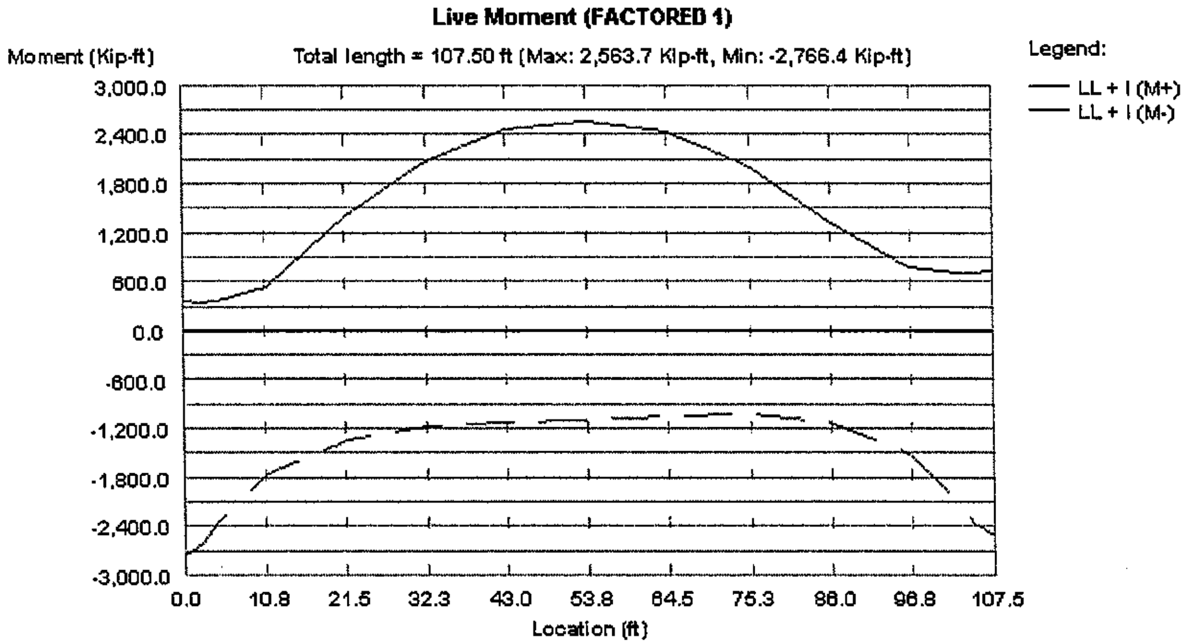


Composite Moment, Span 2, Beam 1, FACTORED 1

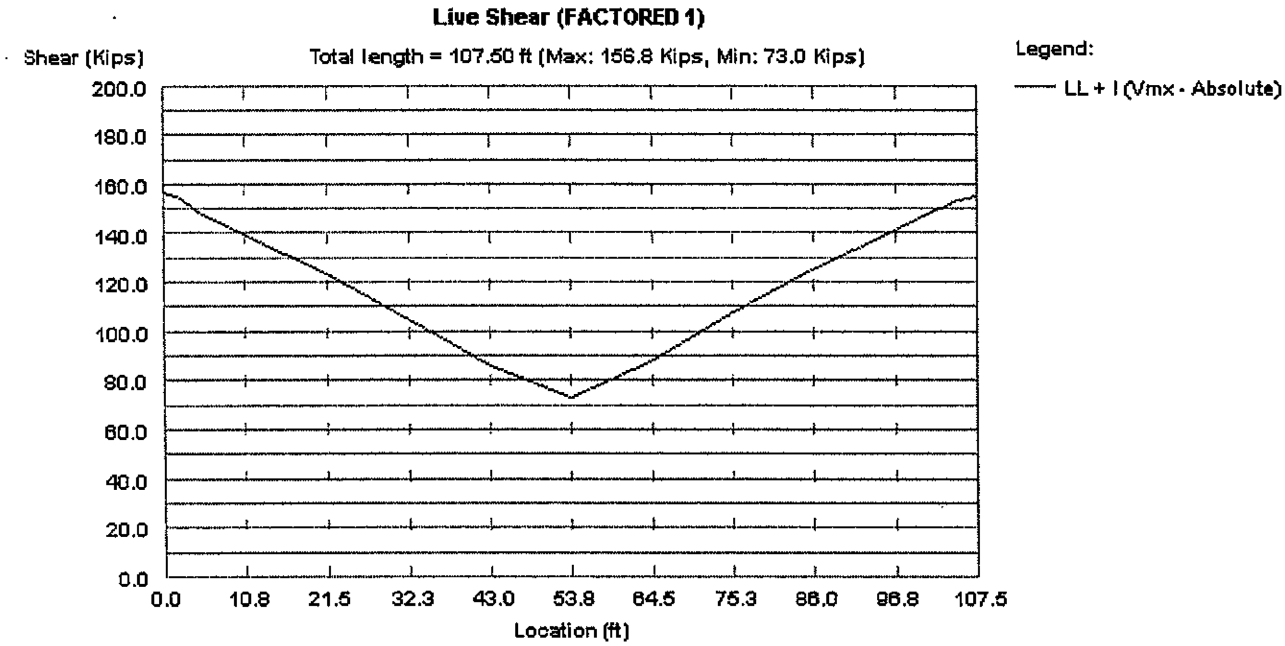


Composite Shear, Span 2, Beam 1, FACTORED 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-35 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



Live Moment, Span 2, Beam 1, FACTORED 1



Live Shear, Span 2, Beam 1, FACTORED 1

POSITIVE ENVELOPE STRESSES

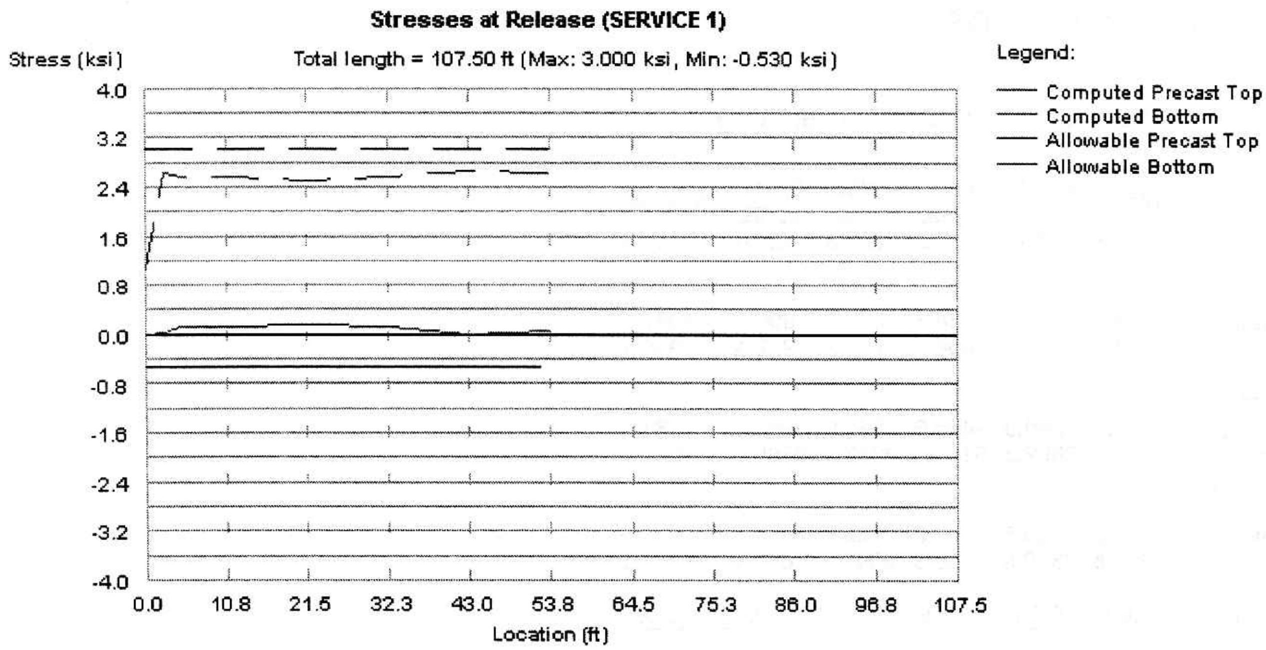
Span : 2, Beam : 1, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.65 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	10.68	21.35	32.03	42.70	53.38
Self Wt.						
Precast-top	79.4	373.5	664.1	871.6	996.1	1037.6
Bottom	-72.7	-342.1	-608.2	-798.3	-912.4	-950.4
Prestress						
Precast-top	-52.1	-250.0	-495.9	-741.8	-987.7	-987.7
Bottom	2711.5	2892.8	3118.0	3343.2	3568.4	3568.4
Total						
Precast-top	27.3	123.5	168.2	129.8	8.4	49.9
Bottom	2638.8	2550.6	2509.8	2544.9	2656.1	2618.1
top (in2)	0.000	0.000	0.000	0.000	0.000	0.000

Span : 2, Beam : 1, SERVICE 1

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-38 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	Copyright © Bentley Systems, Inc. 1984 - 2008. www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:



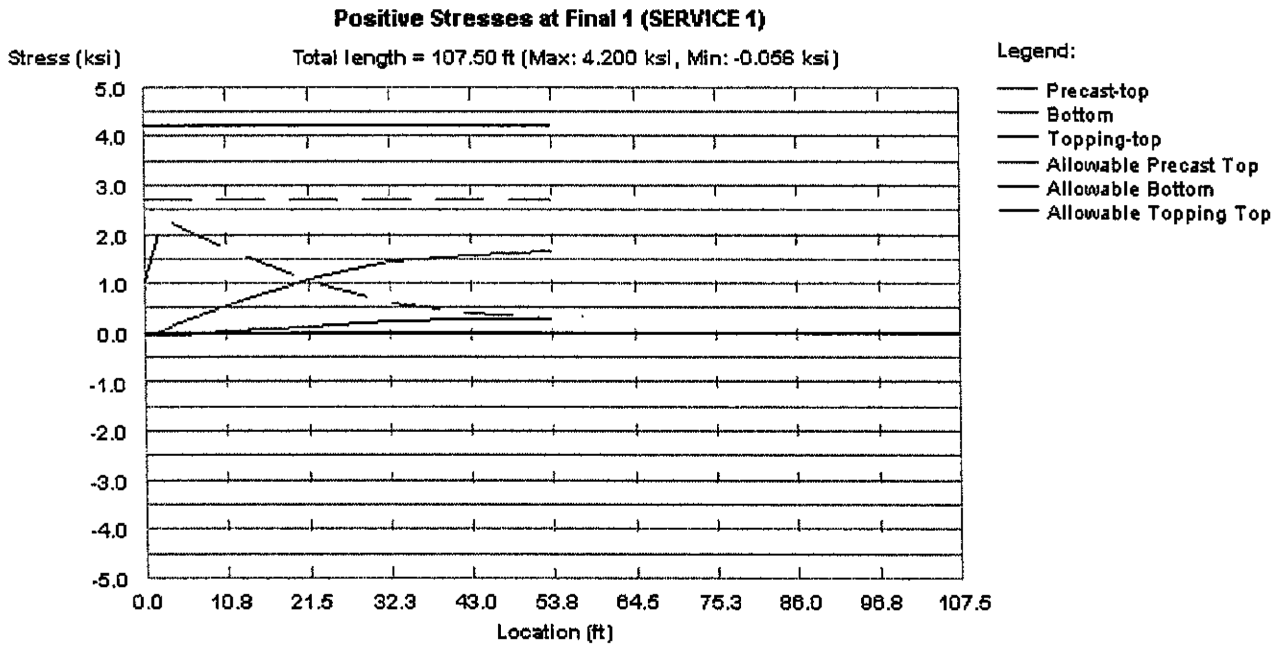
Stresses at Release, Span 2, Beam 1, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 22.24%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Prestress								
Precast-top	-7.9	-44.4	-87.4	-212.8	-422.1	-631.4	-840.7	-840.7
Bottom	914.3	2308.1	2347.5	2462.4	2654.1	2845.8	3037.5	3037.5
Self wt.								
Precast-top	-0.0	47.3	127.6	341.4	631.9	839.5	964.0	1005.5
Bottom	-0.0	-43.3	-116.9	-312.7	-578.8	-768.9	-882.9	-920.9
Prec. DL+ADL								
Precast-top	0.0	5.2	14.0	37.5	69.5	92.3	105.9	110.5
Bottom	-0.0	-4.8	-12.8	-34.4	-63.6	-84.5	-97.0	-101.2
Diaphragm								
Precast-top	-0.0	6.0	16.2	42.7	77.2	100.4	119.6	119.6
Bottom	-0.0	-5.5	-14.8	-39.2	-70.7	-92.0	-109.6	-109.6

BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-39 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0 **File Name: 535502_SCI-823-0837.csl**	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Deck + Haunch									
Precast-top		-0.0	49.0	132.4	354.0	655.3	870.5	999.6	1042.7
Bottom		-0.0	-44.9	-121.2	-324.3	-600.2	-797.3	-915.6	-955.0
Comp. DL+ADL									
Topping-top		-119.6	-110.2	-94.2	-52.7	3.2	41.3	61.8	64.5
Precast-top		-93.0	-85.7	-73.2	-40.9	2.5	32.1	48.0	50.2
Bottom		283.2	260.8	222.9	124.7	-7.5	-97.8	-146.2	-152.8
LL+I(+)									
Topping-top		63.4	62.3	61.6	67.6	116.5	176.2	213.3	224.4
Precast-top		49.3	48.5	47.9	52.5	90.6	137.0	165.9	174.5
Bottom		-150.0	-147.6	-145.9	-160.0	-275.9	-417.2	-505.0	-531.3
Final 1 (P/S + DL	+ LL)								
Topping-top		-56.3	-47.8	-32.5	14.9	119.7	217.5	275.1	289.0
Precast-top		-51.7	26.0	177.4	574.5	1104.9	1440.4	1562.4	1662.3
Bottom		1047.5	2322.8	2158.8	1716.6	1057.3	588.1	381.1	266.7
Final 2 (P/S + DL)									
Topping-top		-119.6	-110.2	-94.2	-52.7	3.2	41.3	61.8	64.5
Precast-top		-101.0	-22.5	129.5	521.9	1014.3	1303.3	1396.5	1487.7
Bottom		1197.5	2470.4	2304.7	1876.6	1333.2	1005.3	886.2	798.0
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		3.6	7.3	14.5	41.2	118.1	196.9	244.2	256.7
Precast-top		-1.2	37.2	112.7	313.5	597.8	788.7	864.1	918.4
Bottom		448.7	1087.6	1006.4	778.3	390.7	85.5	-62.0	-132.3



Positive Stresses at Final 1, Span 2, Beam 1, SERVICE 1

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 2, Beam : 1, FACTORED 1

End Shear Design: Prestressed.

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
Bearing :	0.83	164.1	-945.2	-1274.3	349.0	-3995.3	337.1	-3050.0	173.0
0.0	-179.6	-1172.7	77.38	261.7	88.0	261.7	220.1	10.6	232.8
232.8	155.0	414.3	0.40	0.08	0.40	0.80	1.398	24.0	207.2
Transfer :	2.08	160.4	-741.6	-1201.9	349.0	-3573.5	326.5	-2831.9	166.1
0.0	-168.9	-1229.4	77.38	263.6	88.0	263.6	593.9	26.6	318.2
263.6	124.2	414.3	0.32	0.08	0.32	0.80	1.478	24.0	207.2
[illegible] :	4.28	153.9	-395.3	-1083.7	349.0	-2866.7	307.7	-2471.4	153.8
0.0	-150.5	-1326.1	77.38	267.5	88.0	267.5	667.3	26.6	331.8
267.5	120.2	414.3	0.31	0.08	0.31	0.80	1.488	24.0	207.2
0.1L :	10.68	135.0	526.8	239.2	314.3	1204.2	243.3	677.4	108.2
2462.4	-470.7	5542.6	68.58	1048.2	78.0	1048.2	856.9	26.6	328.3
328.3	20.9	367.2	0.06	0.08	0.08	0.27	1.202	24.0	183.6
0.2L :	21.35	100.5	1783.9	643.4	253.9	3715.9	181.3	1932.1	80.7
2654.1	-1234.5	4270.9	71.61	307.7	81.5	307.7	1093.1	26.6	382.2
307.7	0.0	383.4	0.00	0.08	0.08	0.20	1.345	24.0	191.7
0.3L :	32.03	69.0	2688.9	950.4	194.6	5558.9	110.3	2870.0	41.3
2845.8	-1782.9	3478.2	74.65	149.1	84.9	149.1	1229.6	26.6	421.8
149.1	67.2	399.7	0.18	0.08	0.18	0.40	1.380	24.0	199.8
0.4L :	42.70	34.5	3252.0	1134.5	130.6	6690.7	45.5	3438.7	11.0
3037.5	-2122.6	3149.3	77.68	75.8	88.4	88.4	1270.3	0.0	418.8
88.4	56.7	415.9	0.15	0.08	0.15	0.27	1.323	24.0	208.0
0.5L :	53.38	3.0	3452.2	1180.9	76.9	7051.7	65.8	3599.4	62.8
3037.5	-2239.5	2889.4	77.68	84.6	88.4	88.4	1317.2	0.0	427.5
88.4	0.0	415.9	0.00	0.08	0.08	0.20	1.944	24.0	208.0
0.6L :	64.05	28.5	3316.0	1122.5	125.0	6747.8	39.9	3431.8	11.4
3037.5	-2151.3	3085.4	77.68	69.9	88.4	88.4	1270.3	0.0	418.8
88.4	50.4	415.9	0.13	0.08	0.13	0.27	1.383	24.0	208.0
0.7L :	74.72	63.0	2816.8	927.2	188.9	5674.9	104.5	2858.1	41.5
2845.8	-1840.5	3350.2	74.65	141.6	84.9	141.6	1229.6	26.6	421.8
141.6	68.3	399.7	0.18	0.08	0.18	0.40	1.386	24.0	199.8

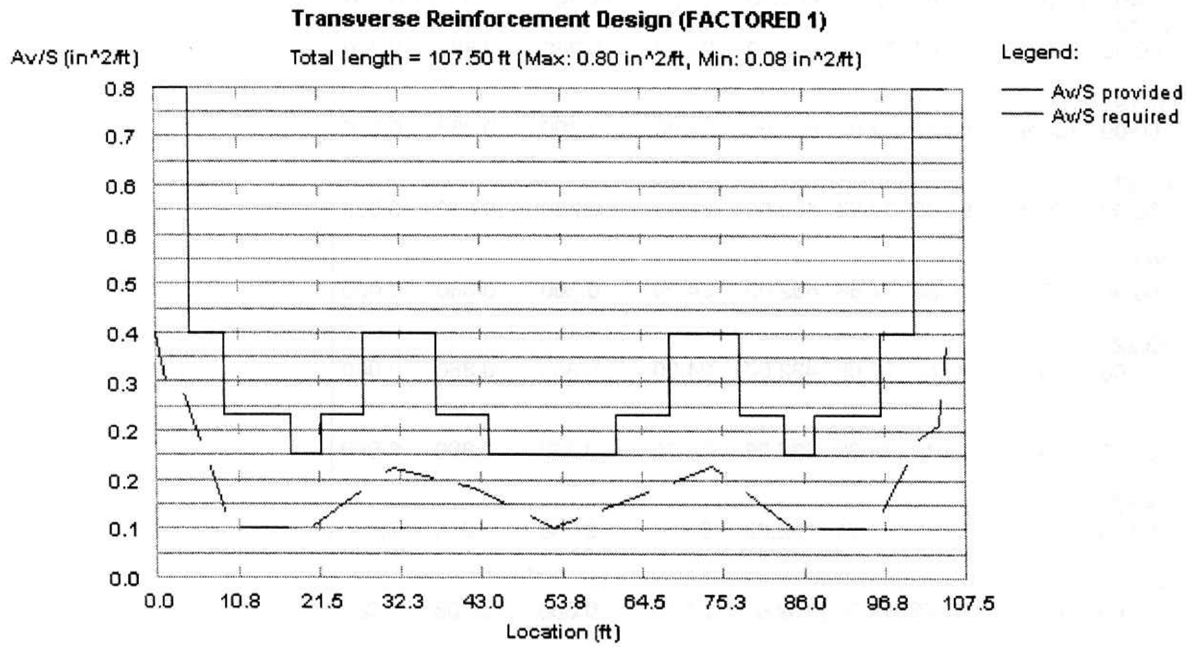
BENTLEY	KZF Design Inc 655 Eden Park Dr Cincinnati OH 45202	Sheet: DS-42 Job No: **KZF #5355.02**
Program: CONSPAN® Rating Version: 8.0.0	 www.leapsoft.com 1-800-451-5327	By: RBK Date: May/1/2009 CKD: Date:

File Name: 535502_SCI-823-0837.csl

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	**fd (psi)**	**Mcr (k.ft)**	**d (in)**	**Vci-com (kips)**	**Vci-min (kips)**	**Vci (kips)**	**fpc (psi)**	**Vp (kips)**	**Vcw (kips)**
Vc (kips)	**Vs-rqrd (kips)**	**Vs-max (kips)**	**Av-com (in2/ft)**	**Av-min (in2/ft)**	**Av (in2/ft)**	**Av-prvd (in2/ft)**	**pVn/Vu**	**MaxSpc (in)**	**Vs-crit (kips)**
0.8L :	85.40	94.6	1975.8	613.2	247.9	3899.7	163.6	1924.0	69.1
2654.1	-1320.9	4079.0	71.61	269.7	81.5	269.7	1093.1	26.6	382.2
269.7	5.8	383.4	0.02	0.08	0.08	0.20	1.239	24.0	191.7
0.9L :	96.08	129.0	782.7	355.5	307.9	1789.3	180.0	1006.6	51.0
2462.4	-585.8	5286.7	68.58	424.4	78.0	424.4	856.9	26.6	328.3
328.3	13.8	367.2	0.04	0.08	0.08	0.27	1.227	24.0	183.6
H/2 :	102.47	147.9	-99.0	-972.0	342.1	-2239.0	294.7	-2140.0	146.8
0.0	-94.2	-1622.4	77.38	290.3	88.0	290.3	667.3	26.6	331.8
290.3	89.8	414.3	0.23	0.08	0.23	0.80	1.578	24.0	207.2
Transfer :	104.67	154.4	-432.7	-1086.2	342.1	-2920.7	313.6	-2488.0	159.2
0.0	-110.2	-1538.3	77.38	283.9	88.0	283.9	593.9	26.6	318.2
283.9	96.2	414.3	0.25	0.08	0.25	0.80	1.561	24.0	207.2
Bearing :	105.92	158.1	-629.5	-1156.0	342.1	-3328.2	324.2	-2698.6	166.0
0.0	-119.6	-1488.4	77.38	280.8	88.0	280.8	220.1	10.6	232.8
232.8	147.3	414.3	0.38	0.08	0.38	0.80	1.427	24.0	207.2

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 2, Beam : 1

Fpi (kips)	fs (ksi)	d/4 (in)	Abrst_rqrd (in2)
1454.15	20.00	13.70	2.91



Vertical Shear, Span 2, Beam 1, FACTORED 1

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 2, Beam : 1

(Beam and Slab effects are INCLUDED in Vu).

Location (ft) bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :	0.00								
36.00	60.00	370.1	145.76	78.38	432.00	24.00	0.360	1.544	0.360
Transfer :	1.25								
36.00	60.00	362.6	142.78	78.38	432.00	24.00	0.360	1.490	0.360
H/2 :	3.45								
36.00	60.00	349.0	137.43	78.38	432.00	24.00	0.360	1.394	0.360
0.1L :	9.84								
36.00	60.00	314.3	123.77	78.38	432.00	24.00	0.360	1.148	0.360

Location (ft)	bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
0.2L : 20.52	36.00	60.00	253.9	109.44	71.61	432.00	24.00	0.360	0.890	0.360
0.3L : 31.19	36.00	60.00	194.6	80.47	74.65	432.00	24.00	0.360	0.368	0.360
0.4L : 41.87	36.00	60.00	130.6	51.88	77.68	432.00	24.00	0.360	0.360	0.000
0.5L : 52.54	36.00	60.00	76.9	30.55	77.68	432.00	24.00	0.360	0.360	0.000
0.6L : 63.22	36.00	60.00	125.0	49.65	77.68	432.00	24.00	0.360	0.360	0.000
0.7L : 73.89	36.00	60.00	188.9	78.10	74.65	432.00	24.00	0.360	0.360	0.000
0.8L : 84.57	36.00	60.00	247.9	106.86	71.61	432.00	24.00	0.360	0.843	0.360
0.9L : 95.24	36.00	60.00	307.9	121.26	78.38	432.00	24.00	0.360	1.103	0.360
H/2 : 101.64	36.00	60.00	342.1	134.70	78.38	432.00	24.00	0.360	1.345	0.360
Transfer : 103.83	36.00	60.00	353.9	139.36	78.38	432.00	24.00	0.360	1.429	0.360
Bearing : 105.08	36.00	60.00	360.5	141.95	78.38	432.00	24.00	0.360	1.475	0.360

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 2, Beam : 1; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.84 ft				
Prestress	0.933	1.80	1.680	2.20	2.053
Self Wt.	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch			-0.267	2.30	-0.614
Prec. DL+ADL			-0.028	3.00	-0.085
Diaphragm			-0.031	3.00	-0.094
Comp. DL+ADL			0.003	3.00	0.009
Live Load(+I)					-0.066
Total	0.587		0.716		0.372

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	20.52 ft				
Prestress	1.701	1.80	3.061	2.20	3.742
Self Wt.	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch			-0.527	2.30	-1.212
Prec. DL+ADL			-0.056	3.00	-0.168
Diaphragm			-0.062	3.00	-0.186
Comp. DL+ADL			-0.009	3.00	-0.026
Live Load(+I)					-0.134
Total	1.047		1.198		0.446

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	31.19 ft				
Prestress	2.277	1.80	4.098	2.20	5.009
Self Wt.	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch			-0.731	2.30	-1.682
Prec. DL+ADL			-0.078	3.00	-0.233
Diaphragm			-0.086	3.00	-0.258
Comp. DL+ADL			-0.025	3.00	-0.076
Live Load(+I)					-0.192
Total	1.382		1.522		0.420

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	41.87 ft				
Prestress	2.636	1.80	4.745	2.20	5.799
Self Wt.	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch			-0.861	2.30	-1.981
Prec. DL+ADL			-0.091	3.00	-0.274
Diaphragm			-0.101	3.00	-0.303
Comp. DL+ADL			-0.040	3.00	-0.119
Live Load(+I)					-0.231
Total	1.587		1.712		0.374

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	52.54 ft				
Prestress	2.757	1.80	4.963	2.20	6.066
Self Wt.	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch			-0.906	2.30	-2.084

	Release	Mult	Erection	Mult	Final
Prec. DL+ADL			-0.096	3.00	-0.288
Diaphragm			-0.106	3.00	-0.319
Comp. DL+ADL			-0.047	3.00	-0.142
Live Load(+I)					-0.244
Total	1.656		1.770		0.347

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	63.22 ft				
Prestress	2.636	1.80	4.745	2.20	5.799
Self Wt.	-1.048	1.85	-1.940	2.40	-2.516
Deck + Haunch			-0.861	2.30	-1.981
Prec. DL+ADL			-0.091	3.00	-0.274
Diaphragm			-0.101	3.00	-0.303
Comp. DL+ADL			-0.046	3.00	-0.139
Live Load(+I)					-0.230
Total	1.587		1.705		0.356

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	73.89 ft				
Prestress	2.277	1.80	4.098	2.20	5.009
Self Wt.	-0.895	1.85	-1.656	2.40	-2.149
Deck + Haunch			-0.731	2.30	-1.682
Prec. DL+ADL			-0.078	3.00	-0.233
Diaphragm			-0.086	3.00	-0.258
Comp. DL+ADL			-0.037	3.00	-0.111
Live Load(+I)					-0.190
Total	1.382		1.510		0.387

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	84.57 ft				
Prestress	1.701	1.80	3.061	2.20	3.742
Self Wt.	-0.654	1.85	-1.210	2.40	-1.569
Deck + Haunch			-0.527	2.30	-1.212
Prec. DL+ADL			-0.056	3.00	-0.168
Diaphragm			-0.062	3.00	-0.186
Comp. DL+ADL			-0.022	3.00	-0.067
Live Load(+I)					-0.131
Total	1.047		1.184		0.408

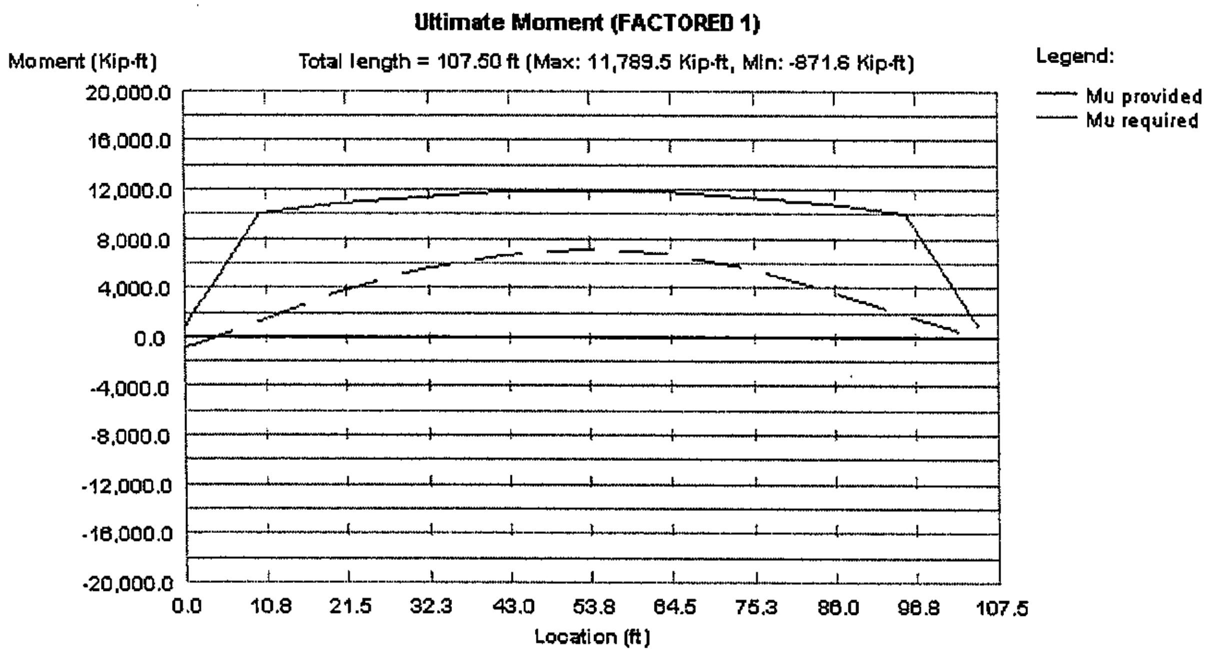
	Release	Mult	Erection	Mult	Final
At 0.9 x L =	95.24 ft				
Prestress	0.933	1.80	1.680	2.20	2.053
Self Wt.	-0.346	1.85	-0.639	2.40	-0.829
Deck + Haunch			-0.267	2.30	-0.614
Prec. DL+ADL			-0.028	3.00	-0.085
Diaphragm			-0.031	3.00	-0.094
Comp. DL+ADL			-0.007	3.00	-0.022
Live Load(+I)					-0.064
Total	0.587		0.706		0.343

Positive values indicate upward deflection.

ULTIMATE MOMENT

ULTIMATE - Span : 2, Beam : 1, FACTORED 1
(Mu-prvd computed by Strain Compatibility method. Ult. Conc. Strain = 0.00300)
(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer 1.25	1.369	16.62	0.00020	269.6	0.9	1959.9	-620.7	6452.8	0.304	3.16
H/2 3.45	2.814	15.99	0.00041	269.3	1.9	4032.7	-162.2	6418.2	0.628	24.87
0.1L 9.84	7.016	14.17	0.00100	268.4	4.7	10090.4	1204.2	6348.3	1.589	-
0.2L 20.52	7.181	11.14	0.00098	268.7	4.8	10808.3	3715.9	6333.7	1.706	-
0.3L 31.19	7.181	8.10	0.00094	268.8	4.8	11299.0	5558.9	6446.0	1.753	-
0.4L 41.87	7.181	5.07	0.00090	268.9	4.8	11789.5	6690.7	6680.3	1.765	-
0.5L 52.54	7.181	5.07	0.00090	268.9	4.8	11789.5	7051.7	6620.6	1.781	-
[illegible] 63.22	7.181	5.07	0.00090	268.9	4.8	11789.5	6747.8	6680.3	1.765	-
[illegible] 73.89	7.181	8.10	0.00094	268.8	4.8	11299.0	5674.9	6446.0	1.753	-
0.8L 84.57	7.181	11.14	0.00098	268.7	4.8	10808.3	3899.7	6333.7	1.706	-
0.9L 95.24	7.016	14.17	0.00100	268.4	4.7	10090.4	1789.3	6348.3	1.589	-
H/2 101.64	2.814	15.99	0.00041	269.3	1.9	4032.7	575.3	6418.2	0.628	7.01
Transfer 103.83	1.369	16.62	0.00020	269.6	0.9	1959.9	149.6	6452.8	0.304	13.10



Ultimate Moment, Span 2, Beam 1, FACTORED 1

KZF Design Inc
655 Eden Park Dr Cincinnati OH 45202

DETENSIONING

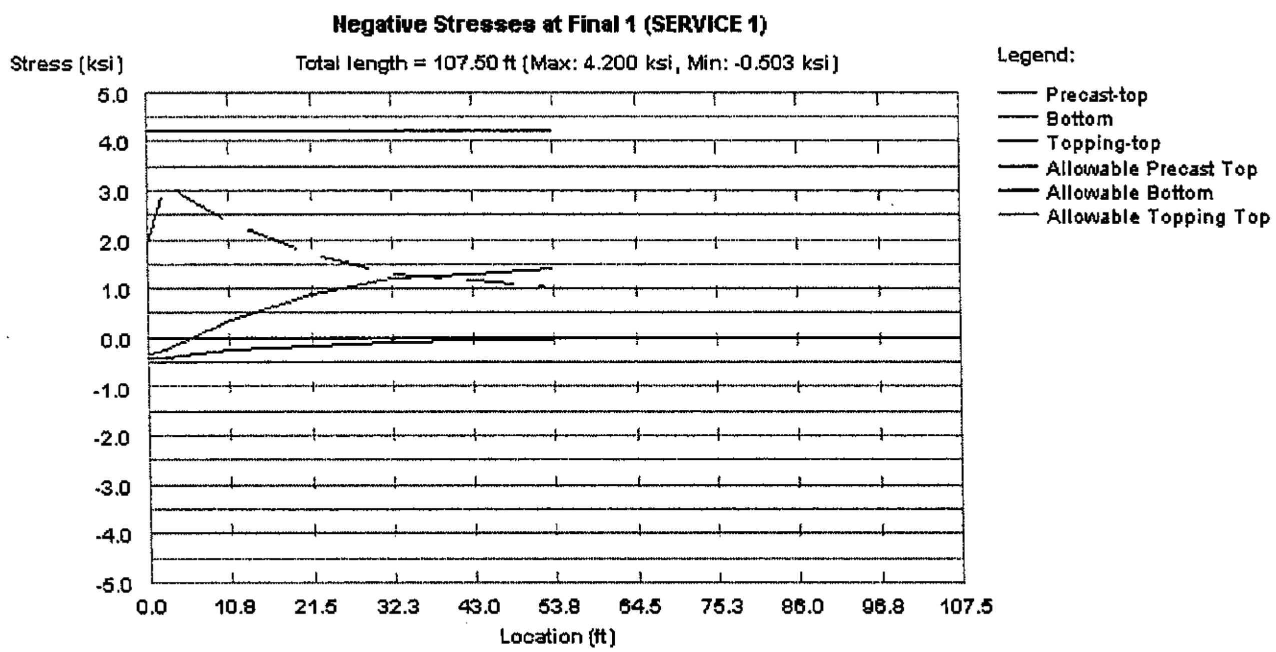
Span : 2, Beam : 1; Groups 1-24; Units: psi

Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	22.010
		M	2.00	Fb	103.739
2	2	E	68.00	Ft	202.560
		M	10.00	Fb	62.268
3	1	E	68.00	Ft	292.835
		M	10.00	Fb	41.532
4	2	E	66.00	Ft	465.849
		M	8.00	Fb	6.965
5	1	E	66.00	Ft	552.356
		M	8.00	Fb	-10.32*
6	2	E	64.00	Ft	717.832
		M	6.00	Fb	-37.98*
7	1	E	64.00	Ft	800.570
		M	6.00	Fb	-51.82*
8	2	E	8.00	Ft	765.673
		M	8.00	Fb	104.044
9	2	E	8.00	Ft	730.776
		M	8.00	Fb	259.904
[illegible]	2	E	6.00	Ft	688.343
		M	6.00	Fb	422.667
[illegible]	2	E	6.00	Ft	645.909
		M	6.00	Fb	585.430
12	2	E	6.00	Ft	603.475
		M	6.00	Fb	748.194
13	2	E	6.00	Ft	561.041
		M	6.00	Fb	910.957
14	2	E	4.00	Ft	511.070
		M	4.00	Fb	1080.623
15	2	E	4.00	Ft	461.099
		M	4.00	Fb	1250.290
16	2	E	4.00	Ft	411.128
		M	4.00	Fb	1419.956
17	2	E	4.00	Ft	361.158
		M	4.00	Fb	1589.622
18	2	E	4.00	Ft	311.187
		M	4.00	Fb	1759.289
19	1	E	4.00	Ft	286.201
		M	4.00	Fb	1844.122
20	2	E	2.00	Ft	228.693
		M	2.00	Fb	2020.692
21	2	E	2.00	Ft	171.186
		M	2.00	Fb	2197.262
22	2	E	2.00	Ft	113.678
		M	2.00	Fb	2373.831
23	2	E	2.00	Ft	56.170
		M	2.00	Fb	2550.401
24	1	E	2.00	Ft	27.416
		M	2.00	Fb	2638.686

NEGATIVE ENVELOPE STRESSES

Span : 2, Beam : 1, SERVICE 1
NEGATIVE ENVELOPE STRESSES, (psi) (LOSS = 22.24%)

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Prestress									
Precast-top		-7.9	-44.4	-87.4	-212.8	-422.1	-631.4	-840.7	-840.7
Bottom		914.3	2308.1	2347.5	2462.4	2654.1	2845.8	3037.5	3037.5
Self wt.									
Precast-top		-0.0	47.3	127.6	341.4	631.9	839.5	964.0	1005.5
Bottom		-0.0	-43.3	-116.9	-312.7	-578.8	-768.9	-882.9	-920.9
Prec. DL+ADL									
Precast-top		-0.0	5.2	14.0	37.5	69.5	92.3	105.9	110.5
Bottom		0.0	-4.8	-12.8	-34.4	-63.6	-84.5	-97.0	-101.2
Diaphragm									
Precast-top		0.0	6.0	16.2	42.7	77.2	100.4	119.6	119.6
Bottom		-0.0	-5.5	-14.8	-39.2	-70.7	-92.0	-109.6	-109.6
Deck + Haunch									
Precast-top		-0.0	49.0	132.4	354.0	655.3	870.5	999.6	1042.7
Bottom		-0.0	-44.9	-121.2	-324.3	-600.2	-797.3	-915.6	-955.0
Comp. DL+ADL									
Topping-top		-179.6	-168.9	-150.5	-101.3	-33.3	17.0	49.6	64.5
Precast-top		-139.7	-131.3	-117.0	-78.8	-25.9	13.2	38.6	50.2
Bottom		425.3	399.7	356.2	239.8	78.8	-40.3	-117.5	-152.8
LL+I(-)									
Topping-top		-242.2	-228.4	-206.0	-153.0	-117.9	-102.4	-99.1	-95.7
Precast-top		-188.3	-177.6	-160.2	-119.0	-91.7	-79.7	-77.0	-74.4
Bottom		573.3	540.8	487.6	362.3	279.1	242.5	234.6	226.6
Final 1 (P/S + DL	+ LL)								
Topping-top		-421.8	-397.3	-356.4	-254.3	-151.2	-85.4	-49.5	-31.2
Precast-top		-335.9	-245.8	-74.4	365.1	894.2	1204.8	1310.0	1413.3
Bottom		1912.9	3150.1	2925.6	2354.0	1698.7	1305.4	1149.5	1024.6
Final 2 (P/S + DL)									
Topping-top		-179.6	-168.9	-150.5	-101.3	-33.3	17.0	49.6	64.5
Precast-top		-147.6	-68.2	85.7	484.1	985.9	1284.4	1387.0	1487.7
Bottom		1339.5	2609.4	2438.0	1991.7	1419.6	1062.9	914.9	798.0
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		-332.0	-312.8	-281.2	-203.7	-134.5	-93.9	-74.3	-63.4
Precast-top		-262.1	-211.7	-117.3	123.1	401.3	562.5	616.5	669.4
Bottom		1243.1	1845.4	1706.6	1358.1	988.9	774.0	692.0	625.6



Negative Stresses at Final 1, Span 2, Beam 1, SERVICE 1

REINFORCED DESIGN

REINFORCED DESIGN - Span : 2, Beam : 1, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	-4227.7	8.00	78.37	2.00	-3176.9	0.000	12.365	0.000*	-0.0
2	11.05	-1063.2	8.00	78.37	2.00	-3176.9	0.000	4.050	0.000*	-0.0
3	21.73	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
4	32.40	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
5	43.08	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
6	53.75	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
7	64.43	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
8	75.10	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
9	85.78	0.0	12.75	80.75	4.37	-0.0	0.000	0.000	0.000	-0.0
10	96.45	-507.5	8.00	78.37	2.00	-3176.9	0.000	1.923	0.000*	-0.0
11	107.50	-3546.7	8.00	78.37	2.00	-3176.9	0.000	10.320	0.000*	-0.0

(b) POSITIVE MOMENTS AT PIERS

NONE

DESIGN SUMMARY

Span: 2, Beam: 1, Exterior beam

Beam type:	I-Girder,	OHIO-MOD-72-TYPE-IV
Precast Length,	ft	106.75
Release Length,	ft	106.75
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-SP-1	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28000.0
No. of strands:	43	
	Draped:	9
	Straight:	34
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.65 %	
Final losses:	22.24 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00	8.42	
Precast Top w/ reinf.	-530.33		
Precast Bot (compression)	3000.00	2656.08	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	11789.51	7051.66	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	289.0 / -56.3	1800.0	64.5	1800.0	256.7

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1662.3 / -51.7	2800.0	1487.7	2800.0	918.4
Precast Bot	4200.0/-502.0	2322.8 / 266.7	2800.0	2470.4	2800.0	1087.6

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	-31.2 /-421.8	1800.0	64.5	1800.0	-63.4
Precast Top	4200.0/-502.0	1413.3 /-335.9	2800.0	1487.7	2800.0	669.4
Precast Bot	4200.0/-502.0	3150.1 /1024.6	2800.0	2609.4	2800.0	1845.4

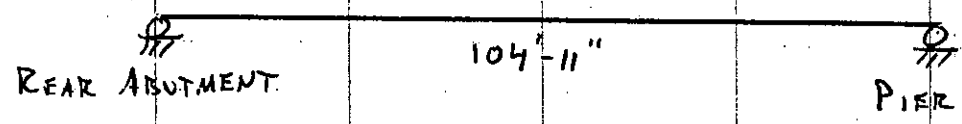
CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 52.54 ft

	Release	Mult	Erection	Mult	Final
Prestress	2.757	1.80	4.963	2.20	6.066
Self Wt.	-1.101	1.85	-2.037	2.40	-2.642
Deck + Haunch			-0.906	2.30	-2.084
Prec. DL+ADL			-0.096	3.00	-0.288
Diaphragm			-0.106	3.00	-0.319
Comp. DL+ADL			-0.047	3.00	-0.142
Live Load					-0.244
Total	1.656		1.770		0.347

Positive values indicate upward deflection.

D. ABUTMENT DESIGN

REAR ABUTMENT



(PER BEAM LINE)

1. Beam Self Weight (CONSPAN OUTPUT)

$= 52.2^{k}$

2. Dead Load on Precast (CONSPAN OUTPUT)

$= 63.2 + 11.9 + 6.8 = 81.9^{k}$

3. Superimposed Dead Load (CONSPAN OUTPUT)

$= \frac{171.1}{5} = 34.2^{k}$

4. Abutment Diaphragm

$$= \frac{0.15^{kcf}\left[\left(\frac{48.5}{\cos 13}\right)(3.5)(6+1) - (5)(2.5)(956\,in^2)\right]}{5 \text{ beams}} = 34.1^{k}$$

5. Live Load & Impact (CONSPAN OUTPUT)

$= 80.1^{k}$ [Per Lane, No DF, No IMPACT]

$LL = (80.1)(1)(0.939) = 75.2^{k}$

$LL+I = (80.1)\underset{I}{(1.217)}\underset{DF}{(0.939)} = 91.5^{k}$

$\boxed{\begin{array}{l} DL: 202.4^{K} \\ LL+I: 91.5^{K} \end{array}}$ $\boxed{\begin{array}{l} DL: 202.4^{K} \\ LL: 75.2^{K} \end{array}}$

PER BEARING

REAR ABUTMENT

1. WIND ON STRUCTURE (AASHTO 3.15.2)

- Total height of structure

Barrier = 42"
Deck = 8.75"
Haunch = 2"
Beams = 72"

124.75" = 10.40'

Bearings = 3.78" = 0.32'

- 100 mph @ 0° (50 psf)

$F_T = \left(\frac{105.1}{2}\right)(10.4')(0.05^{ksf}) = 27.3^{k}$

$M_T = 27.3\left(\frac{10.4}{2} + 0.32\right) = 150.7^{k'}$

- 100 mph @ 60° ($17psf_{TRANS}$, $19psf_{LONG}$)

$F_T = (52.5)(10.4)(.017) = 9.3^{k}$

$M_T = 9.3\left(\frac{10.4}{2} + 0.32\right) = 51.3^{k'}$

$F_L = (52.5)(10.4)(.019) = 10.4^{k}$

$M_L = 10.4\left(\frac{10.4}{2} + 0.32\right) = 57.4^{k'}$

2. OVERTURNING WIND (AASHTO 3.15.3)

- (20 psf @ w/4)

$F_V = (52.5)(48.5)(.02^{ksf}) = 50.9^{k}$

$M_T = 50.9\left(\frac{48.5}{4}\right) = 617.2^{k'}$

3. WIND ON LIVE LOAD (AASHTO 3.15.2)

- 100 plf @ 0°, 6' above deck

$F_T = (52.5)(0.1^{klf}) = 5.3^k$

$M_T = 5.3\left(\frac{72 + 8.75 + 2 + 72 + 3.78}{12}\right) = 70.0^{k'}$

- 34 plf $_{TRANS}$, 38 plf $_{LONG}$ @ 60°, 6' above deck

$F_T = (52.5)(.034) = 1.8^k$

$M_T = 1.8\left(\frac{72 + 8.75 + 2 + 72 + 3.78}{12}\right) = 23.8^k$

$F_L = (52.5)(.038) = 2.0^k$

$M_L = 2\left(\frac{72 + 8.75 + 2 + 72 + 3.78}{12}\right) = 26.4^{k'}$

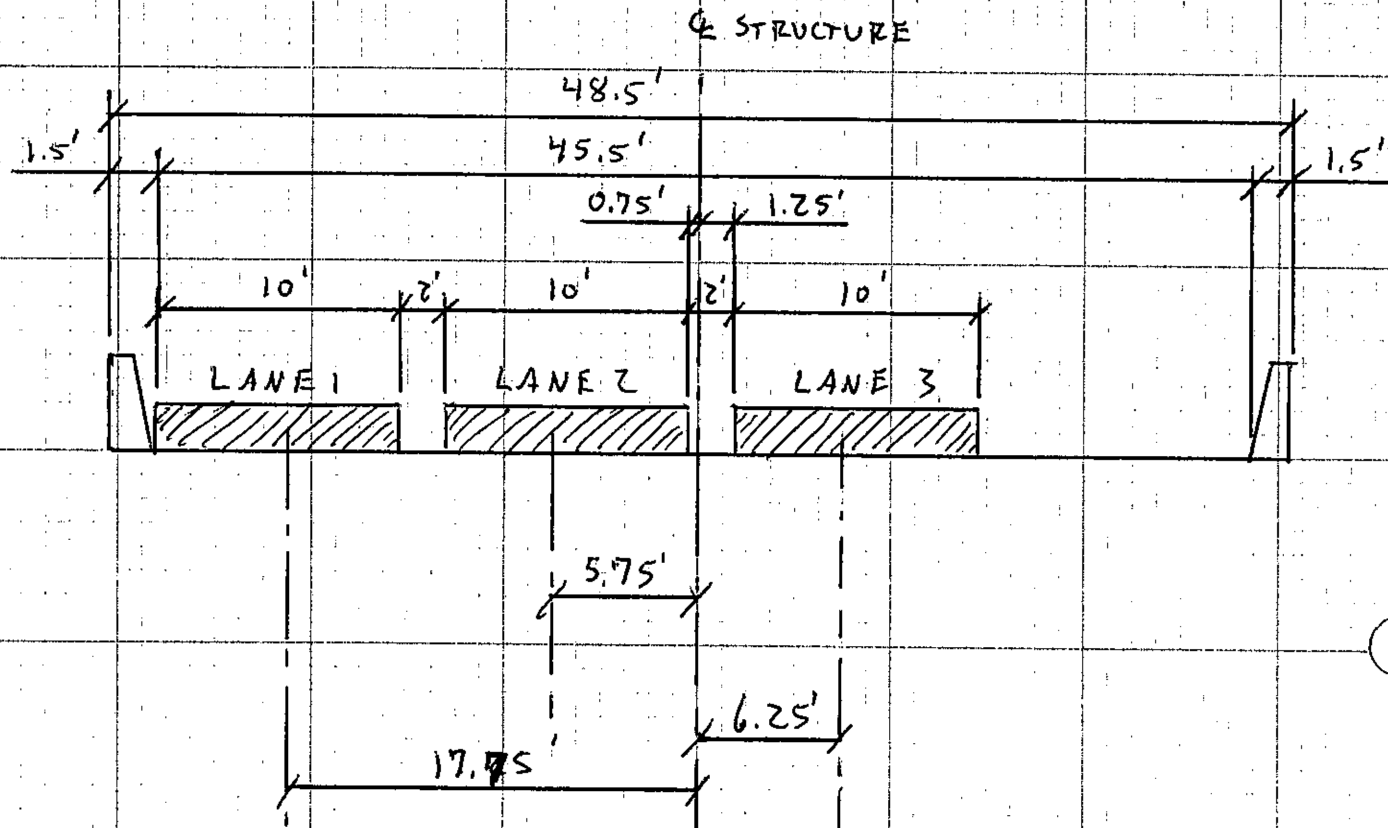
4. BEAM REACTIONS FROM SUPERSTRUCTURE

$DL = 202.4^k$
$LL = 75.2^k$
$LL+I = 91.5^k$

Per Beam Line

NOTE! ABUTMENT DIAPHRAGM WEIGHT INCLUDED IN DEAD LOAD REACTION

5. LIVE LOAD CASES



$e_1 = 17.75'$

$e_2 = \left(\frac{17.75 + 5.75}{2}\right) = 11.75$

$e_3 = \left(\frac{17.75 + 5.75 - 6.25}{3}\right) = 5.75'$

Live Load per Lane $= 80.1^k$

(LL+I) per Lane $= (80.1)(1.217) = 97.5^k$

F_v (1 LANE) $= 97.5^k$

M_T (1 LANE) $= 97.5(17.75) = 1730.6^{k'}$

F_v (2 LANES) $= 2(97.5) = 195^k$

M_T (2 LANES) $= 195(11.75) = 2291.3^{k'}$

F_v (3 LANES) $= 3(97.5)(0.9) = 263.3^k$

M_T (3 LANES) $= 263.3(5.75) = 1513.7^{k'}$

6. LONGITUDINAL LIVE LOAD (AASHTO 3.9)

$F_L(\text{1 LANE}) = (1 \text{ lane})(0.05)\left((0.80^{klf})\left(\overset{105'/2}{\cancel{430\ 842}}\right) + 22.5\right) = \cancel{18.4^k}\ 3.2^k$

$M_L(\text{1 LANE}) = \overset{3.2}{\cancel{18.4}}\left(\dfrac{72+8.75+2+72+3.78}{12}\right) = \cancel{243.1^{k'}}\ 42.3^{k'}$

$F_L(\text{2 LANES}) = \overset{3.2}{\cancel{18.4}}(2) = \cancel{36.8^k}\ 6.4^k$

$M_L(\text{2 LANES}) = \overset{6.4}{\cancel{36.8}}(13.21') = \cancel{486.1}^{k'}\ 84.5^{k'}$

$F_L(\text{3 LANES}) = \overset{3.2}{\cancel{18.4}}(3)(0.9) = \cancel{49.7^k}\ 8.6^k$

$M_L(\text{3 LANES}) = \overset{8.6}{\cancel{49.7}}(13.21) = \cancel{656.5}^{k'}\ 114.1^{k'}$

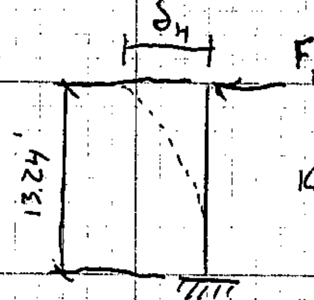
ASSUMPTION:
CONTRIBUTING LENGTH IS 1/2 ADJACENT SPAN

7. CENTRIFUGAL (AASHTO 3.10)

∅ STRUCTURE ON TANGENT ALIGNMENT

8. R+S+T

$E_{CRACK} \approx 0.5E = 0.5(57000)\sqrt{4000}(0.144) = 259{,}560 \text{ ksf}$



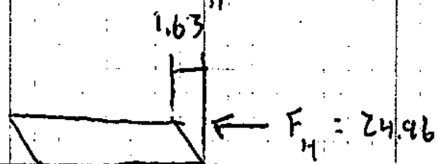
$K_{SPRING} = \dfrac{F_H}{\delta_H}$

$I_{ABUT} = \dfrac{(57.5)(3.5)^3}{12} + \dfrac{(57.5)(6)^3}{12} = 1240.4 \text{ ft}^4$

$K_{ABUT} = \dfrac{3(259560)(1240.4)}{(13.24)^3} = 416156.6 \text{ K/ft}$

$\delta_H = \dfrac{(F_H)L^3}{3EI}$

$K_{BEARING} = \dfrac{F_H}{\delta_H}$



$K_{SPRING} = \dfrac{F_H}{1} \cdot \dfrac{3EI}{(F_H)L^3} = \boxed{\dfrac{3EI}{L^3}}$

$K_{BEARING} = \dfrac{24.96}{1.63/12} = 183.8 \text{ K/ft} (5 \text{ brgs.}) = 918.8 \text{ K/ft}$

$K_{EFF} = \dfrac{1}{\dfrac{1}{416156.6} + \dfrac{1}{918.8}} = 916.8 \text{ K/ft}$

$\delta_T = (50°)(52.5)(6\times10^{-6}) = 0.016'$

ASSUMING $65° \pm 50°$

$F_H = F_L = \delta_T K_{EFF} = (.016)(916.8) = 14.7^K$ ✓

$M_L = (14.7)(13.24) = 194.6^{K'}$ ✓

9. WIND ON SUBSTRUCTURE (AASHTO 3.15.2)

- 100 mph @ 0° (40 psf)

$F_T = \left(\frac{100.75''}{12}\right)\left(\frac{42''}{12}\right)(.04^{ksf}) = 1.2^k$

$M_T = 1.2\left(\frac{100.75''}{2} + 22.16'' + 36''\right) = 10.9^{k'}$

- 100 mph @ 60° (20 psf$_{TRANS}$, 35 psf$_{LONG}$)

$F_T = \left(\frac{100.75}{12}\right)\left(\frac{42}{12}\right)(.02) = 0.6^k$

$M_T = 0.6\left(\frac{100.75}{2} + 22.16 + 36\right) = 5.4^{k'}$

$F_L = \left(\frac{100.75''}{12}\right)(57.5)(.035^{ksf}) = 16.9^k$

$M_L = 16.9\left(\frac{100.75}{2} + 22.16 + 36\right) = 152.9^{k'}$

10. STREAM FLOW (AASHTO 3.18.1)

ϕ NO STREAM

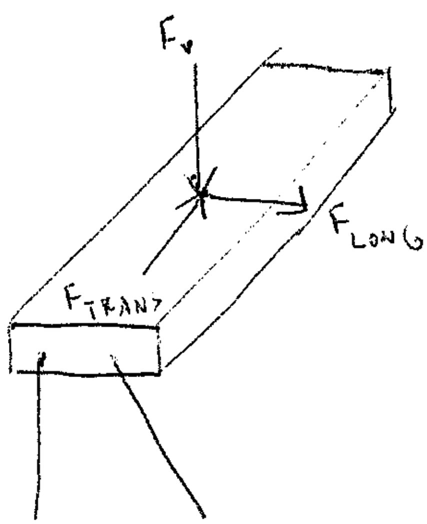
11. DEAD LOAD ABUTMENT

$0.15^{kcf}\left[(42'')(122.91'')(57.5')\right] = 309.2^k$ (ABUTMENT) ✓

$0.15^{kcf}\left[(6)(3)(57.5)\right] = 155.3^k$ (FOOTING) ✓

SUMMARY:
ALL FORCES AND MOMENTS TAKEN ABOUT AXIS OF ~~PIER~~ ABUTMENT AND AT TOP OF BEARING

#	LOADING	F_V	F_{LONG}	F_{TRANS}	M_{TRANS}	M_{LONG}
		(kips)	(kips)	(kips)	(kip-ft)	(kip-ft)
1	DEAD LOAD (5 BEAMS)	1012.0	--	--	--	--
2	LIVE LOAD AND IMPACT (1 LANES)	97.5	--	--	1730.6	--
2	LIVE LOAD AND IMPACT (2 LANES)	195.0	--	--	2291.3	--
2	LIVE LOAD AND IMPACT (3 LANES)	263.3	--	--	1513.7	--
3	LONGITUDINAL LIVE LOAD (1 LANES)	--	3.2	--	--	42.3
3	LONGITUDINAL LIVE LOAD (2 LANES)	--	6.4	--	--	84.5
3	LONGITUDINAL LIVE LOAD (3 LANES)	--	8.6	--	--	114.1
4	WIND ON SUPERSTRUCTURE @ 0°	--	--	27.3	150.7	--
5	WIND ON SUPERSTRUCTURE @ 60°	--	10.4	9.3	51.3	57.4
6	WIND OVERTURNING	-50.9	--	--	617.2	--
7	WIND ON LIVE LOAD @ 0°	--	--	5.3	70.0	--
8	WIND ON LIVE LOAD @ 60°	--	2.0	1.8	23.8	26.4
9	R + S + T (5 BEAMS)	--	14.7	--	--	194.6
10	WIND ON SUBSTRUCTURE @ 0°	--	--	1.2	10.9	--
11	WIND ON SUBSTRUCTURE @ 60°	--	16.9	0.6	5.4	--
12	STREAM FLOW	--	--	--	--	--
13	CENTRIFUGAL	--	--	--	--	--
14	DEAD LOAD ABUTMENT	309.2	--	--	--	--
15	DEAD LOAD FOOTING	155.3	--	--	--	--



CALCULATE ABUTMENT LOADS AT BOTTOM OF FOOTING

1. WIND ON STRUCTURE

– @ 0°

$F_T = 27.3^k$

$M_T = 27.3\left(\frac{10.4}{2} + 0.32 + 28.16'' + 36''\right) = 296.7^{k'}$

– @ 60°

$F_T = 9.3^k$

$M_T = 9.3\left(\frac{10.4}{2} + 0.32 + 28.16'' + 36''\right) = 101.1^{k'}$

$F_L = 10.4^k$

$M_L = 10.4\left(\frac{10.4}{2} + 0.32 + 28.16'' + 36''\right) = 113.0^{k'}$

3. WIND ON LIVE LOAD

– @ 0°

$F_T = 5.3^k$

$M_T = 5.3\left(\frac{72 + 8.75 + 2 + 72 + 3.78}{12} + 28.16'' + 36''\right) = 98.4^{k'}$

– @ 60°

$F_T = 1.8^k$

$M_T = 1.8\left(\frac{72 + 8.75 + 2 + 72 + 3.78}{12} + 28.16'' + 36''\right) = 33.4^{k'}$

$F_L = 2.0^k$

$M_L = 2\left(\frac{72 + 8.75 + 2 + 72 + 3.78}{12} + 28.16'' + 36''\right) = 37.1^{k'}$

6. LONGITUDINAL LIVE LOAD

F_L (1 LANE) = ~~18.4~~^{K} 3.2^K

M_L (1 LANE) = $\cancel{18.4}$ 3.2 $\left(\frac{72+8.75+2+72+3.78}{12} + 28.16'' + 36'' \right) = \cancel{341.5}$ $59.4^{K'}$

F_L (2 LANES) = ~~36.8~~^{K} 6.4

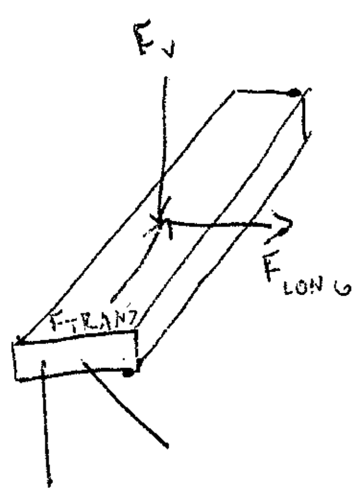
M_L (2 LANES) = $\cancel{36.8}$ 6.4 $\left(\frac{72+8.75+2+72+3.78}{12} + 28.16'' + 36'' \right) = \cancel{682.9}$ $118.8^{K'}$

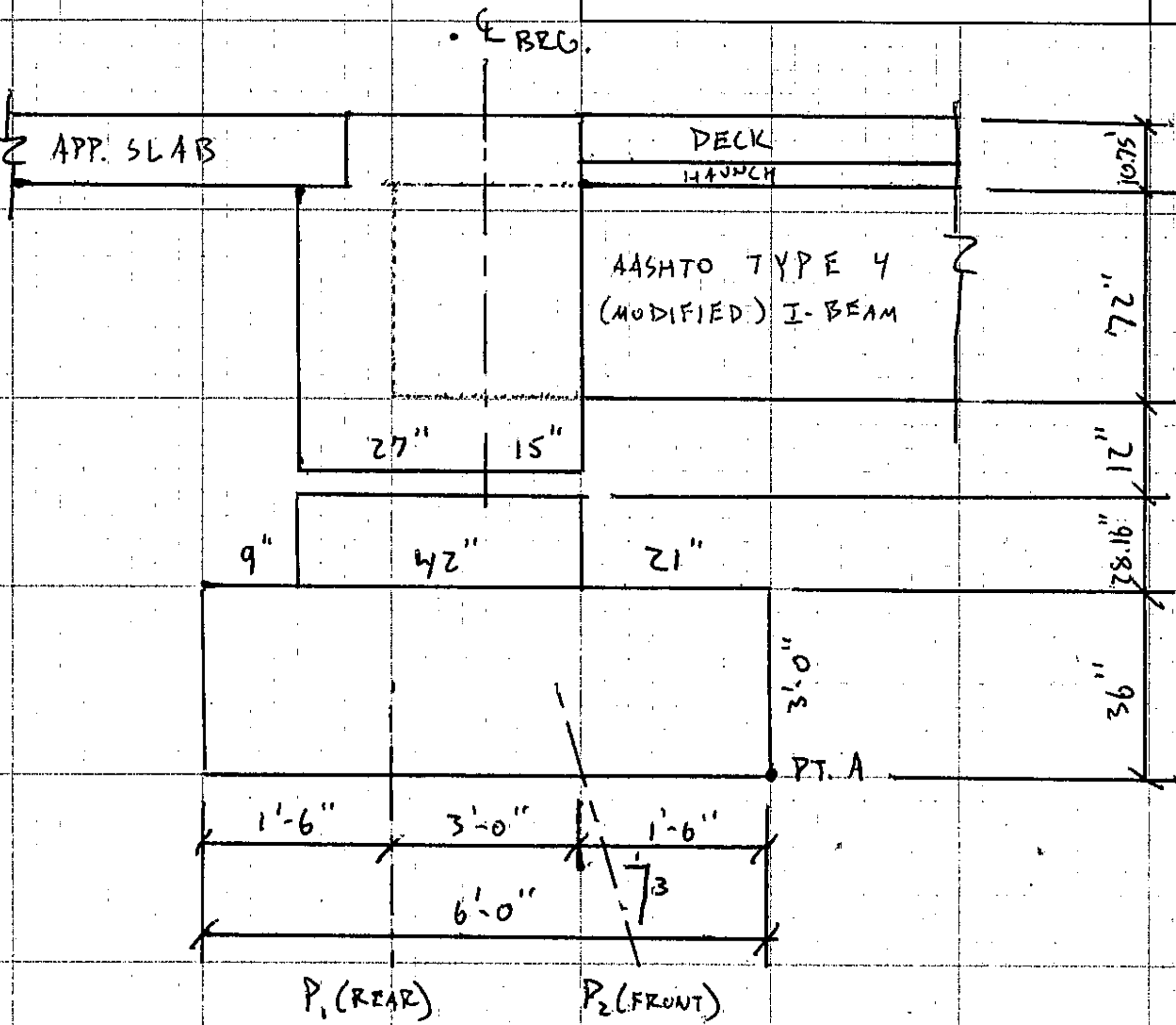
F_L (3 LANES) = ~~49.7~~^{K} 8.6

M_L (3 LANES) = $\cancel{49.7}$ 8.6 $\left(\frac{72+8.75+2+72+3.78}{12} + 28.16'' + 36'' \right) = \cancel{922.3}$ $159.6^{K'}$

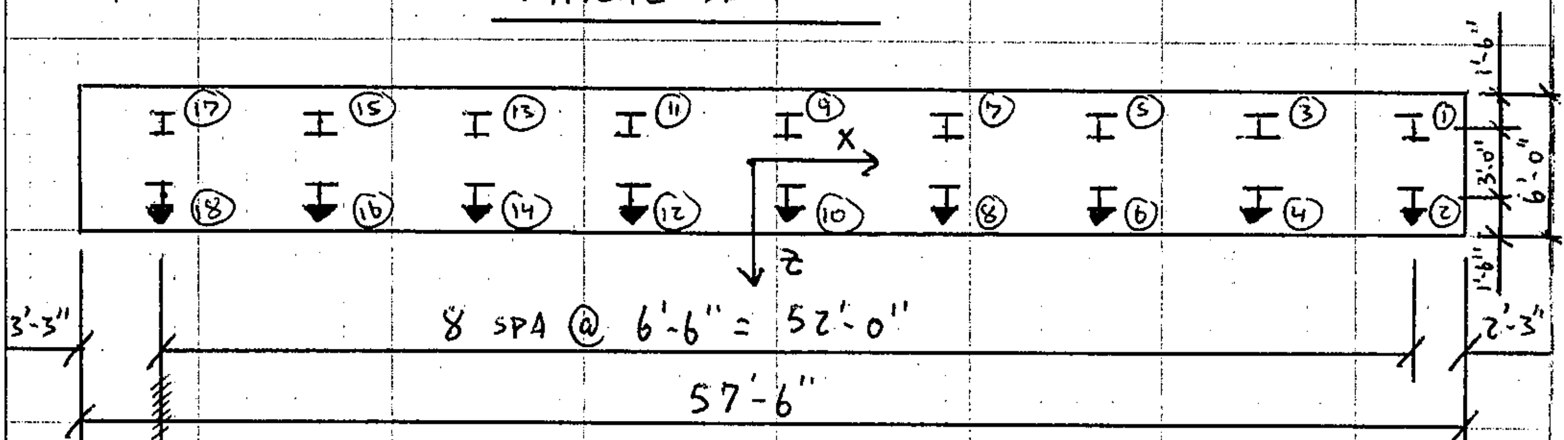
SUMMARY:
ALL FORCES AND MOMENTS TAKEN ABOUT AXIS OF ABUTMENT AND AT BOTTOM OF FOOTING

#	LOADING	F_V	F_{LONG}	F_{TRANS}	M_{TRANS}	M_{LONG}
		(kips)	(kips)	(kips)	(kip-ft)	(kip-ft)
1	DEAD LOAD (5 BEAMS)	1012.0	--	--	--	--
2	LIVE LOAD (1 LANES)	80.1	--	--	1421.8	--
2	LIVE LOAD (2 LANES)	160.2	--	--	1882.4	--
2	LIVE LOAD (3 LANES)	216.3	--	--	1243.7	--
3	LONGITUDINAL LIVE LOAD (1 LANES)	--	3.2	--	--	59.4
3	LONGITUDINAL LIVE LOAD (2 LANES)	--	6.4	--	--	118.8
3	LONGITUDINAL LIVE LOAD (3 LANES)	--	8.6	--	--	159.6
4	WIND ON SUPERSTRUCTURE @ 0°	--	--	27.3	296.7	--
5	WIND ON SUPERSTRUCTURE @ 60°	--	10.4	9.3	101.1	113.0
6	WIND OVERTURNING	-50.9	--	--	617.2	--
7	WIND ON LIVE LOAD @ 0°	--	--	5.3	98.4	--
8	WIND ON LIVE LOAD @ 60°	--	2.0	1.8	33.4	37.1
9	R + S + T (5 BEAMS)	--	14.7	--	--	194.6
10	WIND ON SUBSTRUCTURE @ 0°	--	--	1.2	10.9	--
11	WIND ON SUBSTRUCTURE @ 60°	--	16.9	0.6	5.4	--
12	STREAM FLOW	--	--	--	--	--
13	CENTRIFUGAL	--	--	--	--	--
14	DEAD LOAD ABUTMENT	309.2	--	--	--	--
15	DEAD LOAD FOOTING	155.3	--	--	--	--



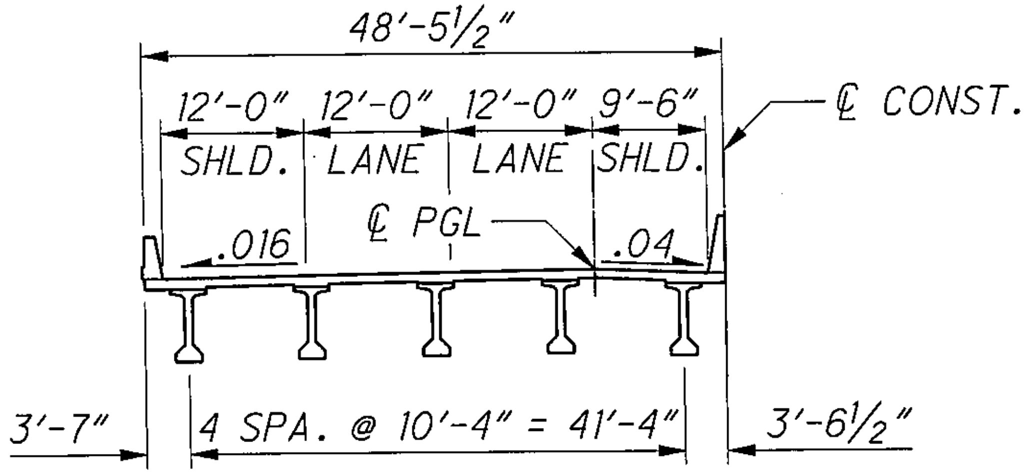


TYPICAL SECTION



▼ ~ INDICATES PILE BATTER 4:1

PILE LAYOUT


48'-5½"
12'-0"
12'-0"
12'-0"
9'-6"
SHLD.
LANE
LANE
SHLD.
℄ CONST.
℄ PGL
.016
.04
3'-7"
4 SPA. @ 10'-4" = 41'-4"
3'-6½"

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

						BETA FACTOR									
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

						BETA FACTOR								
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

BOTTOM OF FOOTING

* for lateral at-rest earth pressures

LOADINGS (Max. LLecc, wind at 0 deg.)

						LOADING (kips, K-ft)								
	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	1529.5	97.5											
TRANS.	F(X)								6.1	1.2	-0.7	-3.3		
LONG.	F(Z)					214.4			26.6	5.2	3.1	14.3		
LONG.	M(X)	-293.7				975.0			142.2	27.6	16.7	76.6		
TRANS.	M(Z)		-1776.1						-32.8	-6.4	-3.8	-17.7		

SERVICE LOAD COMBINATIONS (1 LANE)

	Load	GROUP NO.											
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	1627.0	1724.5	1529.5	1529.5	1627.0	1627.0	1529.5	1627.0	1529.5	1627.0	1529.5	1627.0
TRANS.	F(X)	0.0	0.0	0.0	6.1	2.3	-3.3	2.8	-1.0	0.0	0.0	6.1	0.0
LONG.	F(Z)	214.4	0.0	214.4	241.0	230.7	228.7	255.3	245.0	214.4	214.4	241.0	214.4
LONG.	M(X)	681.3	-293.7	681.3	823.5	768.2	757.9	900.1	844.8	681.3	681.3	823.5	681.3
TRANS.	M(Z)	-1776.1	-3552.3	0.0	-32.8	-1796.2	-1793.8	-50.5	-1813.9	0.0	-1776.1	-32.8	-1776.1
	M(COMB)	1902.3	3564.4	681.3	824.1	1953.6	1947.3	901.5	2001.0	681.3	1902.3	824.1	1902.3

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

	Load	GROUP NO.											
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	1627.0	1149.6	1529.5	1223.6	1301.6	1301.6	1092.5	1162.1	1150.0	1162.1	1019.6	1627.0
TRANS.	F(X)	0.0	0.0	0.0	4.9	1.9	-2.6	2.0	-0.7	0.0	0.0	4.1	0.0
LONG.	F(Z)	214.4	0.0	214.4	192.8	184.5	183.0	182.4	175.0	161.2	153.1	160.7	214.4
LONG.	M(X)	681.3	-195.8	681.3	658.8	614.6	606.3	642.9	603.4	512.2	486.6	549.0	681.3
TRANS.	M(Z)	-1776.1	-2368.2	0.0	-26.3	-1437.0	-1435.1	-36.1	-1295.6	0.0	-1268.7	-21.9	-1776.1
	M(COMB)	1902.3	2376.3	681.3	659.3	1562.9	1557.9	643.9	1429.3	512.2	1358.8	549.4	1902.3

LOAD FACTOR COMBINATIONS (1 LANE)

	Load	GROUP NO.											
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	2200.0	2267.1	1988.3	1988.3	2115.0	2115.0	1911.8	2033.7	1988.3	2115.0	1835.3	2200.0
TRANS.	F(X)	0.0	0.0	0.0	8.0	3.0	-4.3	3.5	-1.2	0.0	0.0	7.4	0.0
LONG.	F(Z)	320.5	0.0	320.5	355.1	341.7	339.2	359.4	346.4	320.5	320.5	327.8	320.5
LONG.	M(X)	1075.8	-381.9	1075.8	1260.7	1188.8	1175.3	1307.9	1238.8	1075.8	1075.8	1163.7	1075.8
TRANS.	M(Z)	-3856.0	-5079.8	0.0	-42.7	-2335.1	-2332.0	-63.1	-2267.4	0.0	-2309.0	-39.4	-3856.0
	M(COMB)	4003.3	5094.1	1075.8	1261.4	2620.3	2611.4	1309.4	2583.7	1075.8	2547.3	1164.4	4003.3

PILE LOAD DESIGN (1 LANE)

			PILE COORDINATES											
			pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)
number of piles =	18		1	26.50	-1.50	6	13.50	1.50	11	-6.00	-1.50	16	-19.00	1.50
Longitudinal			2	26.50	1.50	7	7.00	-1.50	12	-6.00	1.50	17	-25.50	-1.50
Σz^2 (pile group) =	40.5	ft^2	3	20.00	-1.50	8	7.00	1.50	13	-12.50	-1.50	18	-25.50	1.50
Transverse			4	20.00	1.50	9	0.50	-1.50	14	-12.50	1.50			
Σx^2 (pile group) =	5074.5	ft^2	5	13.50	-1.50	10	0.50	1.50	15	-19.00	-1.50			

SERVICE PILE LOADS, KIPS (LOAD CASE #7, 1 LANE)

	GROUP NO.																
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =		
PILE 1	74.43	125.23	59.74	54.64	71.31	71.69	51.90	68.57	59.74	74.43	54.64	74.43	125.23		125.23		
PILE 2	124.89	103.47	110.20	115.64	128.22	127.82	118.57	131.15	110.20	124.89	115.64	124.89	131.15	135.18	135.18		
PILE 3	72.15	120.68	59.74	54.60	69.01	69.39	51.83	66.25	59.74	72.15	54.60	72.15	120.68		120.68		
PILE 4	122.62	98.92	110.20	115.60	125.92	125.52	118.50	128.82	110.20	122.62	115.60	122.62	128.82	132.79	132.79		
PILE 5	69.88	116.13	59.74	54.56	66.71	67.09	51.77	63.92	59.74	69.88	54.56	69.88	116.13		116.13		
PILE 6	120.34	94.37	110.20	115.56	123.62	123.23	118.44	126.50	110.20	120.34	115.56	120.34	126.50	130.39	130.39		
PILE 7	67.60	111.58	59.74	54.51	64.41	64.79	51.70	61.60	59.74	67.60	54.51	67.60	111.58		111.58		
PILE 8	118.07	89.82	110.20	115.51	121.32	120.93	118.38	124.18	110.20	118.07	115.51	118.07	124.18	128.00	128.00		
PILE 9	65.33	107.03	59.74	54.47	62.11	62.49	51.64	59.28	59.74	65.33	54.47	65.33	107.03		107.03		
PILE 10	115.79	85.27	110.20	115.47	119.02	118.63	118.31	121.85	110.20	115.79	115.47	115.79	121.85	125.60	125.60		
PILE 11	63.05	102.48	59.74	54.43	59.81	60.20	51.57	56.95	59.74	63.05	54.43	63.05	102.48		102.48		
PILE 12	113.52	80.72	110.20	115.43	116.71	116.33	118.25	119.53	110.20	113.52	115.43	113.52	119.53	123.21	123.21		
PILE 13	60.78	97.93	59.74	54.39	57.51	57.90	51.51	54.63	59.74	60.78	54.39	60.78	97.93		97.93		
PILE 14	111.24	76.17	110.20	115.39	114.41	114.04	118.18	117.21	110.20	111.24	115.39	111.24	118.18	121.82	121.82		
PILE 15	58.50	93.38	59.74	54.35	55.21	55.60	51.44	52.31	59.74	58.50	54.35	58.50	93.38		93.38		
PILE 16	108.97	71.62	110.20	115.35	112.11	111.74	118.12	114.88	110.20	108.97	115.35	108.97	118.12	121.75	121.75		
PILE 17	56.23	88.83	59.74	54.30	52.91	53.30	51.38	49.98	59.74	56.23	54.30	56.23	88.83		88.83		
PILE 18	106.69	67.07	110.20	115.30	109.81	109.44	118.05	112.56	110.20	106.69	115.30	106.69	118.05	121.68	121.68		
														max =	135.18		
																select	136 kip/pile
																or	
																select	68 ton/pile

SERVICE PILE LOADS (INCLUDING STRESS REDUCTION), KIPS (LOAD CASE #7, 1 LANE)

	GROUP NO.																
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =		
PILE 1	74.43	83.49	59.74	43.71	57.05	57.35	37.07	48.98	44.92	53.16	36.43	74.43	83.49		83.49		
PILE 2	124.89	68.98	110.20	92.51	102.58	102.26	84.69	93.68	82.86	89.21	77.09	124.89	124.89	128.74	128.74		
PILE 3	72.15	80.45	59.74	43.68	55.21	55.51	37.02	47.32	44.92	51.54	36.40	72.15	80.45		80.45		
PILE 4	122.62	65.95	110.20	92.48	100.73	100.42	84.65	92.02	82.86	87.58	77.07	122.62	122.62	126.39	126.39		
PILE 5	69.88	77.42	59.74	43.65	53.37	53.67	36.98	45.66	44.92	49.91	36.37	69.88	77.42		77.42		
PILE 6	120.34	62.92	110.20	92.45	98.89	98.58	84.60	90.36	82.86	85.96	77.04	120.34	120.34	124.05	124.05		
PILE 7	67.60	74.39	59.74	43.61	51.53	51.83	36.93	44.00	44.92	48.29	36.34	67.60	74.39		74.39		
PILE 8	118.07	59.88	110.20	92.41	97.05	96.74	84.55	88.70	82.86	84.33	77.01	118.07	118.07	121.70	121.70		
PILE 9	65.33	71.35	59.74	43.58	49.69	50.00	36.88	42.34	44.92	46.66	36.32	65.33	71.35		71.35		
PILE 10	115.79	56.85	110.20	92.38	95.21	94.91	84.51	87.04	82.86	82.71	76.98	115.79	115.79	119.36	119.36		
PILE 11	63.05	68.32	59.74	43.54	47.85	48.16	36.84	40.68	44.92	45.04	36.29	63.05	68.32		68.32		
PILE 12	113.52	53.82	110.20	92.34	93.37	93.07	84.46	85.38	82.86	81.08	76.95	113.52	113.52	117.01	117.01		
PILE 13	60.78	65.29	59.74	43.51	46.01	46.32	36.79	39.02	44.92	43.41	36.26	60.78	65.29		65.29		
PILE 14	111.24	50.78	110.20	92.31	91.53	91.23	84.42	83.72	82.86	79.46	76.93	111.24	111.24	114.67	114.67		
PILE 15	58.50	62.25	59.74	43.48	44.17	44.48	36.75	37.36	44.92	41.79	36.23	58.50	62.25		62.25		
PILE 16	108.97	47.75	110.20	92.28	89.69	89.39	84.37	82.06	82.86	77.83	76.90	108.97	110.20	113.59	113.59		
PILE 17	56.23	59.22	59.74	43.44	42.33	42.64	36.70	35.70	44.92	40.16	36.20	56.23	59.74		59.74		
PILE 18	106.69	44.72	110.20	92.24	87.85	87.55	84.32	80.40	82.86	76.21	76.87	106.69	110.20	113.59	113.59		
														max =	128.74		
																select	129 kip/pile
																or	
																select	65 ton/pile

L75T
H[illegible]X42
O.K.

FACTORED PILE LOADS, KIPS (LOAD CASE #7, 1 LANE)

	GROUP NO.																
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =		
PILE 1	102.51	166.62	70.62	63.99	85.67	86.15	58.10	78.94	70.62	89.72	59.07	102.51	166.62		166.62		
PILE 2	182.20	138.34	150.30	157.37	173.73	173.21	154.98	170.71	150.30	169.40	145.27	182.20	182.20	187.81	187.81		
PILE 3	97.57	160.12	70.62	63.94	82.68	83.16	58.02	76.04	70.62	86.76	59.02	97.57	160.12		160.12		
PILE 4	177.26	131.83	150.30	157.32	170.74	170.22	154.90	167.80	150.30	166.45	145.22	177.26	177.26	182.72	182.72		
PILE 5	92.63	153.61	70.62	63.88	79.68	80.17	57.94	73.13	70.62	83.80	58.97	92.63	153.61		153.61		
PILE 6	172.32	125.32	150.30	157.27	167.74	167.24	154.82	164.90	150.30	163.49	145.17	172.32	172.32	177.63	177.63		
PILE 7	87.70	147.10	70.62	63.83	76.69	77.19	57.86	70.23	70.62	80.84	58.92	87.70	147.10		147.10		
PILE 8	167.38	118.82	150.30	157.21	164.75	164.25	154.74	161.99	150.30	160.53	145.12	167.38	167.38	172.53	172.53		
PILE 9	82.76	140.60	70.62	63.77	73.70	74.20	57.78	67.32	70.62	77.89	58.87	82.76	140.60		140.60		
PILE 10	162.44	112.31	150.30	157.16	161.76	161.26	154.66	159.09	150.30	157.57	145.07	162.44	162.44	167.44	167.44		
PILE 11	77.82	134.09	70.62	63.72	70.71	71.21	57.70	64.42	70.62	74.93	58.82	77.82	134.09		134.09		
PILE 12	157.50	105.80	150.30	157.10	158.77	158.28	154.58	156.18	150.30	154.62	145.02	157.50	158.77	163.66	163.66		
PILE 13	72.88	127.58	70.62	63.66	67.72	68.23	57.62	61.52	70.62	71.97	58.77	72.88	127.58		127.58		
PILE 14	152.57	99.30	150.30	157.05	155.78	155.29	154.50	153.28	150.30	151.66	144.97	152.57	157.05	161.88	161.88		
PILE 15	67.94	121.08	70.62	63.61	64.73	65.24	57.53	58.61	70.62	69.01	58.72	67.94	121.08		121.08		
PILE 16	147.63	92.79	150.30	156.99	152.79	152.30	154.42	150.38	150.30	148.70	144.92	147.63	156.99	161.82	161.82		
PILE 17	63.00	114.57	70.62	63.55	61.74	62.25	57.45	55.71	70.62	66.06	58.67	63.00	114.57		114.57		
PILE 18	142.69	86.28	150.30	156.94	149.80	149.31	154.34	147.47	150.30	145.74	144.87	142.69	156.94	161.77	161.77		
														max =	187.81		
																select	188 kip pile
																or	
																select	94 ton pile

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

	Load				BETA FACTOR										
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

	Load				BETA FACTOR									
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

BOTTOM OF FOOTING

* for lateral at-rest earth pressures

LOADINGS (Max. LLecc, wind at 0 deg.)

	Load				LOADING (kips, K-ft)									
	Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	1529.5	195.0											
TRANS.	F(X)								6.1	1.2	-1.4	-3.3		
LONG.	F(Z)					214.4			26.6	5.2	6.2	14.3		
LONG.	M(X)	-293.7				975.0			142.2	27.6	33.3	76.6		
TRANS.	M(Z)		-2351.5						-32.8	-6.4	-7.7	-17.7		

SERVICE LOAD COMBINATIONS (2 LANES)

	Load Component	GROUP NO. I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	1724.5	1919.5	1529.5	1529.5	1724.5	1724.5	1529.5	1724.5	1529.5	1724.5	1529.5	1724.5
TRANS.	F(X)	0.0	0.0	0.0	6.1	1.6	-3.3	2.8	-1.7	0.0	0.0	6.1	0.0
LONG.	F(Z)	214.4	0.0	214.4	241.0	233.8	228.7	255.3	248.1	214.4	214.4	241.0	214.4
LONG.	M(X)	681.3	-293.7	681.3	823.5	784.9	757.9	900.1	861.5	681.3	681.3	823.5	681.3
TRANS.	M(Z)	-2351.5	-4703.0	0.0	-32.8	-2375.4	-2369.2	-50.5	-2393.1	0.0	-2351.5	-32.8	-2351.5
	M(COMB)	2448.2	4712.2	681.3	824.1	2501.8	2487.5	901.5	2543.5	681.3	2448.2	824.1	2448.2

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

	Load Component	GROUP NO. I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	1724.5	1279.6	1529.5	1223.6	1379.6	1379.6	1092.5	1231.8	1150.0	1231.8	1019.6	1724.5
TRANS.	F(X)	0.0	0.0	0.0	4.9	1.3	-2.6	2.0	-1.2	0.0	0.0	4.1	0.0
LONG.	F(Z)	214.4	0.0	214.4	192.8	187.0	183.0	182.4	177.2	161.2	153.1	160.7	214.4
LONG.	M(X)	681.3	-195.8	681.3	658.8	627.9	606.3	642.9	615.3	512.2	486.6	549.0	681.3
TRANS.	M(Z)	-2351.5	-3135.4	0.0	-26.3	-1900.4	-1895.4	-36.1	-1709.4	0.0	-1679.7	-21.9	-2351.5
	M(COMB)	2448.2	3141.5	681.3	659.3	2001.4	1990.0	643.9	1816.8	512.2	1748.7	549.4	2448.2

LOAD FACTOR COMBINATIONS (2 LANES)

	Load Component	GROUP NO. I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	2411.6	2546.0	1988.3	1988.3	2241.8	2241.8	1911.8	2155.6	1988.3	2241.8	1835.3	2411.6
TRANS.	F(X)	0.0	0.0	0.0	8.0	2.1	-4.3	3.5	-2.1	0.0	0.0	7.4	0.0
LONG.	F(Z)	320.5	0.0	320.5	355.1	345.7	339.2	359.4	350.3	320.5	320.5	327.8	320.5
LONG.	M(X)	1075.8	-381.9	1075.8	1260.7	1210.5	1175.3	1307.9	1259.7	1075.8	1075.8	1163.7	1075.8
TRANS.	M(Z)	-5105.1	-6725.3	0.0	-42.7	-3088.1	-3080.0	-63.1	-2991.4	0.0	-3057.0	-39.4	-5105.1
	M(COMB)	5217.3	6736.2	1075.8	1261.4	3316.8	3296.6	1309.4	3245.8	1075.8	3240.7	1164.4	5217.3

PILE LOAD DESIGN (2 LANES)

			PILE COORDINATES											
			pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)
number of piles =	18		1	26.50	-1.50	6	13.50	1.50	11	-6.00	-1.50	16	-19.00	1.50
Longitudinal			2	26.50	1.50	7	7.00	-1.50	12	-6.00	1.50	17	-25.50	-1.50
Σz^2 (pile group) =	40.5	ft^2	3	20.00	-1.50	8	7.00	1.50	13	-12.50	-1.50	18	-25.50	1.50
Transverse			4	20.00	1.50	9	0.50	-1.50	14	-12.50	1.50			
Σx^2 (pile group) =	5074.5	ft^2	5	13.50	-1.50	10	0.50	1.50	15	-19.00	-1.50			

SERVICE PILE LOADS, KIPS (LOAD CASE #7, 2 LANES)

	GROUP NO.															
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =	
PILE 1	82.85	142.08	59.74	54.64	79.14	80.11	51.90	76.39	59.74	82.85	54.64	82.85	142.08		142.08	71.0
PILE 2	133.32	120.32	110.20	115.64	137.28	136.24	118.57	140.21	110.20	133.32	115.64	133.32	140.21	144.52	144.52	72.3
PILE 3	79.84	136.05	59.74	54.60	76.10	77.07	51.83	73.33	59.74	79.84	54.60	79.84	136.05		136.05	68.0
PILE 4	130.30	114.29	110.20	115.60	134.24	133.21	118.50	137.14	110.20	130.30	115.60	130.30	137.14	141.36	141.36	70.7
PILE 5	76.83	130.03	59.74	54.56	73.05	74.04	51.77	70.26	59.74	76.83	54.56	76.83	130.03		130.03	65.0
PILE 6	127.29	108.27	110.20	115.56	131.19	130.17	118.44	134.08	110.20	127.29	115.56	127.29	134.08	138.20	138.20	69.1
PILE 7	73.81	124.00	59.74	54.51	70.01	71.00	51.70	67.20	59.74	73.81	54.51	73.81	124.00		124.00	62.0
PILE 8	124.28	102.24	110.20	115.51	128.15	127.14	118.38	131.01	110.20	124.28	115.51	124.28	131.01	135.04	135.04	67.5
PILE 9	70.80	117.98	59.74	54.47	66.97	67.97	51.64	64.13	59.74	70.80	54.47	70.80	117.98		117.98	59.0
PILE 10	121.27	96.22	110.20	115.47	125.11	124.10	118.31	127.95	110.20	121.27	115.47	121.27	127.95	131.88	131.88	65.9
PILE 11	67.79	111.95	59.74	54.43	63.92	64.93	51.57	61.07	59.74	67.79	54.43	67.79	111.95		111.95	56.0
PILE 12	118.25	90.20	110.20	115.43	122.06	121.07	118.25	124.88	110.20	118.25	115.43	118.25	124.88	128.72	128.72	64.4
PILE 13	64.78	105.93	59.74	54.39	60.88	61.90	51.51	58.00	59.74	64.78	54.39	64.78	105.93		105.93	53.0
PILE 14	115.24	84.17	110.20	115.39	119.02	118.04	118.18	121.81	110.20	115.24	115.39	115.24	121.81	125.56	125.56	62.8
PILE 15	61.77	99.91	59.74	54.35	57.84	58.86	51.44	54.94	59.74	61.77	54.35	61.77	99.91		99.91	50.0
PILE 16	112.23	78.15	110.20	115.35	115.98	115.00	118.12	118.75	110.20	112.23	115.35	112.23	118.75	122.40	122.40	61.2
PILE 17	58.75	93.88	59.74	54.30	54.80	55.83	51.38	51.87	59.74	58.75	54.30	58.75	93.88		93.88	46.9
PILE 18	109.22	72.12	110.20	115.30	112.94	111.97	118.05	115.68	110.20	109.22	115.30	109.22	118.05	121.68	121.68	60.8
														max =	144.52	

select 145 kip pile
or
select 73 ton pile

SERVICE PILE LOADS (INCLUDING STRESS REDUCTION), KIPS (LOAD CASE #7, 2 LANES)

	GROUP NO.															
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =	
PILE 1	82.85	94.72	59.74	43.71	63.31	64.09	37.07	54.57	44.92	59.18	36.43	82.85	94.72		94.72	47.4
PILE 2	133.32	80.21	110.20	92.51	109.82	109.00	84.69	100.15	82.86	95.23	77.09	133.32	133.32	137.42	137.42	68.7
PILE 3	79.84	90.70	59.74	43.68	60.88	61.66	37.02	52.38	44.92	57.03	36.40	79.84	90.70		90.70	45.4
PILE 4	130.30	76.20	110.20	92.48	107.39	106.57	84.65	97.96	82.86	93.07	77.07	130.30	130.30	134.31	134.31	67.2
PILE 5	76.83	86.68	59.74	43.65	58.44	59.23	36.98	50.19	44.92	54.88	36.37	76.83	86.68		86.68	43.3
PILE 6	127.29	72.18	110.20	92.45	104.95	104.14	84.60	95.77	82.86	90.92	77.04	127.29	127.29	131.21	131.21	65.6
PILE 7	73.81	82.67	59.74	43.61	56.01	56.80	36.93	48.00	44.92	52.72	36.34	73.81	82.67		82.67	41.3
PILE 8	124.28	68.16	110.20	92.41	102.52	101.71	84.55	93.58	82.86	88.77	77.01	124.28	124.28	128.10	128.10	64.1
PILE 9	70.80	78.65	59.74	43.58	53.57	54.37	36.88	45.81	44.92	50.57	36.32	70.80	78.65		78.65	39.3
PILE 10	121.27	64.15	110.20	92.38	100.09	99.28	84.51	91.39	82.86	86.62	76.98	121.27	121.27	125.00	125.00	62.5
PILE 11	67.79	74.64	59.74	43.54	51.14	51.95	36.84	43.62	44.92	48.42	36.29	67.79	74.64		74.64	37.3
PILE 12	118.25	60.13	110.20	92.34	97.65	96.86	84.46	89.20	82.86	84.47	76.95	118.25	118.25	121.89	121.89	60.9
PILE 13	64.78	70.62	59.74	43.51	48.71	49.52	36.79	41.43	44.92	46.27	36.26	64.78	70.62		70.62	35.3
PILE 14	115.24	56.11	110.20	92.31	95.22	94.43	84.42	87.01	82.86	82.32	76.93	115.24	115.24	118.79	118.79	59.4
PILE 15	61.77	66.60	59.74	43.48	46.27	47.09	36.75	39.24	44.92	44.12	36.23	61.77	66.60		66.60	33.3
PILE 16	112.23	52.10	110.20	92.28	92.78	92.00	84.37	84.82	82.86	80.16	76.90	112.23	112.23	115.68	115.68	57.8
PILE 17	58.75	62.59	59.74	43.44	43.84	44.66	36.70	37.05	44.92	41.97	36.20	58.75	62.59		62.59	31.3
PILE 18	109.22	48.08	110.20	92.24	90.35	89.57	84.32	82.63	82.86	78.01	76.87	109.22	110.20	113.59	113.59	56.8
														max =	137.42	

select 138 kip pile
or
select 69 ton pile

< 75 T
HP X 42
O.K.

FACTORED PILE LOADS, KIPS (LOAD CASE #7, 2 LANES)																		
						GROUP NO.												
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =			
PILE 1	120.80	190.71	70.62	63.99	95.84	97.10	58.10	88.72	70.62	100.66	59.07	120.80	190.71		190.71			
PILE 2	200.48	162.42	150.30	157.37	185.50	184.16	154.98	182.03	150.30	180.35	145.27	200.48	200.48	206.65	206.65			
PILE 3	114.26	182.09	70.62	63.94	91.88	93.15	58.02	84.89	70.62	96.75	59.02	114.26	182.09		182.09			
PILE 4	193.94	153.81	150.30	157.32	181.55	180.21	154.90	178.20	150.30	176.44	145.22	193.94	193.94	199.91	199.91			
PILE 5	107.72	173.48	70.62	63.88	87.93	89.21	57.94	81.06	70.62	92.83	58.97	107.72	173.48		173.48			
PILE 6	187.40	145.19	150.30	157.27	177.59	176.27	154.82	174.37	150.30	172.52	145.17	187.40	187.40	193.17	193.17			
PILE 7	101.18	164.86	70.62	63.83	83.97	85.26	57.86	77.23	70.62	88.92	58.92	101.18	164.86		164.86			
PILE 8	180.87	136.58	150.30	157.21	173.64	172.32	154.74	170.53	150.30	168.60	145.12	180.87	180.87	186.43	186.43			
PILE 9	94.64	156.25	70.62	63.77	80.02	81.32	57.78	73.39	70.62	85.00	58.87	94.64	156.25		156.25			
PILE 10	174.33	127.96	150.30	157.16	169.68	168.38	154.66	166.70	150.30	164.69	145.07	174.33	174.33	179.69	179.69			
PILE 11	88.10	147.63	70.62	63.72	76.06	77.37	57.70	69.56	70.62	81.09	58.82	88.10	147.63		147.63			
PILE 12	167.79	119.35	150.30	157.10	165.73	164.43	154.58	162.87	150.30	160.77	145.02	167.79	167.79	172.95	172.95			
PILE 13	81.56	139.02	70.62	63.66	72.10	73.43	57.62	65.73	70.62	77.17	58.77	81.56	139.02		139.02			
PILE 14	161.25	110.73	150.30	157.05	161.77	160.49	154.50	159.04	150.30	156.86	144.97	161.25	161.77	166.75	166.75			
PILE 15	75.02	130.41	70.62	63.61	68.15	69.48	57.53	61.90	70.62	73.25	58.72	75.02	130.41		130.41			
PILE 16	154.71	102.12	150.30	156.99	157.81	156.54	154.42	155.21	150.30	152.94	144.92	154.71	157.81	162.67	162.67			
PILE 17	68.48	121.79	70.62	63.55	64.19	65.54	57.45	58.07	70.62	69.34	58.67	68.48	121.79		121.79			
PILE 18	148.17	93.51	150.30	156.94	153.86	152.60	154.34	151.38	150.30	149.03	144.87	148.17	156.94	161.77	161.77			
														max =	206.65			
																select	207 kip	pile
																or		
																select	104 ton	pile

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
					BETA FACTOR										
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					BETA FACTOR									
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING

LOADINGS (Max. LLecc, wind at 0 deg.)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
						LOADING (kips, K-ft)								
VERT.	F(V)	1529.5	263.3											
TRANS.	F(X)								6.1	1.2	-1.9	-3.3		
LONG.	F(Z)					214.4			26.6	5.2	8.4	14.3		
LONG.	M(X)	-293.7				975.0			142.2	27.6	44.8	76.6		
TRANS.	M(Z)		-1553.5						-32.8	-6.4	-10.3	-17.7		

SERVICE LOAD COMBINATIONS (3 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	1792.7	2056.0	1529.5	1529.5	1792.7	1792.7	1529.5	1792.7	1529.5	1792.7	1529.5	1792.7
TRANS.	F(X)	0.0	0.0	0.0	6.1	1.1	-3.3	2.8	-2.2	0.0	0.0	6.1	0.0
LONG.	F(Z)	214.4	0.0	214.4	241.0	235.9	228.7	255.3	250.3	214.4	214.4	241.0	214.4
LONG.	M(X)	681.3	-293.7	681.3	823.5	796.4	757.9	900.1	872.9	681.3	681.3	823.5	681.3
TRANS.	M(Z)	-1553.5	-3107.0	0.0	-32.8	-1580.1	-1571.2	-50.5	-1597.8	0.0	-1553.5	-32.8	-1553.5
	M(COMB)	1696.3	3120.9	681.3	824.1	1769.4	1744.4	901.5	1820.7	681.3	1696.3	824.1	1696.3

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	1792.7	1370.6	1529.5	1223.6	1434.2	1434.2	1092.5	1280.5	1150.0	1280.5	1019.6	1792.7
TRANS.	F(X)	0.0	0.0	0.0	4.9	0.9	-2.6	2.0	-1.6	0.0	0.0	4.1	0.0
LONG.	F(Z)	214.4	0.0	214.4	192.8	188.7	183.0	182.4	178.8	161.2	153.1	160.7	214.4
LONG.	M(X)	681.3	-195.8	681.3	658.8	637.1	606.3	642.9	623.5	512.2	486.6	549.0	681.3
TRANS.	M(Z)	-1553.5	-2071.3	0.0	-26.3	-1264.1	-1256.9	-36.1	-1141.3	0.0	-1109.6	-21.9	-1553.5
	M(COMB)	1696.3	2080.6	681.3	659.3	1415.5	1395.5	643.9	1300.5	512.2	1211.7	549.4	1696.3

LOAD FACTOR COMBINATIONS (3 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	2559.8	2741.2	1988.3	1988.3	2330.5	2330.5	1911.8	2240.9	1988.3	2330.5	1835.3	2559.8
TRANS.	F(X)	0.0	0.0	0.0	8.0	1.4	-4.3	3.5	-2.8	0.0	0.0	7.4	0.0
LONG.	F(Z)	320.5	0.0	320.5	355.1	348.5	339.2	359.4	353.0	320.5	320.5	327.8	320.5
LONG.	M(X)	1075.8	-381.9	1075.8	1260.7	1225.4	1175.3	1307.9	1274.0	1075.8	1075.8	1163.7	1075.8
TRANS.	M(Z)	-3372.7	-4443.0	0.0	-42.7	-2054.1	-2042.5	-63.1	-1997.2	0.0	-2019.6	-39.4	-3372.7
	M(COMB)	3540.1	4459.4	1075.8	1261.4	2391.8	2356.6	1309.4	2368.9	1075.8	2288.2	1164.4	3540.1

PILE LOAD DESIGN (3 LANES)

							PILE COORDINATES							
			pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)	pile #	x (ft.)	z (ft.)
number of piles =	18		1	26.50	-1.50	6	13.50	1.50	11	-6.00	-1.50	16	-19.00	1.50
Longitudinal			2	26.50	1.50	7	7.00	-1.50	12	-6.00	1.50	17	-25.50	-1.50
Σz^2 (pile group) =	40.5	ft^2	3	20.00	-1.50	8	7.00	1.50	13	-12.50	-1.50	18	-25.50	1.50
Transverse			4	20.00	1.50	9	0.50	-1.50	14	-12.50	1.50			
Σx^2 (pile group) =	5074.5	ft^2	5	13.50	-1.50	10	0.50	1.50	15	-19.00	-1.50			

SERVICE PILE LOADS, KIPS (LOAD CASE #7, 3 LANES)

	GROUP NO.																
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =		
PILE 1	82.47	141.32	59.74	54.64	78.35	79.73	51.90	75.61	59.74	82.47	54.64	82.47	141.32		141.32		
PILE 2	132.94	119.57	110.20	115.64	137.34	135.87	118.57	140.27	110.20	132.94	115.64	132.94	140.27	144.59	144.59		
PILE 3	80.48	137.34	59.74	54.60	76.33	77.72	51.83	73.56	59.74	80.48	54.60	80.48	137.34		137.34		
PILE 4	130.95	115.59	110.20	115.60	135.32	133.86	118.50	138.22	110.20	130.95	115.60	130.95	138.22	142.48	142.48		
PILE 5	78.50	133.36	59.74	54.56	74.30	75.71	51.77	71.51	59.74	78.50	54.56	78.50	133.36		133.36		
PILE 6	128.96	111.61	110.20	115.56	133.29	131.84	118.44	136.18	110.20	128.96	115.56	128.96	136.18	140.37	140.37		
PILE 7	76.51	129.38	59.74	54.51	72.28	73.69	51.70	69.47	59.74	76.51	54.51	76.51	129.38		129.38		
PILE 8	126.97	107.63	110.20	115.51	131.27	129.83	118.38	134.13	110.20	126.97	115.51	126.97	134.13	138.26	138.26		
PILE 9	74.52	125.40	59.74	54.47	70.26	71.68	51.64	67.42	59.74	74.52	54.47	74.52	125.40		125.40		
PILE 10	124.98	103.65	110.20	115.47	129.24	127.82	118.31	132.08	110.20	124.98	115.47	124.98	132.08	136.15	136.15		
PILE 11	72.53	121.42	59.74	54.43	68.23	69.67	51.57	65.37	59.74	72.53	54.43	72.53	121.42		121.42		
PILE 12	122.99	99.67	110.20	115.43	127.22	125.81	118.25	130.04	110.20	122.99	115.43	122.99	130.04	134.04	134.04		
PILE 13	70.54	117.45	59.74	54.39	66.21	67.66	51.51	63.33	59.74	70.54	54.39	70.54	117.45		117.45		
PILE 14	121.00	95.69	110.20	115.39	125.20	123.79	118.18	127.99	110.20	121.00	115.39	121.00	127.99	131.93	131.93		
PILE 15	68.55	113.47	59.74	54.35	64.18	65.64	51.44	61.28	59.74	68.55	54.35	68.55	113.47		113.47		
PILE 16	119.01	91.71	110.20	115.35	123.17	121.78	118.12	125.94	110.20	119.01	115.35	119.01	125.94	129.82	129.82		
PILE 17	66.56	109.49	59.74	54.30	62.16	63.63	51.38	59.23	59.74	66.56	54.30	66.56	109.49		109.49		
PILE 18	117.02	87.73	110.20	115.30	121.15	119.77	118.05	123.90	110.20	117.02	115.30	117.02	123.90	127.71	127.71		
														max =	144.59		
																select	145 kip pile
																or	
																select	73 ton pile

SERVICE PILE LOADS (INCLUDING STRESS REDUCTION), KIPS (LOAD CASE #7, 3 LANES)

	GROUP NO.																
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =		
PILE 1	82.47	94.22	59.74	43.71	62.68	63.78	37.07	54.01	44.92	58.91	36.43	82.47	94.22		94.22		
PILE 2	132.94	79.71	110.20	92.51	109.87	108.69	84.69	100.19	82.86	94.96	77.09	132.94	132.94	137.03	137.03		
PILE 3	80.48	91.56	59.74	43.68	61.06	62.17	37.02	52.54	44.92	57.49	36.40	80.48	91.56		91.56		
PILE 4	130.95	77.06	110.20	92.48	108.25	107.08	84.65	98.73	82.86	93.54	77.07	130.95	130.95	134.98	134.98		
PILE 5	78.50	88.91	59.74	43.65	59.44	60.56	36.98	51.08	44.92	56.07	36.37	78.50	88.91		88.91		
PILE 6	128.96	74.40	110.20	92.45	106.63	105.47	84.60	97.27	82.86	92.11	77.04	128.96	128.96	132.93	132.93		
PILE 7	76.51	86.26	59.74	43.61	57.82	58.95	36.93	49.62	44.92	54.65	36.34	76.51	86.26		86.26		
PILE 8	126.97	71.75	110.20	92.41	105.01	103.86	84.55	95.81	82.86	90.69	77.01	126.97	126.97	130.88	130.88		
PILE 9	74.52	83.60	59.74	43.58	56.20	57.34	36.88	48.16	44.92	53.23	36.32	74.52	83.60		83.60		
PILE 10	124.98	69.10	110.20	92.38	103.40	102.25	84.51	94.34	82.86	89.27	76.98	124.98	124.98	128.83	128.83		
PILE 11	72.53	80.95	59.74	43.54	54.59	55.73	36.84	46.70	44.92	51.80	36.29	72.53	80.95		80.95		
PILE 12	122.99	66.44	110.20	92.34	101.78	100.64	84.46	92.88	82.86	87.85	76.95	122.99	122.99	126.78	126.78		
PILE 13	70.54	78.30	59.74	43.51	52.97	54.12	36.79	45.23	44.92	50.38	36.26	70.54	78.30		78.30		
PILE 14	121.00	63.79	110.20	92.31	100.16	99.03	84.42	91.42	82.86	86.43	76.93	121.00	121.00	124.72	124.72		
PILE 15	68.55	75.64	59.74	43.48	51.35	52.51	36.75	43.77	44.92	48.96	36.23	68.55	75.64		75.64		
PILE 16	119.01	61.14	110.20	92.28	98.54	97.42	84.37	89.96	82.86	85.01	76.90	119.01	119.01	122.67	122.67		
PILE 17	66.56	72.99	59.74	43.44	49.73	50.90	36.70	42.31	44.92	47.54	36.20	66.56	72.99		72.99		
PILE 18	117.02	58.48	110.20	92.24	96.92	95.81	84.32	88.50	82.86	83.59	76.87	117.02	117.02	120.62	120.62		
														max =	137.03		
																select	138 kip pile
																or	
																select	69 ton pile

< 75T
HP X42
O.K.

FACTORED PILE LOADS, KIPS (LOAD CASE #7, 3 LANES)

	GROUP NO.																
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X	max vert =	resultant =	max =		
PILE 1	119.98	189.63	70.62	63.99	94.82	96.61	58.10	87.74	70.62	100.18	59.07	119.98	189.63		189.63		
PILE 2	199.67	161.35	150.30	157.37	185.58	183.67	154.98	182.11	150.30	179.86	145.27	199.67	199.67	205.81	205.81		
PILE 3	115.66	183.94	70.62	63.94	92.18	93.99	58.02	85.18	70.62	97.59	59.02	115.66	183.94		183.94		
PILE 4	195.35	155.66	150.30	157.32	182.95	181.05	154.90	179.55	150.30	177.28	145.22	195.35	195.35	201.36	201.36		
PILE 5	111.34	178.25	70.62	63.88	89.55	91.38	57.94	82.62	70.62	95.00	58.97	111.34	178.25		178.25		
PILE 6	191.03	149.97	150.30	157.27	180.32	178.44	154.82	176.99	150.30	174.69	145.17	191.03	191.03	196.91	196.91		
PILE 7	107.02	172.56	70.62	63.83	86.92	88.76	57.86	80.06	70.62	92.41	58.92	107.02	172.56		172.56		
PILE 8	186.71	144.27	150.30	157.21	177.69	175.82	154.74	174.43	150.30	172.10	145.12	186.71	186.71	192.45	192.45		
PILE 9	102.70	166.87	70.62	63.77	84.29	86.14	57.78	77.51	70.62	89.83	58.87	102.70	166.87		166.87		
PILE 10	182.39	138.58	150.30	157.16	175.06	173.21	154.66	171.87	150.30	169.52	145.07	182.39	182.39	188.00	188.00		
PILE 11	98.38	161.18	70.62	63.72	81.66	83.53	57.70	74.95	70.62	87.24	58.82	98.38	161.18		161.18		
PILE 12	178.07	132.89	150.30	157.10	172.43	170.59	154.58	169.32	150.30	166.93	145.02	178.07	178.07	183.55	183.55		
PILE 13	94.06	155.49	70.62	63.66	79.03	80.91	57.62	72.39	70.62	84.65	58.77	94.06	155.49		155.49		
PILE 14	173.75	127.20	150.30	157.05	169.80	167.97	154.50	166.76	150.30	164.34	144.97	173.75	173.75	179.09	179.09		
PILE 15	89.74	149.80	70.62	63.61	76.40	78.29	57.53	69.83	70.62	82.07	58.72	89.74	149.80		149.80		
PILE 16	169.43	121.51	150.30	156.99	167.17	165.36	154.42	164.20	150.30	161.75	144.92	169.43	169.43	174.64	174.64		
PILE 17	85.42	144.10	70.62	63.55	73.77	75.68	57.45	67.27	70.62	79.48	58.67	85.42	144.10		144.10		
PILE 18	165.11	115.82	150.30	156.94	164.54	162.74	154.34	161.64	150.30	159.17	144.87	165.11	165.11	170.19	170.19		
														max =	205.81		
																select	206 kip pile
																or	
																select	103 ton pile

CHECK ADEQUACY OF 4-#8 (MOMENT) AND #5 (2 LEGS) STIRRUPS AT 12" SPACING.

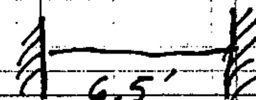
LOAD FACTOR DESIGN

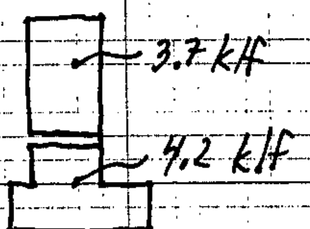
$\boxed{M_u \leq \phi M_n}$

$d = [(708.57 - 702.73)(12)] - 3'' - 0.625'' - \frac{1.0''}{2} = 65.9''$

USING MAX. PILE CAPACITY LOAD = 150 KIPS
HP10X42 (conservative)

AND ASSUMING FIXED-FIXED CONDITION





TAKING % OF SUPERSTRUCTURE REACTIONS

PER BRG. DL = 202.4 K   73.9 % OF TOTAL

PER BRG. LL = 75.2 K   27.1 % OF TOTAL

$M_u = \frac{1.3(3.7+4.2)(6.5)^2}{12} + \frac{1.3(0.739 \times 600K)(6.5)}{8} + \frac{2.17(0.271 \times 600)(6.5)}{8}$

$= \underline{791.2 \text{ K-FT}}$

$\phi M_n = 0.9\left[3.16 \text{ in}^2 (60 \text{ ksi})\left(65.9'' - \frac{0.42(3.16 \text{ in}^2)}{2}\right)\right]$

where: $a = \frac{60 A_s}{0.85(4 \text{ ksi})(42'')} = 0.42 A_s$

$= 11,132 \text{ K-IN}$

$= \underline{\underline{927.7 \text{ K-FT}}} > 791.2$

$\therefore$ 4-#8 O.K.

LOAD FACTOR DESIGN

$\boxed{V_u \le \phi V_n}$

DESIGN SHEAR FOR WORST CASE WITH BEAM LINE DIRECTLY OVER PILE LINE

$V_u = \frac{1.3(7.9)(6.5')}{2} + 1.3(202.4) + 2.17(75.2) = \underline{\underline{459.7\ K}}$

$V_c = 2\sqrt{4000}\,(42'')(65.9'') \times 10^{-3} = 350.1\ K$

USING #5 @ 12'' ($A_v = 0.62\ in^2$) TWO LEGS

$V_s = \frac{A_v f_y d}{s} = \frac{0.62(60)(65.9)}{12} = 204.3\ K$

$\phi V_n = \phi(V_c + V_s)$

$= 0.85(459.7 + 204.3) = \underline{\underline{564.4\ K}} > 459.7\ K$

$\therefore$ #5 @ 12''
TWO-LEGS
<u>O.K.</u>

PROJECT DATA

PROJECT DATA	
Project:	SCI-823-0.00 (PID 19415)
User Job No.:	535502
Designer:	RBK
Date:	Jul/9/2009
Checker:	
Checked ate:	
State:	Ohio
State Job No.:	PID 19415
Structure type:	Abutment.
Code:	AASHTO STANDARD (17th Edition 2002)
Comments:	Structure No. SCI-823-0837 L/R
	SR 823 over Swauger Valley-Minford Road (CR 31)

Bentley	KZF, Inc.	Sheet #	DS-2
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com — Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0.00 (PID 19415)**		Date	

ABUTMENT GEOMETRY

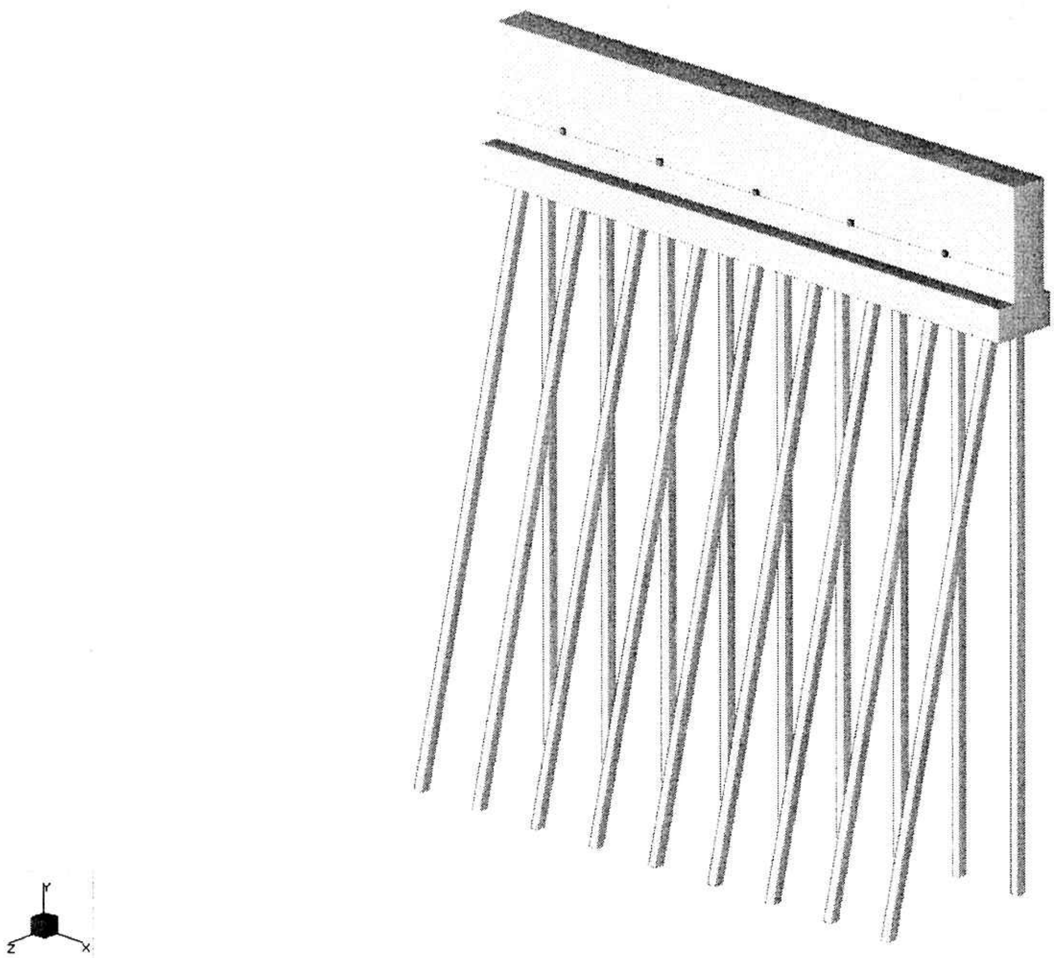
Abutment Shape
Abutment Shape: Cantilever wall
Top Elevations: start = 715.83 ft end = 715.83 ft
Skew angle = 13.00 Reduction of I = 1.000
Length = 57.50 ft
Bw = 42.00 in Bd = 94.75 in
Sw = 42.00 in Sd = 28.16 in

JOB NO. 535502
BY RBK DATE Jul/9/2009
CKD. DATE

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0.00 (PID 19415)

FULL IMAGE:

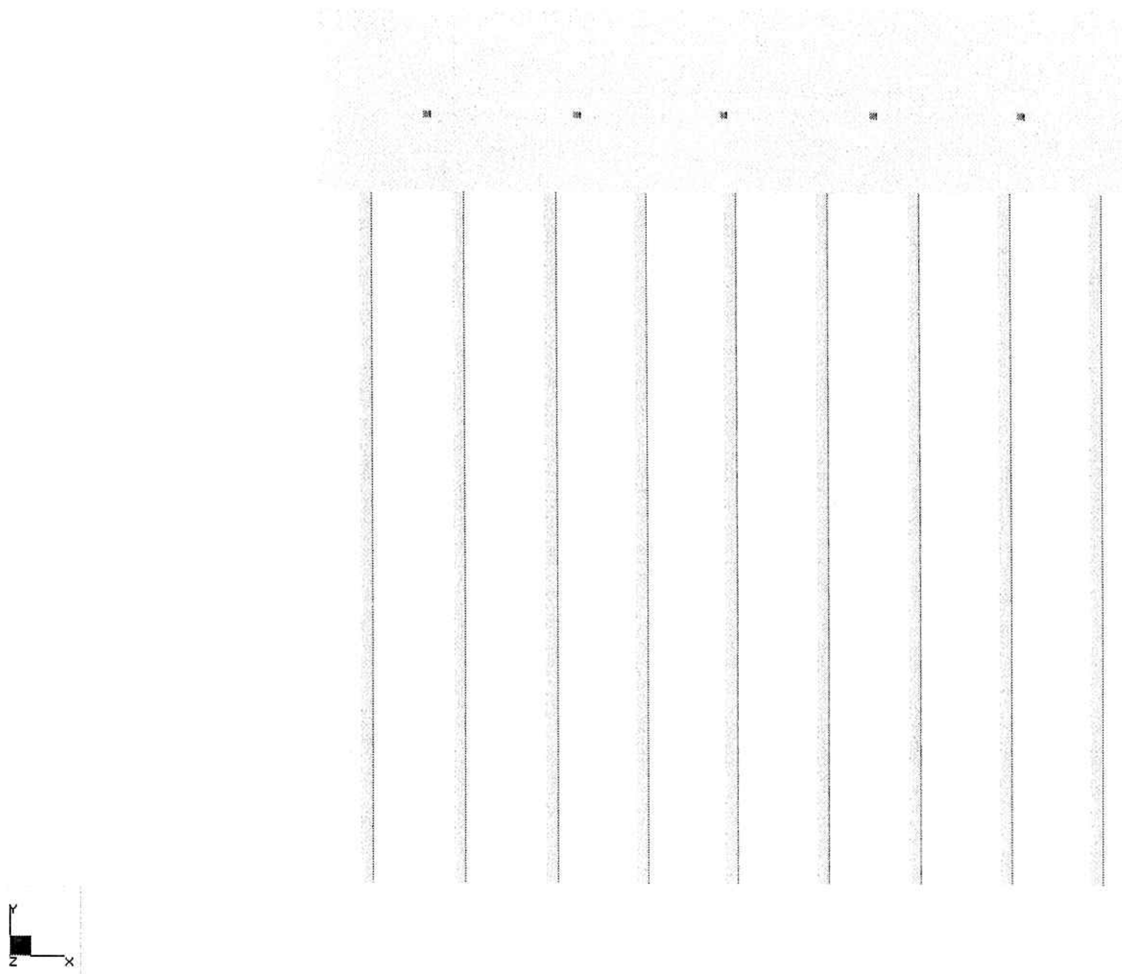


JOB NO. 535502
BY RBK DATE Jul/9/2009
CKD. DATE

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0.00 (PID 19415)

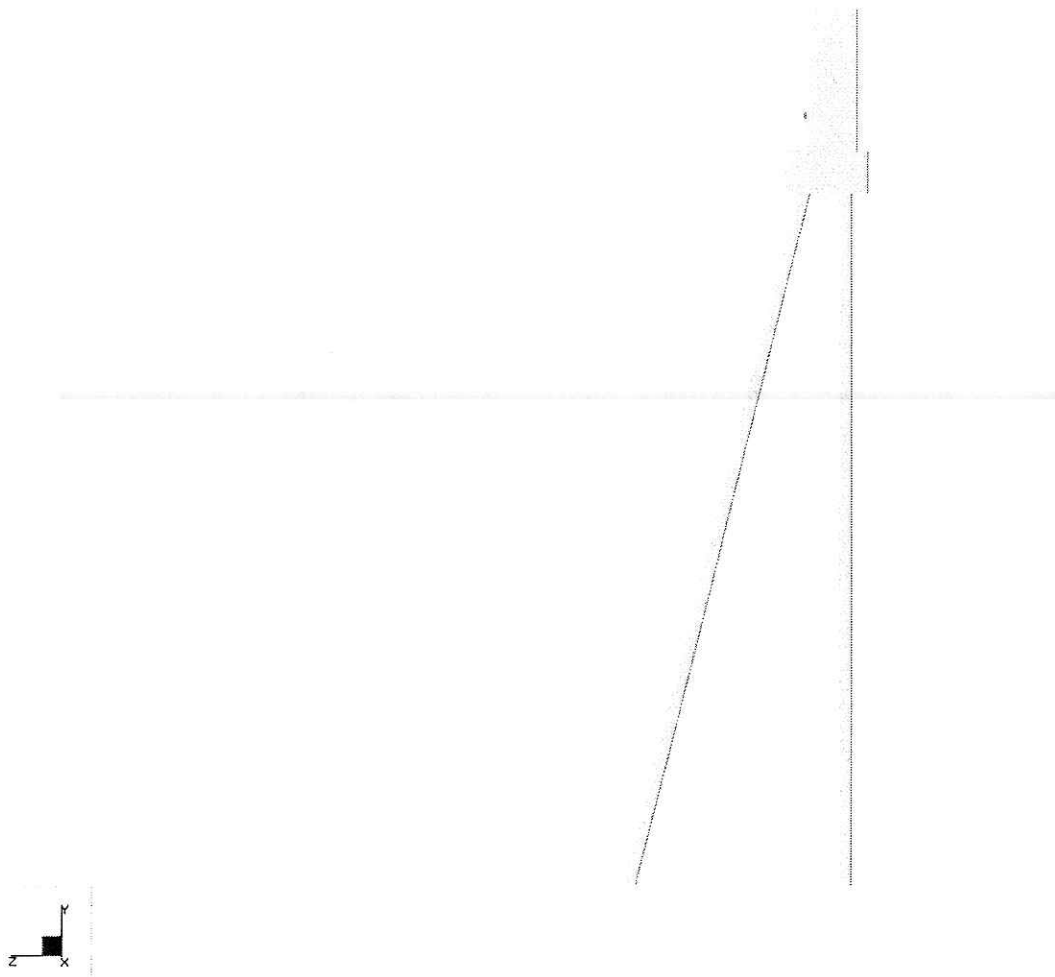
FULL IMAGE:



PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0.00 (PID 19415)

FULL IMAGE:



Bentley	KZF, Inc.	Sheet #	DS-3
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com / Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0.00 (PID 19415)**		Date	

SUPERSTRUCTURE INFO

Superstructure info:	
Total number of spans:	4
Span number rear to current pier:	0
Number of traffic lanes:	3
Barrier height :	42.00 in
Depth of slab :	8.75 in
Curb to curb distance: 0.000	45.500 ft

Beam info:

Height in	Section area in^2	Inertia (Ixx) in^4	Inertia (Iyy) in^4	Beam CG in
72.00	560.00	145679.00	30355.20	34.43

Span #	Span length ft	Bridge Width ft
1	104.917	48.500
2	105.833	48.500
3	105.833	48.500
	104.917	48.500
		48.500

Bentley	KZF, Inc.		Sheet #	DS-4
			Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)			By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.		Date	Jul/9/2009
	www.bentley.com	Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0.00 (PID 19415)			Date	

BEARING POINTS

Number of bearing lines: 1

First bearing line   Eccentricity = 0.00 ft

Point	Distance ft
1	7.54
2	18.14
3	28.75
4	39.36
5	49.96

✓✓

Bentley	KZF, Inc.		Sheet #	DS-5
			Job #	535502
Program:	LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version:	Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
		www.bentley.com Phone: 1-800-778-4277	Checked	
File Name:	SCI-823-0.00 (PID 19415)		Date	

MATERIAL PROPERTIES

MATERIAL PROPERTIES	Cap	Column	Footing
Concrete Type	normal	normal	normal
Concrete Strength (psi)	4000.00	4000.00	4000.00
Concrete Density (lb/ft3)	150.00	150.00	150.00
Concrete Modulus Ec (ksi)	3834.25	3834.30	3834.30
Steel Strength Fy (ksi)	60.00	60.00	60.00

Bentley	KZF, Inc.	Sheet #	DS-6
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/200
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0.00 (PID 19415)		Date	

DESIGN PARAMETERS

DESIGN PARAMETERS
AASHTO STANDARD Code

Strength Reduction factors for reinf. concrete	
Flexure and tension	0.90
Shear and torsion (normal)	0.85
Shear and torsion (lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Multi presence factors for live load	
1 Lane	1.00
2 Lanes	1.00
3 Lanes	0.90
more than 3 Lanes	0.75

	Crack control factor kip/ft	Clear cover in	Clear side cover in	Impact factors (auto calculation)
Cap	170.00	2.00	3.00	1.28
Column	170.00	2.00		1.28
Footing	130.00	3.00	3.00	1.00

Degree of fixity in foundations for Moment Magnify Method: Ga = 5.00

SEISMIC DESIGN PARAMETERS

Strength Reduction factors for reinf. Concrete Seismic Design	
Flexure and tension	0.90
Shear and torsion (normal)	0.85
Shear and torsion (lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Seismic Overstrength	
Flexure and tension	1.30
Axial compression (ties)	1.30
Axial compression (spiral)	1.30

Response Modification Factor 3.00

Use core area for plastic hinging calculations.

Design Factors

Cap Design Factor	1.20
Footing Design Factor	1.20

Plastic Hinge Moment

Use actual computed Plastic Hinging Moment for each column in all combinations.

Bentley	KZF, Inc.	Sheet #	DS-8
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0.00 (PID 19415)		Date	

LOADS

Pier Info:

Pier View: Downstation.

Load Cases: 26

Loadcase ID: D1 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-202.40 ✓
1	2	Y	-202.40 ✓
1	3	Y	-202.40 ✓
1	4	Y	-202.40 ✓
1	5	Y	-202.40 ✓

Loadcase ID: (L+In)1 Name:

Multiplier = 1.000

$$LLR = 1.25\left[32 + 32\left(\frac{90.92}{104.92}\right) + 8\left(\frac{76.92}{104.92}\right)\right] = \underline{82\ K}\ \text{truck}$$

$$LLR = \frac{0.8\ klf(104.92')}{2} + 32.5 = \underline{74.5\ K}\ \text{LANE}$$

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-54.45
1	2	Y	-75.88
1	3	Y	-72.31
1	4	Y	-18.75
1	5	Y	0.00

} 222 TOTAL

$$3\ \text{lanes}\ (0.90)(82) = \underline{221\ K}$$

≈ 222 O.K.

Auto generation details:

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:	
	HS25 truck
	H25/HS25 Lane Load
	Military

Reaction distribution among line

	Bearing Line 1
Truck Case A:	1.00
Lane Case A:	1.00

Transverse Positioning

Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing

Minimum Spacing Between Positions = 2.00 ft

Generate Braking/Longitudinal Force = Selected

Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 11

Total number of Possible Combination = 72

Loadcase ID: (L+In)2 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	-2.98
1	3	Y	-58.19
1	4	Y	-52.57
1	5	Y	-50.25

Auto generation details:

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military

Reaction distribution among line

	Bearing Line 1
Truck Case A:	1.00
Lane Case A:	1.00

Transverse Positioning

Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing

Minimum Spacing Between Positions = 2.00 ft

Generate Braking/Longitudinal Force = Selected

Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 11

Total number of Possible Combination = 72

Loadcase ID: (L+In)3 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-60.50
1	2	Y	-81.33
1	3	Y	-22.15
1	4	Y	0.00
1	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military

Reaction distribution among line

	Bearing Line 1
Truck Case A:	1.00
Lane Case A:	1.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 2.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 11
Total number of Possible Combination = 72

Loadcase ID: (L+In)4 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	-31.74
1	5	Y	-50.25

Auto generation details:

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:	
	HS25 truck
	H25/HS25 Lane Load
	Military

Reaction distribution among line

	Bearing Line 1
Truck Case A:	1.00
Lane Case A:	1.00

Transverse Positioning

- Number of loaded lanes = all combinations
- Live Load Positions = Variable Spacing
- Minimum Spacing Between Positions = 2.00 ft

- Generate Braking/Longitudinal Force = Selected
- Generate Centrifugal Force = Not Selected

- Total number of Considered Truck Positions = 11
- Total number of Possible Combination = 72

Loadcase ID: LF1 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		107.94 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.39
1	1	Z	1.70
1	1	Y	-0.59
1	2	X	-0.39
1	2	Z	1.70
1	3	X	-0.39
1	3	Z	1.70
1	4	X	-0.39
1	4	Z	1.70
1	5	X	-0.39
1	5	Z	1.70
1	5	Y	0.59

Auto generation details:

Selected Live Load for LF generation

Load: H25/HS25 Lane Load

...ber of loaded lanes = 3

...tributing longitudinal length = 52.46 ft

Loadcase ID: LF2 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		79.96 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.29
1	1	Z	1.26
1	1	Y	-0.44
1	2	X	-0.29
1	2	Z	1.26
1	3	X	-0.29
1	3	Z	1.26
1	4	X	-0.29

Line #	Bearing #	Dir	Load kips
1	4	Z	1.26
1	5	X	-0.29
1	5	Z	1.26
1	5	Y	0.44

Auto generation details:

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 2
Contributing longitudinal length = 52.46 ft

Loadcase ID: LF3 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		79.96 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.29
1	1	Z	1.26
1	1	Y	-0.44
1	2	X	-0.29
1	2	Z	1.26
1	3	X	-0.29
1	3	Z	1.26
1	4	X	-0.29
1	4	Z	1.26
1	5	X	-0.29
1	5	Z	1.26
1	5	Y	0.44

Auto generation details:

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 2
Contributing longitudinal length = 52.46 ft

Loadcase ID: LF4 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		39.98 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.15
1	1	Z	0.63
1	1	Y	-0.22
1	2	X	-0.15
1	2	Z	0.63
1	3	X	-0.15
1	3	Z	0.63
1	4	X	-0.15
1	4	Z	0.63
1	5	X	-0.15
1	5	Z	0.63
1	5	Y	0.22

Auto generation details:

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 1
Contributing longitudinal length = 52.46 ft

Loadcase ID: E1 Name:

Multiplier = 1.000

Column loads

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	Trap.	Z	30.427 klf	0.00	18.142 klf	1.00

Auto generation details:

Loadcase ID: W1 Name: Angle: 0

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	5.23
1	1	Y	27.87
1	1	Z	1.21
1	2	X	5.23
1	2	Y	10.18
1	2	Z	1.21
1	3	X	5.23
1	3	Y	10.18
1	3	Z	1.21
1	4	X	5.23
1	4	Y	10.18
1	4	Z	1.21
1	5	X	5.23
1	5	Y	-7.52
1	5	Z	1.21

Auto generation details:

Bentley	KZF, Inc.		Sheet #	DS-17
			Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)			By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.		Date	Jul/9/2009
	www.bentley.com	Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0.00 (PID 19415)**			Date	

Generated Wind Load on Structure

Angle of wind = 0.00 deg Elevation above which wind load acts = 708.60 ft
Default wind pressure:
Wind pressure for superstructure: Wind pressure for substructure:
Transverse 50.000 psf Cap 0.000 psf
Longitudinal 0.000 psf Column 40.000 psf
Overturning 20.000 psf

Loadcase ID: W2 Name: Angle: 15

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Force	X	0.00	0.02 kips	0.50		
UDL	Z		-0.00 klf	0.00		1.00

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	4.75
1	1	Y	2.86
1	1	Z	0.43
1	2	X	4.75
1	2	Y	-0.00
1	2	Z	0.43
1	3	X	4.75
1	3	Y	-0.00
1	3	Z	0.43
1	4	X	4.75
1	4	Y	-0.00
1	4	Z	0.43
1	5	X	4.75
1	5	Y	-2.86
1	5	Z	0.43

...o generation details:

Generated Wind Load on Structure

Angle of wind = 15.00 deg Elevation above which wind load acts = 708.60 ft

Default wind pressure:
Wind pressure for superstructure: Wind pressure for substructure:
Transverse 44.000 psf Cap 40.000 psf
Longitudinal 6.000 psf Column 40.000 psf
Overturning not considered

Loadcase ID: W3 Name: Angle: 30

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Force	X	0.00	0.06 kips	0.50		
UDL	Z		-0.00 klf	0.00		1.00

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	4.58
1	1	Y	2.76
1	1	Z	-0.27
1	2	X	4.58
1	2	Y	-0.00
1	2	Z	-0.27
1	3	X	4.58
1	3	Y	-0.00
1	3	Z	-0.27
1	4	X	4.58
1	4	Y	-0.00
1	4	Z	-0.27
1	5	X	4.58
1	5	Y	-2.76
1	5	Z	-0.27

Auto generation details:

Generated Wind Load on Structure

Angle of wind = 30.00 deg Elevation above which wind load acts = 708.60 ft
Default wind pressure:

Wind pressure for superstructure: Wind pressure for substructure:
Transverse 41.000 psf Cap 40.000 psf
Longitudinal 12.000 psf Column 40.000 psf
Overturning not considered

Loadcase ID: W4 Name: Angle: 45

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Force	X	0.00	0.09 kips	0.50		
UDL	Z		-0.00 klf	0.00		1.00

...ring loads

Line #	Bearing #	Dir	Load kips
1	1	X	3.84
1	1	Y	2.31
1	1	Z	-0.88
1	2	X	3.84
1	2	Y	-0.00
1	2	Z	-0.88
1	3	X	3.84
1	3	Y	-0.00
1	3	Z	-0.88
1	4	X	3.84
1	4	Y	-0.00
1	4	Z	-0.88
1	5	X	3.84
1	5	Y	-2.31
1	5	Z	-0.88

Auto generation details:

G...nerated Wind Load on Structure

... of wind = 45.00 deg Elevation above which wind load acts = 708.60 ft
Default wind pressure:
Wind pressure for superstructure: Wind pressure for substructure:
Transverse 33.000 psf Cap 40.000 psf

Longitudinal 16.000 psf Column 40.000 psf
Overturning not considered

Loadcase ID: W5 Name: Angle: 60

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Force	X	0.00	0.10 kips	0.50		
UDL	Z		-0.00 klf	0.00		1.00

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	2.24
1	1	Y	1.35
1	1	Z	-1.58
1	2	X	2.24
1	2	Y	-0.00
1	2	Z	-1.58
1	3	X	2.24
1	3	Y	-0.00
1	3	Z	-1.58
1	4	X	2.24
1	4	Y	-0.00
1	4	Z	-1.58
1	5	X	2.24
1	5	Y	-1.35
1	5	Z	-1.58

Auto generation details:

Generated Wind Load on Structure

Angle of wind = 60.00 deg Elevation above which wind load acts = 708.60 ft
Default wind pressure:
Wind pressure for superstructure: Wind pressure for substructure:
Transverse 17.000 psf Cap 40.000 psf
Longitudinal 19.000 psf Column 40.000 psf
Overturning not considered

Loadcase ID: W6 Name: Angle: 75
Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Force	X	0.00	0.08 kips	0.50		
UDL	Z		-0.00 klf	0.00		1.00

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	1.68
1	1	Y	1.01
1	1	Z	-2.03
1	2	X	1.68
1	2	Y	-0.00
1	2	Z	-2.03
1	3	X	1.68
1	3	Y	-0.00
1	3	Z	-2.03
1	4	X	1.68
1	4	Y	-0.00
1	4	Z	-2.03
1	5	X	1.68
1	5	Y	-1.01
1	5	Z	-2.03

Auto generation details:

Generated Wind Load on Structure
Angle of wind = 75.00 deg Elevation above which wind load acts = 708.60 ft
Default wind pressure:
Wind pressure for superstructure: Wind pressure for substructure:
Transverse 11.000 psf Cap 40.000 psf
[illegible]itudinal 22.000 psf Column 40.000 psf
[illegible]turning not considered

Loadcase ID: WL1 Name: Angle: 0

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.86
1	1	Y	1.29
1	1	Z	0.20
1	2	X	0.86
1	2	Y	-0.00
1	2	Z	0.20
1	3	X	0.86
1	3	Y	-0.00
1	3	Z	0.20
1	4	X	0.86
1	4	Y	-0.00
1	4	Z	0.20
1	5	X	0.86
1	5	Y	-1.29
1	5	Z	0.20

Auto generation details:

Generated Wind Load on Live Load

Angle of wind = 0.00 deg Live load length = 44.00 ft

Loadcase ID: WL2 Name: Angle: 15

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.78
1	1	Y	1.17

Line #	Bearing #	Dir	Load kips
1	1	Z	0.07
1	2	X	0.78
1	2	Y	-0.00
1	2	Z	0.07
1	3	X	0.78
1	3	Y	-0.00
1	3	Z	0.07
1	4	X	0.78
1	4	Y	-0.00
1	4	Z	0.07
1	5	X	0.78
1	5	Y	-1.17
1	5	Z	0.07

Auto generation details:

Generated Wind Load on Live Load

Angle of wind = 15.00 deg Live load length = 44.00 ft

Loadcase ID: WL3 Name: Angle: 30

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.75
1	1	Y	1.13
1	1	Z	-0.04
1	2	X	0.75
1	2	Y	-0.00
1	2	Z	-0.04
1	3	X	0.75
1	3	Y	-0.00
1	3	Z	-0.04
1	4	X	0.75
1	4	Y	-0.00
1	4	Z	-0.04
1	5	X	0.75
1	5	Y	-1.13
1	5	Z	-0.04

Auto generation details:

Generated Wind Load on Live Load

Angle of wind = 30.00 deg Live load length = 44.00 ft

Loadcase ID: WL4 Name: Angle: 45

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.63
1	1	Y	0.94
1	1	Z	-0.14
1	2	X	0.63
1	2	Y	-0.00
1	2	Z	-0.14
1	3	X	0.63
1	3	Y	-0.00
1	3	Z	-0.14
1	4	X	0.63
1	4	Y	-0.00
1	4	Z	-0.14
1	5	X	0.63
1	5	Y	-0.94
1	5	Z	-0.14

Auto generation details:

Generated Wind Load on Live Load

Angle of wind = 45.00 deg Live load length = 44.00 ft

Loadcase ID: WL5 Name: Angle: 60

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.37
1	1	Y	0.55
1	1	Z	-0.26
1	2	X	0.37
1	2	Y	-0.00
1	2	Z	-0.26
1	3	X	0.37
1	3	Y	-0.00
1	3	Z	-0.26
1	4	X	0.37
1	4	Y	-0.00
1	4	Z	-0.26
1	5	X	0.37
1	5	Y	-0.55
1	5	Z	-0.26

Auto generation details:

Generated Wind Load on Live Load

Angle of wind = 60.00 deg Live load length = 44.00 ft

Loadcase ID: WL6 Name: Angle: 75

Multiplier = 1.000

Bearing loads

#	Bearing #	Dir	Load kips
1	1	X	0.20
1	1	Y	0.30
1	1	Z	-0.33
1	2	X	0.20

Line #	Bearing #	Dir	Load kips
1	2	Y	-0.00
1	2	Z	-0.33
1	3	X	0.20
1	3	Y	-0.00
1	3	Z	-0.33
1	4	X	0.20
1	4	Y	-0.00
1	4	Z	-0.33
1	5	X	0.20
1	5	Y	-0.30
1	5	Z	-0.33

Auto generation details:

Generated Wind Load on Live Load

Angle of wind = 75.00 deg Live load length = 44.00 ft

Loadcase ID: S1 Name:

Multiplier = 1.000

Unit strain: -0.000200

Loadcase ID: S2 Name:

Multiplier = 1.000

Unit strain: 0.000200

Loadcase ID: T1 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-2.78
1	1	Z	12.03
1	2	X	-2.78
1	2	Z	12.03
1	3	X	-2.78
1	3	Z	12.03
1	4	X	-2.78
1	4	Z	12.03
1	5	X	-2.78
1	5	Z	12.03

Auto generation details:

Bearing type
Elastomeric Bearings
Direction of thermal force: +(Z)
Length of Superstructure Contributing, L: 140.000 ft
Change in temperature: 80.000 ºF
Coefficient of thermal expansion: 6.0e-006 ft/ºF
Area of bearing: 384.00 in^2
Shear modulus of Elastomer: 0.13 kips
Total Elastomer Thickness: 3.26 in

Loadcase ID: T2 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	2.78
1	1	Z	-12.03
1	2	X	2.78
1	2	Z	-12.03
1	3	X	2.78
1	3	Z	-12.03
1	4	X	2.78
1	4	Z	-12.03
1	5	X	2.78
1	5	Z	-12.03

Auto generation details:

Bearing type
Elastomeric Bearings
Direction of thermal force: -(Z)
Length of Superstructure Contributing, L: 140.000 ft
Change in temperature: 80.000 ºF
Coefficient of thermal expansion: 6.0e-006 ft/ºF
Area of bearing: 384.00 in^2
Shear modulus of Elastomer: 0.13 kips
Total Elastomer Thickness: 3.26 in

Selected load groups
SERVICE GROUP I
SERVICE GROUP II
SERVICE GROUP III
SERVICE GROUP IV
SERVICE GROUP V
SERVICE GROUP VI
SERVICE GROUP VII
SERVICE GROUP VIII
SERVICE GROUP IX
LOAD FACTOR GROUP I
LOAD FACTOR GROUP II
LOAD FACTOR GROUP III
LOAD FACTOR GROUP IV
LOAD FACTOR GROUP V
LOAD FACTOR GROUP VI
LOAD FACTOR GROUP VII
LOAD FACTOR GROUP VIII
LOAD FACTOR GROUP IX

Bentley	KZF, Inc.	Sheet #	DS-1
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com — Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0.00 (PID 19415)**		Date	

ISOLATED FOOTING DESIGN

ISOLATED FOOTING DESIGN
Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View: Downstation.

GEOMETRY
Name : pile cap
Shape : Rectangular, Type : Pile/Shaft Cap
Bf(X) = 57.50 ft, Hf(Z) = 6.00 ft, Thickness(Y) = 36.00 in
Ag = 345.00 ft^2, Ix = 40.50 ft^2, Iz = 5070.00 ft^2
Footing eccentric: Start at X = -28.80 ft from centerline of column.
Footing eccentric: Start at Z = -3.50 ft from centerline of column.
Columns located on the footing:
Column No. 1 at x = 0.00 ft, Rectangular 690.00 in x 42.00 in
Surcharge = 0.00 ksf
Piles: Square Size: W = 10.00 in
Service Capacity: 190.00 kips Factored Capacity: 380.00 kips
Piles Section Properties: Area = 0.11 ft^2 Ix = 393.00 in^4 Iz = 127.00 in^4

DESIGN PARAMETERS	
f'c = 4000.00 psi	fy = 60000.00 psi
phi flex = 0.90	phi shear = 0.85
Ec = 3834.3 ksi	Es = 29000.0 ksi
Crack control factor z = 130.00 kips/in	
Concrete Type : Normal Weight.	

Pile Reactions, Service (Without the reduction of overstress allowance)

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	Batter degree	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips	Php kips	Plong kips	Plong-Php kips
1	26.45	-2.00	663.00	-18.0	0	438	1.400	-1578.26	-145.75	-1738.05	135.80	0.00	3.26	3.26 #
						295	1.400	-1578.26	781.45	2291.90	80.80	0.00	11.17	11.17 #
2	26.45	-5.00	663.00	18.0	-14	178	1.400	-1563.00	770.89	-1835.95	100.48	-25.12	11.06	-14.06
						515	1.400	-1593.53	-135.19	2389.80	46.31	-11.58	3.37	-8.21
[illegible]	19.95	-2.00	585.00	-18.0	0	438	1.400	-1578.26	-145.75	-1738.05	134.59	0.00	3.26	3.26 #
						158	1.400	-1414.27	697.64	163.50	84.17	0.00	11.13	11.13 #
4	19.95	-5.00	585.00	18.0	-14	178	1.400	-1563.00	770.89	-1835.95	99.12	-24.78	11.06	-13.72
						515	1.400	-1593.53	-135.19	2389.80	50.39	-12.60	3.37	-9.23

Bentley	KZF, Inc.	Sheet #	DS-2
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0.00 (PID 19415)**		Date	

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	Batter degree	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips	Php kips	Plong kips	Plong-Php kips
5	13.45	-2.00	507.00	-18.0	0	438	1.400	-1578.26	-145.75	-1738.05	133.37	0.00	3.26	3.26 #
						129	1.400	-1363.39	674.51	-816.78	84.96	0.00	10.89	10.89 #
6	13.45	-5.00	507.00	18.0	-14	178	1.400	-1563.00	770.89	-1835.95	97.77	-24.44	11.06	-13.38
						515	1.400	-1593.53	-135.19	2389.80	54.47	-13.62	3.37	-10.25
7	6.95	-2.00	429.00	-18.0	0	513	1.400	-1650.92	-175.02	1995.62	133.79	0.00	3.24	3.24 #
						129	1.400	-1363.39	674.51	-816.78	84.80	0.00	10.89	10.89 #
8	6.95	-5.00	429.00	18.0	-14	294	1.400	-1578.26	781.45	-1445.78	96.87	-24.22	11.17	-13.05
						146	1.400	-1414.27	-61.95	-163.64	58.01	-14.50	3.30	-11.20
9	0.45	-2.00	351.00	-18.0	0	513	1.400	-1650.92	-175.02	1995.62	137.40	0.00	3.24	3.24 #
						129	1.400	-1363.39	674.51	-816.78	84.63	0.00	10.89	10.89 #
10	0.45	-5.00	351.00	18.0	-14	293	1.400	-1635.66	821.28	1916.12	99.62	-24.91	11.29	-13.61
						146	1.400	-1414.27	-61.95	-163.64	58.71	-14.68	3.30	-11.38
11	-6.05	-2.00	273.00	-18.0	0	513	1.400	-1650.92	-175.02	1995.62	141.01	0.00	3.24	3.24 #
						129	1.400	-1363.39	674.51	-816.78	84.47	0.00	10.89	10.89 #
12	-6.05	-5.00	273.00	18.0	-14	293	1.400	-1635.66	821.28	1916.12	103.12	-25.78	11.29	-14.49
						146	1.400	-1414.27	-61.95	-163.64	59.42	-14.85	3.30	-11.56
13	-12.55	-2.00	195.00	-18.0	0	513	1.400	-1650.92	-175.02	1995.62	144.62	0.00	3.24	3.24 #
						129	1.400	-1363.39	674.51	-816.78	84.31	0.00	10.89	10.89 #
14	-12.55	-5.00	195.00	18.0	-14	293	1.400	-1635.66	821.28	1916.12	106.62	-26.66	11.29	-15.36
						440	1.400	-1496.27	-88.85	-1535.58	58.74	-14.68	3.43	-11.25
15	-19.05	-2.00	117.00	-18.0	0	513	1.400	-1650.92	-175.02	1995.62	148.23	0.00	3.24	3.24 #
						129	1.400	-1363.39	674.51	-816.78	84.15	0.00	10.89	10.89 #
16	-19.05	-5.00	117.00	18.0	-14	273	1.400	-1650.92	780.54	2216.23	110.36	-27.59	10.87	-16.72
						420	1.400	-1481.00	-48.11	-1835.69	57.50	-14.37	3.85	-10.52
17	-25.55	-2.00	39.00	-18.0	0	513	1.400	-1650.92	-175.02	1995.62	151.84	0.00	3.24	3.24 #
						129	1.400	-1363.39	674.51	-816.78	83.99	0.00	10.89	10.89 #
18	-25.55	-5.00	39.00	18.0	-14	273	1.400	-1650.92	780.54	2216.23	114.25	-28.56	10.87	-17.69
						420	1.400	-1481.00	-48.11	-1835.69	56.10	-14.02	3.85	-10.17

75.9 T

Pile Reactions, Factored

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	Batter degree	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips	Php kips	Plong kips	Plong-Php kips
1	26.45	-2.00	663.0	-18.0	0	579	---	-2194.57	537.16	-3455.99	166.02	0.00	12.19	12.19 #
						872	---	-1972.83	1096.00	2864.88	96.58	0.00	16.67	16.67 #
2	26.45	-5.00	663.0	18.0	-14	755	---	-1953.74	1082.80	-2294.93	130.01	-32.50	16.53	-15.97
						1092	---	-1991.91	-49.80	2987.25	62.30	-15.57	6.91	-8.66
3	19.95	-2.00	585.0	-18.0	0	1015	---	-1972.83	-63.00	-2172.57	163.82	0.00	6.78	6.78 #
						735	---	-1767.84	991.25	204.38	100.80	0.00	16.62	16.62 #
4	19.95	-5.00	585.0	18.0	-14	755	---	-1953.74	1082.80	-2294.93	128.32	-32.08	16.53	-15.55
						1092	---	-1991.91	-49.80	2987.25	67.40	-16.85	6.91	-9.94
5	13.45	-2.00	507.0	-18.0	0	1015	---	-1972.83	-63.00	-2172.57	162.30	0.00	6.78	6.78 #
						706	---	-1704.24	962.33	-1020.98	101.78	0.00	16.32	16.32 #
6	13.45	-5.00	507.0	18.0	-14	755	---	-1953.74	1082.80	-2294.93	126.63	-31.66	16.53	-15.13
						1092	---	-1991.91	-49.80	2987.25	72.50	-18.13	6.91	-11.21
7	6.95	-2.00	429.0	-18.0	0	1090	---	-2063.65	-99.59	2494.52	162.82	0.00	6.76	6.76 #
						706	---	-1704.24	962.33	-1020.98	101.58	0.00	16.32	16.32 #
8	6.95	-5.00	429.0	18.0	-14	871	---	-1972.83	1096.00	-1807.23	125.50	-31.37	16.67	-14.71
						723	---	-1767.84	41.76	-204.55	76.92	-19.23	6.83	-12.40
9	0.45	-2.00	351.0	-18.0	0	1090	---	-2063.65	-99.59	2494.52	167.33	0.00	6.76	6.76 #
						706	---	-1704.24	962.33	-1020.98	101.38	0.00	16.32	16.32 #
10	0.45	-5.00	351.0	18.0	-14	870	---	-2044.57	1145.79	2395.14	128.94	-32.24	16.82	-15.42

Bentley	KZF, Inc.	Sheet #	DS-3
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0.00 (PID 19415)**		Date	

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	Batter degree	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips	Php kips	Plong kips	Plong-Php kips
						723	---	-1767.84	41.76	-204.55	77.80	-19.45	6.83	-12.62
11	-6.05	-2.00	273.0	-18.0	0	1090	---	-2063.65	-99.59	2494.52	171.85	0.00	6.76	6.76 #
						706	---	-1704.24	962.33	-1020.98	101.18	0.00	16.32	16.32 #
12	-6.05	-5.00	273.0	18.0	-14	870	---	-2044.57	1145.79	2395.14	133.32	-33.33	16.82	-16.51
						723	---	-1767.84	41.76	-204.55	78.69	-19.67	6.83	-12.84
13	-12.55	-2.00	195.0	-18.0	0	1090	---	-2063.65	-99.59	2494.52	176.36	0.00	6.76	6.76 #
						706	---	-1704.24	962.33	-1020.98	100.98	0.00	16.32	16.32 #
14	-12.55	-5.00	195.0	18.0	-14	870	---	-2044.57	1145.79	2395.14	137.69	-34.42	16.82	-17.60
						1017	---	-1870.33	8.13	-1919.48	77.84	-19.46	7.00	-12.46
15	-19.05	-2.00	117.0	-18.0	0	578	---	-2319.18	537.16	3822.72	182.21	0.00	12.19	12.19 #
						706	---	-1704.24	962.33	-1020.98	100.77	0.00	16.32	16.32 #
16	-19.05	-5.00	117.0	18.0	-14	850	---	-2063.65	1094.86	2770.28	142.36	-35.59	16.29	-19.30
						997	---	-1851.25	59.05	-2294.62	76.29	-19.07	7.52	-11.55
17	-25.55	-2.00	39.0	-18.0	0	578	---	-2319.18	537.16	3822.72	188.58	0.00	12.19	12.19 #
						706	---	-1704.24	962.33	-1020.98	100.57	0.00	16.32	16.32 #
18	-25.55	-5.00	39.0	18.0	-14	850	---	-2063.65	1094.86	2770.28	147.23	-36.81	16.29	-20.51
						997	---	-1851.25	59.05	-2294.62	74.54	-18.63	7.52	-11.11

Reactions, Service (After the reduction of overstress allowance)

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	Batter degree	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips	Php kips	Plong kips	Plong-Php kips
1	26.45	-2.00	663.00	-18.0	0	2	1.000	-1578.26	317.85	-1591.92	117.88	0.00	7.21	7.21 #
						295	1.400	-1578.26	781.45	2291.90	57.71	0.00	11.17	11.17 #
2	26.45	-5.00	663.00	18.0	-14	2	1.000	-1578.26	317.85	-1591.92	82.97	-20.74	7.21	-13.53
						515	1.400	-1593.53	-135.19	2389.80	33.08	-8.27	3.37	-4.90
3	19.95	-2.00	585.00	-18.0	0	2	1.000	-1578.26	317.85	-1591.92	116.85	0.00	7.21	7.21 #
						158	1.400	-1414.27	697.64	163.50	60.12	0.00	11.13	11.13 #
4	19.95	-5.00	585.00	18.0	-14	2	1.000	-1578.26	317.85	-1591.92	81.94	-20.49	7.21	-13.27
						515	1.400	-1593.53	-135.19	2389.80	35.99	-9.00	3.37	-5.63
5	13.45	-2.00	507.00	-18.0	0	2	1.000	-1578.26	317.85	-1591.92	115.82	0.00	7.21	7.21 #
						129	1.400	-1363.39	674.51	-816.78	60.68	0.00	10.89	10.89 #
6	13.45	-5.00	507.00	18.0	-14	2	1.000	-1578.26	317.85	-1591.92	80.91	-20.23	7.21	-13.01
						515	1.400	-1593.53	-135.19	2389.80	38.91	-9.73	3.37	-6.36
7	6.95	-2.00	429.00	-18.0	0	2	1.000	-1578.26	317.85	-1591.92	114.79	0.00	7.21	7.21 #
						129	1.400	-1363.39	674.51	-816.78	60.57	0.00	10.89	10.89 #
8	6.95	-5.00	429.00	18.0	-14	2	1.000	-1578.26	317.85	-1591.92	79.88	-19.97	7.21	-12.76
						146	1.400	-1414.27	-61.95	-163.64	41.43	-10.36	3.30	-7.06
9	0.45	-2.00	351.00	-18.0	0	1	1.000	-1635.66	317.85	1760.78	118.01	0.00	7.21	7.21 #
						129	1.400	-1363.39	674.51	-816.78	60.45	0.00	10.89	10.89 #
10	0.45	-5.00	351.00	18.0	-14	1	1.000	-1635.66	317.85	1760.78	80.98	-20.24	7.21	-13.03
						146	1.400	-1414.27	-61.95	-163.64	41.94	-10.48	3.30	-7.19
11	-6.05	-2.00	273.00	-18.0	0	1	1.000	-1635.66	317.85	1760.78	121.31	0.00	7.21	7.21 #
						129	1.400	-1363.39	674.51	-816.78	60.34	0.00	10.89	10.89 #
12	-6.05	-5.00	273.00	18.0	-14	1	1.000	-1635.66	317.85	1760.78	84.28	-21.07	7.21	-13.86
						146	1.400	-1414.27	-61.95	-163.64	42.44	-10.61	3.30	-7.31
[illegible]	-12.55	-2.00	195.00	-18.0	0	1	1.000	-1635.66	317.85	1760.78	124.61	0.00	7.21	7.21 #
						129	1.400	-1363.39	674.51	-816.78	60.22	0.00	10.89	10.89 #
14	-12.55	-5.00	195.00	18.0	-14	1	1.000	-1635.66	317.85	1760.78	87.58	-21.89	7.21	-14.68
						440	1.400	-1496.27	-88.85	-1535.58	41.96	-10.49	3.43	-7.06
15	-19.05	-2.00	117.00	-18.0	0	1	1.000	-1635.66	317.85	1760.78	127.91	0.00	7.21	7.21 #
						129	1.400	-1363.39	674.51	-816.78	60.11	0.00	10.89	10.89 #

Bentley	KZF, Inc.	Sheet #	DS-4
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0.00 (PID 19415)**		Date	

Pile	Loc(X) ft	Loc(Z) ft	X in	Z in	Batter degree	comb	Ovs	P kips	Mxx kft	Mzz kft	Pile Reac. kips	Php kips	Plong kips	Plong-Php kips
16	-19.05	-5.00	117.00	18.0	-14	1	1.000	-1635.66	317.85	1760.78	90.88	-22.72	7.21	-15.51
						420	1.400	-1481.00	-48.11	-1835.69	41.07	-10.27	3.85	-6.41
17	-25.55	-2.00	39.00	-18.0	0	1	1.000	-1635.66	317.85	1760.78	131.21	0.00	7.21	7.21 #
						129	1.400	-1363.39	674.51	-816.78	59.99	0.00	10.89	10.89 #
18	-25.55	-5.00	39.00	18.0	-14	1	1.000	-1635.66	317.85	1760.78	94.18	-23.54	7.21	-16.33
						420	1.400	-1481.00	-48.11	-1835.69	40.07	-10.02	3.85	-6.16

65.6 T < 75
HP10X42
o.k.

Footing Design : Notes
= Pile needs to resist remaining lateral force.
Only max. force in piles is considered for design.
Pile coordinates X and Z are from the most left edge of the footing.
Plong= Lateral load in longitudinal direction at the top of pile, Kips.
Php= Available resisting horizontal component due to batter= batter * Vertical pile reaction, Kips.
Plong-Php= Remaining lateral force required to resist by pile.

Max. Pile Reaction Used in Design: (User specified values)	
Factored pile reaction	380.00 kips
Service pile reaction	190.00 kips
Fatigue pile reaction	190.00 kips

300
change to HP10X42
150 K

Reinforcement Schedule						
Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	4	# 5	32.06	1.24	21.79	None
X	4	# 8	4.50	3.16	21.67	None
Z	59	# 5	3.31	18.29	11.78	None
Z	59	# 5	32.69	18.29	11.78	None

Flexure										
Dir ft	Loc	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-28.75	31.50	0.0	U	0.00	3.16	0.06	0.00	1.24	0.06
X	28.75	31.50	0.0	U	0.00	3.16	0.00	0.00	1.24	0.00
Z	-1.75	32.69	0.0	U	0.00	18.29	18.29	18.29	18.29	18.29
Z	1.75	32.69	855.0	U	7.75	18.29	18.29	0.00	18.29	18.29

Flexure Note
*** U: User specified values of soil pressure/pile reaction used.

Bentley	KZF, Inc.	Sheet #	DS-5
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com / Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0.00 (PID 19415)		Date	

Cracking/Fatigue

Dir	Loc ft	d in	Cracking Mmax kft	Cracking Comb	Cracking fs ksi	Cracking ratio fs	Fatigue Mmax kft	Fatigue Comb	Fatigue fs ksi	Fatigue ratio fs
X	-28.75	31.50	0.0	U	0.00	0.00	0.0	U	0.00	0.00
X	28.75	31.50	0.0	U	0.00	-0.00	0.0	U	0.00	0.00
Z	-1.75	32.69	0.0	U	0.00	0.00	0.0	U	0.00	0.00
Z	1.75	32.69	427.5	U	8.89	0.34	427.5	U	8.89	0.39

Cracking/Fatigue Note

U: User specified values of soil pressure/pile reaction used.

One Way Shear

Col	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-31.38	Outside of Footing	---	---	---
	X	31.38	Outside of Footing	---	---	---
	Z	-3.97	Outside of Footing	---	---	---
	Z	4.97	Outside of Footing	---	---	---

Two Way Shear

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns						
1	No Two Way Shear					
Piles - max						
1	10.02	11.41	U	32.09	380.0	829.4
Piles - min						
1	10.02	11.41	U	32.09	380.0	829.4

Two Way Shear Note

TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.

U: User specified values of soil pressure/pile reaction used.

Bentley	KZF, Inc.		Sheet #	DS-1
			Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)			By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.		Date	Jul/9/200
	www.bentley.com	Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0.00 (PID 19415)			Date	

Column Design

COLUMN DESIGN - Column: 1
Code: AASHTO STANDARD (17th Edition 2002) - Factored Load Design
Units: US
Abutment View: Downstation.
Design/Analysis Method: No Slenderness Considered.

Column Type: Rectangular 690.00 x 42.00 in

Column Section Properties

Sec.	Area ft^2	Ixx in^4	Izz in^4
1	201.25	4260060.00	1149781504.00

DESIGN PARAMETERS

f'c = 4000.0 psi	fy = 60000.0 psi
phi flex = 0.90	phi axial = 0.70
Ec = 3834.3 ksi	Es = 29000 ksi
Concrete Type : Normal Weight.	

Reinforcement
Rebar Pattern: Rectangular
Rebar Orientation: Face Parallel

Reinforcement Schedule

Layer	Dir	Size	No. bars	Bar Dist. in
1	X	5	59	3.13
1	Z	5	2	3.13

Reinforcement summary

Bentley	KZF, Inc.	Sheet #	DS-2
		Job #	535502
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	RBK
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/9/2009
	www.bentley.com — Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0.00 (PID 19415)**		Date	

Main bars summary:
118 # 5 bars
Total number of bars in the column: 118
Ties size: # 3

Design values used - (e-min effect included).

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
0.00	5C	-0.0	2294.9	-219.4	-537.2	0.0	-5971.1
5.35	5C	-0.0	2085.1	0.0	-323.2	-0.0	5971.1
0.00	590C	23.6	1588.6	-300.0	-1096.0	0.0	-3620.7
5.35	590C	-23.6	1437.3	89.0	222.8	0.0	3494.3

COLUMN DESIGN

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
0.00	590C	1588.6	1096.0	3620.7	13187.3	73.16	1.00	3.49**
5.35	5C	2085.1	323.2	5971.1	44209.1	86.90	1.00	7.39**

Column Design : Notes

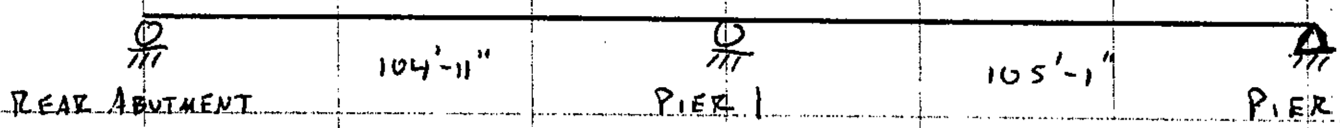
Min reinforcement = 0.0100 % of Ag = 289.80 in^2.

** Minimum/Maximum requirement for reinforcement ratio or bar spacing violated.

```
Comb #   500  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)4 + 1.00 E1 - 0.30 W3
                                      - 1.00 WL3 - 1.00 LF4 + 1.00 S2 + 1.00 T1 )
Comb #   501  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 + 1.00 E1 - 0.30 W4
                                      - 1.00 WL4 - 1.00 LF1 + 1.00 S2 + 1.00 T1 )
Comb #   502  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)2 + 1.00 E1 - 0.30 W4
                                      - 1.00 WL4 - 1.00 LF2 + 1.00 S2 + 1.00 T1 )
Comb #   503  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)3 + 1.00 E1 - 0.30 W4
                                      - 1.00 WL4 - 1.00 LF3 + 1.00 S2 + 1.00 T1 )
Comb #   504  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)4 + 1.00 E1 - 0.30 W4
                                      - 1.00 WL4 - 1.00 LF4 + 1.00 S2 + 1.00 T1 )
Comb #   505  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 + 1.00 E1 - 0.30 W5
                                      - 1.00 WL5 - 1.00 LF1 + 1.00 S2 + 1.00 T1 )
Comb #   506  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)2 + 1.00 E1 - 0.30 W5
                                      - 1.00 WL5 - 1.00 LF2 + 1.00 S2 + 1.00 T1 )
Comb #   507  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)3 + 1.00 E1 - 0.30 W5
                                      - 1.00 WL5 - 1.00 LF3 + 1.00 S2 + 1.00 T1 )
Comb #   508  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)4 + 1.00 E1 - 0.30 W5
                                      - 1.00 WL5 - 1.00 LF4 + 1.00 S2 + 1.00 T1 )
Comb #   509  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 + 1.00 E1 - 0.30 W6
                                      - 1.00 WL6 - 1.00 LF1 + 1.00 S2 + 1.00 T1 )
Comb #   510  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)2 + 1.00 E1 - 0.30 W6
                                      - 1.00 WL6 - 1.00 LF2 + 1.00 S2 + 1.00 T1 )
Comb #   511  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)3 + 1.00 E1 - 0.30 W6
                                      - 1.00 WL6 - 1.00 LF3 + 1.00 S2 + 1.00 T1 )
Comb #   512  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)4 + 1.00 E1 - 0.30 W6
                                      - 1.00 WL6 - 1.00 LF4 + 1.00 S2 + 1.00 T1 )
Comb #   513  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 + 1.00 E1 - 0.30 W1
                                      - 1.00 WL1 - 1.00 LF1 + 1.00 S1 + 1.00 T2 )
Comb #   514  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)2 + 1.00 E1 - 0.30 W1
                                      - 1.00 WL1 - 1.00 LF2 + 1.00 S1 + 1.00 T2 )
Comb #   515  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)3 + 1.00 E1 - 0.30 W1
                                      - 1.00 WL1 - 1.00 LF3 + 1.00 S1 + 1.00 T2 )
Comb #   516  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)4 + 1.00 E1 - 0.30 W1
                                      - 1.00 WL1 - 1.00 LF4 + 1.00 S1 + 1.00 T2 )
Comb #   517  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 + 1.00 E1 - 0.30 W2
                                      - 1.00 WL2 - 1.00 LF1 + 1.00 S1 + 1.00 T2 )
Comb #   518  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)2 + 1.00 E1 - 0.30 W2
                                      - 1.00 WL2 - 1.00 LF2 + 1.00 S1 + 1.00 T2 )
Comb #   519  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)3 + 1.00 E1 - 0.30 W2
                                      - 1.00 WL2 - 1.00 LF3 + 1.00 S1 + 1.00 T2 )
Comb #   520  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)4 + 1.00 E1 - 0.30 W2
                                      - 1.00 WL2 - 1.00 LF4 + 1.00 S1 + 1.00 T2 )
Comb #   521  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 + 1.00 E1 - 0.30 W3
                                      - 1.00 WL3 - 1.00 LF1 + 1.00 S1 + 1.00 T2 )
Comb #   522  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)2 + 1.00 E1 - 0.30 W3
                                      - 1.00 WL3 - 1.00 LF2 + 1.00 S1 + 1.00 T2 )
Comb #   523  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)3 + 1.00 E1 - 0.30 W3
                                      - 1.00 WL3 - 1.00 LF3 + 1.00 S1 + 1.00 T2 )
Comb #   524  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)4 + 1.00 E1 - 0.30 W3
                                      - 1.00 WL3 - 1.00 LF4 + 1.00 S1 + 1.00 T2 )
Comb #   525  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 + 1.00 E1 - 0.30 W4
                                      - 1.00 WL4 - 1.00 LF1 + 1.00 S1 + 1.00 T2 )
Comb #   526  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)2 + 1.00 E1 - 0.30 W4
                                      - 1.00 WL4 - 1.00 LF2 + 1.00 S1 + 1.00 T2 )
Comb #   527  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)3 + 1.00 E1 - 0.30 W4
                                      - 1.00 WL4 - 1.00 LF3 + 1.00 S1 + 1.00 T2 )
Comb #   528  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)4 + 1.00 E1 - 0.30 W4
                                      - 1.00 WL4 - 1.00 LF4 + 1.00 S1 + 1.00 T2 )
Comb #   529  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 + 1.00 E1 - 0.30 W5
                                      - 1.00 WL5 - 1.00 LF1 + 1.00 S1 + 1.00 T2 )
Comb #   530  (SER GP VI   ) = 1.00 (  1.00 D1 + 1.00 (L+In)2 + 1.00 E1 - 0.30 W5
                                      - 1.00 WL5 - 1.00 LF2 + 1.00 S1 + 1.00 T2 )
```

E. PIER DESIGN

PIER 1



(PER BEAM LINE) already per brg.

1. Beam Self Weight (CONSPAN OUTPUT)

$$= \frac{52.2 + 52.3}{2} = 52.3^k$$

2. Dead Load on Precast (CONSPAN OUTPUT) already per brg.

$$= \frac{81.9 + 82}{2} = 82.0^k$$

3. Superimposed Dead Load (CONSPAN OUTPUT)

$$= \frac{\left(\frac{499.4}{10}\right) + \left(\frac{499.4}{10}\right)}{2} = 49.9^k \qquad \frac{499.4}{5\ bms\ (2\ brg)} = 49.9 \checkmark$$

O.K.

4. Pier Diaphragm

$$= \frac{0.15^{kcf}\left[\left(\frac{48.5}{\cos 13}\right)(3)\left(6 - \frac{8}{12} + \frac{2}{12}\right) - (10)(1.125)(956\ in^2)\right]}{10\ beams} = 11.2^k \checkmark$$

5 bms (2 brgs.

5. Live Load & Impact (CONSPAN OUTPUT)

$$= \frac{137.2 + 137.2}{2} = 137.2^k \quad \text{[Per Lane, No DF, No Impact]}$$

$$LL = (137.2)(1)(0.939) = 128.8^k$$

$$LL + I = (137.2)(1.217)(0.939) = 156.8^k$$

I DF

DL = 195.4^k
LL + I = 156.8^k

DL = 195.4^k
LL = 128.8^k

PER BEARING

PIER 1

1. WIND ON STRUCTURE (AASHTO 3.15.2)

- Total height of structure

Barrier = 42"
Deck = 8.75"
Haunch = 2"
Beams = 72"

124.75" = 10.40'

Bearings = 2.75" = 0.23'

- 100 mph @ 0° (50 psf)

$F_T = \left(\frac{105.1 + 104.9}{2}\right)(10.4')(0.05^{ksf}) = 54.6^K$

$M_T = 54.6\left(\frac{10.4}{2} + 0.23\right) = 296.5^{K'}$

- 100 mph @ 60° (17 psf $_{TRANS}$, 19 psf $_{LONG}$)

$F_T = (105')(10.4')(.017) = 18.6^K$

$M_T = 18.6\left(\frac{10.4}{2} + 0.23\right) = 101.1^{K'}$

$F_L = (105')(10.4)(0.019) = 20.7^K$

$M_L = 20.7\left(\frac{10.4}{2} + 0.23\right) = 112.4^{K'}$

2. OVERTURNING WIND (AASHTO 3.15.3)

- (20 psf @ W/4)

$F_V = (105')(48.5')(.02^{ksf}) = 101.9^K$

$M_T = 101.9\left(\frac{48.5}{4}\right) = 1235.5^{K'}$

3. WIND ON LIVE LOAD (AASHTO 3.15.2)

- 100 plf @ 0°, 6' above deck

$$F_T = (105')(0.1^{klf}) = 10.5^k$$

$$M_T = 10.5\left(\frac{72+8.75+2+72+2.75}{12}\right) = 137.8^{k'}$$

- 34 plf$_{TRANS}$, 38 plf$_{LONG}$ @ 60°, 6' above deck

$$F_T = (105')(0.034^{klf}) = 3.6^k$$

$$M_T = 3.6\left(\frac{72+8.75+2+72+2.75}{12}\right) = 47.3^{k'}$$

$$F_L = (105)(0.038^{klf}) = 4.0^k$$

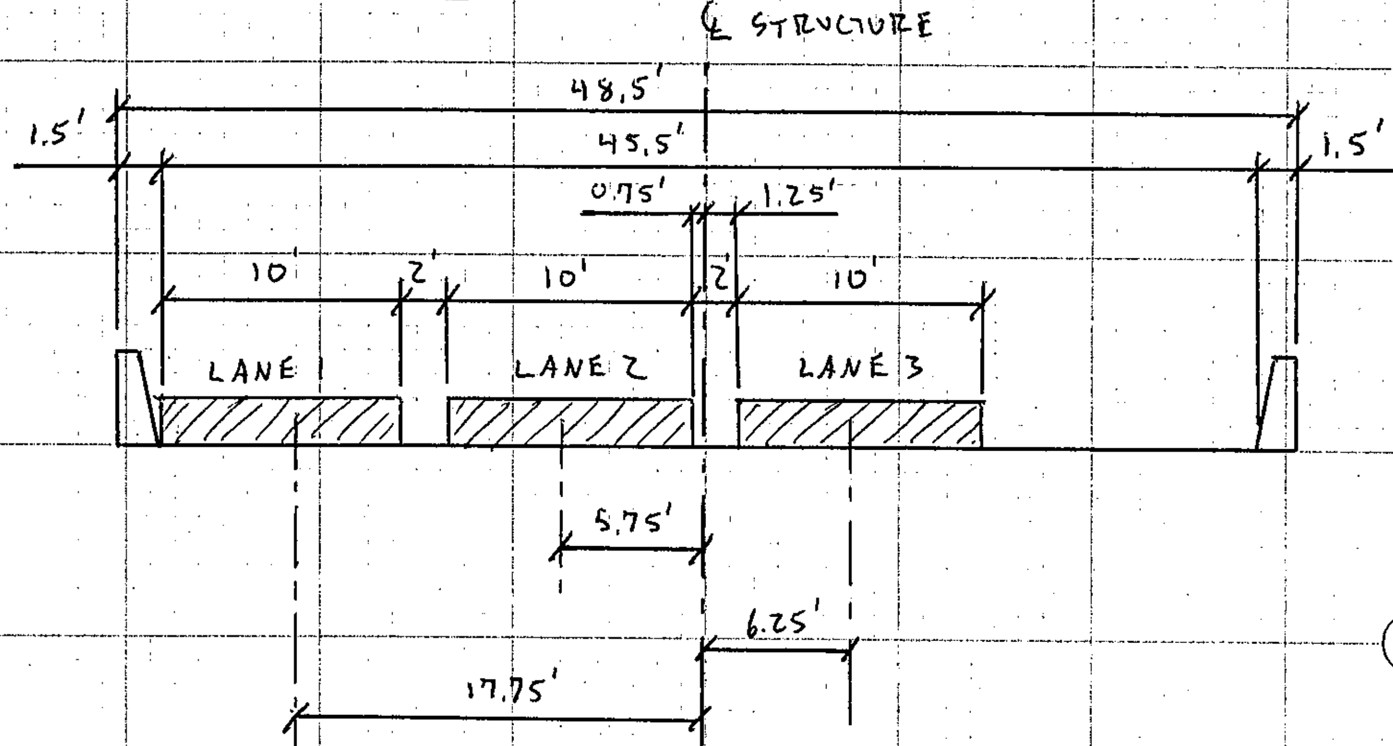
$$M_L = 4.0\left(\frac{72+8.75+2+72+2.75}{12}\right) = 52.5^{k'}$$

4. BEAM REACTIONS FROM SUPERSTRUCTURE

$$\left.\begin{aligned} DL &= 390.8^k \\ LL &= 128.8^k \\ LL+I &= 156.8^k \end{aligned}\right\}\text{ Per Beam Line}$$

NOTE: Pier Diaphragm weight included in dead load reaction

5. LIVE LOAD CASES



Live Load per Lane = 137.2^K

$(LL+I)$ per lane $= (137.2)(1.217) = \cancel{170.0^K}$ 167.0^K

$e_1 = 17.75'$

$e_2 = \left(\frac{17.75 + 5.75}{2}\right) = 11.75'$

$e_3 = \left(\frac{17.75 + 5.75 - 6.25}{3}\right) = 5.75'$

F_V (1 LANE) $= \cancel{170.0^K}$ 167.0^K

M_T (1 LANE) $= \cancel{170}\ 167\,(17.75) = \cancel{3017.5}\ 2964.3^{K'}$

F_V (2 LANES) $= 2(\cancel{170.0}\ 167) = \cancel{340.0}\ 334^{K}$

M_T (2 LANES) $= \cancel{340}\ 334\,(11.75) = \cancel{3995.0}\ 3924.5^{K'}$

F_V (3 LANES) $= 3(\cancel{170.0}\ 167)(0.9) = \cancel{459.0}\ 450.9^{K}$

M_T (3 LANES) $= \cancel{459}\,(5.75') = \cancel{2639.3}\ 2592.7^{K'}$

6. LONGITUDINAL LIVE LOAD (AASHTO 3.9)

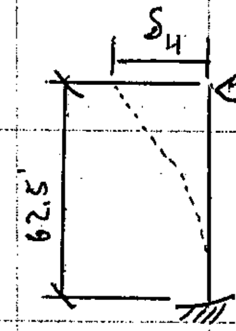
ϕ EXPANSION PIER

ASSUMPTION:
100% DISTRIBUTION TO PIER 2

7. CENTRIFUGAL (AASHTO 3.10)

ϕ STRUCTURE ON TANGENT ALIGNMENT

8. R + S + T



$E_{crack} \approx 0.5E = 0.5(57000)\sqrt{4000}\,(0.144) = 259,560^{ksf}$

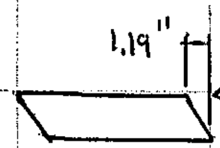
$I_{PIER} = \frac{(14.5)(4.5)^3}{12} + \frac{(46.5)(4.75)^3}{12} + \frac{(14.5)(4.75)^3}{12} + \frac{(13.5)(4.75)^3}{12} = 858.1\ ft^4$

$K_{SPRING} = \frac{F_H}{\delta_H}$

$K_{PIER} = \frac{3(259560)(858.1)}{(62.5)^3} = 2736.9\ ^{K/ft}$

$\delta_H = \frac{(F_H)L^3}{3EI} \Rightarrow K_{spring} = \frac{F_H}{1} \cdot \frac{3EI}{(F_H)L^3} = \boxed{\frac{3EI}{L^3}}$

$K_{BEARING} = \frac{F_H}{\delta_H}$



$K_{BEARING} = \frac{24.96}{1.19/12} = 251.7\ ^{K/ft}(5\ brgs.) = 1258.5\ ^{K/ft}$

$K_{EFF} = \frac{1}{\frac{1}{2736.9} + \frac{1}{1258.5}} = 862.1\ ^{K/ft}$

$\delta_T = (50^\circ)(105')(6\times10^{-6}) = 0.032'$

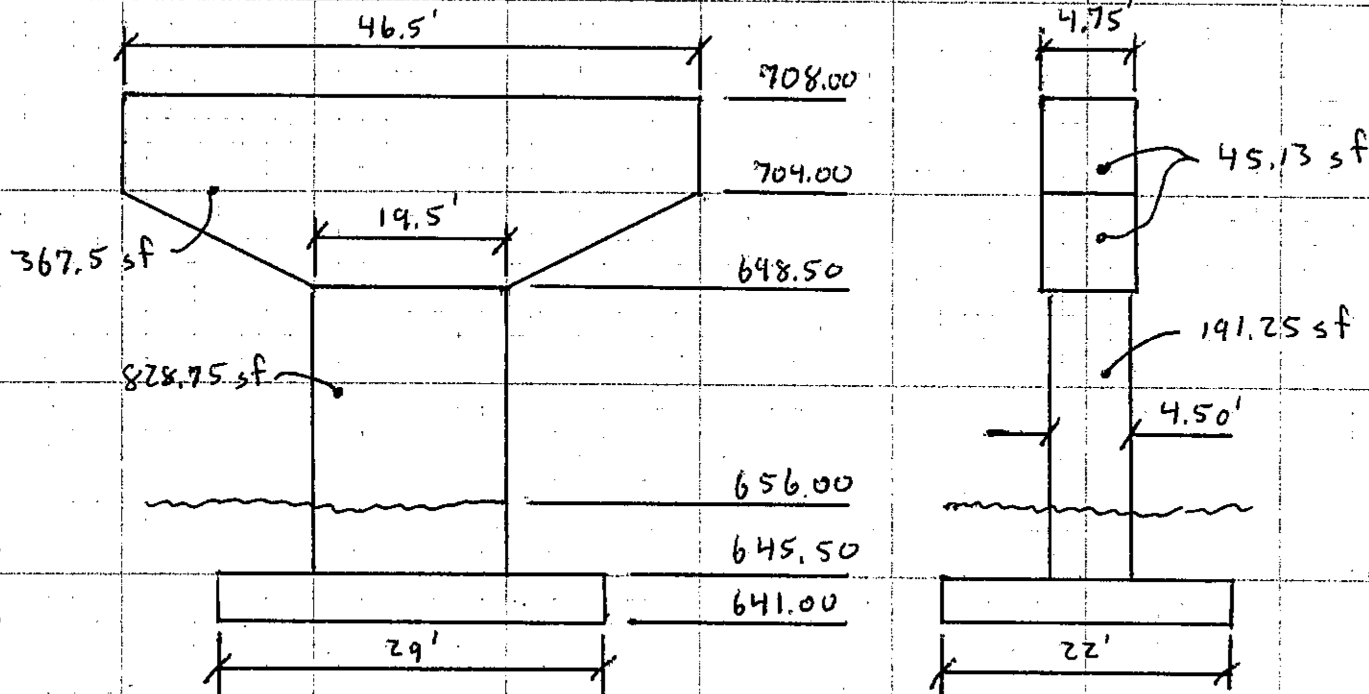
ASSUMING $65^\circ \pm 50^\circ$

$T = F_L = \delta_T K_{EFF} = (.032)(862.1) = 27.6^K$

$M_L = (27.6)(62.5') = 1725.0^{K'}$

4. WIND ON SUBSTRUCTURE (AASHTO 3.15.2)

- 100 mph @ 0° (40 psf)



$$F_T = (236.38\,sf)(.04^{ksf}) = 9.5^k$$

$$M_T = 9.5\left(\frac{708-656}{2} + (656-641)\right) = 389.5^k$$

- 100 mph @ 60° (20 psf_{TRANS} ; 35 psf_{LONG})

$$F_T = (236.38\,sf)(.02^{ksf}) = 4.7^k$$

$$M_T = 4.7\left(\frac{708-656}{2} + (656-641)\right) = 192.7^{k'}$$

$$F_L = (1196.25\,sf)(0.035^{ksf}) = 41.9^k$$

$$M_L = 41.9\left(\frac{708-656}{2} + (656-641)\right) = 1717.9^{k'}$$

10. STREAM FLOW (AASHTO 3.18.1)

$\emptyset$ NO STREAM

11. DEAD LOAD PIER

$0.15^{kcf}\left[(367.5)(4.75)+((4.50)(828.75+(19.5)(656-645.5))\right] = 959.5^{k}$ (PIER)

$0.15^{kcf}\left[(29)(4.5)(22)\right] = 430.7^{k}$ (FOOTING)

SUMMARY:
ALL FORCES AND MOMENTS TAKEN ABOUT AXIS OF PIER AND AT TOP OF PIER

#	LOADING	F_V	F_{LONG}	F_{TRANS}	M_{TRANS}	M_{LONG}
		(kips)	(kips)	(kips)	(kip-ft)	(kip-ft)
1	DEAD LOAD (5 BEAMS)	1954.0	--	--	--	--
2	LIVE LOAD AND IMPACT (1 LANES)	167.0	--	--	2964.3	--
2	LIVE LOAD AND IMPACT (2 LANES)	334.0	--	--	3924.5	--
2	LIVE LOAD AND IMPACT (3 LANES)	450.9	--	--	2592.7	--
3	LONGITUDINAL LIVE LOAD (1 LANES)	--	--	--	--	--
3	LONGITUDINAL LIVE LOAD (2 LANES)	--	--	--	--	--
3	LONGITUDINAL LIVE LOAD (3 LANES)	--	--	--	--	--
4	WIND ON SUPERSTRUCTURE @ 0°	--	--	54.6	296.5	--
5	WIND ON SUPERSTRUCTURE @ 60°	--	20.7	18.6	101.1	112.4
6	WIND OVERTURNING	-101.9	--	--	1235.5	--
7	WIND ON LIVE LOAD @ 0°	--	--	10.5	137.8	--
8	WIND ON LIVE LOAD @ 60°	--	4.0	3.6	47.3	52.5
9	R + S + T	--	27.6	--	--	1725.0
10	WIND ON SUBSTRUCTURE @ 0°	--	--	9.5	389.5	--
11	WIND ON SUBSTRUCTURE @ 60°	--	41.9	4.7	192.7	1717.9
12	STREAM FLOW	--	--	--	--	--
13	CENTRIFUGAL	--	--	--	--	--
14	DEAD LOAD PIER	959.5	--	--	--	--
15	DEAD LOAD FOOTING	430.7	--	--	--	--

CALCULATE PIER LOADS AT BOTTOM OF FOOTING:

** Pier Height = 708 - 641 = 67.00'

1. WIND ON STRUCTURE

- @ 0°

$F_T = 54.6^K$

$M_T = 54.6\left(\frac{10.4}{2} + 0.23 + 67\right) = 3954.7^{K'}$

- @ 60°

$F_T = 18.6^K$

$M_T = 18.6\left(\frac{10.4}{2} + 0.23 + 67\right) = 1347.2^{K'}$

$F_L = 20.7^K$

$M_L = 20.7\left(\frac{10.4}{2} + 0.23 + 67\right) = 1499.3^{K'}$

3. WIND ON LIVE LOAD

- @ 0°

$F_T = 10.5^K$

$M_T = 10.5\left(\frac{72 + 8.75 + 2 + 72 + 2.75}{12} + 67\right) = 841.3^{K'}$

- @ 60°

$F_T = 3.6^K$

$M_T = 3.6\left(\frac{72 + 8.75 + 2 + 72 + 2.75}{12} + 67\right) = 288.5^{K'}$

$F_L = 4.0^K$

$M_L = 4.0\left(\frac{72 + 8.75 + 2 + 72 + 2.75}{12} + 67\right) = 320.5^{K'}$

SUMMARY:
ALL FORCES AND MOMENTS TAKEN ABOUT AXIS OF PIER AND AT BOTTOM OF FOOTING

#	LOADING	F_V	F_{LONG}	F_{TRANS}	M_{TRANS}	M_{LONG}
		(kips)	(kips)	(kips)	(kip-ft)	(kip-ft)
1	DEAD LOAD (5 BEAMS)	1954.0	--	--	--	--
2	LIVE LOAD (1 LANES)	137.2	--	--	2435.3	--
2	LIVE LOAD (2 LANES)	274.4	--	--	3224.2	--
2	LIVE LOAD (3 LANES)	370.4	--	--	2129.8	--
3	LONGITUDINAL LIVE LOAD (1 LANES)	--	--	--	--	--
3	LONGITUDINAL LIVE LOAD (2 LANES)	--	--	--	--	--
3	LONGITUDINAL LIVE LOAD (3 LANES)	--	--	--	--	--
4	WIND ON SUPERSTRUCTURE @ 0°	--	--	54.6	3954.7	--
5	WIND ON SUPERSTRUCTURE @ 60°	--	20.7	18.6	1347.2	1499.3
6	WIND OVERTURNING	-101.9	--	--	1235.5	--
7	WIND ON LIVE LOAD @ 0°	--	--	10.5	841.3	--
8	WIND ON LIVE LOAD @ 60°	--	4.0	3.6	288.5	320.5
9	R + S + T	--	27.6	--	--	1725.0
10	WIND ON SUBSTRUCTURE @ 0°	--	--	9.5	389.5	--
11	WIND ON SUBSTRUCTURE @ 60°	--	41.9	4.7	192.7	1717.9
12	STREAM FLOW	--	--	--	--	--
13	CENTRIFUGAL	--	--	--	--	--
14	DEAD LOAD PIER	959.5	--	--	--	--
15	DEAD LOAD FOOTING	430.7	--	--	--	--

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
					BETA FACTOR										
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	100
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	125
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	140
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	133
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	140
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	150

(% column as printed, offset one row: 100, 150, 100, 100, 125, 125, 125, 140, 140, 133, 140, 150, 100)

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					BETA FACTOR									
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING LOADINGS (Max. LLecc, wind at 0 deg.)

LOADING (kips, K-ft)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3344.2	137.2											
TRANS.	F(X)								54.6	10.5				
LONG.	F(Z)											27.6		
LONG.	M(X)											1725.0		
TRANS.	M(Z)		-2435.3						-3954.7	-841.3				

SERVICE LOAD COMBINATIONS (1 LANE)

GROUP NO.

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3481.4	3618.6	3344.2	3344.2	3481.4	3481.4	3344.2	3481.4	3344.2	3481.4	3344.2	3481.4
TRANS.	F(X)	0.0	0.0	0.0	54.6	26.9	0.0	54.6	. 26.9	0.0	0.0	54.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	27.6	27.6	27.6	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	1725.0	1725.0	1725.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2435.3	-4870.6	0.0	-3954.7	-4463.0	-2435.3	-3954.7	-4463.0	0.0	-2435.3	-3954.7	-2435.3
	M(COMB)	2435.3	4870.6	0.0	3954.7	4463.0	2984.3	4314.5	4784.8	0.0	2435.3	3954.7	2435.3

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

GROUP NO.

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3481.4	2412.4	3344.2	2675.4	2785.1	2785.1	2388.7	2486.7	2514.4	2486.7	2229.5	3481.4
TRANS.	F(X)	0.0	0.0	0.0	43.7	21.5	0.0	39.0	19.2	0.0	0.0	36.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	22.1	19.7	19.7	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	1380.0	1232.1	1232.1	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2435.3	-3247.1	0.0	-3163.8	-3570.4	-1948.2	-2824.8	-3187.9	0.0	-1739.5	-2636.5	-2435.3
	M(COMB)	2435.3	3247.1	0.0	3163.8	3570.4	2387.5	3081.8	3417.7	0.0	1739.5	2636.5	2435.3

LOAD FACTOR COMBINATIONS (1 LANE)

GROUP NO.

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4645.3	4739.9	4347.5	4347.5	4525.8	4525.8	4180.3	4351.8	4347.5	4525.8	4013.0	4645.3
TRANS.	F(X)	0.0	0.0	0.0	71.0	34.9	0.0	68.3	33.6	0.0	0.0	65.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	35.9	34.5	34.5	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	2242.5	2156.3	2156.3	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-5287.0	-6965.0	0.0	-5141.1	-5801.9	-3165.9	-4943.4	-5578.8	0.0	-3165.9	-4745.6	-5287.0
	M(COMB)	5287.0	6965.0	0.0	5141.1	5801.9	3879.6	5393.2	5981.0	0.0	3165.9	4745.6	5287.0

SPREAD FOOTING DESIGN (1 LANE)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal section modulus =	2339.3	ft^3
Transverse section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (1 LANE)

GROUP NO.

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	4.67	2.73	5.24	3.17	3.21	4.32	3.35	3.39	3.94	3.33	2.64	4.67
EDGE 2	6.25	4.83	5.24	5.22	5.52	5.59	5.19	5.46	3.94	4.46	4.35	6.25
EDGE 3	4.67	2.73	5.24	3.17	3.21	3.14	2.30	2.34	3.94	3.33	2.64	4.67
EDGE 4	6.25	4.83	5.24	5.22	5.52	4.41	4.13	4.40	3.94	4.46	4.35	6.25

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (1 LANE)

GROUP NO.

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.57	5.17	6.81	5.15	5.21	7.03	5.87	5.93	6.81	6.07	4.75	5.57
EDGE 2	9.00	9.69	6.81	8.48	8.98	9.08	9.08	9.55	6.81	8.12	7.83	9.00
EDGE 3	5.57	5.17	6.81	5.15	5.21	5.11	4.03	4.09	6.81	6.07	4.75	5.57
EDGE 4	9.00	9.69	6.81	8.48	8.98	7.16	7.23	7.71	6.81	8.12	7.83	9.00

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

					BETA FACTOR										
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

					BETA FACTOR									
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

					LOADING (kips, K-ft)									
	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3344.2	274.4											
TRANS.	F(X)								54.6	10.5				
LONG.	F(Z)											27.6		
LONG.	M(X)											1725.0		
TRANS.	M(Z)		-3224.2						-3954.7	-841.3				

SERVICE LOAD COMBINATIONS (2 LANES)

	Load Component	GROUP NO.											
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3618.6	3893.0	3344.2	3344.2	3618.6	3618.6	3344.2	3618.6	3344.2	3618.6	3344.2	3618.6
TRANS.	F(X)	0.0	0.0	0.0	54.6	26.9	0.0	54.6	26.9	0.0	0.0	54.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	27.6	27.6	27.6	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	1725.0	1725.0	1725.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-3224.2	-6448.4	0.0	-3954.7	-5251.9	-3224.2	-3954.7	-5251.9	0.0	-3224.2	-3954.7	-3224.2
	M(COMB)	3224.2	6448.4	0.0	3954.7	5251.9	3656.7	4314.5	5527.9	0.0	3224.2	3954.7	3224.2

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

	Load Component	GROUP NO.											
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3618.6	2595.3	3344.2	2675.4	2894.9	2894.9	2388.7	2584.7	2514.4	2584.7	2229.5	3618.6
TRANS.	F(X)	0.0	0.0	0.0	43.7	21.5	0.0	39.0	19.2	0.0	0.0	36.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	22.1	19.7	19.7	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	1380.0	1232.1	1232.1	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-3224.2	-4298.9	0.0	-3163.8	-4201.5	-2579.4	-2824.8	-3751.4	0.0	-2303.0	-2636.5	-3224.2
	M(COMB)	3224.2	4298.9	0.0	3163.8	4201.5	2925.3	3081.8	3948.5	0.0	2303.0	2636.5	3224.2

LOAD FACTOR COMBINATIONS (2 LANES)

	Load Component	GROUP NO.											
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4943.2	5132.2	4347.5	4347.5	4704.2	4704.2	4180.3	4523.3	4347.5	4704.2	4013.0	4943.2
TRANS.	F(X)	0.0	0.0	0.0	71.0	34.9	0.0	68.3	33.6	0.0	0.0	65.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	35.9	34.5	34.5	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	2242.5	2156.3	2156.3	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-6999.7	-9221.2	0.0	-5141.1	-6827.5	-4191.5	-4943.4	-6564.9	0.0	-4191.5	-4745.6	-6999.7
	M(COMB)	6999.7	9221.2	0.0	5141.1	6827.5	4753.6	5393.2	6909.9	0.0	4191.5	4745.6	6999.7

SPREAD FOOTING DESIGN (2 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (2 LANES)

	GROUP NO.											
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	4.63	2.67	5.24	3.17	3.17	4.29	3.35	3.36	3.94	3.30	2.64	4.63
EDGE 2	6.72	5.46	5.24	5.22	5.90	5.96	5.19	5.79	3.94	4.80	4.35	6.72
EDGE 3	4.63	2.67	5.24	3.17	3.17	3.11	2.30	2.31	3.94	3.30	2.64	4.63
EDGE 4	6.72	5.46	5.24	5.22	5.90	4.78	4.13	4.74	3.94	4.80	4.35	6.72

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (2 LANES)

	GROUP NO.											
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.48	5.05	6.81	5.15	5.16	6.97	5.87	5.88	6.81	6.01	4.75	5.48
EDGE 2	10.02	11.03	6.81	8.48	9.59	9.69	9.08	10.14	6.81	8.73	7.83	10.02
EDGE 3	5.48	5.05	6.81	5.15	5.16	5.06	4.03	4.04	6.81	6.01	4.75	5.48
EDGE 4	10.02	11.03	6.81	8.48	9.59	7.77	7.23	8.30	6.81	8.73	7.83	10.02

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
						BETA FACTOR									
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
						BETA FACTOR								
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING

LOADINGS (Max. LLecc, wind at 0 deg.)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					LOADING (kips, K-ft)									
VERT.	F(V)	3344.2	370.4											
TRANS.	F(X)								54.6	10.5				
LONG.	F(Z)											27.6		
LONG.	M(X)											1725.0		
TRANS.	M(Z)		-2129.8						-3954.7	-841.3				

SERVICE LOAD COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3714.6	4085.0	3344.2	3344.2	3714.6	3714.6	3344.2	3714.6	3344.2	3714.6	3344.2	3714.6
TRANS.	F(X)	0.0	0.0	0.0	54.6	26.9	0.0	54.6	26.9	0.0	0.0	54.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	27.6	27.6	27.6	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	1725.0	1725.0	1725.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2129.8	-4259.6	0.0	-3954.7	-4157.5	-2129.8	-3954.7	-4157.5	0.0	-2129.8	-3954.7	-2129.8
	M(COMB)	2129.8	4259.6	0.0	3954.7	4157.5	2740.7	4314.5	4501.2	0.0	2129.8	3954.7	2129.8

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3714.6	2723.3	3344.2	2675.4	2971.7	2971.7	2388.7	2653.3	2514.4	2653.3	2229.5	3714.6
TRANS.	F(X)	0.0	0.0	0.0	43.7	21.5	0.0	39.0	19.2	0.0	0.0	36.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	22.1	19.7	19.7	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	1380.0	1232.1	1232.1	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2129.8	-2839.7	0.0	-3163.8	-3326.0	-1703.8	-2824.8	-2969.7	0.0	-1521.3	-2636.5	-2129.8
	M(COMB)	2129.8	2839.7	0.0	3163.8	3326.0	2192.6	3081.8	3215.1	0.0	1521.3	2636.5	2129.8

LOAD FACTOR COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	5151.6	5406.8	4347.5	4347.5	4829.0	4829.0	4180.3	4643.3	4347.5	4829.0	4013.0	5151.6
TRANS.	F(X)	0.0	0.0	0.0	71.0	34.9	0.0	68.3	33.6	0.0	0.0	65.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	35.9	34.5	34.5	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	2242.5	2156.3	2156.3	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-4623.8	-6091.2	0.0	-5141.1	-5404.8	-2768.7	-4943.4	-5196.9	0.0	-2768.7	-4745.6	-4623.8
	M(COMB)	4623.8	6091.2	0.0	5141.1	5404.8	3563.0	5393.2	5626.5	0.0	2768.7	4745.6	4623.8

SPREAD FOOTING DESIGN (3 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (3 LANES)

		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
	EDGE 1	5.13	3.35	5.24	3.17	3.58	4.70	3.35	3.72	3.94	3.67	2.64	5.13
	EDGE 2	6.51	5.19	5.24	5.22	5.74	5.80	5.19	5.65	3.94	4.65	4.35	6.51
	EDGE 3	5.13	3.35	5.24	3.17	3.58	3.52	2.30	2.67	3.94	3.67	2.64	5.13
	EDGE 4	6.51	5.19	5.24	5.22	5.74	4.62	4.13	4.60	3.94	4.65	4.35	6.51

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (3 LANES)

		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
	EDGE 1	6.58	6.50	6.81	5.15	5.82	7.63	5.87	6.51	6.81	6.67	4.75	6.58
	EDGE 2	9.57	10.45	6.81	8.48	9.32	9.43	9.08	9.88	6.81	8.47	7.83	9.57
	EDGE 3	6.58	6.50	6.81	5.15	5.82	5.71	4.03	4.67	6.81	6.67	4.75	6.58
	EDGE 4	9.57	10.45	6.81	8.48	9.32	7.51	7.23	8.04	6.81	8.47	7.83	9.57

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

	Load							BETA FACTOR							
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

	Load						BETA FACTOR							
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

	Load					LOADING (kips, K-ft)								
	Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3344.2	137.2											
TRANS.	F(X)								54.6	10.5				
LONG.	F(Z)											-27.6		
LONG.	M(X)											-1725.0		
TRANS.	M(Z)		-2435.3						-3954.7	-841.3				

* switched R+S+T

SERVICE LOAD COMBINATIONS (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3481.4	3618.6	3344.2	3344.2	3481.4	3481.4	3344.2	3481.4	3344.2	3481.4	3344.2	3481.4
TRANS.	F(X)	0.0	0.0	0.0	54.6	26.9	0.0	54.6	26.9	0.0	0.0	54.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-27.6	-27.6	-27.6	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-1725.0	-1725.0	-1725.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2435.3	-4870.6	0.0	-3954.7	-4463.0	-2435.3	-3954.7	-4463.0	0.0	-2435.3	-3954.7	-2435.3
	M(COMB)	2435.3	4870.6	0.0	3954.7	4463.0	2984.3	4314.5	4784.8	0.0	2435.3	3954.7	2435.3

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3481.4	2412.4	3344.2	2675.4	2785.1	2785.1	2388.7	2486.7	2514.4	2486.7	2229.5	3481.4
TRANS.	F(X)	0.0	0.0	0.0	43.7	21.5	0.0	39.0	19.2	0.0	0.0	36.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-22.1	-19.7	-19.7	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-1380.0	-1232.1	-1232.1	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2435.3	-3247.1	0.0	-3163.8	-3570.4	-1948.2	-2824.8	-3187.9	0.0	-1739.5	-2636.5	-2435.3
	M(COMB)	2435.3	3247.1	0.0	3163.8	3570.4	2387.5	3081.8	3417.7	0.0	1739.5	2636.5	2435.3

LOAD FACTOR COMBINATIONS (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4645.3	4739.9	4347.5	4347.5	4525.8	4525.8	4180.3	4351.8	4347.5	4525.8	4013.0	4645.3
TRANS.	F(X)	0.0	0.0	0.0	71.0	34.9	0.0	68.3	33.6	0.0	0.0	65.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-35.9	-34.5	-34.5	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-2242.5	-2156.3	-2156.3	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-5287.0	-6965.0	0.0	-5141.1	-5801.9	-3165.9	-4943.4	-5578.8	0.0	-3165.9	-4745.6	-5287.0
	M(COMB)	5287.0	6965.0	0.0	5141.1	5801.9	3879.6	5393.2	5981.0	0.0	3165.9	4745.6	5287.0

SPREAD FOOTING DESIGN (1 LANE)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (1 LANE)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	4.67	2.73	5.24	3.17	3.21	3.14	2.30	2.34	3.94	3.33	2.64	4.67
EDGE 2	6.25	4.83	5.24	5.22	5.52	4.41	4.13	4.40	3.94	4.46	4.35	6.25
EDGE 3	4.67	2.73	5.24	3.17	3.21	4.32	3.35	3.39	3.94	3.33	2.64	4.67
EDGE 4	6.25	4.83	5.24	5.22	5.52	5.59	5.19	5.46	3.94	4.46	4.35	6.25

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (1 LANE)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.57	5.17	6.81	5.15	5.21	5.11	4.03	4.09	6.81	6.07	4.75	5.57
EDGE 2	9.00	9.69	6.81	8.48	8.98	7.16	7.23	7.71	6.81	8.12	7.83	9.00
EDGE 3	5.57	5.17	6.81	5.15	5.21	7.03	5.87	5.93	6.81	6.07	4.75	5.57
EDGE 4	9.00	9.69	6.81	8.48	8.98	9.08	9.08	9.55	6.81	8.12	7.83	9.00

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

						BETA FACTOR									
	Load														
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

						BETA FACTOR								
	Load													
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

BOTTOM OF FOOTING

* for lateral at-rest earth pressures

LOADINGS (Max. LLecc, wind at 0 deg.)

						LOADING (kips, K-ft)								
	Load													
	Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3344.2	274.4											
TRANS.	F(X)								54.6	10.5				
LONG.	F(Z)											-27.6		
LONG.	M(X)											-1725.0		
TRANS.	M(Z)		-3224.2						-3954.7	-841.3				

* switched R+S+T

SERVICE LOAD COMBINATIONS (2 LANES)

	Load						GROUP NO.						
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3618.6	3893.0	3344.2	3344.2	3618.6	3618.6	3344.2	3618.6	3344.2	3618.6	3344.2	3618.6
TRANS.	F(X)	0.0	0.0	0.0	54.6	26.9	0.0	54.6	26.9	0.0	0.0	54.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-27.6	-27.6	-27.6	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-1725.0	-1725.0	-1725.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-3224.2	-6448.4	0.0	-3954.7	-5251.9	-3224.2	-3954.7	-5251.9	0.0	-3224.2	-3954.7	-3224.2
	M(COMB)	3224.2	6448.4	0.0	3954.7	5251.9	3656.7	4314.5	5527.9	0.0	3224.2	3954.7	3224.2

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

	Load						GROUP NO.						
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3618.6	2595.3	3344.2	2675.4	2894.9	2894.9	2388.7	2584.7	2514.4	2584.7	2229.5	3618.6
TRANS.	F(X)	0.0	0.0	0.0	43.7	21.5	0.0	39.0	19.2	0.0	0.0	36.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-22.1	-19.7	-19.7	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-1380.0	-1232.1	-1232.1	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-3224.2	-4298.9	0.0	-3163.8	-4201.5	-2579.4	-2824.8	-3751.4	0.0	-2303.0	-2636.5	-3224.2
	M(COMB)	3224.2	4298.9	0.0	3163.8	4201.5	2925.3	3081.8	3948.5	0.0	2303.0	2636.5	3224.2

LOAD FACTOR COMBINATIONS (2 LANES)

	Load						GROUP NO.						
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4943.2	5132.2	4347.5	4347.5	4704.2	4704.2	4180.3	4523.3	4347.5	4704.2	4013.0	4943.2
TRANS.	F(X)	0.0	0.0	0.0	71.0	34.9	0.0	68.3	33.6	0.0	0.0	65.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-35.9	-34.5	-34.5	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-2242.5	-2156.3	-2156.3	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-6999.7	-9221.2	0.0	-5141.1	-6827.5	-4191.5	-4943.4	-6564.9	0.0	-4191.5	-4745.6	-6999.7
	M(COMB)	6999.7	9221.2	0.0	5141.1	6827.5	4753.6	5393.2	6909.9	0.0	4191.5	4745.6	6999.7

SPREAD FOOTING DESIGN (2 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (2 LANES)

							GROUP NO.						
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
	EDGE 1	4.63	2.67	5.24	3.17	3.17	3.11	2.30	2.31	3.94	3.30	2.64	4.63
	EDGE 2	6.72	5.46	5.24	5.22	5.90	4.78	4.13	4.74	3.94	4.80	4.35	6.72
	EDGE 3	4.63	2.67	5.24	3.17	3.17	4.29	3.35	3.36	3.94	3.30	2.64	4.63
	EDGE 4	6.72	5.46	5.24	5.22	5.90	5.96	5.19	5.79	3.94	4.80	4.35	6.72

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (2 LANES)

							GROUP NO.						
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
	EDGE 1	5.48	5.05	6.81	5.15	5.16	5.06	4.03	4.04	6.81	6.01	4.75	5.48
	EDGE 2	10.02	11.03	6.81	8.48	9.59	7.77	7.23	8.30	6.81	8.73	7.83	10.02
	EDGE 3	5.48	5.05	6.81	5.15	5.16	6.97	5.87	5.88	6.81	6.01	4.75	5.48
	EDGE 4	10.02	11.03	6.81	8.48	9.59	9.69	9.08	10.14	6.81	8.73	7.83	10.02

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
					BETA FACTOR										
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					BETA FACTOR									
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					LOADING (kips, K-ft)									
VERT.	F(V)	3344.2	370.4											
TRANS.	F(X)								54.6	10.5				
LONG.	F(Z)											-27.6		
LONG.	M(X)											-1725.0		
TRANS.	M(Z)		-2129.8						-3954.7	-841.3				

* switched R+S+T

SERVICE LOAD COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3714.6	4085.0	3344.2	3344.2	3714.6	3714.6	3344.2	3714.6	3344.2	3714.6	3344.2	3714.6
TRANS.	F(X)	0.0	0.0	0.0	54.6	26.9	0.0	54.6	26.9	0.0	0.0	54.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-27.6	-27.6	-27.6	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-1725.0	-1725.0	-1725.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2129.8	-4259.6	0.0	-3954.7	-4157.5	-2129.8	-3954.7	-4157.5	0.0	-2129.8	-3954.7	-2129.8
	M(COMB)	2129.8	4259.6	0.0	3954.7	4157.5	2740.7	4314.5	4501.2	0.0	2129.8	3954.7	2129.8

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3714.6	2723.3	3344.2	2675.4	2971.7	2971.7	2388.7	2653.3	2514.4	2653.3	2229.5	3714.6
TRANS.	F(X)	0.0	0.0	0.0	43.7	21.5	0.0	39.0	19.2	0.0	0.0	36.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-22.1	-19.7	-19.7	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-1380.0	-1232.1	-1232.1	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2129.8	-2839.7	0.0	-3163.8	-3326.0	-1703.8	-2824.8	-2969.7	0.0	-1521.3	-2636.5	-2129.8
	M(COMB)	2129.8	2839.7	0.0	3163.8	3326.0	2192.6	3081.8	3215.1	0.0	1521.3	2636.5	2129.8

LOAD FACTOR COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	5151.6	5406.8	4347.5	4347.5	4829.0	4829.0	4180.3	4643.3	4347.5	4829.0	4013.0	5151.6
TRANS.	F(X)	0.0	0.0	0.0	71.0	34.9	0.0	68.3	33.6	0.0	0.0	65.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	0.0	-35.9	-34.5	-34.5	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	0.0	-2242.5	-2156.3	-2156.3	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-4623.8	-6091.2	0.0	-5141.1	-5404.8	-2768.7	-4943.4	-5196.9	0.0	-2768.7	-4745.6	-4623.8
	M(COMB)	4623.8	6091.2	0.0	5141.1	5404.8	3563.0	5393.2	5626.5	0.0	2768.7	4745.6	4623.8

SPREAD FOOTING DESIGN (3 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (3 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	5.13	3.35	5.24	3.17	3.58	3.52	2.30	2.67	3.94	3.67	2.64	5.13
EDGE 2	6.51	5.19	5.24	5.22	5.74	4.62	4.13	4.60	3.94	4.65	4.35	6.51
EDGE 3	5.13	3.35	5.24	3.17	3.58	4.70	3.35	3.72	3.94	3.67	2.64	5.13
EDGE 4	6.51	5.19	5.24	5.22	5.74	5.80	5.19	5.65	3.94	4.65	4.35	6.51

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (3 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	6.58	6.50	6.81	5.15	5.82	5.71	4.03	4.67	6.81	6.67	4.75	6.58
EDGE 2	9.57	10.45	6.81	8.48	9.32	7.51	7.23	8.04	6.81	8.47	7.83	9.57
EDGE 3	6.58	6.50	6.81	5.15	5.82	7.63	5.87	6.51	6.81	6.67	4.75	6.58
EDGE 4	9.57	10.45	6.81	8.48	9.32	9.43	9.08	9.88	6.81	8.47	7.83	9.57

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

	Load						BETA FACTOR								
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

	Load						BETA FACTOR							
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 60 deg.)

	Load					LOADING (kips, K-ft)								
	Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3344.2	137.2											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.7	4.0		27.6		
LONG.	M(X)								-1499.3	-320.5		1725.0		
TRANS.	M(Z)		-2435.3						-1347.2	-288.5				

* switched wind direction

SERVICE LOAD COMBINATIONS (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3481.4	3618.6	3344.2	3344.2	3481.4	3481.4	3344.2	3481.4	3344.2	3481.4	3344.2	3481.4
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.7	10.2	27.6	48.3	37.8	0.0	0.0	20.7	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	-770.3	1725.0	225.7	954.7	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-2435.3	-4870.6	0.0	-1347.2	-3128.0	-2435.3	-1347.2	-3128.0	0.0	-2435.3	-1347.2	-2435.3
	M(COMB)	2435.3	4870.6	0.0	2015.7	3221.4	2984.3	1366.0	3270.4	0.0	2435.3	2015.7	2435.3

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3481.4	2412.4	3344.2	2675.4	2785.1	2785.1	2388.7	2486.7	2514.4	2486.7	2229.5	3481.4
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	8.2	22.1	34.5	27.0	0.0	0.0	13.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-616.2	1380.0	161.2	681.9	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-2435.3	-3247.1	0.0	-1077.8	-2502.4	-1948.2	-962.3	-2234.3	0.0	-1739.5	-898.1	-2435.3
	M(COMB)	2435.3	3247.1	0.0	1612.5	2577.1	2387.5	975.7	2336.0	0.0	1739.5	1343.8	2435.3

LOAD FACTOR COMBINATIONS (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4645.3	4739.9	4347.5	4347.5	4525.8	4525.8	4180.3	4351.8	4347.5	4525.8	4013.0	4645.3
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	26.9	13.3	35.9	60.4	47.3	0.0	0.0	24.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-1001.4	2242.5	282.1	1193.4	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-5287.0	-6965.0	0.0	-1751.4	-4066.3	-3165.9	-1684.0	-3910.0	0.0	-3165.9	-1616.6	-5287.0
	M(COMB)	5287.0	6965.0	0.0	2620.3	4187.8	3679.6	1707.5	4088.0	0.0	3165.9	2418.8	5287.0

SPREAD FOOTING DESIGN (1 LANE)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (1 LANE)

						GROUP NO.							
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
	EDGE 1	4.67	2.73	5.24	3.33	3.29	4.32	3.50	3.46	3.94	3.33	2.78	4.67
	EDGE 2	6.25	4.83	5.24	4.03	4.91	5.59	4.13	4.91	3.94	4.46	3.36	6.25
	EDGE 3	4.67	2.73	5.24	4.36	3.82	3.14	3.36	2.88	3.94	3.33	3.63	4.67
	EDGE 4	6.25	4.83	5.24	5.06	5.44	4.41	3.99	4.33	3.94	4.46	4.21	6.25

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (1 LANE)

						GROUP NO.							
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
	EDGE 1	5.57	5.17	6.81	5.41	5.35	7.03	6.13	6.06	6.81	6.07	5.00	5.57
	EDGE 2	9.00	9.69	6.81	6.55	7.98	9.08	7.22	8.60	6.81	8.12	6.05	9.00
	EDGE 3	5.57	5.17	6.81	7.08	6.20	5.11	5.89	5.04	6.81	6.07	6.53	5.57
	EDGE 4	9.00	9.69	6.81	8.22	8.84	7.16	6.98	7.58	6.81	8.12	7.58	9.00

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

						BETA FACTOR									
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

						BETA FACTOR								
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 60 deg.)

						LOADING (kips, K-ft)								
	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3344.2	274.4											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.7	4.0		27.6		
LONG.	M(X)								-1499.3	-320.5		1725.0		
TRANS.	M(Z)		-3224.2						-1347.2	-288.5				

* switched wind direction

SERVICE LOAD COMBINATIONS (2 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3618.6	3893.0	3344.2	3344.2	3618.6	3618.6	3344.2	3618.6	3344.2	3618.6	3344.2	3618.6
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.7	10.2	27.6	48.3	37.8	0.0	0.0	20.7	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	-770.3	1725.0	225.7	954.7	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-3224.2	-6448.4	0.0	-1347.2	-3916.9	-3224.2	-1347.2	-3916.9	0.0	-3224.2	-1347.2	-3224.2
	M(COMB)	3224.2	6448.4	0.0	2015.7	3991.9	3656.7	1366.0	4031.5	0.0	3224.2	2015.7	3224.2

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3618.6	2595.3	3344.2	2675.4	2894.9	2894.9	2388.7	2584.7	2514.4	2584.7	2229.5	3618.6
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	8.2	22.1	34.5	27.0	0.0	0.0	13.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-616.2	1380.0	161.2	681.9	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-3224.2	-4298.9	0.0	-1077.8	-3133.5	-2579.4	-962.3	-2797.8	0.0	-2303.0	-898.1	-3224.2
	M(COMB)	3224.2	4298.9	0.0	1612.5	3193.5	2925.3	975.7	2879.7	0.0	2303.0	1343.8	3224.2

LOAD FACTOR COMBINATIONS (2 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4943.2	5132.2	4347.5	4347.5	4704.2	4704.2	4180.3	4523.3	4347.5	4704.2	4013.0	4943.2
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	26.9	13.3	35.9	60.4	47.3	0.0	0.0	24.6	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-1001.4	2242.5	282.1	1193.4	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-6999.7	-9221.2	0.0	-1751.4	-5091.9	-4191.5	-1684.0	-4896.1	0.0	-4191.5	-1616.6	-6999.7
	M(COMB)	6999.7	9221.2	0.0	2620.3	5189.4	4753.6	1707.5	5039.4	0.0	4191.5	2418.6	6999.7

SPREAD FOOTING DESIGN (2 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (2 LANES)

						GROUP NO.							
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
	EDGE 1	4.63	2.67	5.24	3.33	3.26	4.29	3.50	3.44	3.94	3.30	2.78	4.63
	EDGE 2	6.72	5.46	5.24	4.03	5.29	5.96	4.13	5.25	3.94	4.80	3.36	6.72
	EDGE 3	4.63	2.67	5.24	4.36	3.78	3.11	3.36	2.85	3.94	3.30	3.63	4.63
	EDGE 4	6.72	5.46	5.24	5.06	5.82	4.78	3.99	4.67	3.94	4.80	4.21	6.72

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (2 LANES)

						GROUP NO.							
		I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
	EDGE 1	5.48	5.05	6.81	5.41	5.29	6.97	6.13	6.01	6.81	6.01	5.00	5.48
	EDGE 2	10.02	11.03	6.81	6.55	8.60	9.69	7.22	9.19	6.81	8.73	6.05	10.02
	EDGE 3	5.48	5.05	6.81	7.08	6.15	5.06	5.89	4.99	6.81	6.01	6.53	5.48
	EDGE 4	10.02	11.03	6.81	8.22	9.45	7.77	6.98	8.17	6.81	8.73	7.58	10.02

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
						BETA FACTOR									
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
						BETA FACTOR								
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 60 deg.)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
						LOADING (kips, K-ft)								
VERT.	F(V)	3344.2	370.4											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.7	4.0		27.6		
LONG.	M(X)								-1499.3	-320.5		1725.0		
TRANS.	M(Z)		-2129.8						-1347.2	-288.5				

*switched wind direction

SERVICE LOAD COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3714.6	4085.0	3344.2	3344.2	3714.6	3714.6	3344.2	3714.6	3344.2	3714.6	3344.2	3714.6
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.7	10.2	27.6	48.3	37.8	0.0	0.0	20.7	0.0
LONG.	M(X)	0.0 .	0.0	0.0	-1499.3	-770.3	1725.0	225.7	954.7	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-2129.8	-4259.6	0.0	-1347.2	-2822.5	-2129.8	-1347.2	-2822.5	0.0	-2129.8	-1347.2	-2129.8
	M(COMB)	2129.8	4259.6	0.0	2015.7	2925.7	2740.7	1366.0	2979.6	0.0	2129.8	2015.7	2129.8

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3714.6	2723.3	3344.2	2675.4	2971.7	2971.7	2388.7	2653.3	2514.4	2653.3	2229.5	3714.6
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	8.2	22.1	34.5	27.0	0.0	0.0	13.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-616.2	1380.0	161.2	681.9	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-2129.8	-2839.7	0.0	-1077.8	-2258.0	-1703.8	-962.3	-2016.0	0.0	-1521.3	-898.1	-2129.8
	M(COMB)	2129.8	2839.7	0.0	1612.5	2340.5	2192.6	975.7	2128.3	0.0	1521.3	1343.8	2129.8

LOAD FACTOR COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	5151.6	5406.8	4347.5	4347.5	4829.0	4829.0	4180.3	4643.3	4347.5	4829.0	4013.0	5151.6
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	26.9	13.3	35.9	60.4	47.3	0.0	0.0	24.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-1001.4	2242.5	282.1	1193.4	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-4623.8	-6091.2	0.0	-1751.4	-3669.2	-2768.7	-1684.0	-3528.1	0.0	-2768.7	-1616.6	-4623.8
	M(COMB)	4623.8	6091.2	0.0	2620.3	3803.4	3563.0	1707.5	3724.4	0.0	2768.7	2418.8	4623.8

SPREAD FOOTING DESIGN (3 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (3 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	5.13	3.35	5.24	3.33	3.66	4.70	3.50	3.80	3.94	3.67	2.78	5.13
EDGE 2	6.51	5.19	5.24	4.03	5.13	5.80	4.13	5.10	3.94	4.65	3.36	6.51
EDGE 3	5.13	3.35	5.24	4.36	4.19	3.52	3.36	3.21	3.94	3.67	3.63	5.13
EDGE 4	6.51	5.19	5.24	5.06	5.65	4.62	3.99	4.52	3.94	4.65	4.21	6.51

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (3 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	6.58	6.50	6.81	5.41	5.95	7.63	6.13	6.64	6.81	6.67	5.00	6.58
EDGE 2	9.57	10.45	6.81	6.55	8.33	9.43	7.22	8.93	6.81	8.47	6.05	9.57
EDGE 3	6.58	6.50	6.81	7.08	6.81	5.71	5.89	5.62	6.81	6.67	6.53	6.58
EDGE 4	9.57	10.45	6.81	8.22	9.18	7.51	6.98	7.91	6.81	8.47	7.58	9.57

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
					BETA FACTOR										
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					BETA FACTOR									
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING LOADINGS (Max. LLecc, wind at 60 deg.)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					LOADING (kips, K-ft)									
VERT.	F(V)	3400.3	130.7											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.7	4.0		-27.6		
LONG.	M(X)								-1499.3	-320.5		-1725.0		
TRANS.	M(Z)		-2320.0						-1347.2	-288.5				

x switched R+S+T & wind direction

SERVICE LOAD COMBINATIONS (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3531.0	3661.7	3400.3	3400.3	3531.0	3531.0	3400.3	3531.0	3400.3	3531.0	3400.3	3531.0
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.7	10.2	-27.6	-6.9	-17.4	0.0	0.0	20.7	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	-770.3	-1725.0	-3224.3	-2495.3	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-2320.0	-4640.0	0.0	-1347.2	-3012.7	-2320.0	-1347.2	-3012.7	0.0	-2320.0	-1347.2	-2320.0
	M(COMB)	2320.0	4640.0	0.0	2015.7	3109.6	2891.0	3494.4	3911.9	0.0	2320.0	2015.7	2320.0

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3531.0	2441.1	3400.3	2720.2	2824.8	2824.8	2428.6	2522.1	2556.6	2522.1	2266.9	3531.0
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	8.2	-22.1	-4.9	-12.4	0.0	0.0	13.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-616.2	-1380.0	-2303.1	-1782.4	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-2320.0	-3093.3	0.0	-1077.8	-2410.1	-1856.0	-962.3	-2151.9	0.0	-1657.1	-898.1	-2320.0
	M(COMB)	2320.0	3093.3	0.0	1612.5	2487.7	2312.8	2496.0	2794.2	0.0	1657.1	1343.8	2320.0

LOAD FACTOR COMBINATIONS (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	4704.1	4794.2	4420.4	4420.4	4590.3	4590.3	4250.4	4413.8	4420.4	4590.3	4080.4	4704.1
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	26.9	13.3	-35.9	-8.6	-21.7	0.0	0.0	24.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-1001.4	-2242.5	-4030.4	-3119.1	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-5036.7	-6635.2	0.0	-1751.4	-3916.5	-3016.0	-1684.0	-3765.8	0.0	-3016.0	-1616.6	-5036.7
	M(COMB)	5036.7	6635.2	0.0	2620.3	4042.4	3758.3	4368.0	4889.8	0.0	3016.0	2418.8	5036.7

SPREAD FOOTING DESIGN (1 LANE)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (1 LANE)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	4.78	2.82	5.33	3.40	3.38	3.24	2.51	2.49	4.01	3.42	2.83	4.78
EDGE 2	6.29	4.83	5.33	4.10	4.95	4.44	3.13	3.89	4.01	4.49	3.42	6.29
EDGE 3	4.78	2.82	5.33	4.43	3.91	4.42	4.48	4.02	4.01	3.42	3.69	4.78
EDGE 4	6.29	4.83	5.33	5.13	5.47	5.62	5.10	5.41	4.01	4.49	4.27	6.29

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (1 LANE)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	5.74	5.36	6.93	5.53	5.50	5.26	4.39	4.36	6.93	6.22	5.10	5.74
EDGE 2	9.01	9.67	6.93	6.66	8.04	7.21	5.49	6.81	6.93	6.17	6.15	9.01
EDGE 3	5.74	5.36	6.93	7.19	6.35	7.18	7.64	7.03	6.93	6.22	6.64	5.74
EDGE 4	9.01	9.67	6.93	8.33	8.89	9.13	8.93	9.47	6.93	8.17	7.69	9.01

By: RBK
6/29/2009

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
						BETA FACTOR									
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
						BETA FACTOR								
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING LOADINGS (Max. LLecc, wind at 60 deg.)

LOADING (kips, K-ft)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	261.4											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.7	4.0		-27.6		
LONG.	M(X)								-1499.3	-320.5		-1725.0		
TRANS.	M(Z)		-3071.5						-1347.2	-288.5				

x switched
R+S+T &
wind direction

SERVICE LOAD COMBINATIONS (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3661.7	3923.1	3400.3	3400.3	3661.7	3661.7	3400.3	3661.7	3400.3	3661.7	3400.3	3661.7
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.7	10.2	-27.6	-6.9	-17.4	0.0	0.0	20.7	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	-770.3	-1725.0	-3224.3	-2495.3	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-3071.5	-6143.0	0.0	-1347.2	-3764.2	-3071.5	-1347.2	-3764.2	0.0	-3071.5	-1347.2	-3071.5
	M(COMB)	3071.5	6143.0	0.0	2015.7	3842.2	3522.7	3494.4	4516.1	0.0	3071.5	2015.7	3071.5

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3661.7	2615.4	3400.3	2720.2	2929.4	2929.4	2428.8	2615.5	2556.6	2615.5	2266.9	3661.7
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	8.2	-22.1	-4.9	-12.4	0.0	0.0	13.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-618.2	-1380.0	-2303.1	-1782.4	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-3071.5	-4095.3	0.0	-1077.8	-3011.3	-2457.2	-962.3	-2688.7	0.0	-2193.9	-898.1	-3071.5
	M(COMB)	3071.5	4095.3	0.0	1612.5	3073.7	2818.2	2496.0	3225.8	0.0	2193.9	1343.8	3071.5

LOAD FACTOR COMBINATIONS (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	4987.9	5168.0	4420.4	4420.4	4760.2	4760.2	4250.4	4577.1	4420.4	4760.2	4080.4	4987.9
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	26.9	13.3	-35.9	-8.6	-21.7	0.0	0.0	24.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-1001.4	-2242.5	-4030.4	-3119.1	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-6668.2	-8784.5	0.0	-1751.4	-4893.4	-3993.0	-1684.0	-4705.2	0.0	-3993.0	-1616.6	-6668.2
	M(COMB)	6668.2	8784.5	0.0	2620.3	4994.8	4579.6	4368.0	5645.2	0.0	3993.0	2418.8	6668.2

SPREAD FOOTING DESIGN (2 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (2 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	4.74	2.77	5.33	3.40	3.35	3.20	2.51	2.47	4.01	3.39	2.83	4.74
EDGE 2	6.74	5.43	5.33	4.10	5.30	4.80	3.13	4.21	4.01	4.81	3.42	6.74
EDGE 3	4.74	2.77	5.33	4.43	3.88	4.38	4.48	3.99	4.01	3.39	3.69	4.74
EDGE 4	6.74	5.43	5.33	5.13	5.83	5.98	5.10	5.73	4.01	4.81	4.27	6.74

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (2 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	5.66	5.25	6.93	5.53	5.45	5.21	4.39	4.31	6.93	6.17	5.10	5.66
EDGE 2	9.98	10.95	6.93	6.66	8.62	7.80	5.49	7.37	6.93	8.76	6.15	9.98
EDGE 3	5.66	5.25	6.93	7.19	6.30	7.12	7.84	6.98	6.93	6.17	6.64	5.66
EDGE 4	9.98	10.95	6.93	8.33	9.48	9.71	8.93	10.03	6.93	8.76	7.69	9.98

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

BETA FACTOR

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

BETA FACTOR

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING LOADINGS (Max. LLecc, wind at 60 deg.)

LOADING (kips, K-ft)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	352.9											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.7	4.0		-27.6		
LONG.	M(X)								-1499.3	-320.5		-1725.0		
TRANS.	M(Z)		-2029.1						-1347.2	-288.5				

* switched R+S+T & wind direction

SERVICE LOAD COMBINATIONS (3 LANES)

GROUP NO.

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3753.2	4106.1	3400.3	3400.3	3753.2	3753.2	3400.3	3753.2	3400.3	3753.2	3400.3	3753.2
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.7	10.2	-27.6	-6.9	-17.4	0.0	0.0	20.7	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	-770.3	-1725.0	-3224.3	-2495.3	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-2029.1	-4058.2	0.0	-1347.2	-2721.8	-2029.1	-1347.2	-2721.8	0.0	-2029.1	-1347.2	-2029.1
	M(COMB)	2029.1	4058.2	0.0	2015.7	2826.7	2663.2	3494.4	3692.5	0.0	2029.1	2015.7	2029.1

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

GROUP NO.

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3753.2	2737.4	3400.3	2720.2	3002.6	3002.6	2428.8	2680.9	2556.6	2680.9	2266.9	3753.2
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	8.2	-22.1	-4.9	-12.4	0.0	0.0	13.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-616.2	-1380.0	-2303.1	-1782.4	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-2029.1	-2705.5	0.0	-1077.8	-2177.4	-1623.3	-962.3	-1944.1	0.0	-1449.4	-898.1	-2029.1
	M(COMB)	2029.1	2705.5	0.0	1612.5	2262.9	2130.6	2496.0	2637.5	0.0	1449.4	1343.8	2029.1

LOAD FACTOR COMBINATIONS (3 LANES)

GROUP NO.

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	5186.5	5429.7	4420.4	4420.4	4879.2	4879.2	4250.4	4691.5	4420.4	4879.2	4080.4	5186.5
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	26.9	13.3	-35.9	-8.6	-21.7	0.0	0.0	24.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-1001.4	-2242.5	-4030.4	-3119.1	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-4405.2	-5803.2	0.0	-1751.4	-3538.3	-2637.8	-1684.0	-3402.2	0.0	-2637.8	-1616.6	-4405.2
	M(COMB)	4405.2	5803.2	0.0	2620.3	3677.3	3462.2	4368.0	4615.6	0.0	2637.8	2418.8	4405.2

SPREAD FOOTING DESIGN (3 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (3 LANES)

GROUP NO.

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.22	3.41	5.33	3.40	3.74	3.59	2.51	2.81	4.01	3.73	2.83	5.22
EDGE 2	6.54	5.17	5.33	4.10	5.15	4.64	3.13	4.07	4.01	4.67	3.42	6.54
EDGE 3	5.22	3.41	5.33	4.43	4.26	4.77	4.48	4.33	4.01	3.73	3.69	5.22
EDGE 4	6.54	5.17	5.33	5.13	5.68	5.82	5.10	5.59	4.01	4.67	4.27	6.54

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (3 LANES)

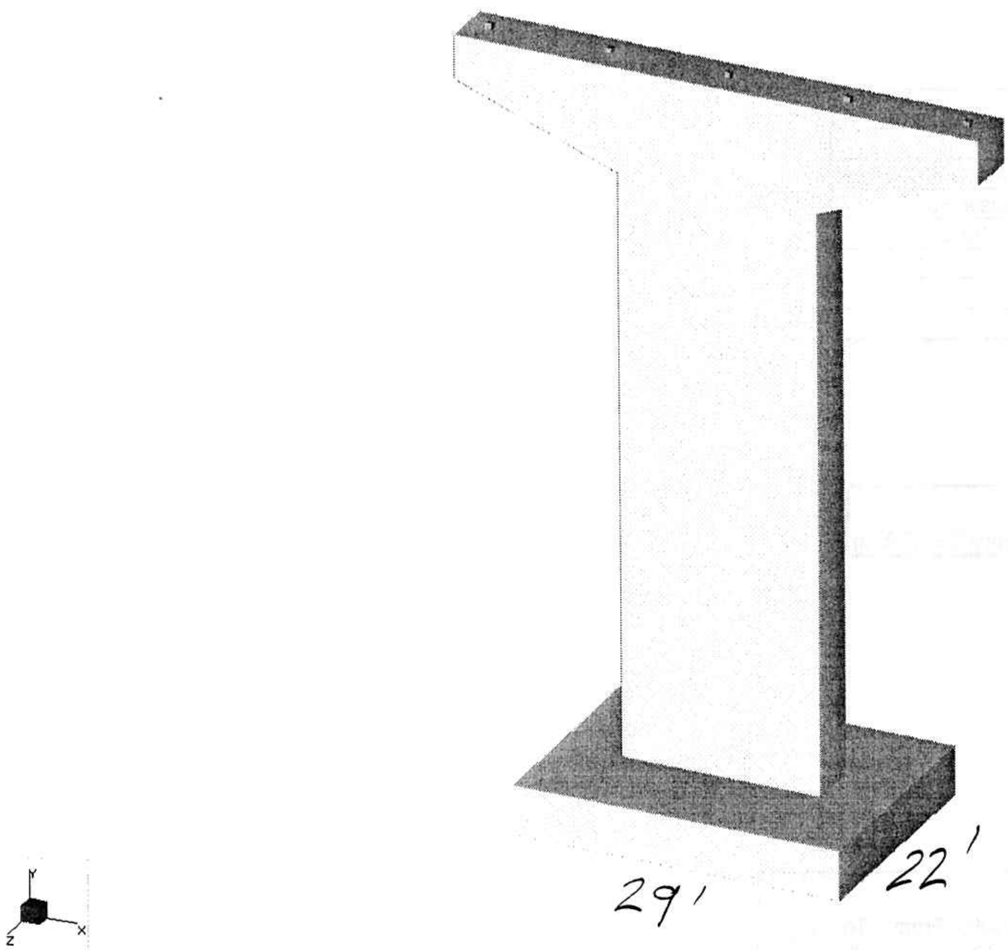
GROUP NO.

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	6.70	6.63	6.93	5.53	6.07	5.83	4.39	4.92	6.93	6.79	5.10	6.70
EDGE 2	9.56	10.39	6.93	6.66	8.37	7.54	5.49	7.12	6.93	8.50	6.15	9.56
EDGE 3	6.70	6.63	6.93	7.19	6.93	7.75	7.84	7.58	6.93	6.79	6.64	6.70
EDGE 4	9.56	10.39	6.93	8.33	9.22	9.46	8.93	9.79	6.93	8.50	7.69	9.56

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.	SHEET 1 OF 1
PHONE : TOLL-FREE 1-800-778-4277	JOB NO. 5355.02
	BY DAT DATE Jul/21/2009
	CKD. DATE

PROJECT: SCI-823-0837

FULL IMAGE:



P1 & P3

Bentley		KZF, Inc.	Sheet #	DS-1
			Job #	5355.02
Program:	LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version:	Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/21/2009
		www.bentley.com Phone: 1-800-778-4277	Checked	
File Name:	SCI-823-0837		Date	

CAP DESIGN

CAP DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design

Units: US

Pier View: Upstation.

DESIGN PARAMETERS

f'c = 4000.0 psi	
Fy flex = 60000.0 psi	Fy shear = 60000.0 psi
phi flex = 0.90	phi shear = 0.85
Ec = 3834.3 ksi	Es = 29000.0 ksi
crack control factor z = 170.00 kips / in	
Concrete Type : Normal Weight.	
Design of cap at face of column.	

CAP GEOMETRY

Hammer Head Cap : Length(X) = 46.50 ft Depth(Z) = 57.00 in

Cap Section Properties

Sec.	Area ft ^2	Ixx in ^4	Izz in ^4
1	45.13	7037334.00	1759333.50

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	# 10	16	3.38	20.320	0.00	46.50	Both
	# 10	12	6.56	15.240	0.00	46.50	Both
BOTTOM							
	# 10	2	3.38	2.540	0.00	19.45	Left
	# 10	2	3.38	2.540	15.43	31.07	None
	# 10	2	3.38	2.540	27.05	46.50	Right

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
0.00	15.50	# 6	4	6.00	3.52

Bentley	KZF, Inc.	Sheet #	DS-2
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/21/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
16.47	31.00	# 6	4	11.63	1.82
31.50	46.20	# 6	4	6.00	3.52

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 23.25 ft

Loc	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn kips-ft	Comb	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
	2.1	57	35.2	717.3	315	0.19	2.54	2.54	0.00	35.56	35.56
			-42.9	-7633.1	346	0.00	2.54	2.54	0.24	35.56	35.56
12.7	12.7	106	0.0	1272.2	0	0.00	2.54	2.54	0.00	35.56	35.56
			-11037.1	-15402.1	318	0.00	2.54	2.54	25.19	35.56	35.56
14.4	14.4	114	0.0	1363.5	0	0.00	2.54	2.54	0.00	35.56	35.56
			-14315.3	-16680.2	318	0.00	2.54	2.54	30.43	35.56	35.56

Span 2: From 23.25 ft To 46.50 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn kips-ft	Comb	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
8.8	32.1	114	0.0	1363.5	0	0.00	2.54	2.54	0.00	35.56	35.56
			-12721.5	-16680.2	300	0.00	2.54	2.54	26.90	35.56	35.56
10.6	33.9	106	0.0	1269.4	0	0.00	2.54	2.54	0.00	35.56	35.56
			-9688.8	-15362.6	300	0.00	2.54	2.54	22.06	35.56	35.56
21.2	44.5	57	26.0	714.4	346	0.14	2.54	2.54	0.00	35.56	35.56
			-52.2	-7593.6	315	0.00	2.54	2.54	0.29	35.56	35.56

SHEAR AND TORSION DESIGN

Span 1: From 0.00 ft To 23.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alt in^2
2.07	2.07	L	8.4	293	0.0	0	323.1	209.9	0.00	0.00	0.00	3.52	0.00
		R	1009.0	318	72.2	355	331.4	209.9	2.95	0.00	2.95	3.52	0.00
12.67	12.67	L	1075.9	318	72.2	355	620.6	501.7	1.06	0.00	1.06	3.52	0.00
		R	1886.9	318	144.4	355	620.6	501.7	2.94	0.00	2.94	3.52	0.00
14.42	14.42	L	1901.7	318	144.4	355	669.6	553.1	2.65	0.00	2.65	3.52	0.00

Span 2: From 23.25 ft To 46.50 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alt in^2
8.83	32.08	R	1693.7	300	144.4	355	669.6	553.1	2.21	0.00	2.21	3.52	0.00
10.63	33.88	L	1678.4	300	144.4	355	619.1	500.2	2.47	0.00	2.47	3.52	0.00
		R	946.2	300	72.2	355	619.1	500.2	0.76	0.00	0.76	3.52	0.00
21.24	44.49	L	879.5	300	72.2	355	321.6	208.6	2.50	0.00	2.50	3.52	0.00
		R	8.2	293	0.0	0	321.6	208.6	0.00	0.00	0.00	3.52	0.00

Shear and Torsion Design : Notes

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED flexural steel.

CRACKING/FATIGUE CHECK

Span 1: From 0.00 ft To 23.25 ft

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
2.07	2.1	57.5	0.2	0.01	54	0.0	0.00
			2.5	0.11	23	0.0	0.00
12.67	12.7	106.0	30.9	0.86	26	15.2	0.89
			0.0	0.00	0	148.4	5.91 *
14.42	14.4	114.0	37.0	1.03 *	26	18.0	1.15 *
			0.0	0.00	0	173.4	6.82 *

Span 2: From 23.25 ft To 46.50 ft

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
8.83	32.1	114.0	32.9	0.91	8	18.0	1.15 *
			0.0	0.00	0	173.4	6.81 *
10.63	33.9	105.8	27.2	0.75	8	15.1	0.88
			0.0	0.00	0	147.5	5.87 *
21.24	44.5	57.2	0.3	0.01	23	0.0	0.00
			1.8	0.08	54	0.0	0.00

Cracking and fatigue Check : Notes

* Cracking / fatigue checking failed.

Column Design

COLUMN DESIGN - Column: 1

Code: AASHTO STANDARD (17th Edition 2002) - Factored Load Design

Units: US

Pier View: Upstation.

Design/Analysis Method: Moment Magnification - Unbraced Column.

Column Type: Rectangular 212.00 x 57.00 in

Column Section Properties

Sec.	Area ft^2	Ixx in^4	Izz in^4
1	83.92	3271747.50	45258872.00

DESIGN PARAMETERS

f'c = 4000.0 psi	fy = 60000.0 psi
phi flex = 0.90	phi axial = 0.70
Ec = 3834.3 ksi	Es = 29000 ksi
Concrete Type : Normal Weight.	

Reinforcement

Rebar Pattern: Rectangular

Rebar Orientation: Face Parallel

Reinforcement Schedule

Layer	Dir	Size	No. bars	Bar Dist. in
1	X	10	39	4.64
1	Z	10	11	4.64

Reinforcement summary

Bentley	KZF, Inc.	Sheet #	DS-2
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00		Date	Jul/21/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

Main bars summary:
96 # 10 bars
Total number of bars in the column: 96
Ties size: # 5

Moment Magnification calculation - Mx (global)

Loc ft	Comb	K	Cm	Beta	Delta B	Delta S	pPc kips
0.00	22C	1.0000	1.0000	1.0000	----	1.0724	32886.71
60.50	22C	1.0000	1.0000	1.0000	----	1.0502	32886.71
0.00	92C	1.0000	1.0000	0.0452	----	1.0437	62926.39
60.50	92C	1.0000	1.0000	1.0000	----	1.0641	32886.71

Moment Magnification calculation - Mz (global)

Loc ft	Comb	K	Cm	Beta	Delta B	Delta S	pPc kips
0.00	22C	2.0000	1.0000	0.1606	----	1.0115	195987.32
60.50	22C	2.0000	1.0000	0.1234	----	1.0078	202477.07
0.00	92C	2.0000	1.0000	0.8441	----	1.0218	123347.05
[illegible]	92C	2.0000	1.0000	0.5107	----	1.0133	150564.50

Design values used after Moment Magnification (e-min effect included).

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
0.00	22C	-0.0	2221.4	0.0	-458.6	0.0	10258.0
60.50	22C	-0.0	1571.0	0.0	-317.6	-0.0	-10221.0
0.00	92C	-8.6	2632.3	-191.5	-12470.6	4.9	-1971.8
60.50	92C	8.6	1981.8	191.5	406.0	4.9	2483.2

COLUMN DESIGN

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
0.00	126C	2632.3	12470.6	1971.8	16608.7	8.98	1.00	1.32
60.50	26C	1571.0	317.6	10221.0	56823.5	88.22	1.00	5.56

K values for all columns used in unbraced moment magnification

Column	Kx	Kz
1	1.00	2.00

Bentley		KZF, Inc.	Sheet #	DS-3
			Job #	5355.02
Program:	LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version:	Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/24/2009
		www.bentley.com — Phone: 1-800-778-4277	Checked	
File Name:	SCI-823-0837		Date	

Column Design : Notes
Min reinforcement = 0.0100 % of Ag = 120.84 in^2.
---- Values do not exist at that location as computation is done at the top and bottom of clear length of column.

Bentley	KZF, Inc.		Sheet #	DS-1
			Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)			By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.		Date	Jul/21/2009
	www.bentley.com	Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837			Date	

ISOLATED FOOTING DESIGN

ISOLATED FOOTING DESIGN
Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View: Upstation.

GEOMETRY
Name : footing 22x29
Shape : Rectangular, Type : Spread
Bf(X) = 29.00 ft, Hf(Z) = 22.00 ft, Thickness(Y) = 54.00 in
Ag = 638.00 ft^2, Ix = 25732.67 ft^4, Iz = 44713.17 ft^4
Footing concentric.
Columns located on the footing:
Column No. 1 at x = 0.00 ft, Rectangular 212.00 in x 57.00 in
Surcharge = 2.00 ksf

DESIGN PARAMETERS	
f'c = 4000.00 psi	fy = 60000.00 psi
phi flex = 0.90	phi shear = 0.85
Ec = 3834.3 ksi	Es = 29000.0 ksi
Crack control factor z = 170.00 kips/in	
Concrete Type : Normal Weight.	

Max Soil Pressures, Service (Without the reduction of overstress allowance)

Corner	X ft	Z ft	comb	Ovs	P kips	Mxx kft	Mzz kft	Soil press. ksf
1	14.50	-11.00	29	1.250	-2991.87	-8494.58	-4033.78	12.30
			58	1.250	-2768.91	8515.84	2523.15	2.56
2	-14.50	-11.00	59	1.250	-2768.91	-6798.68	6061.10	11.89
			28	1.250	-2991.87	6819.94	-7571.72	1.99
3	-14.50	11.00	61	1.250	-2768.91	650.54	4657.61	12.25
			91	1.250	-2991.87	-1045.36	-5437.26	1.70
4	14.50	11.00	28	1.250	-2991.87	6819.94	-7571.72	12.74
			59	1.250	-2768.91	-6798.68	6061.10	2.14

Soil Pressures, Factored

Corner	X ft	Z ft	comb	Ovs	P kips	Mxx kft	Mzz kft	Soil press. ksf
1	14.500	-11.000	321	---	-3889.43	-11042.95	-5243.91	15.99
			487	---	-3461.14	10644.81	3153.94	3.20

Bentley	KZF, Inc.	Sheet #	DS-2
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/[illegible]/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

Corner	X ft	Z ft	comb	Ovs	P kips	Mxx kft	Mzz kft	Soil press. ksf
2	-14.500	-11.000	351	---	-3599.58	-8838.28	7879.43	15.45
			457	---	-3739.84	8524.93	-9464.66	2.49
3	-14.500	11.000	353	---	-3599.58	845.71	6054.90	15.93
			520	---	-3739.84	-1306.70	-6796.58	2.13
4	14.500	11.000	320	---	-3889.43	8865.93	-9843.24	16.56
			488	---	-3461.14	-8498.35	7576.37	2.68

Max Soil Pressures, Service (After the reduction of overstress allowance)

Corner	X ft	Z ft	comb	Ovs	P kips	Mxx kft	Mzz kft	Soil press. ksf
1	14.50	-11.00	29	1.250	-2991.87	-8494.58	-4033.78	9.84
			195	1.400	-2768.91	8515.84	2523.15	1.83
2	-14.50	-11.00	59	1.250	-2768.91	-6798.68	6061.10	9.51
			165	1.400	-2991.87	6819.94	-7571.72	1.42
3	-14.50	11.00	61	1.250	-2768.91	650.54	4657.61	9.80
			228	1.400	-2991.87	-1045.36	-5437.26	1.22
4	14.50	11.00	28	1.250	-2991.87	6819.94	-7571.72	10.19
			196	1.400	-2768.91	-6798.68	6061.10	1.53

Footing Design : Notes

Only max. positive pressure is considered for design.

Max. Soil Pressure Used in Design: (without selfweight and surcharge)

Factored soil pressure	13.35 ksf
Service soil pressure	10.95 ksf
Fatigue soil pressure	2.65 ksf

Reinforcement Schedule

Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	33	# 9	5.14	33.00	8.03	None
Z	68	# 10	3.63	86.36	5.09	None

Flexure

Bentley	KZF, Inc.	Sheet #	DS-3
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/21/2009
	www.bentley.com — Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

Dir ft	Loc	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-8.83	48.86	4714.0	320	29.09	33.00	33.00	0.00	0.00	0.00
X	8.83	48.86	4714.0	320	29.09	33.00	33.00	0.00	0.00	0.00
Z	-2.38	50.37	14395.6	320	65.69	86.36	86.36	0.00	0.00	0.00
Z	2.38	50.37	14395.6	320	65.69	86.36	86.36	0.00	0.00	0.00

Cracking/Fatigue

Dir	Loc ft	d in	Cracking Mmax kft	Cracking Comb	Cracking fs ksi	Cracking ratio fs	Fatigue Mmax kft	Fatigue Comb	Fatigue fs ksi	Fatigue ratio fs
X	-8.83	48.86	3868.4	282	30.61	0.85	937.4	8	7.42	0.37
X	8.83	48.86	3868.4	282	30.61	0.85	937.4	8	7.42	0.37
Z	-2.38	50.37	11813.4	282	35.40	0.98	2862.8	8	8.58	0.45
Z	2.38	50.37	11813.4	282	35.40	0.98	2862.8	8	8.58	0.45

One Way Shear

#	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-12.91	320	48.86	468.2	1387.0
	X	12.91	320	48.86	468.2	1387.0
	Z	-6.57	320	50.37	1713.7	1884.5
	Z	6.57	320	50.37	1713.7	1884.5

Two Way Shear

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns						
1	61.37	193.70	320	49.61	5929.6	6041.2

Two Way Shear Note

TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

PROJECT DATA

Project : SCI-823-0837
User Job No.: 5355.02
Designer : DAT
Date : Jul/21/2009
Checker :
Checked Date:
State : OH State Job No. :
Structure type: Pier.
Pier View : Upstation.
Code : AASHTO STANDARD (17th Edition 2002)
Comments : Full Pier Design (Cap, Column, and Footing)
P1

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277
BY DAT DATE Jul/21/2009
CKD. DATE

PROJECT: SCI-823-0837

PIER GEOMETRY

Pier Type: Hammer Head

Pier View : Upstation.
Length(X) = 46.50 ft Height max(Y) = 9.50 ft Height min(Y) = 4.00 ft
Bottom length(X) = 17.67 ft Depth(Z) = 4.75 ft Skew angle = 13.00 Reduction of I = 1.

Column Shape: Rectangular Non Tapered
Bottom width(X) = 17.67 ft Top width(X) = 17.67 ft Depth(Z) = 4.75 ft Height(Y) = 53.00 f
Column Bottom has Diagonal Spring Matrix Defined
Diagonal Spring Matrix: (Units: kip, ft, radians)

	Kx	Ky	Kz	Rx	Ry	Rz
Kx	0.00	0.00	0.00	0.00	0.00	0.00
Ky	0.00	0.00	0.00	0.00	0.00	0.00
Kz	0.00	0.00	0.00	0.00	0.00	0.00
Rx	0.00	0.00	0.00	0.00	0.00	0.00
Ry	0.00	0.00	0.00	0.00	0.00	0.00
Rz	0.00	0.00	0.00	0.00	0.00	0.00

SUPERSTRUCTURE INFO

Total number of spans: 4 Span number rear to current pier: 1
Number of traffic lanes: 3

Beam: height : 72.00 in section area : 955.00 in^2
Beam Inertia (Ixx): 616109.00 in^4 Beam inertia (Iyy): 154028.00 in^4
Beam CG:36.00 in Barrier height : 42.00 in Depth of slab : 8.75 in
Curb to curb distance: 45.500 ft

Span #	Span length	Bridge Width
1	107.500 ft	48.500 ft
2	107.500 ft	48.500 ft
3	107.500 ft	48.500 ft
4	107.500 ft	48.500 ft
		48.500 ft

BEARING POINTS

Number of bearing lines: 1
First bearing line Eccentricity = 0.00 ft

Point	Distance ft
1	2.07
2	12.67
3	23.28
4	33.88
5	44.49

MATERIAL PROPERTIES

PROJECT: SCI-823-0837

	Cap	Column	Footing
Concrete Type	normal	normal	normal
Concrete Strength (psi)	4000.00	4000.00	4000.00
Concrete Density (lb/ft3)	150.00	150.00	150.00
Concrete Modulus Ec (ksi)	3834.30	3834.30	3834.30
Steel Strength Fy (ksi)	60.00	60.00	60.00

DESIGN PARAMETERS

AASHTO STANDARD Code

Strength Reduction factors for reinf. concrete:

Flexure and tension	0.90
Shear and torsion (normal)	0.85
(lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Multi presence factors for live load:

1 Lane	1.00
2 Lanes	1.00
3 Lanes	0.90
more than 3 Lanes	0.75

	Crack control factor kip/ft	Clear cover in	Clear side cover in	Impact factors (auto calculation)
Cap	170.00	2.00	2.00	1.22
Column	170.00	3.50		1.22
Footing	170.00	3.00	3.00	1.00

Degree of fixity in foundations for Moment Magnify Method: Ga = 5.00

SEISMIC DESIGN PARAMETERS

Strength Reduction factors for reinf. Concrete Seismic Design:

- Flexure and tension : 0.90
- Shear and torsion (normal) : 0.85
- (lightweight) : 0.85
- Axial compression (ties): 0.70
- Axial compression (spiral): 0.75

Seismic Overstrength

- Flexure and tension : 1.30
- Axial compression (ties): 1.30
- Axial compression (spiral): 1.30

Response Modification Factor : 3.00

Use core area for plastic hinging calculations.

Design Factors

- Cap Design Factor : 1.20
- Footing Design Factor : 1.20

Plastic Hinge Moment

Use actual computed Plastic Hinging Moment for each column in all combinations.

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

LOADS

Pier View : Upstation.
Load Cases: 20

Loadcase ID: D1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-391.00
1	2	Y	-391.00
1	3	Y	-391.00
1	4	Y	-391.00
1	5	Y	-391.00

Loadcase ID: (L+In)1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	-2.25
1	3	Y	-209.30
1	4	Y	-159.95
1	5	Y	-0.09

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: (L+In)2 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-231.70
1	2	Y	-139.89
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: (L+In)3 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	-141.79
1	5	Y	-229.81

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning

PROJECT: SCI-823-0837

Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: (L+In)4 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-22.37
1	4	Y	-192.94
1	5	Y	-156.29

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: (L+In)5 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-106.66
1	2	Y	-210.17
1	3	Y	-54.76
1	4	Y	0.00
1	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: W1 Name: Angle: 0
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-4.89	0.50	----	----
UDL	Z	----	-0.02	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-10.71
1	1	Y	-15.41
1	1	Z	-2.47
1	2	X	-10.71
1	2	Y	20.85
1	2	Z	-2.47
1	3	X	-10.71
1	3	Y	20.85
1	3	Z	-2.47
1	4	X	-10.71
1	4	Y	20.85
1	4	Z	-2.47
1	5	X	-10.71
1	5	Y	57.12
1	5	Z	-2.47

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 643.00 ft
Default wind pressure

Wind pressure for superstructure:

Transverse	50.000	psf
Longitudinal	0.000	psf
Overturning	20.000	psf

Wind pressure for substructure:

Cap	40.000	psf
Column	40.000	psf

Loadcase ID: W2 Name: Angle: 15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	2.31	0.50	----	----
UDL	Z	----	-0.00	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	9.73
1	1	Y	5.86
1	1	Z	0.89
1	2	X	9.73
1	2	Y	-0.00
1	2	Z	0.89
1	3	X	9.73
1	3	Y	-0.00
1	3	Z	0.89
1	4	X	9.73
1	4	Y	-0.00
1	4	Z	0.89
1	5	X	9.73
1	5	Y	-5.86
1	5	Z	0.89

Auto generation details
Generated Wind Load on Structure
Angle of wind = 15.00 deg Elevation above which wind load acts = 643.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	44.000 psf	Cap	40.000 psf
Longitudinal	6.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W3 Name: Angle: 30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	5.70	0.50	----	----
UDL	Z	----	-0.04	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	9.38
1	1	Y	5.65
1	1	Z	-0.54
1	2	X	9.38
1	2	Y	-0.00
1	2	Z	-0.54
1	3	X	9.38

1	3	Y	-0.00
1	3	Z	-0.54
1	4	X	9.38
1	4	Y	-0.00
1	4	Z	-0.54
1	5	X	9.38
1	5	Y	-5.65
1	5	Z	-0.54

Auto generation details
Generated Wind Load on Structure
Angle of wind = 30.00 deg Elevation above which wind load acts = 643.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	41.000 psf	Cap	40.000 psf
Longitudinal	12.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W4 Name: Angle: 45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	7.81	0.50	----	----
UDL	Z	----	-0.10	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	7.86
1	1	Y	4.74
1	1	Z	-1.80
1	2	X	7.86
1	2	Y	-0.00
1	2	Z	-1.80
1	3	X	7.86
1	3	Y	-0.00
1	3	Z	-1.80
1	4	X	7.86
1	4	Y	-0.00
1	4	Z	-1.80
1	5	X	7.86
1	5	Y	-4.74
1	5	Z	-1.80

Auto generation details
Generated Wind Load on Structure
Angle of wind = 45.00 deg Elevation above which wind load acts = 643.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	33.000 psf	Cap	40.000 psf
Longitudinal	16.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W5 Name: Angle: 60
Multiplier = 1.000

PROJECT: SCI-823-0837

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	8.07	0.50	----	----
UDL	Z	----	-0.18	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	4.58
1	1	Y	2.76
1	1	Z	-3.23
1	2	X	4.58
1	2	Y	-0.00
1	2	Z	-3.23
1	3	X	4.58
1	3	Y	-0.00
1	3	Z	-3.23
1	4	X	4.58
1	4	Y	-0.00
1	4	Z	-3.23
1	5	X	4.58
1	5	Y	-2.76
1	5	Z	-3.23

Auto generation details
Generated Wind Load on Structure
Angle of wind = 60.00 deg Elevation above which wind load acts = 643.00 ft
Default wind pressure

Wind pressure for superstructure:
Transverse 17.000 psf
Longitudinal 19.000 psf
Overturning not considered

Wind pressure for substructure:
Cap 40.000 psf
Column 40.000 psf

Loadcase ID: W6 Name: Angle: 75
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	6.41	0.50	----	----
UDL	Z	----	-0.26	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	3.45
1	1	Y	2.08
1	1	Z	-4.17
1	2	X	3.45
1	2	Y	-0.00
1	2	Z	-4.17
1	3	X	3.45
1	3	Y	-0.00
1	3	Z	-4.17
1	4	X	3.45
1	4	Y	-0.00
1	4	Z	-4.17

PROJECT: SCI-823-0837

1	5	X	3.45
1	5	Y	-2.08
1	5	Z	-4.17

Auto generation details
Generated Wind Load on Structure
Angle of wind = 75.00 deg Elevation above which wind load acts = 643.00 ft
Default wind pressure

Wind pressure for superstructure:

Transverse	11.000 psf
Longitudinal	22.000 psf
Overturning	not considered

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: WL1 Name: Angle: 0
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.09
1	1	Y	3.14
1	1	Z	0.48
1	2	X	2.09
1	2	Y	-0.00
1	2	Z	0.48
1	3	X	2.09
1	3	Y	-0.00
1	3	Z	0.48
1	4	X	2.09
1	4	Y	-0.00
1	4	Z	0.48
1	5	X	2.09
1	5	Y	-3.14
1	5	Z	0.48

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 0.00 deg Live load length = 107.50 ft

Loadcase ID: WL2 Name: Angle: 15
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.90
1	1	Y	2.85
1	1	Z	0.17
1	2	X	1.90
1	2	Y	-0.00
1	2	Z	0.17
1	3	X	1.90
1	3	Y	-0.00
1	3	Z	0.17
1	4	X	1.90
1	4	Y	-0.00
1	4	Z	0.17
1	5	X	1.90
1	5	Y	-2.85

1	5	Z	0.17

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 15.00 deg Live load length = 107.50 ft

Loadcase ID: WL3 Name: Angle: 30
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.83
1	1	Y	2.75
1	1	Z	-0.11
1	2	X	1.83
1	2	Y	-0.00
1	2	Z	-0.11
1	3	X	1.83
1	3	Y	-0.00
1	3	Z	-0.11
1	4	X	1.83
1	4	Y	-0.00
1	4	Z	-0.11
1	5	X	1.83
1	5	Y	-2.75
1	5	Z	-0.11

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 30.00 deg Live load length = 107.50 ft

Loadcase ID: WL4 Name: Angle: 45
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.54
1	1	Y	2.31
1	1	Z	-0.35
1	2	X	1.54
1	2	Y	-0.00
1	2	Z	-0.35
1	3	X	1.54
1	3	Y	-0.00
1	3	Z	-0.35
1	4	X	1.54
1	4	Y	-0.00
1	4	Z	-0.35
1	5	X	1.54
1	5	Y	-2.31
1	5	Z	-0.35

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 45.00 deg Live load length = 107.50 ft

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc. | BY DAT DATE Jul/21/2009
PHONE : TOLL-FREE 1-800-778-4277 | CKD. DATE

PROJECT: SCI-823-0837

Loadcase ID: WL5 Name: Angle: 60
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.90
1	1	Y	1.34
1	1	Z	-0.63
1	2	X	0.90
1	2	Y	-0.00
1	2	Z	-0.63
1	3	X	0.90
1	3	Y	-0.00
1	3	Z	-0.63
1	4	X	0.90
1	4	Y	-0.00
1	4	Z	-0.63
1	5	X	0.90
1	5	Y	-1.34
1	5	Z	-0.63

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 60.00 deg Live load length = 107.50 ft

Loadcase ID: WL6 Name: Angle: 75
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.50
1	1	Y	0.74
1	1	Z	-0.81
1	2	X	0.50
1	2	Y	-0.00
1	2	Z	-0.81
1	3	X	0.50
1	3	Y	-0.00
1	3	Z	-0.81
1	4	X	0.50
1	4	Y	-0.00
1	4	Z	-0.81
1	5	X	0.50
1	5	Y	-0.74
1	5	Z	-0.81

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 75.00 deg Live load length = 107.50 ft

Loadcase ID: T1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	5.62

PROJECT: SCI-823-0837

1	1	Z	24.36
1	2	Z	24.36
1	3	Z	24.36
1	4	Z	24.36
1	5	Z	24.36
1	2	X	5.62
1	3	X	5.62
1	4	X	5.62
1	5	X	5.62

Loadcase ID: T2 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-5.62
1	1	Z	-24.36
1	2	Z	-24.36
1	3	Z	-24.36
1	4	Z	-24.36
1	5	Z	-24.36
1	2	X	-5.62
1	3	X	-5.62
1	4	X	-5.62
1	5	X	-5.62

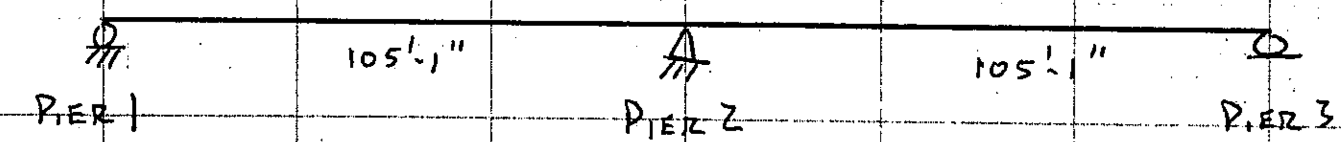
Selected load groups:

SERVICE GROUP I
SERVICE GROUP II
SERVICE GROUP III
SERVICE GROUP IV
SERVICE GROUP V
SERVICE GROUP VI
SERVICE GROUP VII
SERVICE GROUP VIII
SERVICE GROUP IX
LOAD FACTOR GROUP I
LOAD FACTOR GROUP II
LOAD FACTOR GROUP III
LOAD FACTOR GROUP IV
LOAD FACTOR GROUP V
LOAD FACTOR GROUP VI
LOAD FACTOR GROUP VII
LOAD FACTOR GROUP VIII
LOAD FACTOR GROUP IX

KZFDESIGN Architecture | Engineering | Interiors | Planning

project name	SCI-823-0.00 Portsmouth Bypass
project	535502
subject	SCI-823-0837 ~~Bearing Pad~~ Design Pier 2
date	6/09
designed	RBK
checked	DAT

PIER 2



(PER BEAM LINE)

1. Beam Self Weight (CONSPAN OUTPUT)

   $= 52.3^k$

2. Dead Load on Precast (CONSPAN OUTPUT)

   $= 63.3 + 11.9 + 6.8 = 82^k$

3. Superimposed Dead Load (CONSPAN OUTPUT)

   $= \frac{409.1}{10} = 40.9^k$

4. Pier Diaphragm

   $$= \frac{0.15^{kcf}\left[\left(\frac{48.5}{\cos 13}\right)(3)\left(6 - \frac{8}{12} + \frac{2}{12}\right) - (10)(1.125)(956\,in^2)\right]}{10 \text{ beams}} = 11.2^k$$

5. Live Load & Impact (CONSPAN OUTPUT)

   $= 130.7^k$ [Per Lane, No DF, No Impact]

   $LL = (130.7)(1)(0.939) = 122.7^k$

   $LL + I = (130.7)(1.217)(0.939) = 149.4^k$

   $\quad\quad\quad\quad\quad\quad\quad I \quad\quad DF$

$\boxed{DL = 186.4^k \quad LL + I = 149.4^k}$

$\boxed{DL = 186.4^k \quad LL = 122.7^k}$

PER BEARING

PIER 2

1. WIND ON STRUCTURE (AASHTO 3.15.2)

- Total height of Structure

Barrier = 42"

Deck = 8.75"

Haunch = 2"

Beams = 72"

= 124.75" = 10.40'

Bearings = 1.72" = 0.14'

- 100 mph @ 0° (50 psf)

$$F_T = \left(\frac{105.1' + 105.1'}{2}\right)(10.4')(.05^{ksf}) = 54.7^{k}$$

$$M_T = 54.7\left(\frac{10.4}{2} + 0.14\right) = 292.1^{k'}$$

- 100 mph @ 60° ($17\ psf_{TRANS}$, $19\ psf_{LONG}$)

$$F_T = (105.1')(10.4')(.017) = 18.6^{k}$$

$$M_T = 18.6\left(\frac{10.4}{2} + 0.14\right) = 99.3^{k'}$$

$$F_L = (105.1')(10.4)(.019) = 20.8^{k}$$

$$M_L = 20.8\left(\frac{10.4}{2} + 0.14\right) = 111.1^{k'}$$

2. OVERTURNING WIND (AASHTO 3.15.3)

- (20 psf @ w/4)

$$F_V = (105.1')(48.5')(.02^{ksf}) = 101.9^{k}$$

$$M_T = 101.9\left(\frac{48.5}{4}\right) = 1235.5^{k'}$$

3. WIND ON LIVE LOAD (AASHTO 3.15.2)

- 100 plf @ 0°, 6' above deck

$F_T = (105.1')(0.1^{klf}) = 10.5^K$

$M_T = 10.5\left(\frac{72'' + 8.75'' + 2'' + 72'' + 1.72''}{12}\right) = 136.9^{K'}$

- 34 plf$_{TRANS}$, 38 plf$_{LONG}$ @ 60°, 6' above deck

$F_T = (105.1)(0.034^{klf}) = 3.6^K$

$M_T = 3.6\left(\frac{72 + 8.75 + 2 + 72 + 1.72}{12}\right) = 46.9^{K'}$

$F_L = (105.1)(0.038^{klf}) = 4.0^K$

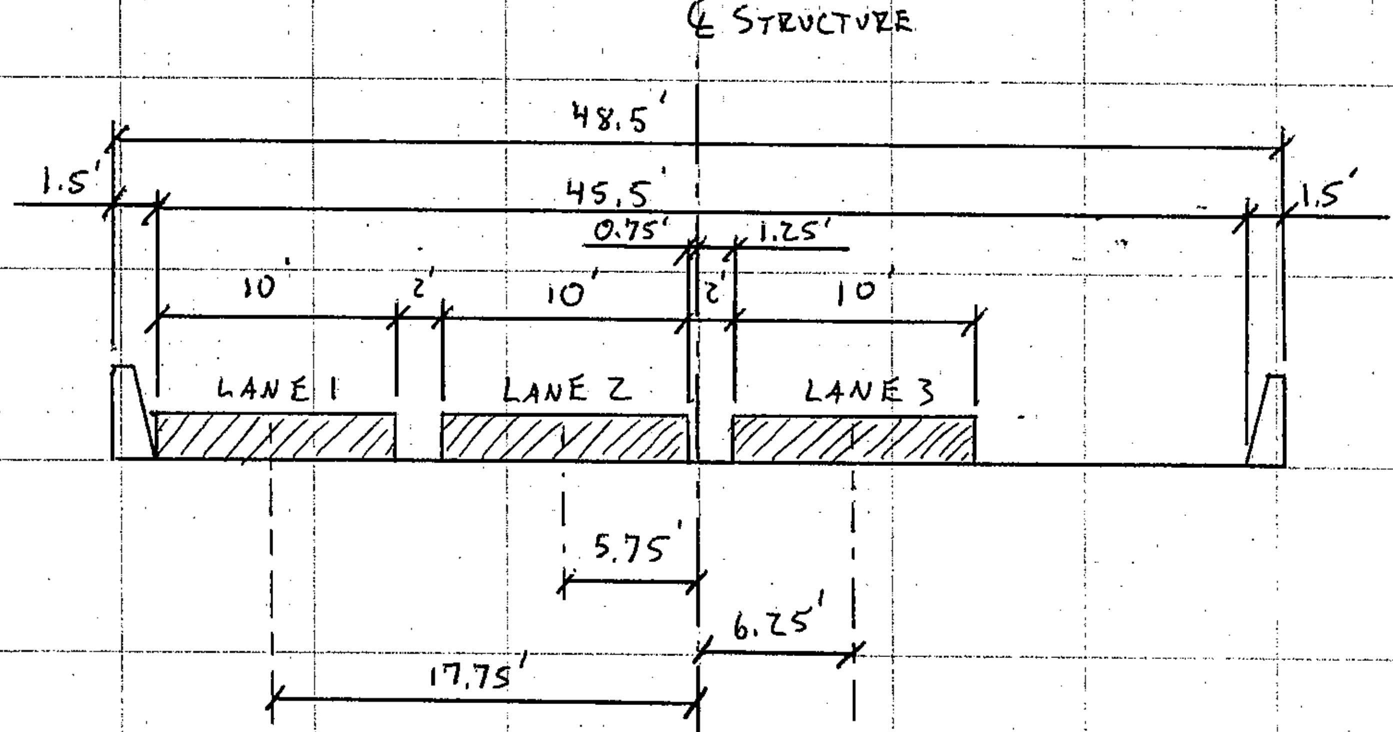
$M_L = 4.0\left(\frac{72 + 8.75 + 2 + 72 + 1.72}{12}\right) = 52.2^{K'}$

4. BEAM REACTIONS FROM SUPERSTRUCTURE

$\left.\begin{array}{l} DL = 372.8^K \\ LL = 122.7^K \\ LL+I = 149.4^K \end{array}\right\}$ ✓ Per Beam Line

NOTE! Pier Diaphragm weight included in dead load reaction

5. LIVE LOAD CASES



$e_1 = 17.75'$

$e_2 = \left(\frac{17.75 + 5.75}{2}\right) = 11.75'$

$e_3 = \left(\frac{17.75 + 5.75 - 6.25}{3}\right) = 5.75'$

Live Load per Lane $= 130.7^K$

$(LL+I)$ per lane $= (130.7)(1.217) = 159.1^K$

F_V (1 LANE) $= 159.1^K$

M_T (1 LANE) $= 159.1(17.75') = 2824.0^{K'}$

F_V (2 LANES) $= 2(159.1) = 318.2^K$

M_T (2 LANES) $= 318.2(11.75) = 3738.9^{K'}$

F_V (3 LANES) $= 3(159.1)(0.9) = 429.6^K$

M_T (3 LANES) $= 429.6(5.75') = 2470.2^{K'}$

6. LONGITUDINAL LIVE LOAD (AASHTO 3.9)

F_L (1 LANE) $= (1\ \text{lane})(0.05)\left((0.80^{\text{klf}})(430.8421) + 22.5^{k}\right) = 18.4^{k}$

ASSUMPTION: 100% DISTRIBUTION TO PIER 2

M_L (1 LANE) $= 18.4\left(\dfrac{72 + 8.75 + 2 + 72 + 1.72}{12}\right) = 239.9^{k'}$

F_L (2 LANES) $= 18.4(2) = 36.8^{k}$

M_L (2 LANES) $= 36.8\,(13.04') = 479.8^{k'}$

F_L (3 LANES) $= 18.4(3)(0.9) = 49.7^{k}$

M_L (3 LANES) $= 49.7\,(13.04') = 647.8^{k'}$

7. CENTRIFUGAL (AASHTO 3.10)

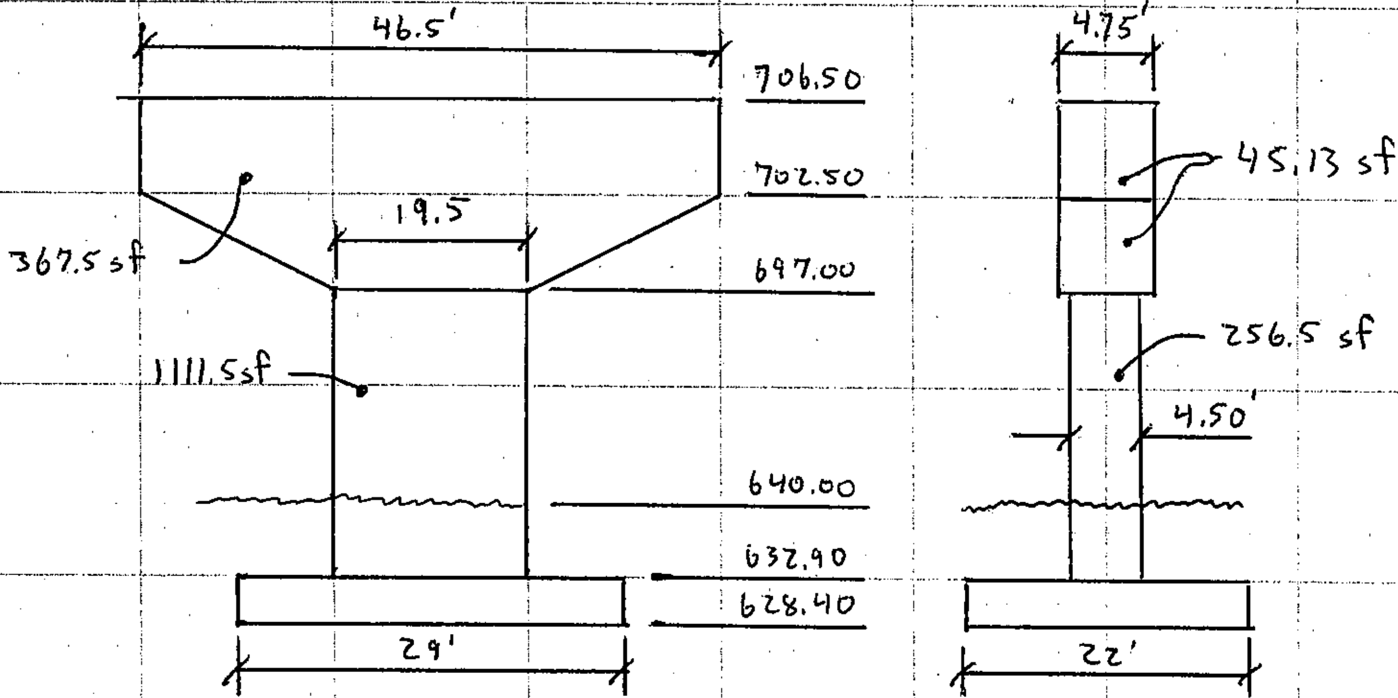
ϕ STRUCTURE ON TANGENT ALIGNMENT

8. R + S + T

ϕ FIXED PIER

9. WIND ON SUBSTRUCTURE (3.15.2)

- 100 mph @ 0° (40 psf)



$$F_T = (301.63\ sf)(.04^{ksf}) = 12.1^{k}$$

$$M_T = 12.1\left(\frac{706.5-640}{2} + (640-628.4)\right) = 542.7^{k'}$$

- 100 mph @ 60° (20 psf_{TRANS} , 35 psf_{LONG})

$$F_T = (301.63\ sf)(.02^{ksf}) = 6.0^{k}$$

$$M_T = 6.0\left(\frac{706.5-640}{2} + (640-628.4)\right) = 269.1^{k'}$$

$$F_L = (1479\ sf)(.035^{ksf}) = 51.8^{k}$$

$$M_L = 51.8\left(\frac{706.5-640}{2} + (640-628.4)\right) = 2323.2^{k'}$$

10. STREAM FLOW (AASHTO 3.18.1)

$\emptyset$ NO STREAM

11. DEAD LOAD PIER

$0.15^{kcf}\left[(367.5\ sf)(4.75') + \left((4.50')(1111.5'sf + (19.5)(640-632.9)\right)\right] = 1105.6^{k}$ (PIER)

$0.15^{kcf}\left[(29')(4.5')(22')\right] = 430.7^{k}$ (FOOTING)

By: RBK
6/29/2009

SUMMARY:
ALL FORCES AND MOMENTS TAKEN ABOUT AXIS OF PIER AND AT TOP OF PIER

#	LOADING	F_V	F_{LONG}	F_{TRANS}	M_{TRANS}	M_{LONG}
		(kips)	(kips)	(kips)	(kip-ft)	(kip-ft)
1	DEAD LOAD (5 BEAMS)	1864.0	--	--	--	--
2	LIVE LOAD AND IMPACT (1 LANES)	159.2	--	--	2824.0	--
2	LIVE LOAD AND IMPACT (2 LANES)	318.2	--	--	3738.9	--
2	LIVE LOAD AND IMPACT (3 LANES)	429.6	--	--	2470.2	--
3	LONGITUDINAL LIVE LOAD (1 LANES)	--	18.4	--	--	239.9
3	LONGITUDINAL LIVE LOAD (2 LANES)	--	36.8	--	--	479.8
3	LONGITUDINAL LIVE LOAD (3 LANES)	--	49.7	--	--	647.8
4	WIND ON SUPERSTRUCTURE @ 0°	--	--	54.7	292.1	--
5	WIND ON SUPERSTRUCTURE @ 60°	--	20.8	18.6	99.3	111.1
6	WIND OVERTURNING	-101.9	--	--	1235.5	--
7	WIND ON LIVE LOAD @ 0°	--	--	10.5	136.9	--
8	WIND ON LIVE LOAD @ 60°	--	4.0	3.6	46.9	52.2
9	R + S + T	--	--	--	--	--
10	WIND ON SUBSTRUCTURE @ 0°	--	--	12.1	542.7	--
11	WIND ON SUBSTRUCTURE @ 60°	--	51.8	6.0	269.1	2323.2
12	STREAM FLOW	--	--	--	--	--
13	CENTRIFUGAL	--	--	--	--	--
14	DEAD LOAD PIER	1105.6	--	--	--	--
15	DEAD LOAD FOOTING	430.7	--	--	--	--

CALCULATE PIER LOADS AT BOTTOM OF FOOTING:

** Pier Height = 706.50 - 628.40 = 78.10'

1. WIND ON STRUCTURE

- @ 0°

$F_T = 54.7^k$

$M_T = 54.7\left(\frac{10.4}{2} + 0.14 + 78.1'\right) = 4564.2^{k'}$

- @ 60°

$F_T = 18.6^k$

$M_T = 18.6\left(\frac{10.4}{2} + 0.14 + 78.1'\right) = 1552.0^{k'}$

$F_L = 20.8^k$

$M_L = 20.8\left(\frac{10.4}{2} + 0.14 + 78.1\right) = 1735.6^{k'}$

3. WIND ON LIVE LOAD

- @ 0°

$F_T = 10.5^k$

$M_T = 10.5\left(\frac{72 + 8.75 + 2 + 72 + 1.72}{12} + 78.1\right) = 957.0^{k'}$

- @ 60°

$F_T = 3.6^k$

$M_T = 3.6\left(\frac{72 + 8.75 + 2 + 72 + 1.72}{12} + 78.1\right) = 328.1^{k'}$

$F_L = 4.0^k$

$M_L = 4.0\left(\frac{72 + 8.75 + 2 + 72 + 1.72}{12} + 78.1\right) = 364.6^{k'}$

6. LONGITUDINAL LIVE LOAD

F_L (1 LANE) = 18.4^k

M_L (1 LANE) = $18.4\left(\frac{72+8.75+2+72+1.72}{12}+78.1\right)$ = ~~[illegible]~~ $1677^{k'}$

F_L (2 LANES) = 36.8^k

M_L (2 LANES) = $36.8\left(\frac{72+8.75+2+72+1.72}{12}+78.1\right)$ = $3353.9^{k'}$

F_L (3 LANES) = 49.7^k

M_L (3 LANES) = $49.7\left(\frac{72+8.75+2+72+1.72}{12}+78.1\right)$ = $4529.6^{k'}$

By: RBK
6/29/2009

SUMMARY:
ALL FORCES AND MOMENTS TAKEN ABOUT AXIS OF PIER AND AT BOTTOM OF FOOTING

#	LOADING	F_V	F_{LONG}	F_{TRANS}	M_{TRANS}	M_{LONG}
		(kips)	(kips)	(kips)	(kip-ft)	(kip-ft)
1	DEAD LOAD (5 BEAMS)	1864.0	--	--	--	--
2	LIVE LOAD (1 LANES)	130.7	--	--	2320.0	--
2	LIVE LOAD (2 LANES)	261.4	--	--	3071.5	--
2	LIVE LOAD (3 LANES)	352.9	--	--	2029.1	--
3	LONGITUDINAL LIVE LOAD (1 LANES)	--	18.4	--	--	1677.0
3	LONGITUDINAL LIVE LOAD (2 LANES)	--	36.8	--	--	3353.9
3	LONGITUDINAL LIVE LOAD (3 LANES)	--	49.7	--	--	4529.6
4	WIND ON SUPERSTRUCTURE @ 0°	--	--	54.7	4564.2	--
5	WIND ON SUPERSTRUCTURE @ 60°	--	20.8	18.6	1552.0	1735.6
6	WIND OVERTURNING	-101.9	--	--	1235.5	--
7	WIND ON LIVE LOAD @ 0°	--	--	10.5	957.0	--
8	WIND ON LIVE LOAD @ 60°	--	4.0	3.6	328.1	364.6
9	R + S + T	--	--	--	--	--
10	WIND ON SUBSTRUCTURE @ 0°	--	--	12.1	542.7	--
11	WIND ON SUBSTRUCTURE @ 60°	--	51.8	6.0	269.1	2323.2
12	STREAM FLOW	--	--	--	--	--
13	CENTRIFUGAL	--	--	--	--	--
14	DEAD LOAD PIER	1105.6	--	--	--	--
15	DEAD LOAD FOOTING	430.7	--	--	--	--

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

					BETA FACTOR										
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

					BETA FACTOR									
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

					LOADING (kips, K-ft)									
	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	130.7											
TRANS.	F(X)								54.7	10.5				
LONG.	F(Z)										18.4			
LONG.	M(X)										1677.0			
TRANS.	M(Z)		-2320.0						-4564.2	-957.0				

SERVICE LOAD COMBINATIONS (1 LANE)

						GROUP NO.							
	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3531.0	3661.7	3400.3	3400.3	3531.0	3531.0	3400.3	3531.0	3400.3	3531.0	3400.3	3531.0
TRANS.	F(X)	0.0	0.0	0.0	54.7	26.9	0.0	54.7	26.9	0.0	0.0	54.7	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	18.4	0.0	0.0	18.4	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	1677.0	0.0	0.0	1677.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2320.0	-4640.0	0.0	-4564.2	-4646.3	-2320.0	-4564.2	-4646.3	0.0	-2320.0	-4564.2	-2320.0
	M(COMB)	2320.0	4640.0	0.0	4564.2	4939.6	2320.0	4564.2	4939.6	0.0	2320.0	4564.2	2320.0

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

						GROUP NO.							
	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3531.0	2441.1	3400.3	2720.2	2824.8	2824.8	2428.8	2522.1	2556.6	2522.1	2266.9	3531.0
TRANS.	F(X)	0.0	0.0	0.0	43.8	21.5	0.0	39.1	19.2	0.0	0.0	36.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	14.7	0.0	0.0	13.1	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	1341.6	0.0	0.0	1197.9	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2320.0	-3093.3	0.0	-3651.4	-3717.0	-1856.0	-3260.1	-3318.8	0.0	-1657.1	-3042.8	-2320.0
	M(COMB)	2320.0	3093.3	0.0	3651.4	3951.7	1856.0	3260.1	3528.3	0.0	1657.1	3042.8	2320.0

LOAD FACTOR COMBINATIONS (1 LANE)

						GROUP NO.							
	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4704.1	4794.2	4420.4	4420.4	4590.3	4590.3	4250.4	4413.8	4420.4	4590.3	4080.4	4704.1
TRANS.	F(X)	0.0	0.0	0.0	71.1	35.0	0.0	68.4	33.6	0.0	0.0	65.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	23.9	0.0	0.0	23.0	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	2180.1	0.0	0.0	2096.3	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-5036.7	-6635.2	0.0	-5933.5	-6040.1	-3016.0	-5705.3	-5807.8	0.0	-3016.0	-5477.0	-5036.7
	M(COMB)	5036.7	6635.2	0.0	5933.5	6421.5	3016.0	5705.3	6174.6	0.0	3016.0	5477.0	5036.7

SPREAD FOOTING DESIGN (1 LANE)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (1 LANE)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	4.78	2.82	5.33	3.08	3.80	3.83	2.75	3.39	4.01	3.42	2.57	4.78
EDGE 2	6.29	4.83	5.33	5.45	6.21	5.03	4.86	5.54	4.01	4.49	4.54	6.29
EDGE 3	4.78	2.82	5.33	3.08	2.65	3.83	2.75	2.36	4.01	3.42	2.57	4.78
EDGE 4	6.29	4.83	5.33	5.45	5.06	5.03	4.86	4.52	4.01	4.49	4.54	6.29

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (1 LANE)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.74	5.36	6.93	5.00	6.17	6.22	4.81	5.93	6.93	6.22	4.62	5.74
EDGE 2	9.01	9.67	6.93	8.85	10.09	8.17	8.51	9.70	6.93	8.17	8.17	9.01
EDGE 3	5.74	5.36	6.93	5.00	4.30	6.22	4.81	4.14	6.93	6.22	4.62	5.74
EDGE 4	9.01	9.67	6.93	8.85	8.22	8.17	8.51	7.91	6.93	8.17	8.17	9.01

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

	Load				BETA FACTOR										
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

	Load				BETA FACTOR									
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

	Load				LOADING (kips, K-ft)									
	Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	261.4											
TRANS.	F(X)								54.7	10.5				
LONG.	F(Z)										36.8			
LONG.	M(X)										3353.9			
TRANS.	M(Z)		-3071.5						-4564.2	-957.0				

SERVICE LOAD COMBINATIONS (2 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3661.7	3923.1	3400.3	3400.3	3661.7	3661.7	3400.3	3661.7	3400.3	3661.7	3400.3	3661.7
TRANS.	F(X)	0.0	0.0	0.0	54.7	26.9	0.0	54.7	26.9	0.0	0.0	54.7	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	36.8	0.0	0.0	36.8	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	3353.9	0.0	0.0	3353.9	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-3071.5	-6143.0	0.0	-4564.2	-5397.8	-3071.5	-4564.2	-5397.8	0.0	-3071.5	-4564.2	-3071.5
	M(COMB)	3071.5	6143.0	0.0	4564.2	6354.9	3071.5	4564.2	6354.9	0.0	3071.5	4564.2	3071.5

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3661.7	2615.4	3400.3	2720.2	2929.4	2929.4	2428.8	2615.5	2556.6	2615.5	2266.9	3661.7
TRANS.	F(X)	0.0	0.0	0.0	43.8	21.5	0.0	39.1	19.2	0.0	0.0	36.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	29.4	0.0	0.0	26.3	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	2683.1	0.0	0.0	2395.6	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-3071.5	-4095.3	0.0	-3651.4	-4318.2	-2457.2	-3260.1	-3855.5	0.0	-2193.9	-3042.8	-3071.5
	M(COMB)	3071.5	4095.3	0.0	3651.4	5083.9	2457.2	3260.1	4539.2	0.0	2193.9	3042.8	3071.5

LOAD FACTOR COMBINATIONS (2 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4987.9	5168.0	4420.4	4420.4	4760.2	4760.2	4250.4	4577.1	4420.4	4760.2	4080.4	4987.9
TRANS.	F(X)	0.0	0.0	0.0	71.1	35.0	0.0	68.4	33.6	0.0	0.0	65.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	47.8	0.0	0.0	46.0	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	4360.1	0.0	0.0	4192.4	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-6668.2	-8784.5	0.0	-5933.5	-7017.1	-3993.0	-5705.3	-6747.2	0.0	-3993.0	-5477.0	-6668.2
	M(COMB)	6668.2	8784.5	0.0	5933.5	8261.3	3993.0	5705.3	7943.6	0.0	3993.0	5477.0	6668.2

SPREAD FOOTING DESIGN (2 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (2 LANES)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	4.74	2.77	5.33	3.08	4.34	3.79	2.75	3.87	4.01	3.39	2.57	4.74
EDGE 2	6.74	5.43	5.33	5.45	7.14	5.39	4.86	6.37	4.01	4.81	4.54	6.74
EDGE 3	4.74	2.77	5.33	3.08	2.04	3.79	2.75	1.83	4.01	3.39	2.57	4.74
EDGE 4	6.74	5.43	5.33	5.45	4.84	5.39	4.86	4.33	4.01	4.81	4.54	6.74

6.74 ksf << 80

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (2 LANES)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.66	5.25	6.93	5.00	7.05	6.17	4.81	6.78	6.93	6.17	4.62	5.66
EDGE 2	9.98	10.95	6.93	8.85	11.60	8.76	8.51	11.15	6.93	8.76	8.17	9.98
EDGE 3	5.66	5.25	6.93	5.00	3.32	6.17	4.81	3.19	6.93	6.17	4.62	5.66
EDGE 4	9.98	10.95	6.93	8.85	7.87	8.76	8.51	7.57	6.93	8.76	8.17	9.98

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

						BETA FACTOR									
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

						BETA FACTOR								
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

						LOADING (kips, K-ft)								
	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	352.9											
TRANS.	F(X)								54.7	10.5				
LONG.	F(Z)										49.7			
LONG.	M(X)										4529.6			
TRANS.	M(Z)		-2029.1						-4564.2	-957.0				

SERVICE LOAD COMBINATIONS (3 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3753.2	4106.1	3400.3	3400.3	3753.2	3753.2	3400.3	3753.2	3400.3	3753.2	3400.3	3753.2
TRANS.	F(X)	0.0	0.0	0.0	54.7	26.9	0.0	54.7	26.9	0.0	0.0	54.7	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	49.7	0.0	0.0	49.7	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	4529.6	0.0	0.0	4529.6	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2029.1	-4058.2	0.0	-4564.2	-4355.4	-2029.1	-4564.2	-4355.4	0.0	-2029.1	-4564.2	-2029.1
	M(COMB)	2029.1	4058.2	0.0	4564.2	6283.8	2029.1	4564.2	6283.8	0.0	2029.1	4564.2	2029.1

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3753.2	2737.4	3400.3	2720.2	3002.6	3002.6	2428.8	2680.9	2556.8	2680.9	2266.9	3753.2
TRANS.	F(X)	0.0	0.0	0.0	43.8	21.5	0.0	39.1	19.2	0.0	0.0	36.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	39.8	0.0	0.0	35.5	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	3623.7	0.0	0.0	3235.4	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2029.1	-2705.5	0.0	-3651.4	-3484.3	-1623.3	-3260.1	-3111.0	0.0	-1449.4	-3042.8	-2029.1
	M(COMB)	2029.1	2705.5	0.0	3651.4	5027.1	1623.3	3260.1	4488.4	0.0	1449.4	3042.8	2029.1

LOAD FACTOR COMBINATIONS (3 LANES)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	5186.5	5429.7	4420.4	4420.4	4879.2	4879.2	4250.4	4691.5	4420.4	4879.2	4080.4	5186.5
TRANS.	F(X)	0.0	0.0	0.0	71.1	35.0	0.0	68.4	33.6	0.0	0.0	65.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	64.6	0.0	0.0	62.1	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	5888.5	0.0	0.0	5662.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-4405.2	-5803.2	0.0	-5933.5	-5662.0	-2637.8	-5705.3	-5444.2	0.0	-2637.8	-5477.0	-4405.2
	M(COMB)	4405.2	5803.2	0.0	5933.5	8169.0	2637.8	5705.3	7854.8	0.0	2637.8	5477.0	4405.2

SPREAD FOOTING DESIGN (3 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (3 LANES)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.22	3.41	5.33	3.08	5.13	4.18	2.75	4.58	4.01	3.73	2.57	5.22
EDGE 2	6.54	5.17	5.33	5.45	7.39	5.23	4.86	6.59	4.01	4.67	4.54	6.54
EDGE 3	5.22	3.41	5.33	3.08	2.03	4.18	2.75	1.81	4.01	3.73	2.57	5.22
EDGE 4	6.54	5.17	5.33	5.45	4.29	5.23	4.86	3.83	4.01	4.67	4.54	6.54

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (3 LANES)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	6.70	6.63	6.93	5.00	8.33	6.79	4.81	8.01	6.93	6.79	4.62	6.70
EDGE 2	9.56	10.39	6.93	8.85	12.00	8.50	8.51	11.54	6.93	8.50	8.17	9.56
EDGE 3	6.70	6.63	6.93	5.00	3.29	6.79	4.81	3.17	6.93	6.79	4.62	6.70
EDGE 4	9.56	10.39	6.93	8.85	6.97	8.50	8.51	6.70	6.93	8.50	8.17	9.56

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
					BETA FACTOR										
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					BETA FACTOR									
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

LOADING (kips, K-ft)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	130.7											
TRANS.	F(X)								54.7	10.5				
LONG.	F(Z)										-18.4			
LONG.	M(X)										-1677.0			
TRANS.	M(Z)		-2320.0						-4564.2	-957.0				

* switched braking direction

SERVICE LOAD COMBINATIONS (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
							GROUP NO.						
VERT.	F(V)	3531.0	3661.7	3400.3	3400.3	3531.0	3531.0	3400.3	3531.0	3400.3	3531.0	3400.3	3531.0
TRANS.	F(X)	0.0	0.0	0.0	54.7	26.9	0.0	54.7	26.9	0.0	0.0	54.7	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-18.4	0.0	0.0	-18.4	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-1677.0	0.0	0.0	-1677.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2320.0	-4640.0	0.0	-4564.2	-4646.3	-2320.0	-4564.2	-4646.3	0.0	-2320.0	-4564.2	-2320.0
	M(COMB)	2320.0	4640.0	0.0	4564.2	4939.6	2320.0	4564.2	4939.6	0.0	2320.0	4564.2	2320.0

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
							GROUP NO.						
VERT.	F(V)	3531.0	2441.1	3400.3	2720.2	2824.8	2824.8	2428.8	2522.1	2556.6	2522.1	2266.9	3531.0
TRANS.	F(X)	0.0	0.0	0.0	43.8	21.5	0.0	39.1	19.2	0.0	0.0	36.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-14.7	0.0	0.0	-13.1	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-1341.6	0.0	0.0	-1197.9	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2320.0	-3093.3	0.0	-3651.4	-3717.0	-1856.0	-3260.1	-3318.8	0.0	-1657.1	-3042.8	-2320.0
	M(COMB)	2320.0	3093.3	0.0	3651.4	3951.7	1856.0	3260.1	3528.3	0.0	1657.1	3042.8	2320.0

LOAD FACTOR COMBINATIONS (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
							GROUP NO.						
VERT.	F(V)	4704.1	4794.2	4420.4	4420.4	4590.3	4590.3	4250.4	4413.8	4420.4	4590.3	4080.4	4704.1
TRANS.	F(X)	0.0	0.0	0.0	71.1	35.0	0.0	68.4	33.6	0.0	0.0	65.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-23.9	0.0	0.0	-23.0	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-2180.1	0.0	0.0	-2096.3	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-5036.7	-6635.2	0.0	-5933.5	-6040.1	-3016.0	-5705.3	-5807.8	0.0	-3016.0	-5477.0	-5036.7
	M(COMB)	5036.7	6635.2	0.0	5933.5	6421.5	3016.0	5705.3	6174.6	0.0	3016.0	5477.0	5036.7

SPREAD FOOTING DESIGN (1 LANE)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (1 LANE)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.						
EDGE 1	4.78	2.82	5.33	3.08	2.65	3.83	2.75	2.36	4.01	3.42	2.57	4.78
EDGE 2	6.29	4.83	5.33	5.45	5.06	5.03	4.86	4.52	4.01	4.49	4.54	6.29
EDGE 3	4.78	2.82	5.33	3.08	3.80	3.83	2.75	3.39	4.01	3.42	2.57	4.78
EDGE 4	6.29	4.83	5.33	5.45	6.21	5.03	4.86	5.54	4.01	4.49	4.54	6.29

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (1 LANE)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.						
EDGE 1	5.74	5.36	6.93	5.00	4.30	6.22	4.81	4.14	6.93	6.22	4.62	5.74
EDGE 2	9.01	9.67	6.93	8.85	8.22	8.17	8.51	7.91	6.93	8.17	8.17	9.01
EDGE 3	5.74	5.36	6.93	5.00	6.17	6.22	4.81	5.93	6.93	6.22	4.62	5.74
EDGE 4	9.01	9.67	6.93	8.85	10.09	8.17	8.51	9.70	6.93	8.17	8.17	9.01

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
					BETA FACTOR										
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					BETA FACTOR									
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					LOADING (kips, K-ft)									
VERT.	F(V)	3400.3	261.4											
TRANS.	F(X)								54.7	10.5				
LONG.	F(Z)										-36.8			
LONG.	M(X)										-3353.9			
TRANS.	M(Z)		-3071.5						-4564.2	-957.0				

* switched braking direction

SERVICE LOAD COMBINATIONS (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3661.7	3923.1	3400.3	3400.3	3661.7	3661.7	3400.3	3661.7	3400.3	3661.7	3400.3	3661.7
TRANS.	F(X)	0.0	0.0	0.0	54.7	26.9	0.0	54.7	26.9	0.0	0.0	54.7	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-36.8	0.0	0.0	-36.8	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-3353.9	0.0	0.0	-3353.9	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-3071.5	-6143.0	0.0	-4564.2	-5397.8	-3071.5	-4564.2	-5397.8	0.0	-3071.5	-4564.2	-3071.5
	M(COMB)	3071.5	6143.0	0.0	4564.2	6354.9	3071.5	4564.2	6354.9	0.0	3071.5	4564.2	3071.5

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3661.7	2615.4	3400.3	2720.2	2929.4	2929.4	2428.8	2615.5	2556.6	2615.5	2266.9	3661.7
TRANS.	F(X)	0.0	0.0	0.0	43.8	21.5	0.0	39.1	19.2	0.0	0.0	36.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-29.4	0.0	0.0	-26.3	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-2683.1	0.0	0.0	-2395.6	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-3071.5	-4095.3	0.0	-3651.4	-4318.2	-2457.2	-3260.1	-3855.5	0.0	-2193.9	-3042.8	-3071.5
	M(COMB)	3071.5	4095.3	0.0	3651.4	5083.9	2457.2	3260.1	4539.2	0.0	2193.9	3042.8	3071.5

LOAD FACTOR COMBINATIONS (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	4987.9	5168.0	4420.4	4420.4	4760.2	4760.2	4250.4	4577.1	4420.4	4760.2	4080.4	4987.9
TRANS.	F(X)	0.0	0.0	0.0	71.1	35.0	0.0	68.4	33.6	0.0	0.0	65.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-47.8	0.0	0.0	-46.0	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-4360.1	0.0	0.0	-4192.4	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-6668.2	-8784.5	0.0	-5933.5	-7017.1	-3993.0	-5705.3	-6747.2	0.0	-3993.0	-5477.0	-6668.2
	M(COMB)	6668.2	8784.5	0.0	5933.5	8261.3	3993.0	5705.3	7943.6	0.0	3993.0	5477.0	6668.2

SPREAD FOOTING DESIGN (2 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (2 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	4.74	2.77	5.33	3.08	2.04	3.79	2.75	1.83	4.01	3.39	2.57	4.74
EDGE 2	6.74	5.43	5.33	5.45	4.84	5.39	4.86	4.33	4.01	4.81	4.54	6.74
EDGE 3	4.74	2.77	5.33	3.08	4.34	3.79	2.75	3.87	4.01	3.39	2.57	4.74
EDGE 4	6.74	5.43	5.33	5.45	7.14	5.39	4.86	6.37	4.01	4.81	4.54	6.74

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (2 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	5.66	5.25	6.93	5.00	3.32	6.17	4.81	3.19	6.93	6.17	4.62	5.66
EDGE 2	9.98	10.95	6.93	8.85	7.87	8.76	8.51	7.57	6.93	8.76	8.17	9.98
EDGE 3	5.66	5.25	6.93	5.00	7.05	6.17	4.81	6.78	6.93	6.17	4.62	5.66
EDGE 4	9.98	10.95	6.93	8.85	11.60	8.76	8.51	11.15	6.93	8.76	8.17	9.98

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E (BETA FACTOR)	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E (BETA FACTOR)	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 0 deg.)

LOADING (kips, K-ft)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	352.9											
TRANS.	F(X)								54.7	10.5				
LONG.	F(Z)										-49.7			
LONG.	M(X)										-4529.6			
TRANS.	M(Z)		-2029.1						-4564.2	-957.0				

* switched braking direction

SERVICE LOAD COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3753.2	4106.1	3400.3	3400.3	3753.2	3753.2	3400.3	3753.2	3400.3	3753.2	3400.3	3753.2
TRANS.	F(X)	0.0	0.0	0.0	54.7	26.9	0.0	54.7	26.9	0.0	0.0	54.7	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-49.7	0.0	0.0	-49.7	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-4529.6	0.0	0.0	-4529.6	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2029.1	-4058.2	0.0	-4564.2	-4355.4	-2029.1	-4564.2	-4355.4	0.0	-2029.1	-4564.2	-2029.1
	M(COMB)	2029.1	4058.2	0.0	4564.2	6283.8	2029.1	4564.2	6283.8	0.0	2029.1	4564.2	2029.1

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3753.2	2737.4	3400.3	2720.2	3002.6	3002.6	2428.8	2680.9	2556.6	2680.9	2266.9	3753.2
TRANS.	F(X)	0.0	0.0	0.0	43.8	21.5	0.0	39.1	19.2	0.0	0.0	36.5	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-39.8	0.0	0.0	-35.5	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-3623.7	0.0	0.0	-3235.4	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-2029.1	-2705.5	0.0	-3651.4	-3484.3	-1623.3	-3260.1	-3111.0	0.0	-1449.4	-3042.8	-2029.1
	M(COMB)	2029.1	2705.5	0.0	3651.4	5027.1	1623.3	3260.1	4488.4	0.0	1449.4	3042.8	2029.1

LOAD FACTOR COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	5186.5	5429.7	4420.4	4420.4	4879.2	4879.2	4250.4	4691.5	4420.4	4879.2	4080.4	5186.5
TRANS.	F(X)	0.0	0.0	0.0	71.1	35.0	0.0	68.4	33.6	0.0	0.0	65.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	0.0	-64.6	0.0	0.0	-62.1	0.0	0.0	0.0	0.0
LONG.	M(X)	0.0	0.0	0.0	0.0	-5888.5	0.0	0.0	-5662.0	0.0	0.0	0.0	0.0
TRANS.	M(Z)	-4405.2	-5803.2	0.0	-5933.5	-5662.0	-2637.8	-5705.3	-5444.2	0.0	-2637.8	-5477.0	-4405.2
	M(COMB)	4405.2	5803.2	0.0	5933.5	8169.0	2637.8	5705.3	7854.8	0.0	2637.8	5477.0	4405.2

SPREAD FOOTING DESIGN (3 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal section modulus =	2339.3	ft^3
Transverse section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (3 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.22	3.41	5.33	3.08	2.03	4.18	2.75	1.81	4.01	3.73	2.57	5.22
EDGE 2	6.54	5.17	5.33	5.45	4.29	5.23	4.86	3.83	4.01	4.67	4.54	6.54
EDGE 3	5.22	3.41	5.33	3.08	5.13	4.18	2.75	4.58	4.01	3.73	2.57	5.22
EDGE 4	6.54	5.17	5.33	5.45	7.39	5.23	4.86	6.59	4.01	4.67	4.54	6.54

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (3 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	6.70	6.63	6.93	5.00	3.29	6.79	4.81	3.17	6.93	6.79	4.62	6.70
EDGE 2	9.56	10.39	6.93	8.85	6.97	8.50	8.51	6.70	6.93	8.50	8.17	9.56
EDGE 3	6.70	6.63	6.93	5.00	8.33	6.79	4.81	8.01	6.93	6.79	4.62	6.70
EDGE 4	9.56	10.39	6.93	8.85	12.00	8.50	8.51	11.54	6.93	8.50	8.17	9.56

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
						BETA FACTOR									
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
						BETA FACTOR								
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 60 deg.)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					LOADING (kips, K-ft)									
VERT.	F(V)	3400.3	130.7											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.8	4.0	18.4			
LONG.	M(X)								-1499.3	-364.6	1677.0			
TRANS.	M(Z)		-2320.0						-1347.2	-328.1				

* switched wind direction

SERVICE LOAD COMBINATIONS (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3531.0	3661.7	3400.3	3400.3	3531.0	3531.0	3400.3	3531.0	3400.3	3531.0	3400.3	3531.0
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.8	28.6	0.0	20.8	28.6	0.0	0.0	20.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	862.6	0.0	-1499.3	862.6	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-2320.0	-4640.0	0.0	-1347.2	-3052.3	-2320.0	-1347.2	-3052.3	0.0	-2320.0	-1347.2	-2320.0
	M(COMB)	2320.0	4640.0	0.0	2015.7	3171.8	2320.0	2015.7	3171.8	0.0	2320.0	2015.7	2320.0

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3531.0	2441.1	3400.3	2720.2	2824.8	2824.8	2428.8	2522.1	2556.6	2522.1	2266.9	3531.0
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	22.9	0.0	14.9	20.5	0.0	0.0	13.9	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	690.1	0.0	-1070.9	616.2	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-2320.0	-3093.3	0.0	-1077.8	-2441.8	-1856.0	-962.3	-2180.2	0.0	-1657.1	-898.1	-2320.0
	M(COMB)	2320.0	3093.3	0.0	1612.5	2537.4	1856.0	1439.8	2265.6	0.0	1657.1	1343.8	2320.0

LOAD FACTOR COMBINATIONS (1 LANE)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	4704.1	4794.2	4420.4	4420.4	4590.3	4590.3	4250.4	4413.8	4420.4	4590.3	4080.4	4704.1
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	27.0	37.2	0.0	26.0	35.8	0.0	0.0	25.0	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	1121.4	0.0	-1874.1	1078.3	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-5036.7	-6635.2	0.0	-1751.4	-3967.9	-3016.0	-1684.0	-3815.3	0.0	-3016.0	-1616.6	-5036.7
	M(COMB)	5036.7	6635.2	0.0	2620.3	4123.4	3016.0	2519.6	3964.8	0.0	3016.0	2418.8	5036.7

SPREAD FOOTING DESIGN (1 LANE)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (1 LANE)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	4.78	2.82	5.33	3.40	3.93	3.83	3.04	3.51	4.01	3.42	2.83	4.78
EDGE 2	6.29	4.83	5.33	4.10	5.51	5.03	3.66	4.92	4.01	4.49	3.42	6.29
EDGE 3	4.78	2.82	5.33	4.43	3.34	3.83	3.95	2.98	4.01	3.42	3.69	4.78
EDGE 4	6.29	4.83	5.33	5.13	4.92	5.03	4.58	4.40	4.01	4.49	4.27	6.29

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (1 LANE)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	5.74	5.36	6.93	5.53	6.39	6.22	5.31	6.14	6.93	6.22	5.10	5.74
EDGE 2	9.01	9.67	6.93	6.66	8.96	8.17	6.41	8.62	6.93	8.17	6.15	9.01
EDGE 3	5.74	5.36	6.93	7.19	5.43	6.22	6.92	5.22	6.93	6.22	6.64	5.74
EDGE 4	9.01	9.67	6.93	8.33	8.00	8.17	8.01	7.69	6.93	8.17	7.69	9.01

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

						BETA FACTOR									
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

						BETA FACTOR								
Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING

LOADINGS (Max. LLecc, wind at 60 deg.)

						LOADING (kips, K-ft)								
	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	261.4											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.8	4.0	36.8			
LONG.	M(X)								-1499.3	-364.6	3353.9			
TRANS.	M(Z)		-3071.5						-1347.2	-328.1				

* switched wind direction

SERVICE LOAD COMBINATIONS (2 LANES)

							GROUP NO.						
	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3661.7	3923.1	3400.3	3400.3	3661.7	3661.7	3400.3	3661.7	3400.3	3661.7	3400.3	3661.7
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.8	47.0	0.0	20.8	47.0	0.0	0.0	20.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	2539.5	0.0	-1499.3	2539.5	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-3071.5	-6143.0	0.0	-1347.2	-3803.8	-3071.5	-1347.2	-3803.8	0.0	-3071.5	-1347.2	-3071.5
	M(COMB)	3071.5	6143.0	0.0	2015.7	4573.6	3071.5	2015.7	4573.6	0.0	3071.5	2015.7	3071.5

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

							GROUP NO.						
	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3661.7	2615.4	3400.3	2720.2	2929.4	2929.4	2428.8	2615.5	2556.6	2615.5	2266.9	3661.7
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	37.6	0.0	14.9	33.6	0.0	0.0	13.9	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	2031.6	0.0	-1070.9	1813.9	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-3071.5	-4095.3	0.0	-1077.8	-3043.0	-2457.2	-962.3	-2717.0	0.0	-2193.9	-898.1	-3071.5
	M(COMB)	3071.5	4095.3	0.0	1612.5	3658.9	2457.2	1439.8	3266.8	0.0	2193.9	1343.8	3071.5

LOAD FACTOR COMBINATIONS (2 LANES)

							GROUP NO.						
	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4987.9	5168.0	4420.4	4420.4	4760.2	4760.2	4250.4	4577.1	4420.4	4760.2	4080.4	4987.9
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	27.0	61.2	0.0	26.0	58.8	0.0	0.0	25.0	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	3301.4	0.0	-1874.1	3174.4	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-6668.2	-8784.5	0.0	-1751.4	-4944.9	-3993.0	-1684.0	-4754.7	0.0	-3993.0	-1616.6	-6668.2
	M(COMB)	6668.2	8784.5	0.0	2620.3	5945.7	3993.0	2519.6	5717.0	0.0	3993.0	2418.8	6668.2

SPREAD FOOTING DESIGN (2 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (2 LANES)

						GROUP NO.						
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	4.74	2.77	5.33	3.40	4.47	3.79	3.04	3.99	4.01	3.39	2.83	4.74
EDGE 2	6.74	5.43	5.33	4.10	6.45	5.39	3.66	5.76	4.01	4.81	3.42	6.74
EDGE 3	4.74	2.77	5.33	4.43	2.74	3.79	3.95	2.44	4.01	3.39	3.69	4.74
EDGE 4	6.74	5.43	5.33	5.13	4.71	5.39	4.58	4.21	4.01	4.81	4.27	6.74

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (2 LANES)

						GROUP NO.						
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.66	5.25	6.93	5.53	7.27	6.17	5.31	6.99	6.93	6.17	5.10	5.66
EDGE 2	9.98	10.95	6.93	6.66	10.48	8.76	6.41	10.07	6.93	8.76	6.15	9.98
EDGE 3	5.66	5.25	6.93	7.19	4.45	6.17	6.92	4.28	6.93	6.17	6.64	5.66
EDGE 4	9.98	10.95	6.93	8.33	7.65	8.76	8.01	7.36	6.93	8.76	7.69	9.98

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
						BETA FACTOR									
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
						BETA FACTOR								
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING LOADINGS (Max. LLecc, wind at 60 deg.)

LOADING (kips, K-ft)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	352.9											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.8	4.0	49.7			
LONG.	M(X)								-1499.3	-364.6	4529.6			
TRANS.	M(Z)		-2029.1						-1347.2	-328.1				

* switched wind direction

SERVICE LOAD COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3753.2	4106.1	3400.3	3400.3	3753.2	3753.2	3400.3	3753.2	3400.3	3753.2	3400.3	3753.2
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.8	59.9	0.0	20.8	59.9	0.0	0.0	20.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	3715.2	0.0	-1499.3	3715.2	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-2029.1	-4058.2	0.0	-1347.2	-2761.4	-2029.1	-1347.2	-2761.4	0.0	-2029.1	-1347.2	-2029.1
	M(COMB)	2029.1	4058.2	0.0	2015.7	4629.0	2029.1	2015.7	4629.0	0.0	2029.1	2015.7	2029.1

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3753.2	2737.4	3400.3	2720.2	3002.6	3002.6	2428.8	2680.9	2556.6	2680.9	2266.9	3753.2
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	48.0	0.0	14.9	42.8	0.0	0.0	13.9	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	2972.2	0.0	-1070.9	2653.7	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-2029.1	-2705.5	0.0	-1077.8	-2209.1	-1623.3	-962.3	-1972.4	0.0	-1449.4	-898.1	-2029.1
	M(COMB)	2029.1	2705.5	0.0	1612.5	3703.2	1623.3	1439.8	3306.4	0.0	1449.4	1343.8	2029.1

LOAD FACTOR COMBINATIONS (3 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	5186.5	5429.7	4420.4	4420.4	4879.2	4879.2	4250.4	4691.5	4420.4	4879.2	4080.4	5186.5
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	27.0	77.9	0.0	26.0	74.9	0.0	0.0	25.0	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	4829.8	0.0	-1874.1	4644.0	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-4405.2	-5803.2	0.0	-1751.4	-3589.8	-2637.8	-1684.0	-3451.7	0.0	-2637.8	-1616.6	-4405.2
	M(COMB)	4405.2	5803.2	0.0	2620.3	6017.7	2637.8	2519.6	5786.3	0.0	2637.8	2418.8	4405.2

SPREAD FOOTING DESIGN (3 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal section modulus =	2339.3	ft^3
Transverse section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (3 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	5.22	3.41	5.33	3.40	5.26	4.18	3.04	4.70	4.01	3.73	2.83	5.22
EDGE 2	6.54	5.17	5.33	4.10	6.69	5.23	3.66	5.98	4.01	4.67	3.42	6.54
EDGE 3	5.22	3.41	5.33	4.43	2.72	4.18	3.95	2.43	4.01	3.73	3.69	5.22
EDGE 4	6.54	5.17	5.33	5.13	4.15	5.23	4.58	3.71	4.01	4.67	4.27	6.54

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (3 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	6.70	6.63	6.93	5.53	8.55	6.79	5.31	8.22	6.93	6.79	5.10	6.70
EDGE 2	9.56	10.39	6.93	6.66	10.88	8.50	6.41	10.46	6.93	8.50	6.15	9.56
EDGE 3	6.70	6.63	6.93	7.19	4.42	6.79	6.92	4.25	6.93	6.79	6.64	6.70
EDGE 4	9.56	10.39	6.93	8.33	6.75	8.50	8.01	6.49	6.93	8.50	7.69	9.56

AASHTO LOAD COMBINATIONS (1 LANE)

SCI-823-0837

SERVICE LOAD DESIGN

						BETA FACTOR									
	Load														
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

						BETA FACTOR								
	Load													
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 60 deg.)

						LOADING (kips, K-ft)								
	Load													
	Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	130.7											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.8	4.0	-18.4			
LONG.	M(X)								-1499.3	-364.6	-1677.0			
TRANS.	M(Z)		-2320.0						-1347.2	-328.1				

* switched wind & braking direction

SERVICE LOAD COMBINATIONS (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3531.0	3661.7	3400.3	3400.3	3531.0	3531.0	3400.3	3531.0	3400.3	3531.0	3400.3	3531.0
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.8	-8.2	0.0	20.8	-8.2	0.0	0.0	20.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	-2491.4	0.0	-1499.3	-2491.4	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-2320.0	-4640.0	0.0	-1347.2	-3052.3	-2320.0	-1347.2	-3052.3	0.0	-2320.0	-1347.2	-2320.0
	M(COMB)	2320.0	4640.0	0.0	2015.7	3940.0	2320.0	2015.7	3940.0	0.0	2320.0	2015.7	2320.0

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3531.0	2441.1	3400.3	2720.2	2824.8	2824.8	2428.8	2522.1	2556.6	2522.1	2266.9	3531.0
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	-6.5	0.0	14.9	-5.8	0.0	0.0	13.9	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-1993.1	0.0	-1070.9	-1779.6	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-2320.0	-3093.3	0.0	-1077.8	-2441.8	-1856.0	-962.3	-2180.2	0.0	-1657.1	-898.1	-2320.0
	M(COMB)	2320.0	3093.3	0.0	1612.5	3152.0	1856.0	1439.8	2814.3	0.0	1657.1	1343.8	2320.0

LOAD FACTOR COMBINATIONS (1 LANE)

	Load					GROUP NO.							
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	4704.1	4794.2	4420.4	4420.4	4590.3	4590.3	4250.4	4413.8	4420.4	4590.3	4080.4	4704.1
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	27.0	-10.6	0.0	26.0	-10.2	0.0	0.0	25.0	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-3238.8	0.0	-1874.1	-3114.2	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-5036.7	-6635.2	0.0	-1751.4	-3967.9	-3016.0	-1684.0	-3815.3	0.0	-3016.0	-1616.6	-5036.7
	M(COMB)	5036.7	6635.2	0.0	2620.3	5122.0	3016.0	2519.6	4925.0	0.0	3016.0	2418.8	5036.7

SPREAD FOOTING DESIGN (1 LANE)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (1 LANE)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	4.78	2.82	5.33	3.40	2.78	3.83	3.04	2.49	4.01	3.42	2.83	4.78
EDGE 2	6.29	4.83	5.33	4.10	4.37	5.03	3.66	3.90	4.01	4.49	3.42	6.29
EDGE 3	4.78	2.82	5.33	4.43	4.49	3.83	3.95	4.01	4.01	3.42	3.69	4.78
EDGE 4	6.29	4.83	5.33	5.13	6.07	5.03	4.58	5.42	4.01	4.49	4.27	6.29

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (1 LANE)

					GROUP NO.							
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.74	5.36	6.93	5.53	4.52	6.22	5.31	4.35	6.93	6.22	5.10	5.74
EDGE 2	9.01	9.67	6.93	6.66	7.10	8.17	6.41	6.82	6.93	8.17	6.15	9.01
EDGE 3	5.74	5.36	6.93	7.19	7.29	6.22	6.92	7.01	6.93	6.22	6.64	5.74
EDGE 4	9.01	9.67	6.93	8.33	9.67	8.17	8.01	9.49	6.93	8.17	7.69	9.01

AASHTO LOAD COMBINATIONS (2 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
					BETA FACTOR										
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

Group	Load Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
					BETA FACTOR									
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 60 deg.)

LOADING (kips, K-ft)

	Load Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	261.4											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.8	4.0	-36.8			
LONG.	M(X)								-1499.3	-364.6	-3353.9			
TRANS.	M(Z)		-3071.5						-1347.2	-328.1				

* switched wind & braking direction

SERVICE LOAD COMBINATIONS (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3661.7	3923.1	3400.3	3400.3	3661.7	3661.7	3400.3	3661.7	3400.3	3661.7	3400.3	3661.7
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.8	-26.6	0.0	20.8	-26.6	0.0	0.0	20.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	-4168.3	0.0	-1499.3	-4168.3	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-3071.5	-6143.0	0.0	-1347.2	-3803.8	-3071.5	-1347.2	-3803.8	0.0	-3071.5	-1347.2	-3071.5
	M(COMB)	3071.5	6143.0	0.0	2015.7	5643.0	3071.5	2015.7	5643.0	0.0	3071.5	2015.7	3071.5

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	3661.7	2615.4	3400.3	2720.2	2929.4	2929.4	2428.8	2615.5	2556.6	2615.5	2266.9	3661.7
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	-21.2	0.0	14.9	-19.0	0.0	0.0	13.9	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-3334.6	0.0	-1070.9	-2977.4	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-3071.5	-4095.3	0.0	-1077.8	-3043.0	-2457.2	-962.3	-2717.0	0.0	-2193.9	-898.1	-3071.5
	M(COMB)	3071.5	4095.3	0.0	1612.5	4514.4	2457.2	1439.8	4030.7	0.0	2193.9	1343.8	3071.5

LOAD FACTOR COMBINATIONS (2 LANES)

	Load Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
						GROUP NO.							
VERT.	F(V)	4987.9	5168.0	4420.4	4420.4	4760.2	4760.2	4250.4	4577.1	4420.4	4760.2	4080.4	4987.9
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	27.0	-34.5	0.0	26.0	-33.2	0.0	0.0	25.0	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-5418.8	0.0	-1874.1	-5210.4	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-6668.2	-8784.5	0.0	-1751.4	-4944.9	-3993.0	-1684.0	-4754.7	0.0	-3993.0	-1616.6	-6668.2
	M(COMB)	6668.2	8784.5	0.0	2620.3	7335.9	3993.0	2519.6	7053.7	0.0	3993.0	2418.8	6668.2

SPREAD FOOTING DESIGN (2 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (2 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	4.74	2.77	5.33	3.40	2.18	3.79	3.04	1.95	4.01	3.39	2.83	4.74
EDGE 2	6.74	5.43	5.33	4.10	4.15	5.39	3.66	3.71	4.01	4.81	3.42	6.74
EDGE 3	4.74	2.77	5.33	4.43	5.03	3.79	3.95	4.49	4.01	3.39	3.69	4.74
EDGE 4	6.74	5.43	5.33	5.13	7.00	5.39	4.58	6.25	4.01	4.81	4.27	6.74

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (2 LANES)

	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
					GROUP NO.							
EDGE 1	5.66	5.25	6.93	5.53	3.54	6.17	5.31	3.40	6.93	6.17	5.10	5.66
EDGE 2	9.98	10.95	6.93	6.66	6.75	8.76	6.41	6.49	6.93	8.76	6.15	9.98
EDGE 3	5.66	5.25	6.93	7.19	8.17	6.17	6.92	7.86	6.93	6.17	6.64	5.66
EDGE 4	9.98	10.95	6.93	8.33	11.38	8.76	8.01	10.94	6.93	8.76	7.69	9.98

By: RBK
6/29/2009

AASHTO LOAD COMBINATIONS (3 LANES)

SCI-823-0837

SERVICE LOAD DESIGN

						BETA FACTOR									
	Load														
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE	%
I	1.00	1	1	0	1	1	1	1	0	0	0	0	0	0	100
IA	1.00	1	2	0	0	0	0	0	0	0	0	0	0	0	150
IB	1.00	1	0	1	1	1	1	1	0	0	0	0	0	0	100
II	1.00	1	0	0	0	1	1	1	1	0	0	0	0	0	125
III	1.00	1	1	0	1	1	1	1	0.3	1	1	0	0	0	125
IV	1.00	1	1	0	1	1	1	1	0	0	0	1	0	0	125
V	1.00	1	0	0	0	1	1	1	1	0	0	1	0	0	140
VI	1.00	1	1	0	1	1	1	1	0.3	1	1	1	0	0	140
VII	1.00	1	0	0	0	1	1	1	0	0	0	0	1	0	133
VIII	1.00	1	1	0	1	1	1	1	0	0	0	0	0	1	140
IX	1.00	1	0	0	0	1	1	1	1	0	0	0	0	1	150
X	1.00	1	1	0	0	1	0	0	0	0	0	0	0	0	100

LOAD FACTOR DESIGN

						BETA FACTOR								
	Load													
Group	Factor	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
I	1.30	1	1.67	0	1	* 1.15	1	1	0	0	0	0	0	0
IA	1.30	1	2.20	0	0	0	0	0	0	0	0	0	0	0
IB	1.30	1	0	1	1	* 1.15	1	1	0	0	0	0	0	0
II	1.30	1	0	0	0	* 1.15	1	1	1	0	0	0	0	0
III	1.30	1	1	0	1	* 1.15	1	1	0.3	1	1	0	0	0
IV	1.30	1	1	0	1	* 1.15	1	1	0	0	0	1	0	0
V	1.25	1	0	0	0	* 1.15	1	1	1	0	0	1	0	0
VI	1.25	1	1	0	1	* 1.15	1	1	0.3	1	1	1	0	0
VII	1.30	1	0	0	0	* 1.15	1	1	0	0	0	0	1	0
VIII	1.30	1	1	0	1	* 1.15	1	1	0	0	0	0	0	1
IX	1.20	1	0	0	0	* 1.15	1	1	1	0	0	0	0	1
X	1.30	1	1.67	0	0	* 1.15	0	0	0	0	0	0	0	0

* for lateral at-rest earth pressures

BOTTOM OF FOOTING
LOADINGS (Max. LLecc, wind at 60 deg.)

						LOADING (kips, K-ft)								
	Load													
	Component	DL	(L+I)n	(L+I)p	CF	E	B	SF	W	WL	LF	R+S+T	EQ	ICE
VERT.	F(V)	3400.3	352.9											
TRANS.	F(X)								18.6	3.6				
LONG.	F(Z)								20.8	4.0	-49.7			
LONG.	M(X)								-1499.3	-364.6	-4529.6			
TRANS.	M(Z)		-2029.1						-1347.2	-328.1				

* switched wind & braking direction

SERVICE LOAD COMBINATIONS (3 LANES)

	Load						GROUP NO.						
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3753.2	4106.1	3400.3	3400.3	3753.2	3753.2	3400.3	3753.2	3400.3	3753.2	3400.3	3753.2
TRANS.	F(X)	0.0	0.0	0.0	18.6	9.2	0.0	18.6	9.2	0.0	0.0	18.6	0.0
LONG.	F(Z)	0.0	0.0	0.0	20.8	-39.5	0.0	20.8	-39.5	0.0	0.0	20.8	0.0
LONG.	M(X)	0.0	0.0	0.0	-1499.3	-5344.0	0.0	-1499.3	-5344.0	0.0	0.0	-1499.3	0.0
TRANS.	M(Z)	-2029.1	-4058.2	0.0	-1347.2	-2761.4	-2029.1	-1347.2	-2761.4	0.0	-2029.1	-1347.2	-2029.1
	M(COMB)	2029.1	4058.2	0.0	2015.7	6015.3	2029.1	2015.7	6015.3	0.0	2029.1	2015.7	2029.1

SERVICE LOAD COMBINATIONS (INCLUDING STRESS REDUCTION) (3 LANES)

	Load						GROUP NO.						
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	3753.2	2737.4	3400.3	2720.2	3002.6	3002.6	2428.8	2680.9	2556.6	2680.9	2266.9	3753.2
TRANS.	F(X)	0.0	0.0	0.0	14.9	7.3	0.0	13.3	6.6	0.0	0.0	12.4	0.0
LONG.	F(Z)	0.0	0.0	0.0	16.6	-31.6	0.0	14.9	-28.2	0.0	0.0	13.9	0.0
LONG.	M(X)	0.0	0.0	0.0	-1199.4	-4275.2	0.0	-1070.9	-3817.1	0.0	0.0	-999.5	0.0
TRANS.	M(Z)	-2029.1	-2705.5	0.0	-1077.8	-2209.1	-1623.3	-962.3	-1972.4	0.0	-1449.4	-898.1	-2029.1
	M(COMB)	2029.1	2705.5	0.0	1612.5	4812.2	1623.3	1439.8	4296.6	0.0	1449.4	1343.8	2029.1

LOAD FACTOR COMBINATIONS (3 LANES)

	Load						GROUP NO.						
	Component	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
VERT.	F(V)	5186.5	5429.7	4420.4	4420.4	4879.2	4879.2	4250.4	4691.5	4420.4	4879.2	4080.4	5186.5
TRANS.	F(X)	0.0	0.0	0.0	24.2	11.9	0.0	23.3	11.5	0.0	0.0	22.3	0.0
LONG.	F(Z)	0.0	0.0	0.0	27.0	-51.3	0.0	26.0	-49.3	0.0	0.0	25.0	0.0
LONG.	M(X)	0.0	0.0	0.0	-1949.1	-6947.2	0.0	-1874.1	-6680.0	0.0	0.0	-1799.2	0.0
TRANS.	M(Z)	-4405.2	-5803.2	0.0	-1751.4	-3589.8	-2637.8	-1684.0	-3451.7	0.0	-2637.8	-1616.6	-4405.2
	M(COMB)	4405.2	5803.2	0.0	2620.3	7819.8	2637.8	2519.6	7519.1	0.0	2637.8	2418.8	4405.2

SPREAD FOOTING DESIGN (3 LANES)

footing width =	22.0	ft.
footing length =	29.0	ft.
footing area =	638.0	ft^2
Longitudinal		
section modulus =	2339.3	ft^3
Transverse		
section modulus =	3083.7	ft^3

SPREAD FOOTING STRESS CHECK, KSF (ALLOWABLE BEARING PRESSURE = 80 KSF) (3 LANES)

						GROUP NO.						
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	5.22	3.41	5.33	3.40	2.16	4.18	3.04	1.93	4.01	3.73	2.83	5.22
EDGE 2	6.54	5.17	5.33	4.10	3.60	5.23	3.66	3.21	4.01	4.67	3.42	6.54
EDGE 3	5.22	3.41	5.33	4.43	5.82	4.18	3.95	5.19	4.01	3.73	3.69	5.22
EDGE 4	6.54	5.17	5.33	5.13	7.25	5.23	4.58	6.47	4.01	4.67	4.27	6.54

FACTORED BASE PRESSURES, KSF (USED FOR FOOTING MOMENT AND SHEAR DESIGN) (3 LANES)

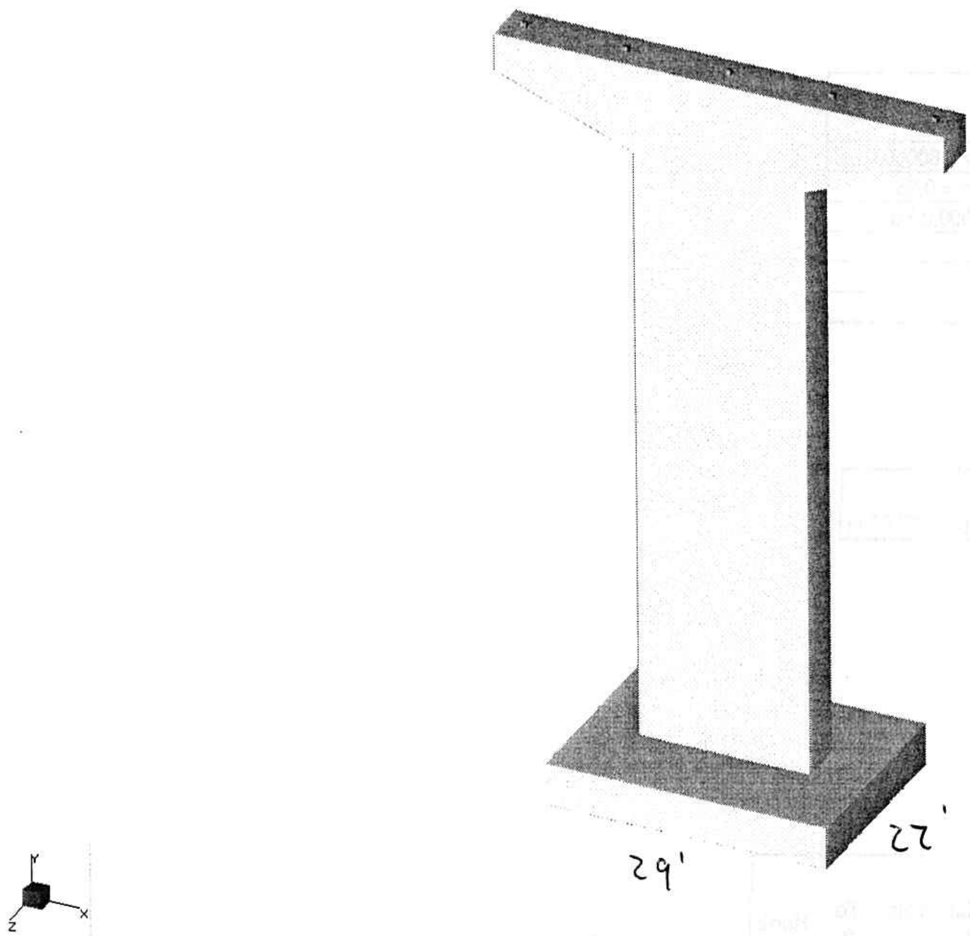
						GROUP NO.						
	I	IA	IB	II	III	IV	V	VI	VII	VIII	IX	X
EDGE 1	6.70	6.63	6.93	5.53	3.51	6.79	5.31	3.38	6.93	6.79	5.10	6.70
EDGE 2	9.56	10.39	6.93	6.66	5.84	8.50	6.41	5.62	6.93	8.50	6.15	9.56
EDGE 3	6.70	6.63	6.93	7.19	9.45	6.79	6.92	9.09	6.93	6.79	6.64	6.70
EDGE 4	9.56	10.39	6.93	8.33	11.78	8.50	8.01	11.33	6.93	8.50	7.69	9.56

JOB NO. 5355.02
BY DAT DATE Jul/21/2009
CKD. DATE

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

FULL IMAGE:



P2

Bentley	KZF, Inc.	Sheet #	DS-1
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/21/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

CAP DESIGN

CAP DESIGN
Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View: Upstation.

DESIGN PARAMETERS	
f'c = 4000.0 psi	
Fy flex = 60000.0 psi	Fy shear = 60000.0 psi
phi flex = 0.90	phi shear = 0.85
Ec = 3834.3 ksi	Es = 29000.0 ksi
crack control factor z = 170.00 kips / in	
Concrete Type : Normal Weight.	
Design of cap at face of column.	

CAP GEOMETRY
Hammer Head Cap : Length(X) = 46.50 ft Depth(Z) = 57.00 in

Cap Section Properties

Sec.	Area ft ^2	Ixx in ^4	Izz in ^4
1	45.13	7037334.00	1759333.50

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	# 10	16	3.38	20.320	0.00	46.50	Both
	# 10	12	6.56	15.240	0.00	46.50	Both
BOTTOM							
	# 10	2	3.38	2.540	0.00	19.45	Left
	# 10	2	3.38	2.540	15.43	31.07	None
	# 10	2	3.38	2.540	27.05	46.50	Right

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
0.00	15.50	# 6	4	6.00	3.52

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
16.47	31.00	# 6	4	11.63	1.82
31.50	46.20	# 6	4	6.00	3.52

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 23.25 ft

Loc	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn kips-ft	Comb	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
[illegible]	2.1	57	48.5	717.3	360	0.27	2.54	2.54	0.00	35.56	35.56
			-32.4	-7633.1	394	0.00	2.54	2.54	0.18	35.56	35.56
12.7	12.7	106	0.0	1272.2	0	0.00	2.54	2.54	0.00	35.56	35.56
			-9724.6	-15402.1	299	0.00	2.54	2.54	22.09	35.56	35.56
14.4	14.4	114	0.0	1363.5	0	0.00	2.54	2.54	0.00	35.56	35.56
			-12666.6	-16680.2	299	0.00	2.54	2.54	26.78	35.56	35.56

Span 2: From 23.25 ft To 46.50 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn kips-ft	Comb	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
8.8	32.1	114	0.0	1363.5	0	0.00	2.54	2.54	0.00	35.56	35.56
			-12721.5	-16680.2	300	0.00	2.54	2.54	26.90	35.56	35.56
10.6	33.9	106	0.0	1269.4	0	0.00	2.54	2.54	0.00	35.56	35.56
			-9688.8	-15362.6	300	0.00	2.54	2.54	22.06	35.56	35.56
21.2	44.5	57	15.5	714.4	394	0.08	2.54	2.54	0.00	35.56	35.56
			-65.4	-7593.6	360	0.00	2.54	2.54	0.37	35.56	35.56

SHEAR AND TORSION DESIGN

Bentley	KZF, Inc.	Sheet #	DS-3
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/21/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

Span 1: From 0.00 ft To 23.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alt in^2
2.07	2.07	L	8.4	293	0.0	0	323.1	209.9	0.00	0.00	0.00	3.52	0.00
		R	882.7	299	19.9	353	323.1	209.9	2.50	0.00	2.50	3.52	0.00
12.67	12.67	L	949.6	299	19.9	353	620.6	501.7	0.76	0.00	0.76	3.52	0.00
		R	1678.9	299	39.8	353	620.6	501.7	2.46	0.00	2.46	3.52	0.00
14.42	14.42	L	1693.7	299	39.8	353	669.6	553.1	2.21	0.00	2.21	3.52	0.00

Span 2: From 23.25 ft To 46.50 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alt in^2
8.83	32.08	R	1693.7	300	39.8	348	669.6	553.1	2.21	0.00	2.21	3.52	0.00
10.63	33.88	L	1678.4	300	39.8	348	619.1	500.2	2.47	0.00	2.47	3.52	0.00
		R	946.2	300	19.9	348	619.1	500.2	0.76	0.00	0.76	3.52	0.00
21.24	44.49	L	879.5	300	19.9	348	321.6	208.6	2.50	0.00	2.50	3.52	0.00
		R	8.2	293	0.0	0	321.6	208.6	0.00	0.00	0.00	3.52	0.00

Shear and Torsion Design : Notes

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED flexural steel.

CRACKING/FATIGUE CHECK

Span 1: From 0.00 ft To 23.25 ft

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
2.07	2.1	57.5	0.2	0.00	102	0.0	0.00
			3.4	0.15	68	0.0	0.00
12.67	12.7	106.0	27.2	0.76	7	15.2	0.89
			0.0	0.00	0	148.4	5.91 *
14.42	14.4	114.0	32.8	0.91	7	18.0	1.15 *
			0.0	0.00	0	173.4	6.82 *

Span 2: From 23.25 ft To 46.50 ft

Bentley	KZF, Inc.		Sheet #	DS-4
			Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)			By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.		Date	Jul/21/2009
	www.bentley.com	Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837			Date	

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
8.83	32.1	114.0	32.9	0.91	8	18.0	1.15 *
			0.0	0.00	0	173.4	6.81 *
10.63	33.9	105.8	27.2	0.75	8	15.1	0.88
			0.0	0.00	0	147.5	5.87 *
21.24	44.5	57.2	0.4	0.01	68	0.0	0.00
			1.1	0.05	102	0.0	0.00

Cracking and fatigue Check : Notes

* Cracking / fatigue checking failed.

Bentley	KZF, Inc.		Sheet #	DS-1
			Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)			By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.		Date	Jul/21/2009
	www.bentley.com	Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837			Date	

Column Design

COLUMN DESIGN - Column: 1

Code: AASHTO STANDARD (17th Edition 2002) - Factored Load Design

Units: US

Pier View: Upstation.

Design/Analysis Method: Moment Magnification - Unbraced Column.

Column Type: Rectangular 212.00 x 57.00 in

Column Section Properties

Sec.	Area ft^2	Ixx in^4	Izz in^4
1	83.92	3271747.50	45258872.00

DESIGN PARAMETERS

f'c = 4000.0 psi	fy = 60000.0 psi
phi flex = 0.90	phi axial = 0.70
Ec = 3834.3 ksi	Es = 29000 ksi
Concrete Type : Normal Weight.	

Reinforcement

Rebar Pattern: Rectangular

Rebar Orientation: Face Parallel

Reinforcement Schedule

Layer	Dir	Size	No. bars	Bar Dist. in
1	X	10	39	4.64
1	Z	10	11	4.64

Reinforcement summary

Bentley	KZF, Inc.		Sheet #	DS-2
			Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)			By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.		Date	Jul/21/2009
	www.bentley.com	Phone: 1-800-778-4277	Checked	
File Name: **SCI-823-0837**			Date	

Main bars summary:
96 # 10 bars
Total number of bars in the column: 96
Ties size: # 5

Moment Magnification calculation - Mx (global)

Loc ft	Comb	K	Cm	Beta	Delta B	Delta S	pPc kips
0.00	22C	1.0000	1.0000	1.0000	----	1.1108	23612.11
71.40	22C	1.0000	1.0000	1.0000	----	1.0713	23612.11
0.00	88C	1.0000	1.0000	0.1134	----	1.0698	42414.47
71.40	88C	1.0000	1.0000	1.0000	----	1.0916	23612.11

Moment Magnification calculation - Mz (global)

Loc ft	Comb	K	Cm	Beta	Delta B	Delta S	pPc kips
0.00	22C	2.0000	1.0000	0.1683	----	1.0171	139794.10
71.40	22C	2.0000	1.0000	0.1234	----	1.0109	145375.13
0.00	88C	2.0000	1.0000	0.2708	----	1.0220	128517.73
[illegible]	88C	2.0000	1.0000	0.3696	----	1.0169	119247.37

Design values used after Moment Magnification (e-min effect included).

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
0.00	22C	-0.0	2355.2	0.0	-503.6	0.0	10315.5
71.40	22C	-0.0	1571.0	0.0	-324.0	-0.0	-10252.5
0.00	88C	-40.8	2766.1	65.2	5342.9	-1.3	6440.9
71.40	88C	40.8	1981.8	-65.2	-416.5	-1.3	-3444.0

COLUMN DESIGN

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
0.00	112C	2766.1	5342.9	6440.9	23407.2	50.32	1.00	2.80
71.40	26C	1571.0	324.0	10252.5	56805.4	88.19	1.00	5.54

K values for all columns used in unbraced moment magnification

Column	Kx	Kz
1	1.00	2.00

Column Design : Notes

Column Design : Notes
Min reinforcement = 0.0100 % of Ag = 120.84 in^2.
---- Values do not exist at that location as computation is done at the top and bottom of clear length of column.

				Sheet #	DS-1
Bentley		KZF, Inc.		Job #	5355.02
Program:	LEAP® RC-PIER® V8i (SELECTseries1)			By	DAT
Version:	Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.		Date	Jul/21/2009
		www.bentley.com	Phone: 1-800-778-4277	Checked	
File Name:	SCI-823-0837			Date	

ISOLATED FOOTING DESIGN

ISOLATED FOOTING DESIGN
Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View: Upstation.

GEOMETRY
Name : footing 22x29
Shape : Rectangular, Type : Spread
Bf(X) = 29.00 ft, Hf(Z) = 22.00 ft, Thickness(Y) = 54.00 in
Ag = 638.00 ft^2, Ix = 25732.67 ft^4, Iz = 44713.17 ft^4
Footing concentric.
Columns located on the footing:
Column No. 1 at x = 0.00 ft, Rectangular 212.00 in x 57.00 in
Surcharge = 2.00 ksf

DESIGN PARAMETERS	
f'c = 4000.00 psi	fy = 60000.00 psi
phi flex = 0.90	phi shear = 0.85
Ec = 3834.3 ksi	Es = 29000.0 ksi
Crack control factor z = 170.00 kips/in	
Concrete Type : Normal Weight.	

Max Soil Pressures, Service (Without the reduction of overstress allowance)

Corner	X ft	Z ft	comb	Ovs	P kips	Mxx kft	Mzz kft	Soil press. ksf
1	14.50	-11.00	69	1.250	-3010.39	-52.94	-11654.26	11.20
			14	1.250	-2646.00	0.00	6335.20	4.77
2	-14.50	-11.00	101	1.250	-3024.80	-3132.52	5689.91	10.60
			68	1.250	-3010.39	729.87	-12128.10	3.15
3	-14.50	11.00	7	1.250	-3389.19	0.00	6335.20	10.04
			69	1.250	-3010.39	-52.94	-11654.26	3.59
4	14.50	11.00	68	1.250	-3010.39	729.87	-12128.10	11.64
			101	1.250	-3024.80	-3132.52	5689.91	4.23

Soil Pressures, Factored

Corner	X ft	Z ft	comb	Ovs	P kips	Mxx kft	Mzz kft	Soil press. ksf
1	14.500	-11.000	361	---	-3913.51	-68.82	-15150.53	14.55
			581	---	-3175.20	0.00	7602.24	5.72

Bentley	KZF, Inc.	Sheet #	DS-2
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/21/2009
	www.bentley.com / Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

Corner	X ft	Z ft	comb	Ovs	P kips	Mxx kft	Mzz kft	Soil press. ksf
2	-14.500	-11.000	393	---	-3932.24	-4072.28	7396.89	13.78
			497	---	-3762.99	912.33	-15160.13	3.94
3	-14.500	11.000	299	---	-4405.95	0.00	8235.76	13.05
			498	---	-3762.99	-66.17	-14567.82	4.49
4	14.500	11.000	360	---	-3913.51	948.83	-15766.53	15.13
			530	---	-3781.00	-3915.65	7112.39	5.29

Max Soil Pressures, Service (After the reduction of overstress allowance)

Corner	X ft	Z ft	comb	Ovs	P kips	Mxx kft	Mzz kft	Soil press. ksf
1	14.50	-11.00	2	1.000	-3017.60	-997.24	-3697.53	9.03
			289	1.500	-2646.00	0.00	6335.20	3.18
2	-14.50	-11.00	101	1.250	-3024.80	-3132.52	5689.91	8.48
			205	1.400	-3010.39	729.87	-12128.10	2.25
3	-14.50	11.00	7	1.250	-3389.19	0.00	6335.20	8.03
			206	1.400	-3010.39	-52.94	-11654.26	2.57
4	14.50	11.00	68	1.250	-3010.39	729.87	-12128.10	9.31
			238	1.400	-3024.80	-3132.52	5689.91	3.02

Footing Design : Notes

Only max. positive pressure is considered for design.

Max. Soil Pressure Used in Design: (without selfweight and surcharge)

Factored soil pressure	11.92 ksf
Service soil pressure	9.86 ksf
Fatigue soil pressure	2.65 ksf

Reinforcement Schedule

Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	33	# 9	5.14	33.00	8.03	None
Z	68	# 10	3.63	86.36	5.09	None

Flexure

Bentley	KZF, Inc.	Sheet #	DS-3
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/21/2009
	www.bentley.com Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

Dir ft	Loc	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-8.83	48.86	4210.4	360	25.93	33.00	33.00	0.00	0.00	0.00
X	8.83	48.86	4210.4	360	25.93	33.00	33.00	0.00	0.00	0.00
Z	-2.38	50.37	12857.7	360	58.45	86.36	86.36	0.00	0.00	0.00
Z	2.38	50.37	12857.7	360	58.45	86.36	86.36	0.00	0.00	0.00

Cracking/Fatigue

Dir	Loc ft	d in	Cracking Mmax kft	Cracking Comb	Cracking fs ksi	Cracking ratio fs	Fatigue Mmax kft	Fatigue Comb	Fatigue fs ksi	Fatigue ratio fs
X	-8.83	48.86	3481.0	282	27.54	0.77	937.4	8	7.42	0.38
X	8.83	48.86	3481.0	282	27.54	0.77	937.4	8	7.42	0.38
Z	-2.38	50.37	10630.4	282	31.86	0.88	2862.8	8	8.58	0.45
Z	2.38	50.37	10630.4	282	31.86	0.88	2862.8	8	8.58	0.45

One Way Shear

	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-12.91	360	48.86	418.2	1387.0
	X	12.91	360	48.86	418.2	1387.0
	Z	-6.57	360	50.37	1530.6	1884.5
	Z	6.57	360	50.37	1530.6	1884.5

Two Way Shear

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns						
1	61.37	193.70	360	49.61	5296.1	6041.2

Two Way Shear Note

TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

PROJECT DATA

Project : SCI-823-0837
User Job No.: 5355.02
Designer : DAT
Date : Jul/21/2009
Checker :
Checked Date:
State : OH State Job No. :
Structure type: Pier.
Pier View : Upstation.
Code : AASHTO STANDARD (17th Edition 2002)
Comments : Full Pier Design (Cap, Column, and Footing)
P2

PROJECT: SCI-823-0837

PIER GEOMETRY

Pier Type: Hammer Head

Pier View : Upstation.
Length(X) = 46.50 ft Height max(Y) = 9.50 ft Height min(Y) = 4.00 ft
Bottom length(X) = 17.67 ft Depth(Z) = 4.75 ft Skew angle = 13.00 Reduction of I = 1.

Column Shape: Rectangular Non Tapered
Bottom width(X) = 17.67 ft Top width(X) = 17.67 ft Depth(Z) = 4.75 ft Height(Y) = 63.90 f
Column Bottom has Diagonal Spring Matrix Defined
Diagonal Spring Matrix: (Units: kip, ft, radians)

	Kx	Ky	Kz	Rx	Ry	Rz
Kx	0.00	0.00	0.00	0.00	0.00	0.00
Ky	0.00	0.00	0.00	0.00	0.00	0.00
Kz	0.00	0.00	0.00	0.00	0.00	0.00
Rx	0.00	0.00	0.00	0.00	0.00	0.00
Ry	0.00	0.00	0.00	0.00	0.00	0.00
Rz	0.00	0.00	0.00	0.00	0.00	0.00

SUPERSTRUCTURE INFO

Total number of spans: 4 Span number rear to current pier: 1
Number of traffic lanes: 3

Beam: height : 72.00 in section area : 955.00 in^2
Beam Inertia (Ixx): 616109.00 in^4 Beam inertia (Iyy): 154028.00 in^4
Beam CG:36.00 in Barrier height : 42.00 in Depth of slab : 8.75 in
Curb to curb distance: 45.500 ft

Span #	Span length	Bridge Width
1	107.500 ft	48.500 ft
2	107.500 ft	48.500 ft
3	107.500 ft	48.500 ft
4	107.500 ft	48.500 ft
		48.500 ft

BEARING POINTS

Number of bearing lines: 1
First bearing line Eccentricity = 0.00 ft

Point	Distance ft
1	2.07
2	12.67
3	23.28
4	33.88
5	44.49

MATERIAL PROPERTIES

PROJECT: SCI-823-0837

	Cap	Column	Footing
Concrete Type	normal	normal	normal
Concrete Strength (psi)	4000.00	4000.00	4000.00
Concrete Density (lb/ft3)	150.00	150.00	150.00
Concrete Modulus Ec (ksi)	3834.30	3834.30	3834.30
Steel Strength Fy (ksi)	60.00	60.00	60.00

DESIGN PARAMETERS

AASHTO STANDARD Code

Strength Reduction factors for reinf. concrete:

Flexure and tension	0.90
Shear and torsion (normal)	0.85
(lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Multi presence factors for live load:

1 Lane	1.00
2 Lanes	1.00
3 Lanes	0.90
more than 3 Lanes	0.75

	Crack control factor kip/ft	Clear cover in	Clear side cover in	Impact factors (auto calculation)
Cap	170.00	2.00	2.00	1.22
Column	170.00	3.50		1.22
Footing	170.00	3.00	3.00	1.00

Degree of fixity in foundations for Moment Magnify Method: Ga = 5.00

SEISMIC DESIGN PARAMETERS

Strength Reduction factors for reinf. Concrete Seismic Design:

- Flexure and tension : 0.90
- Shear and torsion (normal) : 0.85
- (lightweight) : 0.85
- Axial compression (ties): 0.70
- Axial compression (spiral): 0.75

Seismic Overstrength

- Flexure and tension : 1.30
- Axial compression (ties): 1.30
- Axial compression (spiral): 1.30

Response Modification Factor : 3.00

Use core area for plastic hinging calculations.

Design Factors

- Cap Design Factor : 1.20
- Footing Design Factor : 1.20

Plastic Hinge Moment

Use actual computed Plastic Hinging Moment for each column in all combinations.

LOADS
=====

Pier View : Upstation.
Load Cases: 23

Loadcase ID: D1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-391.00
1	2	Y	-391.00
1	3	Y	-391.00
1	4	Y	-391.00
1	5	Y	-391.00

Loadcase ID: (L+In)1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	-2.25
1	3	Y	-209.30
1	4	Y	-159.95
1	5	Y	-0.09

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: (L+In)2 Name:
Multiplier = 1.000

PROJECT: SCI-823-0837

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-231.70
1	2	Y	-139.89
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: (L+In)3 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	-141.79
1	5	Y	-229.81

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc. | BY DAT DATE Jul/21/2009
PHONE : TOLL-FREE 1-800-778-4277 | CKD. DATE

PROJECT: SCI-823-0837

Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: (L+In)4 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-22.37
1	4	Y	-192.94
1	5	Y	-156.29

Auto generation details

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: (L+In)5 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-106.66
1	2	Y	-210.17
1	3	Y	-54.76
1	4	Y	0.00
1	5	Y	0.00

Auto generation details

PROJECT: SCI-823-0837

Generated Live Load

Longitudinal Reaction: Continuous Beam Reaction

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Reaction distribution among line
Bearing Line 1
Truck Case A: 1.00
Lane Case A: 1.00
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.00 ft
Center to Center Spacing = 1.00 ft
Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 72
Total number of Possible Combination = 57297

Loadcase ID: LF1 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	181.67	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.66
1	1	Z	2.85
1	1	Y	-0.99
1	2	X	-0.66
1	2	Z	2.85
1	3	X	-0.66
1	3	Z	2.85
1	4	X	-0.66
1	4	Z	2.85
1	5	X	-0.66
1	5	Z	2.85
1	5	Y	0.99

Auto generation details

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 3
Contributing longitudinal length = 107.50 ft

Loadcase ID: LF2 Name:
Multiplier = 1.000

Cap loads:

PROJECT: SCI-823-0837

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	181.67	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.66
1	1	Z	2.85
1	1	Y	-0.99
1	2	X	-0.66
1	2	Z	2.85
1	3	X	-0.66
1	3	Z	2.85
1	4	X	-0.66
1	4	Z	2.85
1	5	X	-0.66
1	5	Z	2.85
1	5	Y	0.99

Auto generation details

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 3
Contributing longitudinal length = 107.50 ft

Loadcase ID: LF3 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	181.67	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.66
1	1	Z	2.85
1	1	Y	-0.99
1	2	X	-0.66
1	2	Z	2.85
1	3	X	-0.66
1	3	Z	2.85
1	4	X	-0.66
1	4	Z	2.85
1	5	X	-0.66
1	5	Z	2.85
1	5	Y	0.99

Auto generation details

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 3
Contributing longitudinal length = 107.50 ft

Loadcase ID: LF4 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	181.67	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.66
1	1	Z	2.85
1	1	Y	-0.99
1	2	X	-0.66
1	2	Z	2.85
1	3	X	-0.66
1	3	Z	2.85
1	4	X	-0.66
1	4	Z	2.85
1	5	X	-0.66
1	5	Z	2.85
1	5	Y	0.99

Auto generation details

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 3
Contributing longitudinal length = 107.50 ft

Loadcase ID: LF5 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	181.67	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.66
1	1	Z	2.85
1	1	Y	-0.99
1	2	X	-0.66
1	2	Z	2.85
1	3	X	-0.66
1	3	Z	2.85
1	4	X	-0.66
1	4	Z	2.85
1	5	X	-0.66
1	5	Z	2.85
1	5	Y	0.99

Auto generation details

PROJECT: SCI-823-0837

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 3
Contributing longitudinal length = 107.50 ft

Loadcase ID: W1 Name: Angle: 0
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-4.89	0.50	----	----
UDL	Z	----	-0.02	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-10.71
1	1	Y	-15.41
1	1	Z	-2.47
1	2	X	-10.71
1	2	Y	20.85
1	2	Z	-2.47
1	3	X	-10.71
1	3	Y	20.85
1	3	Z	-2.47
1	4	X	-10.71
1	4	Y	20.85
1	4	Z	-2.47
1	5	X	-10.71
1	5	Y	57.12
1	5	Z	-2.47

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 633.90 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	50.000 psf	Cap	40.000 psf
Longitudinal	0.000 psf	Column	40.000 psf
Overturning	20.000 psf		

Loadcase ID: W2 Name: Angle: 15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	2.31	0.50	----	----
UDL	Z	----	-0.00	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	9.73
1	1	Y	5.86
1	1	Z	0.89

PROJECT: SCI-823-0837

1	2	X	9.73
1	2	Y	-0.00
1	2	Z	0.89
1	3	X	9.73
1	3	Y	-0.00
1	3	Z	0.89
1	4	X	9.73
1	4	Y	-0.00
1	4	Z	0.89
1	5	X	9.73
1	5	Y	-5.86
1	5	Z	0.89

Auto generation details
Generated Wind Load on Structure
Angle of wind = 15.00 deg Elevation above which wind load acts = 633.90 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	44.000 psf	Cap	40.000 psf
Longitudinal	6.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W3 Name: Angle: 30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	5.70	0.50	----	----
UDL	Z	----	-0.04	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	9.38
1	1	Y	5.65
1	1	Z	-0.54
1	2	X	9.38
1	2	Y	-0.00
1	2	Z	-0.54
1	3	X	9.38
1	3	Y	-0.00
1	3	Z	-0.54
1	4	X	9.38
1	4	Y	-0.00
1	4	Z	-0.54
1	5	X	9.38
1	5	Y	-5.65
1	5	Z	-0.54

Auto generation details
Generated Wind Load on Structure
Angle of wind = 30.00 deg Elevation above which wind load acts = 633.90 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	41.000 psf	Cap	40.000 psf
Longitudinal	12.000 psf	Column	40.000 psf
Overturning	not considered		

PROJECT: SCI-823-0837

Loadcase ID: W4 Name: Angle: 45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	7.81	0.50	----	----
UDL	Z	----	-0.10	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	7.86
1	1	Y	4.74
1	1	Z	-1.80
1	2	X	7.86
1	2	Y	-0.00
1	2	Z	-1.80
1	3	X	7.86
1	3	Y	-0.00
1	3	Z	-1.80
1	4	X	7.86
1	4	Y	-0.00
1	4	Z	-1.80
1	5	X	7.86
1	5	Y	-4.74
1	5	Z	-1.80

Auto generation details
Generated Wind Load on Structure
Angle of wind = 45.00 deg Elevation above which wind load acts = 633.90 ft
Default wind pressure

Wind pressure for superstructure:

Transverse	33.000 psf	
Longitudinal	16.000 psf	
Overturning	not considered	

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: W5 Name: Angle: 60
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	8.07	0.50	----	----
UDL	Z	----	-0.18	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	4.58
1	1	Y	2.76
1	1	Z	-3.23
1	2	X	4.58
1	2	Y	-0.00
1	2	Z	-3.23
1	3	X	4.58
1	3	Y	-0.00

1	3	Z	-3.23
1	4	X	4.58
1	4	Y	-0.00
1	4	Z	-3.23
1	5	X	4.58
1	5	Y	-2.76
1	5	Z	-3.23

Auto generation details
Generated Wind Load on Structure
Angle of wind = 60.00 deg Elevation above which wind load acts = 633.90 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	17.000 psf	Cap	40.000 psf
Longitudinal	19.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W6 Name: Angle: 75
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	6.41	0.50	----	----
UDL	Z	----	-0.26	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	3.45
1	1	Y	2.08
1	1	Z	-4.17
1	2	X	3.45
1	2	Y	-0.00
1	2	Z	-4.17
1	3	X	3.45
1	3	Y	-0.00
1	3	Z	-4.17
1	4	X	3.45
1	4	Y	-0.00
1	4	Z	-4.17
1	5	X	3.45
1	5	Y	-2.08
1	5	Z	-4.17

Auto generation details
Generated Wind Load on Structure
Angle of wind = 75.00 deg Elevation above which wind load acts = 633.90 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	11.000 psf	Cap	40.000 psf
Longitudinal	22.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: WL1 Name: Angle: 0
Multiplier = 1.000

Bearing loads:

PROJECT: SCI-823-0837

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.09
1	1	Y	3.14
1	1	Z	0.48
1	2	X	2.09
1	2	Y	-0.00
1	2	Z	0.48
1	3	X	2.09
1	3	Y	-0.00
1	3	Z	0.48
1	4	X	2.09
1	4	Y	-0.00
1	4	Z	0.48
1	5	X	2.09
1	5	Y	-3.14
1	5	Z	0.48

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 0.00 deg Live load length = 107.50 ft

Loadcase ID: WL2 Name: Angle: 15
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.90
1	1	Y	2.85
1	1	Z	0.17
1	2	X	1.90
1	2	Y	-0.00
1	2	Z	0.17
1	3	X	1.90
1	3	Y	-0.00
1	3	Z	0.17
1	4	X	1.90
1	4	Y	-0.00
1	4	Z	0.17
1	5	X	1.90
1	5	Y	-2.85
1	5	Z	0.17

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 15.00 deg Live load length = 107.50 ft

Loadcase ID: WL3 Name: Angle: 30
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.83
1	1	Y	2.75
1	1	Z	-0.11
1	2	X	1.83
1	2	Y	-0.00

PROJECT: SCI-823-0837

1	2	Z	-0.11
1	3	X	1.83
1	3	Y	-0.00
1	3	Z	-0.11
1	4	X	1.83
1	4	Y	-0.00
1	4	Z	-0.11
1	5	X	1.83
1	5	Y	-2.75
1	5	Z	-0.11

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 30.00 deg   Live load length = 107.50 ft

Loadcase ID: WL4   Name: Angle: 45
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.54
1	1	Y	2.31
1	1	Z	-0.35
1	2	X	1.54
1	2	Y	-0.00
1	2	Z	-0.35
1	3	X	1.54
1	3	Y	-0.00
1	3	Z	-0.35
1	4	X	1.54
1	4	Y	-0.00
1	4	Z	-0.35
1	5	X	1.54
1	5	Y	-2.31
1	5	Z	-0.35

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 45.00 deg   Live load length = 107.50 ft

Loadcase ID: WL5   Name: Angle: 60
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.90
1	1	Y	1.34
1	1	Z	-0.63
1	2	X	0.90
1	2	Y	-0.00
1	2	Z	-0.63
1	3	X	0.90
1	3	Y	-0.00
1	3	Z	-0.63
1	4	X	0.90
1	4	Y	-0.00
1	4	Z	-0.63

PROJECT: SCI-823-0837

1	5	X	0.90
1	5	Y	-1.34
1	5	Z	-0.63

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 60.00 deg Live load length = 107.50 ft

Loadcase ID: WL6 Name: Angle: 75
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.50
1	1	Y	0.74
1	1	Z	-0.81
1	2	X	0.50
1	2	Y	-0.00
1	2	Z	-0.81
1	3	X	0.50
1	3	Y	-0.00
1	3	Z	-0.81
1	4	X	0.50
1	4	Y	-0.00
1	4	Z	-0.81
1	5	X	0.50
1	5	Y	-0.74
1	5	Z	-0.81

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 75.00 deg Live load length = 107.50 ft

Selected load groups:

SERVICE GROUP I
SERVICE GROUP II
SERVICE GROUP III
SERVICE GROUP IV
SERVICE GROUP V
SERVICE GROUP VI
SERVICE GROUP VII
SERVICE GROUP VIII
SERVICE GROUP IX
LOAD FACTOR GROUP I
LOAD FACTOR GROUP II
LOAD FACTOR GROUP III
LOAD FACTOR GROUP IV
LOAD FACTOR GROUP V
LOAD FACTOR GROUP VI
LOAD FACTOR GROUP VII
LOAD FACTOR GROUP VIII
LOAD FACTOR GROUP IX

| SHEET 1 OF 1
| JOB NO. 5355.02
PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc. | BY DAT DATE Jul/21/2009
PHONE : TOLL-FREE 1-800-778-4277 | CKD. DATE

PROJECT: SCI-823-0837

AASHTO STANDARD Load: Self

Coord. system: Global Units: kips kips-ft

Memb	Node	Fx	Fy	Fz	Mx	My	Mz
1	1	-0	535.2	0	-0	0	-0.003623
1	2	-0	-258.3	0	-0	0	0.003623
2	3	0	0	0	0	0	0
2	4	0	6.472	0	0	0	-6.688
3	4	0	-6.472	0	0	0	6.688
3	5	0	57.94	0	0	0	-348.2
4	5	0	-57.94	0	0	0	348.2
4	6	0	69.34	0	0	0	-459.3
5	6	0	-69.34	0	0	0	459.3
5	2	0	129.1	0	0	0	-1336
6	2	0	129.1	0	0	0	1336
6	7	0	-128.9	0	0	0	-1332
7	7	0	128.9	0	0	0	1332
7	8	0	-69.34	0	0	0	-459.3
8	8	0	69.34	0	0	0	459.3
8	9	0	-57.6	0	0	0	-345.1
9	9	0	57.6	0	0	0	345.1
9	10	0	-6.288	0	0	0	-6.329
10	10	0	6.288	0	0	0	6.329
10	11	0	0	0	0	0	0

ISOLATED
PIER CAP
CHECK

| SHEET 1 OF 1
| JOB NO. 5355.02
PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc. | BY DAT DATE Jul/21/2009
PHONE : TOLL-FREE 1-800-778-4277 | CKD. DATE

PROJECT: SCI-823-0837

AASHTO STANDARD Load: D1-

Coord. system: Global Units: kips kips-ft

Memb	Node	Fx	Fy	Fz	Mx	My	Mz
1	1	-0	1955	0	-0	0	52.78
1	2	-0	-1955	0	-0	0	-52.78
2	3	0	0	0	0	0	0
2	4	0	0	0	0	0	0
3	4	0	-391	0	0	0	0
3	5	0	391	0	0	0	-4147
4	5	0	-782	0	0	0	4147
4	6	0	782	0	0	0	-5511
5	6	0	-782	0	0	0	5511
5	2	0	782	0	0	0	-1.242e+004
6	2	0	1173	0	0	0	1.247e+004
6	7	0	-1173	0	0	0	-1.244e+004
7	7	0	782	0	0	0	1.244e+004
7	8	0	-782	0	0	0	-5553
8	8	0	782	0	0	0	5553
8	9	0	-782	0	0	0	-4147
9	9	0	391	0	0	0	4147
9	10	0	-391	0	0	0	0
10	10	0	0	0	0	0	0
10	11	0	0	0	0	0	0

| SHEET 1 OF 1
| JOB NO. 5355.02
PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc. | BY DAT DATE Jul/21/2009
PHONE : TOLL-FREE 1-800-778-4277 | CKD. DATE

PROJECT: SCI-823-0837

AASHTO STANDARD Load: (L+In)1- Impact factor not included.
Coord. system: Global Units: kips kips-ft

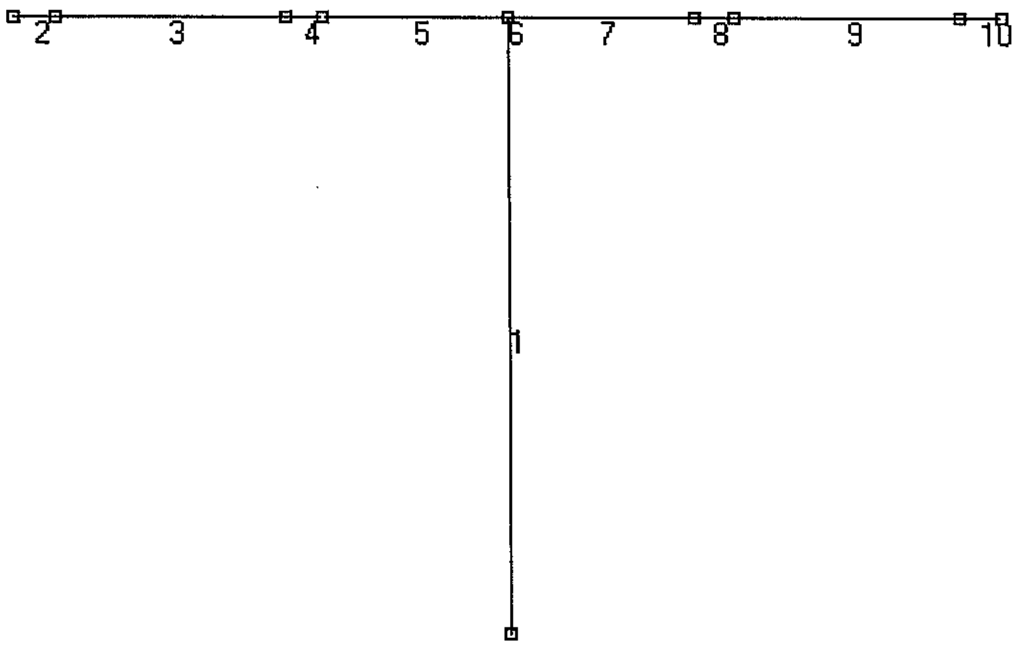
Memb	Node	Fx	Fy	Fz	Mx	My	Mz
1	1	-0	263.9	0	-0	0	-4415
1	2	-0	-263.9	0	-0	0	4415
2	3	0	0	0	0	0	0
2	4	0	0	0	0	0	0
3	4	0	-153.1	0	0	0	0
3	5	0	153.1	0	0	0	-1624
4	5	0	-263.9	0	0	0	1624
4	6	0	263.9	0	0	0	-2084
5	6	0	-263.9	0	0	0	2084
5	2	0	263.9	0	0	0	-4415
6	2	0	0	0	0	0	0
6	7	0	0	0	0	0	0
7	7	0	0	0	0	0	0
7	8	0	0	0	0	0	0
8	8	0	0	0	0	0	0
8	9	0	0	0	0	0	0
9	9	0	0	0	0	0	0
9	10	0	0	0	0	0	0
10	10	0	0	0	0	0	0
10	11	0	0	0	0	0	0

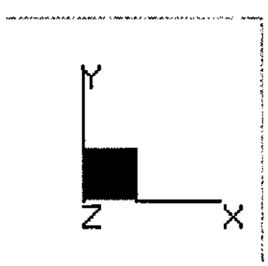
PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

| SHEET 1 OF 1
| JOB NO. 5355.02
| BY DAT DATE Jul/21/2009
| CKD. DATE

PROJECT: SCI-823-0837

STRUCTURE MODEL: MEMBERS

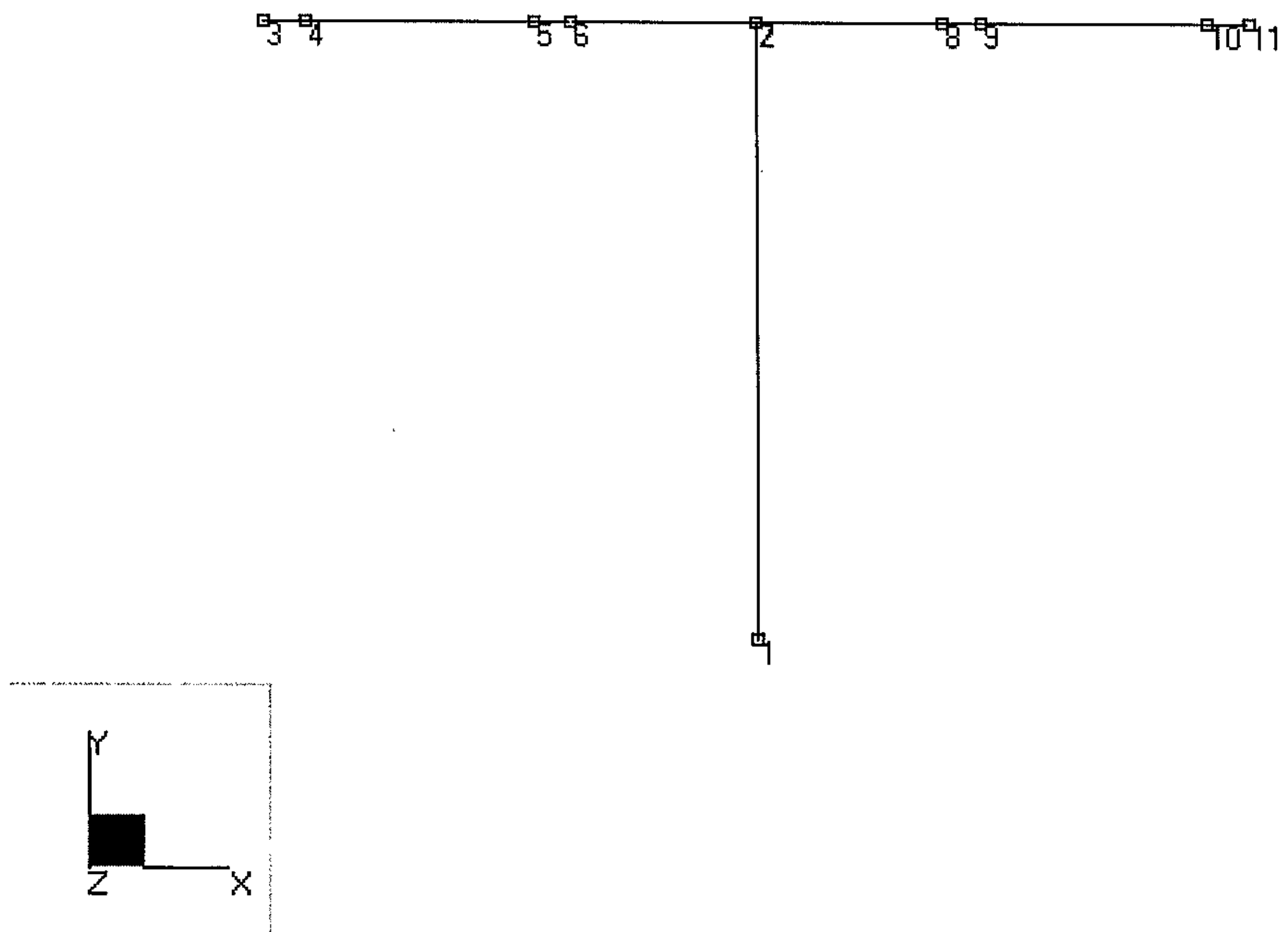




PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.	SHEET 1 OF 1
PHONE : TOLL-FREE 1-800-778-4277	JOB NO. 5355.02
	BY DAT DATE Jul/21/2009
	CKD. DATE

PROJECT: SCI-823-0837

STRUCTURE MODEL: NODES



PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

LOAD COMBINATIONS - AASHTO STANDARD

```
Comb #     1  (SER GP I    ) = 1.00 (  1.00 D1 + 1.00 (L+In)1 )
Comb #     2  (LFR GP I    ) = 1.30 (  1.00 D1 + 1.67 (L+In)1 )
```

Load Combinations for Columns only:

```
Comb #     1C (LFR GP I    ) = 1.30 (  1.00 D1 + 1.67 (L+In)1 )
Comb #     2C (LFR GP I    ) = 1.30 (  0.75 D1 + 1.67 (L+In)1 )
```

CAP DESIGN

CAP DESIGN
Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View: Upstation.

DESIGN PARAMETERS	
f'c = 4000.0 psi	
Fy flex = 60000.0 psi	Fy shear = 60000.0 psi
phi flex = 0.90	phi shear = 0.85
Ec = 3834.3 ksi	Es = 29000.0 ksi
crack control factor z = 170.00 kips / in	
Concrete Type : Normal Weight.	
Design of cap at face of column.	

GEOMETRY
Hammer Head Cap : Length(X) = 46.50 ft Depth(Z) = 57.00 in

Cap Section Properties

Sec.	Area ft ^2	Ixx in ^4	Izz in ^4
1	45.13	7037334.00	1759333.50

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	# 10	16	3.38	20.320	0.00	46.50	Both
	# 10	7	6.56	8.890	0.00	46.50	Both
BOTTOM							
	# 10	2	3.38	2.540	0.00	19.45	Left
	# 10	2	3.38	2.540	15.43	31.07	None
	# 10	2	3.38	2.540	27.05	46.50	Right

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
0.00	2.07	# 6	4	21.00	1.01

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
2.07	14.42	# 6	4	6.00	3.52
14.42	32.08	# 6	4	24.00	0.88
32.08	33.88	# 6	4	18.00	1.17
33.88	44.49	# 6	4	24.00	0.88
44.49	46.50	# 6	4	21.00	1.01

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 23.25 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn kips-ft	Comb	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
2.1	2.1	57	0.0	696.8	0	0.00	2.54	2.54	0.00	29.21	29.21
			-8.7	-6441.1	2	0.00	2.54	2.54	0.05	29.21	29.21
12.7	12.7	106	0.0	1251.7	0	0.00	2.54	2.54	0.00	29.21	29.21
			-10126.2	-12822.7	2	0.00	2.54	2.54	22.94	29.21	29.21
14.4	14.4	114	0.0	1343.0	0	0.00	2.54	2.54	0.00	29.21	29.21
			-13258.6	-13872.6	2	0.00	2.54	2.54	27.98	29.21	29.21

Span 2: From 23.25 ft To 46.50 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn kips-ft	Comb	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
8.8	32.1	114	0.0	1343.0	0	0.00	2.54	2.54	0.00	29.21	29.21
			-7816.0	-13872.6	2	0.00	2.54	2.54	19.03	29.21	29.21
10.6	33.9	106	0.0	1248.9	0	0.00	2.54	2.54	0.00	29.21	29.21
			-5839.1	-12790.2	2	0.00	2.54	2.54	17.48	29.21	29.21
21.2	44.5	57	0.0	693.9	0	0.00	2.54	2.54	0.00	29.21	29.21
			-8.2	-6408.6	2	0.00	2.54	2.54	0.05	29.21	29.21

SHEAR AND TORSION DESIGN

Bentley	KZF, Inc.	Sheet #	DS-3
		Job #	5355.02
Program: LEAP® RC-PIER® V8i (SELECTseries1)		By	DAT
Version: Version: 09.00.00	Copyright © Bentley Systems, Inc. 1984 - 2009.	Date	Jul/21/2009
	www.bentley.com / Phone: 1-800-778-4277	Checked	
File Name: SCI-823-0837		Date	

Span 1: From 0.00 ft To 23.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alt in^2
2.07	2.07	L	8.4	2	0.0	0	325.5	209.9	0.00	0.00	0.00	1.01	0.00
		R	920.6	2	0.0	0	325.5	209.9	2.64	0.00	2.64	3.52	0.00
12.67	12.67	L	987.5	2	0.0	0	623.0	501.7	0.84	0.00	0.84	3.52	0.00
		R	1788.1	2	0.0	0	623.0	501.7	2.70	0.00	2.70	3.52	0.00
14.42	14.42	L	1802.9	2	0.0	0	672.0	553.1	2.43	0.00	2.43	3.52	0.00

Span 2: From 23.25 ft To 46.50 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alt in^2
8.83	32.08	R	1106.7	2	0.0	0	672.0	553.1	0.93	0.00	0.93	1.17	0.00
10.63	33.88	L	1091.5	2	0.0	0	621.5	500.2	1.09	0.00	1.09	1.17	0.00
		R	583.2	2	0.0	0	621.5	500.2	0.57	0.00	0.57	0.88	0.00
21.24	44.49	L	516.5	2	0.0	0	324.0	208.6	0.86	0.00	0.86	0.88	0.00
		R	8.2	2	0.0	0	324.0	208.6	0.00	0.00	0.00	1.01	0.00

Shear and Torsion Design : Notes

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED flexural steel.

CRACKING/FATIGUE CHECK

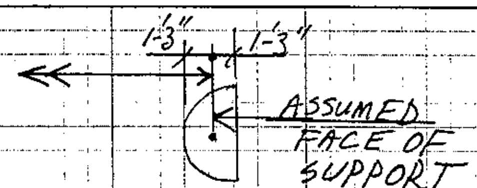
Span 1: From 0.00 ft To 23.25 ft

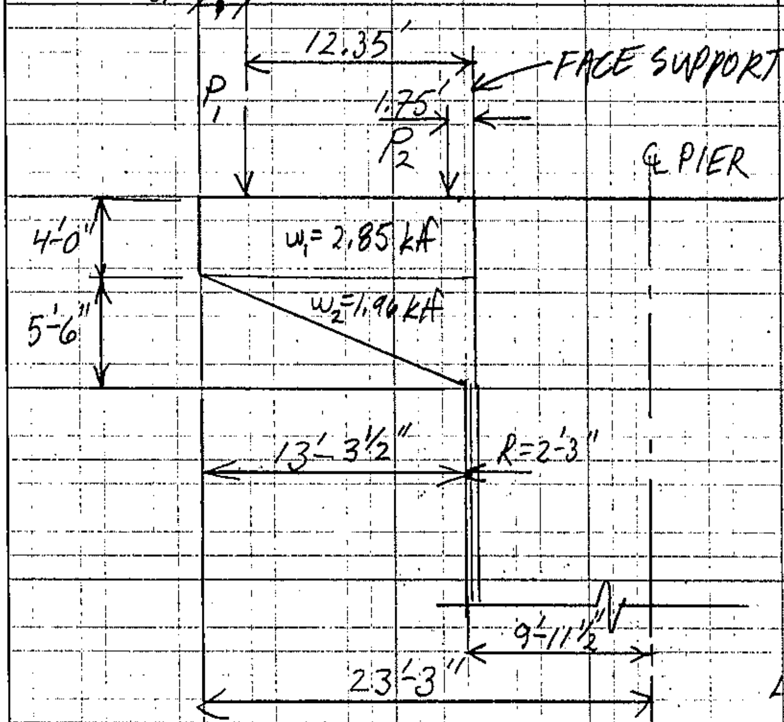
Loc ft	AbsLoc ft	H In	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
2.07	2.1	57.5	0.1	0.00	1	0.0	0.00
			0.0	0.00	0	0.0	0.00
[illegible]	12.7	106.0	28.3	0.79	1	8.6	0.59
			0.0	0.00	0	0.0	0.00
14.42	14.4	114.0	34.4	0.96	1	10.2	0.81
			0.0	0.00	0	0.0	0.00

Span 2: From 23.25 ft To 46.50 ft

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
8.83	32.1	114.0	24.3	0.68	1	0.0	0.00
			0.0	0.00	0	0.0	0.00
10.63	33.9	105.8	19.7	0.55	1	0.0	0.00
			0.0	0.00	0	0.0	0.00
21.24	44.5	57.2	0.1	0.00	1	0.0	0.00
			0.0	0.00	0	0.0	0.00

* Cracking / fatigue checking failed.



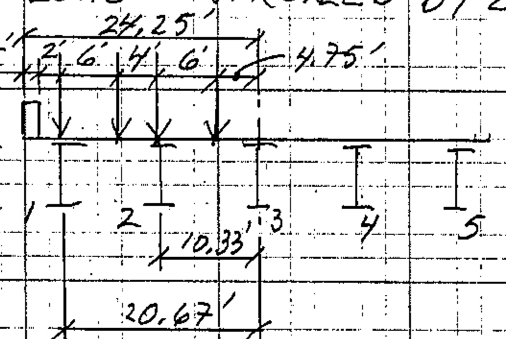


PIER CAP WIDTH = 4'-9"

TAKING $P_1 = P_2$ DEAD LOAD

DL = 2(195.4) = 390.8 K

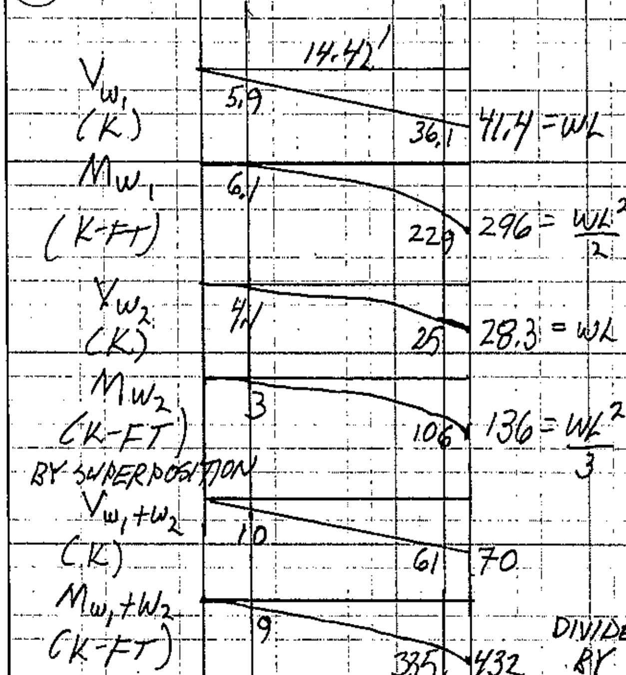
LIVE LOAD CONTROLLED BY 2-LANES



LIVE LOAD REACTION = 137.2 K PER LANE NO IMPACT

WHEEL REACTION = 68.6 K

PIER CAP SELF WT. MOMENT:



$$R_1 = \frac{4(68.6)}{5 \text{ BMS}} + \frac{68.6(20.75+14.75+10.75+4.75)(20.67)}{2(10.33^2+20.67^2)}$$

$$= 54.9 + 67.7 = 122.6 \text{ K}$$

$$R_2 = \frac{4(68.6)}{5} + \frac{68.6(51.0')(10.33)}{1067.9}$$

$$= 54.9 + 33.8 = 88.7 \text{ K}$$

$$R_3 = 4(68.6)/5 = 54.9 \text{ K}$$

$$R_4 = 54.9 - 33.8 = 21.1 \text{ K}$$

$$R_5 = 54.9 - 67.7 = -12.8 \text{ K}$$

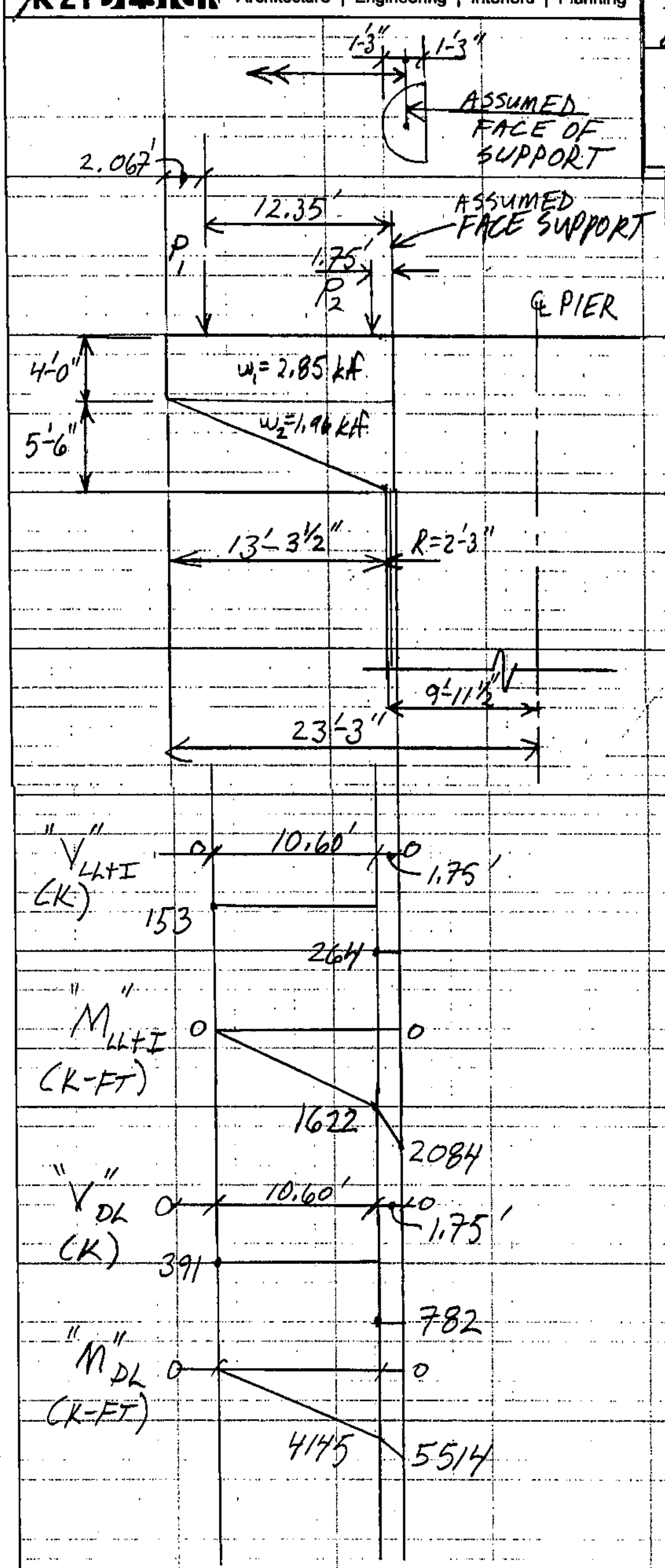
DIVIDE BY COS 13° TO OBTAIN REACTION ALONG ℄ PIER

$$P_1 = \frac{122.6}{\cos 13°} = \underline{\underline{125.8 \text{ K}}} \quad (\underline{\underline{153.1 \text{ K}}} \text{ WITH IMPACT})$$

$$P_2 = \frac{88.7}{\cos 13°} = \underline{\underline{91.0 \text{ K}}} \quad (\underline{\underline{110.8 \text{ K}}} \text{ WITH IMPACT})$$

KZF DESIGN Architecture | Engineering | Interiors | Planning

project name	SCI-823
sheet #	2 of 2
	BRIDGE NO. SCI-823-0837
project #	5355.02
subject	PIER CAP REIN.
date	7-21-09
by	DAT
checked by	



$P_1 = 153\ K$ (LL+I)

$P_2 = 111\ K$ (LL+I)

$P_1 = 391\ K$ (DL)

$P_2 = 391\ K$ (DL)

CAP DEPTH:

AT COLUMN FACE $= \underline{\underline{114''}}$

AT BEAM 2 (P_2)

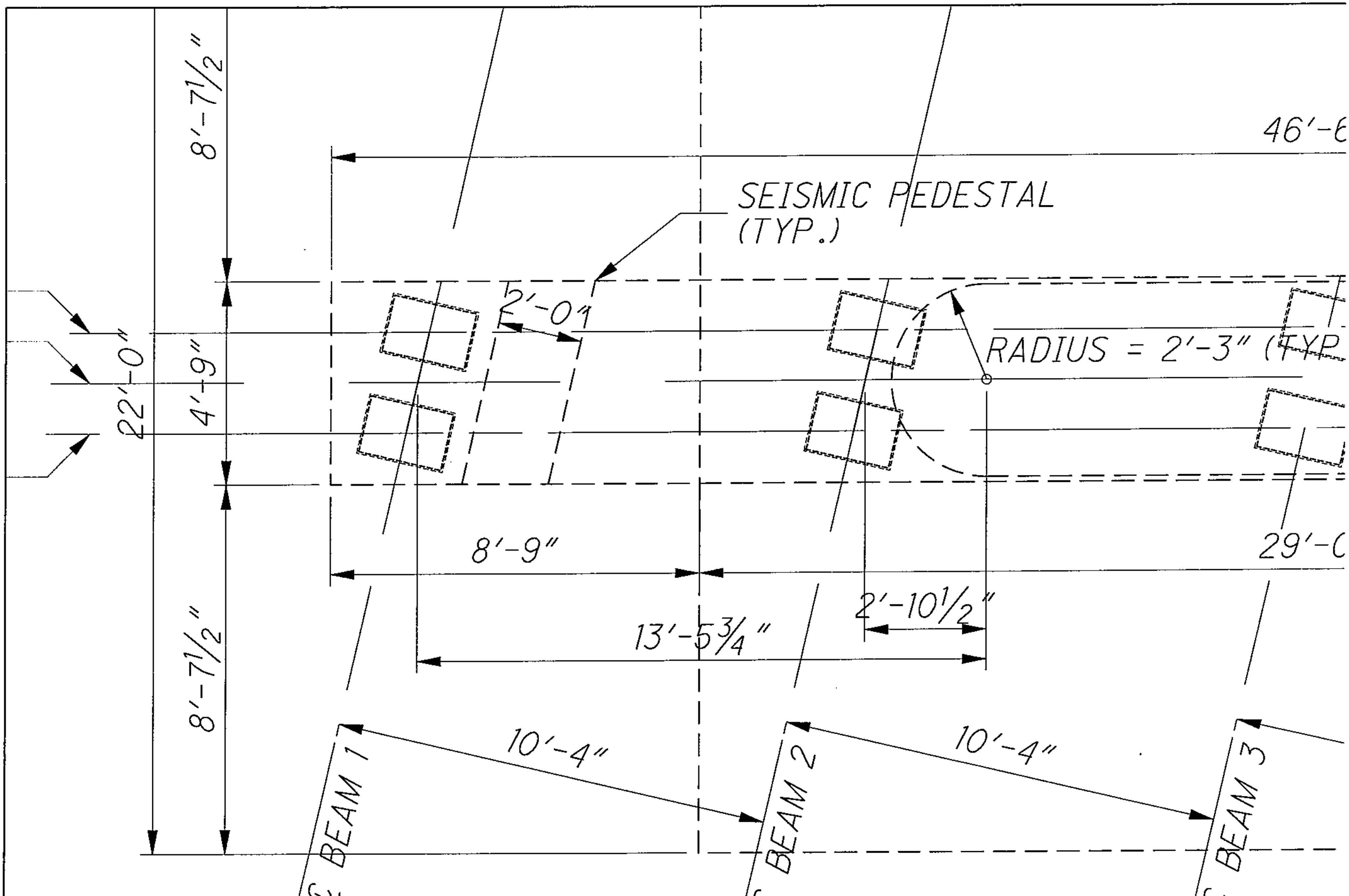
$$y = (13.29' - 0.5')(\tan 22.5°)(12) + 48''$$

$$= \underline{\underline{111.5''}}$$

AT BEAM 1 (P_1)

$$y = (13.29' - 11.22')(\tan 22.5°)(12) + 48''$$

$$= \underline{\underline{58.3''}}$$



823_0837CPI001.dgn 7/20/2009 1:18:02 PM

Company: KZFDESIGN					
Structure :	SCI-823-0837	Design :	DAT	Date :	7/21/2009
Subject:	Pier Cap Reinforcing	Checked :		Date :	

Neg. Mom. at pier (taken at B1)

						ft-K	in-K
				in.			
# bars:	28		steelarea:	34.34	MDL =	9.00	108.00
barsize:	10		beam width	57.00	MLL =	0.00	0.00
spacing:	1.86	in	cover	2.00	Mservice =	9.00	108.00
Fy :	60000	psi	stirrup	0.75	Multimate	11.70	140.40
F'c :	4000	psi	clr	2.75	VDL	401.00	
Z :	130	ksi	beam depth	58.30	VLL	153.00	
n :	6		d	45.05	VU	853.31	
dc:	3.38		barspacing	2.75	min 1.5 in between		
dc':	3.38			3.13	min 1.5 dia between		

STRENGTH

a = As * fy / (.85 * f'c * b) =	10.63			
phi * Mn = 0.9 * As * fy * (d-a/2) =	73689	in-K	CRACKW FL	
	6141	ft-K	0.0000	
phi * Mn / Mu	524.85	MUST BE >1		

MAX REBAR

BALANCED REBAR pb = (.85 * b1 * f'c / fy) * (87000/87000 + fy) = 0.0285

b1 = .85-(f'c-4000)*.05	0.85		
MAX REBAR pmax = .75 * pb =	0.0214		
p = As / b*d =		0.0134	
pmax / p =		1.5986	MUST BE >1

DISTRIBUTION

STEEL STRESS AT SERVICE	fs = M / As (d - a/2) =	0.08	
ALLOWABLE STEEL STRESS	Z / (A * dc) ^ .333 =		
	A = 2 * SPA * dc' =	12.56	
	fs allowable	37.29	
	allowable / actual =	471.12	MUST BE >1
CRACK WIDTH			
	W = fs * (dc * A)^1/3 / 10000	0.0000	MUST BE <.012

MINIMUM REBAR

SECT MOD S =	32289.46		
fr = 7.5 sqrt fc' =	474.34		
PHI * Mn = > 1.2 * Mcr =		18379	in-K
Mcr = fr * S =		1532	ft-K
Mcr / phi * Mn =		0.25	MUST BE <1

FATIGUE

LIVELOAD STRESS	fs = M / As (d- a/2) =	0.00	
DEADLOAD STRESS	fmin =	0.08	
ALLOWABLE	ff = 21- fmin * .33 + 8 * .3	23.37	
	allowable/actual	#DIV/0!	MUST BE >1

SHEAR

Vu < phi * (Vc + Vs)

Vc = 2 * sqrt fc' * b * d =				324.81	kips	
Vc = (1.9 * sqrt fc' + 2500 * pw * Vu * d / Mu) / (b * d) =				23816.92	kips	
phi = 0.85	Vu * d / Mu = 273.8007					
Vu / phi =				1003.89	kips	
Vs required =				679.08	kips	
As = Vs / fy * d =				3.01	in^2	< 3.52 prv'd
REBARSIZE 6	area	0.44	in^2			#6 @ 6" (4 legs)
# OF ROWS 4	spacing	7.03	in			
MINIMUM SHEAR REBAR						spacing
As = 50 * b * s / fy =				0.57	in^2	37.1842 in

Company:	KZFDESIGN				
Structure :	SCI-823-0837	Design :	DAT	Date :	7/21/2009
Subject:	Pier Cap Reinforcing	Checked :		Date :	

Neg. Mom. at pier (taken at B2)

				in.		ft-K	in-K	
# bars:	28		steelarea:	34.34	MDL =	4480.00	53760.00	
barsize:	10		beam width	57.00	MLL =	1622.00	19464.00	
spacing:	1.86	in	cover	2.00	Mservice =	6102.00	73224.00	
Fy :	60000	psi	stirrup	0.75	Multimate	9343.74	112124.88	
F'c :	4000	psi	clr	2.75	VDL	843.00		
Z :	130	ksi	beam depth	111.50	VLL	264.00		
n :	6		d	98.25	VU	1668.78		
dc:	3.38		barspacing	2.75	min 1.5 in between			
dc':	3.38			3.13	min 1.5 dia between			

****

STRENGTH

a = As * fy / (.85 * f'c * b) = 10.63

phi * Mn = 0.9 * As * fy * (d-a/2) = 172351 in-K — CRACKW FL

14363 ft-K — 0.0080

phi * Mn / Mu 1.54 MUST BE >1

****

MAX REBAR

BALANCED REBAR pb = (.85 * b1 * f'c / fy) * (87000/87000 + fy) = 0.0285

b1 = .85-(f'c-4000)*.05 0.85

MAX REBAR pmax = .75 * pb = 0.0214

p = As / b*d = 0.0061

pmax / p = 3.4863 MUST BE >1

****

DISTRIBUTION

STEEL STRESS AT SERVICE	fs = M / As (d - a/2) =	22.94	
ALLOWABLE STEEL STRESS	Z / (A * dc) ^ .333 =		
	A = 2 * SPA * dc' =	12.56	
	fs allowable	37.29	
	allowable / actual =	1.63	MUST BE >1
CRACK WIDTH			
	W = fs * (dc * A)^1/3 / 10000	0.0080	MUST BE <.012

****

MINIMUM REBAR

SECT MOD S = 118106.38

fr = 7.5 sqrt fc' = 474.34

PHI * Mn = > 1.2 * Mcr = 67227 in-K

Mcr = fr * S = 5602 ft-K

Mcr / phi * Mn = 0.39 MUST BE <1

****

FATIGUE

LIVELOAD STRESS	fs = M / As (d- a/2) =	6.10	
DEADLOAD STRESS	fmin =	16.84	
ALLOWABLE	ff = 21- fmin * .33 + 8 * .3	17.79	
	allowable/actual	2.92	MUST BE >1

****

SHEAR

Vu < phi * (Vc + Vs)

Vc = 2 * sqrt fc' * b * d =			708.38	kips
Vc = (1.9 * sqrt fc' + 2500 * pw * Vu * d / Mu) / (b * d) =			798.51	kips
phi = 0.85	Vu * d / Mu =	1.4623		
Vu / phi =			1963.27	kips
Vs required =			1254.89	kips
As = Vs / fy * d =			2.55	in^2
REBARSIZE 6	area	0.44 in^2		
# OF ROWS 4	spacing	8.30 in		
MINIMUM SHEAR REBAR				
As = 50 * b * s / fy =			0.57	in^2

< 3.52 prv'd
#6 @ 6" (4 legs)

spacing 37.1842 in

****

Neg. Mom. at pier (taken at column face)

						ft-K	in-K
				in.			
# bars:	28		steelarea:	34.34	MDL =	5946.00	71352.00
barsize:	10		beam width	57.00	MLL =	2084.00	25008.00
spacing:	1.86	in	cover	2.00	Mservice =	8030.00	96360.00
Fy :	60000	psi	stirrup	0.75	Multimate	12252.08	147024.96
F'c :	4000	psi	clr	2.75	VDL	852.00	
Z :	130	ksi	beam depth	114.00	VLL	264.00	
n :	6		d	100.75	VU	1680.48	
dc:	3.38		barspacing	2.75	min 1.5 in between		
dc':	3.38			3.13	min 1.5 dia between		

****

STRENGTH

a = As * fy / (.85 * f'c * b) = 10.63

phi * Mn = 0.9 * As * fy * (d-a/2) = 176988 in-K — CRACKW FL

14749 ft-K — 0.0102

phi * Mn / Mu 1.20 MUST BE >1 ✓

****

MAX REBAR

BALANCED REBAR pb = (.85 * b1 * f'c / fy) * (87000/87000 + fy) = 0.0285

b1 = .85-(f'c-4000)*.05 0.85

MAX REBAR pmax = .75 * pb = 0.0214

p = As / b*d = 0.0060

pmax / p = 3.5750 MUST BE >1

****

DISTRIBUTION

STEEL STRESS AT SERVICE	fs = M / As (d - a/2) =	29.40	
ALLOWABLE STEEL STRESS	Z / (A * dc) ^ .333 =		
	A = 2 * SPA * dc' =	12.56	
	fs allowable	37.29	
	allowable / actual =	1.27	MUST BE >1
CRACK WIDTH			
	W = fs * (dc * A)^1/3 / 10000	0.0102	MUST BE <.012

****

MINIMUM REBAR

SECT MOD S = 123462.00

fr = 7.5 sqrt fc' = 474.34

PHI * Mn = > 1.2 * Mcr = 70276 in-K

Mcr = fr * S = 5856 ft-K

Mcr / phi * Mn = 0.40 MUST BE <1

****

FATIGUE

LIVELOAD STRESS	fs = M / As (d- a/2) =	7.63	
DEADLOAD STRESS	fmin =	21.77	
ALLOWABLE	ff = 21- fmin * .33 + 8 * .3	16.14	
	allowable/actual	2.12	MUST BE >1

****

SHEAR

Vu < phi * (Vc + Vs)

Vc = 2 * sqrt fc' * b * d = 726.41 kips

Vc = (1.9 * sqrt fc' + 2500 * pw * Vu * d / Mu) / (b * d) = 788.96 kips

phi = 0.85 — Vu * d / Mu = 1.1516

Vu / phi = 1977.04 kips

Vs required = 1250.63 kips

As = Vs / fy * d = 2.48 in^2 < 3.52 prv'd

REBARSIZE 6 area 0.44 in^2 #6 @ 6" (4 legs)

OF ROWS 4 spacing 8.54 in

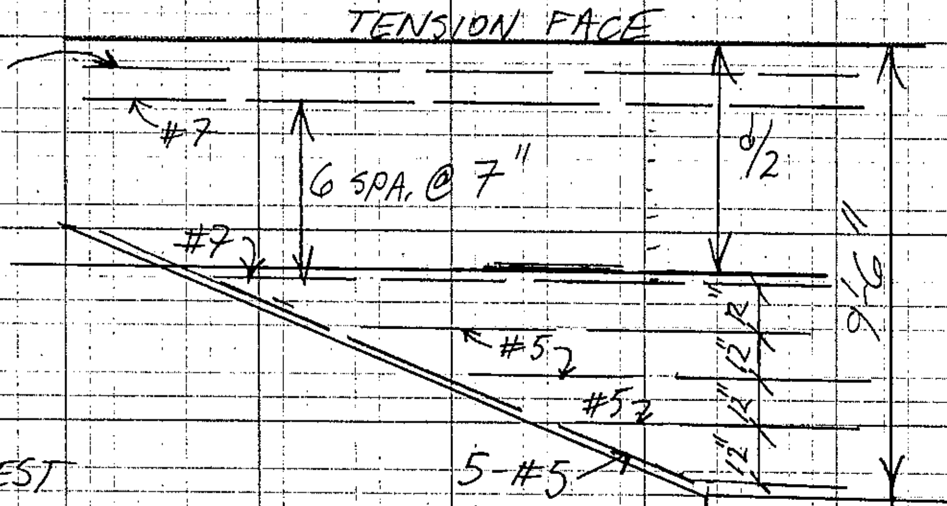
MINIMUM SHEAR REBAR — spacing

As = 50 * b * s / fy = 0.57 in^2 — 37.1842 in

****

AASHTO § 8.17.2.1.3

PROVIDE SKIN REIN. IF DEPTH OF SIDE FACE > 3 FT.



$d = 9.5'$

$d/2 = 4.75'$ NEAREST FLEXURAL TENSION REIN.

$A_{SK} \geq 0.012(d-30)$

$0.012(114''-30) = 1.01\ in^2$ PER FT

MAX. SPACING $= d/6$ OR $12''$

$= 114/6 = 19''$, $12''$ MAX CONTROLS

PROVIDE #7 @ 7" c/c

$A_{SK\,prv'd} = 0.6\ in^2\left(\frac{12''}{7''}\right) = 1.03\ in^2 > 1.01$

UPPER LIMIT ON $A_{SK} = 0.5A_T = 0.5(28 \times 1.27) = 17.8\ in^2$

28-#10

$A_{SK_{TOTAL}} = 2(7 \times 0.6) = 8.4\ in^2 < 17.8$

AASHTO § 8.29.4
ENCASE HOOKED BARS WITH STIRRUPS
SPACED NOT TO EXCEED $3 d_b = 3(1.27'') = 3.81''$

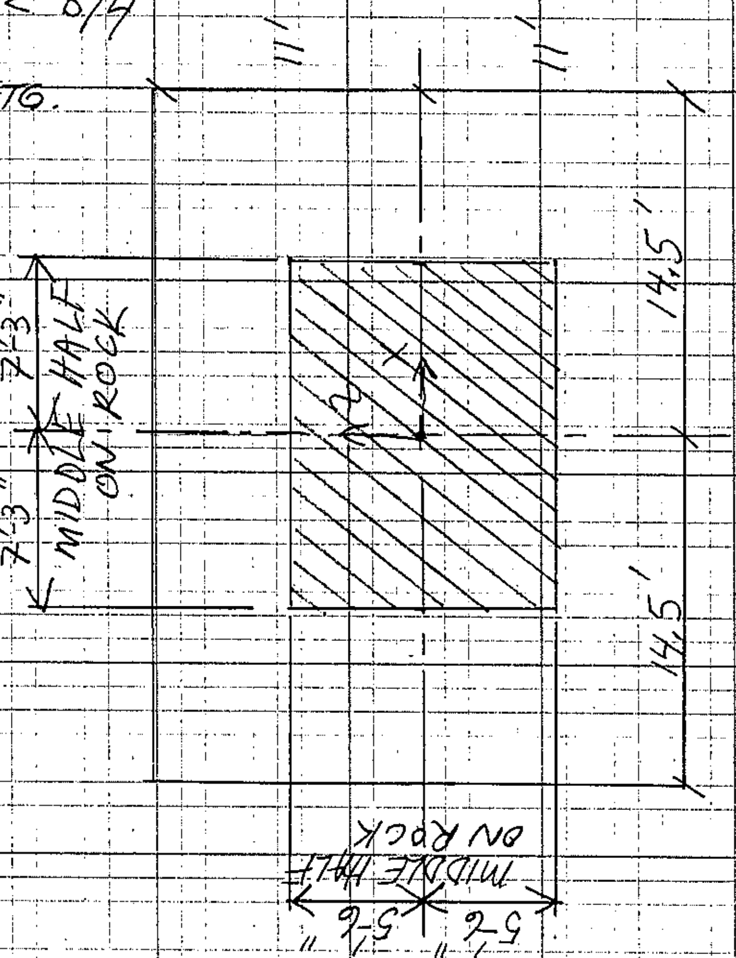
USE $\underline{3''}$

$$l_{dh} = \frac{1200(1.27 \text{ in}^2)}{(4000)^{1/2}}(1.2) = 29''$$

(1.2) EPOXY M.F.

∴ PROVIDE STIRRUPS AT 3'' c/c FOR DISTANCE OF 36'' FROM EDGE OF PIER CAP.

AASHTO § 4.4.8
CHECK STABILITY FOR
FOOTING LOCATED IN ROCK
RESULTANT < B/4
MEASURED
FROM ℄ FTG.



CHECK MAXIMUM ENVELOPE SERVICE LOADS [USE LARGEST M AND SMALLEST P CONSERVATIVE]

PIER 2: $F_y = 3469$ MAX $\quad M_x = 3842$

$F_y = 2566$ min. $\quad M_z = 12{,}420$

$$\theta = \tan^{-1}\left(\frac{3842}{12420}\right) = 17.2^\circ$$

$$e_R = \frac{\left[(3842)^2 + (12420)^2\right]^{0.5}}{2566} = 5.1'$$

$$e_{\text{middle half}} = \frac{B/4}{\cos\theta} = \frac{29/4}{\cos 17.2^\circ} = 7.6' > 5.1'$$

$\therefore$ O.K.

PIER 1: $F_y = 3499$ MAX. $M_x = 9191$

$F_y = 2262$ MIN. $M_z = 14,150$

$$\theta = \tan^{-1}\left(\frac{9191}{14150}\right) = 33.0^\circ$$

$$e_R = \frac{\left[(9191)^2 + (14150)^2\right]^{0.5}}{2262} = 7.5'$$

$$e_{\text{middle half}} = \frac{B/4}{\cos\theta} = \frac{29'/4}{\cos 33^\circ} = 8.6' > 7.5'$$

$\therefore$ O.K.

SHEET 1 OF 1
JOB NO. 5355.02
BY DAT   DATE Jul/21/2009
CKD.   DATE

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

PIER 2

AASHTO STANDARD Envelope Service

Coord. system: Global   Units: kips   kips-ft

Memb	Node	Fx	Fy(Max/Min)	Fz	Mx	My	Mz
1	1	-0	3469	0	-0	0	7815
		-0	2566	0	-0	0	-7709
1	2	-0	-1762	0	-0	0	7709
		-0	-2665	0	-0	0	-7815
2	3	0	0	0	0	0	0
		0	0	0	0	0	0
2	4	0	6.472	0.5768	0	0.5961	-6.688
		0	6.472	0.5768	0	0.5961	-6.688
3	4	0	-115.9	0	0	0	6.688
		0	-679	0	0	0	6.688
3	5	0	730.5	0	0	0	-7480
		0	167.4	0	0	0	-1509
4	5	0	-388.4	0	0	0	1509
		0	-1291	0	0	0	7480
4	6	0	1303	0	0	0	-9744
		0	399.8	0	0	0	-2197
5	6	0	-399.8	0	0	0	2197
		0	-1303	0	0	0	9744
5	2	0	1363	0	0	0	-2.152e+004
		0	459.6	0	0	0	-5993
6	2	0	1754	0	0	0	2.033e+004
		0	850.6	0	0	0	7281
6	7	0	-850.4	0	0	0	-7258
		0	-1753	0	0	0	-2.029e+004
7	7	0	1362	0	0	0	2.152e+004
		0	459.4	0	0	0	6022
7	8	0	-399.8	0	0	0	-2239
		0	-1303	0	0	0	-9786
8	8	0	1303	0	0	0	9786
		0	399.8	0	0	0	2239
8	9	0	-388.1	0	0	0	-1530
		0	-1291	0	0	0	-7453
9	9	0	727.8	0	0	0	7453
		0	169.4	0	0	0	1530
9	10	0	-118.1	0	0	0	-6.329
		0	-676.5	0	0	0	-6.329
10	10	0	6.288	0.5617	0	-0.5653	6.329
		0	6.288	0.5617	0	-0.5653	6.329
10	11	0	0	0	0	0	0
		0	0	0	0	0	0

COLUMN BOTTOM LOADS WITHOUT IMPACT

1	1	-0	3389	0	-0	0	6441
		-0	2646	0	-0	0	-6335

| SHEET 1 OF 1
| JOB NO. 5355.02
PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc. | BY DAT DATE Jul/21/2009
PHONE : TOLL-FREE 1-800-778-4277 | CKD. DATE

PROJECT: SCI-823-0837

PIER 2

AASHTO STANDARD Envelope Service

Coord. system: Global Units: kips kips-ft

Memb	Node	Fx	Fy	Fz	Mx(Max/Min)	My	Mz
1	1	-4.697	3153	-20.75	-1705	0.5604	2786
		-31.41	2882	50.19	3842	-1.034	4861
1	2	31.41	-2078	-50.19	-258.2	1.034	-2618
		4.697	-2349	20.75	223.2	-0.5604	-2450
2	3	0	0	0	0	0	0
		0	0	0	0	0	0
2	4	0	6.472	0.5768	0	0.5961	-6.688
		0	6.472	0.5768	0	0.5961	-6.688
3	4	0.9395	-480.5	4.15	8.3	0	4.809
		5.001	-393.1	-8.186	-15.31	-0.5475	-3.313
3	5	-5.001	444.5	10.9	15.31	101.8	-4438
		-0.9395	532	-4.15	-8.3	-44.01	-5374
4	5	1.879	-974	8.3	16.6	44.01	5372
		10	-835.5	-18.56	-30.62	-101.8	4428
4	6	-10	846.9	19.01	30.62	134.5	-5896
		-1.879	985.4	-8.3	-16.6	-58.49	-7081
5	6	1.879	-985.4	8.3	16.6	58.49	7081
		10	-846.9	-19.01	-30.62	-134.5	5896
5	2	-10	906.7	21.27	30.62	312.4	-1.364e+004
		-1.879	1045	-8.3	-16.6	-131.8	-1.605e+004
6	2	-15	1307	28.93	45.94	-313.5	1.393e+004
		-2.818	1439	-12.44	-24.9	132.4	1.617e+004
6	7	2.818	-1439	12.44	24.9	-132	-1.613e+004
		15	-1306	-28.92	-45.94	312.7	-1.39e+004
7	7	-10	915.4	21.26	30.62	-312.7	1.389e+004
		-1.879	1048	-8.3	-16.6	132	1.613e+004
7	8	1.879	-988.2	8.3	16.6	-58.94	-7166
		10	-855.7	-19.01	-30.62	135.4	-6087
8	8	-10	855.7	19.01	30.62	-135.4	6087
		-1.879	988.2	-8.3	-16.6	58.94	7166
8	9	1.879	-976.5	8.3	16.6	-44.01	-5399
		10	-844	-18.55	-30.62	101.6	-4558
9	9	-5.001	453	10.89	15.31	-101.6	4548
		-0.9395	533.8	-4.15	-8.3	44.01	5397
9	10	0.9395	-482.5	4.15	8.3	0	-8.208
		5.001	-401.7	-8.172	-15.31	0.5192	-16.33
10	10	0	6.288	0.5617	0	-0.5653	6.329
		0	6.288	0.5617	0	-0.5653	6.329
10	11	0	0	0	0	0	0
		0	0	0	0	0	0

COLUMN BOTTOM LOADS WITHOUT IMPACT

1	1	-4.697	3129	-20.75	-1705	0.5604	2374
		-31.41	2906	50.19	3842	-1.034	4449

SHEET 1 OF 1
JOB NO. 5355.02
BY DAT   DATE Jul/21/2009
CKD.   DATE

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

AASHTO STANDARD Envelope Service

PIER 2

Coord. system: Global   Units: kips   kips-ft

Memb	Node	Fx	Fy	Fz	Mx	My	Mz(Max/Min)
1	1	-120.6	2986	-9.927	-729.9	0.2842	1.242e+004
		-0	2566	0	-0	0	-7709
1	2	-0	-1762	0	-0	0	7709
		-0	-2665	0	-0	0	-7815
2	3	0	0	0	0	0	0
		0	0	0	0	0	0
2	4	0	6.472	0.5768	0	0.5961	-6.688
		0	6.472	0.5768	0	0.5961	-6.688
3	4	-9.116	-449.4	-1.225	-2.356	-0.04862	24.92
		22	-334.7	2.078	4.21	-0.02734	-37.3
3	5	0	167.4	0	0	0	-1509
		0	730.5	0	0	0	-7480
4	5	0	-1291	0	0	0	7480
		0	-388.4	0	0	0	1509
4	6	0	399.8	0	0	0	-2197
		0	1303	0	0	0	-9744
5	6	0	-1303	0	0	0	9744
		0	-399.8	0	0	0	2197
5	2	0	459.6	0	0	0	-5993
		0	1363	0	0	0	-2.152e+004
6	2	0	1754	0	0	0	2.157e+004
		0	850.6	0	0	0	6045
6	7	0	-850.4	0	0	0	-6022
		0	-1753	0	0	0	-2.152e+004
7	7	0	1362	0	0	0	2.152e+004
		0	459.4	0	0	0	6022
7	8	0	-399.8	0	0	0	-2239
		0	-1303	0	0	0	-9786
8	8	0	1303	0	0	0	9786
		0	399.8	0	0	0	2239
8	9	0	-388.1	0	0	0	-1530
		0	-1291	0	0	0	-7453
9	9	0	727.8	0	0	0	7453
		0	169.4	0	0	0	1530
9	10	-9.116	-342.6	-1.224	-2.356	0.04611	11.9
		22	-462.9	2.079	4.21	0.02593	-50.32
10	10	0	6.288	0.5617	0	-0.5653	6.329
		0	6.288	0.5617	0	-0.5653	6.329
10	11	0	0	0	0	0	0
		0	0	0	0	0	0

COLUMN BOTTOM LOADS WITHOUT IMPACT

1	1	-120.6	3010	-9.927	-729.9	0.2842	1.213e+004
		50.47	3025	6.947	507.8	-0.159	-6426

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

AASHTO STANDARD Envelope Service PIER 1

Coord. system: Global Units: kips kips-ft

Memb	Node	Fx	Fy(Max/Min)	Fz	Mx	My	Mz
1	1	-57.08	3499	27.81	1721	-0.5214	-6727
		48.12	2262	-21.49	-1326	0.3509	7507
1	2	-48.12	-1595	21.49	25.99	-0.3509	-1.042e+004
		57.08	-2832	-27.81	-38.62	0.5214	1.018e+004
2	3	0	0	0	0	0	0
		0	0	0	0	0	0
2	4	0	6.472	0.3776	0	0.3902	-6.688
		0	6.472	0.3776	0	0.3902	-6.688
3	4	-8.484	-16.11	-0.01503	-0.177	0.07596	23.66
		10.28	-776.1	-1.248	-2.349	-0.07596	-13.86
3	5	-10.28	827.6	1.625	2.349	15.31	-8490
		8.484	67.57	-0.3621	0.177	-1.916	-467.4
4	5	-16.97	-225.7	0.2735	-0.3541	1.916	484.3
		20.55	-1451	-2.8	-4.699	-15.31	8470
4	6	-20.55	1463	2.862	4.699	20.25	-1.101e+004
		16.97	237.1	-0.3356	0.3541	-2.447	-888.1
5	6	-16.97	-237.1	0.3356	-0.3541	2.447	888.1
		20.55	-1463	-2.862	-4.699	-20.25	1.101e+004
5	2	-20.55	1523	3.176	4.699	46.92	-2.42e+004
		16.97	296.9	-0.6497	0.3541	-6.799	-3247
6	2	0	1754	0	0	0	2.157e+004
		0	850.6	0	0	0	7281
6	7	0	-850.4	0	0	0	-7258
		0	-1753	0	0	0	-2.152e+004
7	7	0	1362	0	0	0	2.152e+004
		0	459.4	0	0	0	6022
7	8	0	-399.8	0	0	0	-2239
		0	-1303	0	0	0	-9786
8	8	0	1303	0	0	0	9786
		0	399.8	0	0	0	2239
8	9	0	-388.1	0	0	0	-1530
		0	-1291	0	0	0	-7453
9	9	0	727.8	0	0	0	7453
		0	169.4	0	0	0	1530
9	10	0	-118.1	0	0	0	-6.329
		0	-676.5	0	0	0	-6.329
10	10	0	6.288	0.3677	0	-0.3701	6.329
		0	6.288	0.3677	0	-0.3701	6.329
10	11	0	0	0	0	0	0
		0	0	0	0	0	0

COLUMN BOTTOM LOADS WITHOUT IMPACT

1	1	-57.08	3475	27.81	1721	-0.5214	-6315
		48.12	2286	-21.49	-1326	0.3509	7094

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.	SHEET 1 OF 1
PHONE : TOLL-FREE 1-800-778-4277	JOB NO. 5355.02
	BY DAT DATE Jul/21/2009
	CKD. DATE

PROJECT: SCI-823-0837

AASHTO STANDARD Envelope Service PIER 1

Coord. system: Global Units: kips kips-ft

Memb	Node	Fx	Fy	Fz	Mx(Max/Min)	My	Mz
1	1	-6.622	2745	-147.3	-9191	3.748	-1471
		-12.06	3016	147	9170	-3.739	2982
1	2	12.06	-2349	-147	-277	3.739	-2252
		6.622	-2078	147.3	277.6	-3.748	1872
2	3	0	0	0	0	0	0
		0	0	0	0	0	0
2	4	0	6.472	0.3776	0	0.3902	-6.688
		0	6.472	0.3776	0	0.3902	-6.688
3	4	2.939	-397.4	28.14	55.53	0.3902	0.8112
		0.7968	-392	-28.07	-55.39	-0.3902	5.095
3	5	-0.7968	443.4	30.01	55.39	308.4	-4435
		-2.939	448.8	-30.08	-55.53	-309.1	-4488
4	5	5.877	-839.8	57.84	111.1	309.1	4482
		1.594	-834.4	-57.71	-110.8	-308.4	4433
4	6	-1.594	845.8	58.03	110.8	409.3	-5899
		-5.877	851.2	-58.16	-111.1	-410.3	-5957
5	6	5.877	-851.2	58.16	111.1	410.3	5957
		1.594	-845.8	-58.03	-110.8	-409.3	5899
5	2	-1.594	905.6	59.64	110.8	929	-1.363e+004
		-5.877	911	-59.78	-111.1	-931.2	-1.374e+004
6	2	-2.39	1443	87.35	166.2	-932.8	1.589e+004
		-8.816	1167	-87.55	-166.6	935	1.187e+004
6	7	8.816	-1167	87.55	166.6	-932.6	-1.184e+004
		2.39	-1443	-87.34	-166.2	930.4	-1.585e+004
7	7	-1.594	1044	59.64	110.8	-930.4	1.585e+004
		-5.877	783.7	-59.77	-111.1	932.6	1.183e+004
7	8	5.877	-724.1	58.16	111.1	-413.3	-5192
		1.594	-984.1	-58.03	-110.8	412.3	-6917
8	8	-1.594	984.1	58.03	110.8	-412.3	6917
		-5.877	724.1	-58.16	-111.1	413.3	5192
8	9	5.877	-712.4	57.83	111.1	-309	-3900
		1.594	-972.4	-57.7	-110.8	308.3	-5157
9	9	-0.7968	511.1	30	55.39	-308.3	5156
		-2.939	391.7	-30.07	-55.53	309	3894
9	10	2.939	-340.4	28.13	55.53	-0.3701	-12.21
		0.7968	-459.8	-28.06	-55.39	0.3701	-7.922
10	10	0	6.288	0.3677	0	-0.3701	6.329
		0	6.288	0.3677	0	-0.3701	6.329
10	11	0	0	0	0	0	0
		0	0	0	0	0	0

COLUMN BOTTOM LOADS WITHOUT IMPACT

1	1	-6.622	2769	-147.3	-9191	3.748	-1125
		-12.06	2992	147	9170	-3.739	2635

PROGRAM: RC-PIER® v9.0.0 Bentley Systems, Inc.
PHONE : TOLL-FREE 1-800-778-4277

PROJECT: SCI-823-0837

AASHTO STANDARD Envelope Service PIER 1

Coord. system: Global Units: kips kips-ft

Memb	Node	Fx	Fy	Fz	Mx	My	Mz(Max/Min)
1	1	-51.61	2533	16.88	1045	-0.3278	1.415e+004
		42.65	3228	-10.56	-650.5	0.1572	-1.337e+004
1	2	-42.65	-2561	10.56	11.64	-0.1572	1.079e+004
		51.61	-1866	-16.88	-24.28	0.3278	-1.103e+004
2	3	0	0	0	0	0	0
		0	0	0	0	0	0
2	4	0	6.472	0.3776	0	0.3902	-6.688
		0	6.472	0.3776	0	0.3902	-6.688
3	4	-13.17	-315.9	-23.85	-47.85	0.07596	33.02
		16.9	-473.4	23.92	47.98	-0.07596	-27.11
3	5	8.484	67.57	-0.3621	0.177	-1.916	-467.4
		-10.28	827.6	1.625	2.349	15.31	-8490
4	5	20.55	-1451	-2.8	-4.699	-15.31	8470
		-16.97	-225.7	0.2735	-0.3541	1.916	484.3
4	6	16.97	237.1	-0.3356	0.3541	-2.447	-888.1
		-20.55	1463	2.862	4.699	20.25	-1.101e+004
5	6	20.55	-1463	-2.862	-4.699	-20.25	1.101e+004
		-16.97	-237.1	0.3356	-0.3541	2.447	888.1
5	2	16.97	296.9	-0.6497	0.3541	-6.799	-3247
		-20.55	1523	3.176	4.699	46.92	-2.42e+004
6	2	0	1754	0	0	0	2.157e+004
		0	850.6	0	0	0	6045
6	7	0	-850.4	0	0	0	-6022
		0	-1753	0	0	0	-2.152e+004
7	7	0	1362	0	0	0	2.152e+004
		0	459.4	0	0	0	6022
7	8	0	-399.8	0	0	0	-2239
		0	-1303	0	0	0	-9786
8	8	0	1303	0	0	0	9786
		0	399.8	0	0	0	2239
8	9	0	-388.1	0	0	0	-1530
		0	-1291	0	0	0	-7453
9	9	0	727.8	0	0	0	7453
		0	169.4	0	0	0	1530
9	10	-13.17	-394.4	-23.85	-47.85	-0.07204	20
		16.9	-405.8	23.92	47.98	0.07204	-40.13
10	10	0	6.288	0.3677	0	-0.3701	6.329
		0	6.288	0.3677	0	-0.3701	6.329
10	11	0	0	0	0	0	0
		0	0	0	0	0	0

COLUMN BOTTOM LOADS WITHOUT IMPACT

1	1	-51.61	2509	16.88	1045	-0.3278	1.374e+004
		42.65	3252	-10.56	-650.5	0.1572	-1.296e+004

STABILITY CHECK

1) Per AASHTO 5.5.5, unfactored dead load and live loads shall be used to determine the factor of safety against sliding and overturning.

2) Ensure Resultant lies within middle half (i.e. B/4)

LOAD CASES TO CHECK

CASE 1 PIER SELF WEIGHT + WIND ON SUBSTRUCTURE

CASE 2 PIER SELF WEIGHT + DEAD LOAD FROM SUPERSTRUCTURE + WIND ON SUBSTRUCTURE + WIND ON SUPERSTRUCTURE

CASE 3 PIER SELF WEIGHT + DEAD LOAD FROM SUPERSTRUCTURE + LIVE LOAD FROM SUPERSTRUCTURE + WIND ON SUBSTRUCTURE + WIND ON SUPERSTRUCTURE

KZF DESIGN Architecture | Engineering | Interiors | Planning

project name: SCI-823-6.00 Portsmouth Bypass

sheet # 2 4

project # 535502

subject: SCI-823-0837 Pier Stability Check Footing

date: 07/04

designed by: RBK

checked by:

LOAD CASE 2

GRAVITY FORCES

ITEM	LOAD (Kips)	ARM PT. A (feet)	MOMENT (K-ft)
FOOTING	430.7	11	4737.7
PIER	1105.6	11	12161.6
DEAD LOAD	3400.3	11	37403.3
	4936.6		54302.6

LATERAL FORCES

ITEM	LOAD (Kips)	ARM PT. A (feet)	MOMENT (K-ft)
WIND ON SUBSTRUCTURE	51.8	44.85	2323.2
WIND ON SUPERSTRUCTURE	12.3	83.44	1026.3
	64.1		3349.5

OVERTURNING $FS = \frac{54302.6}{3349.5} = 16.2 > 2.0$ OK

SLIDING $FS = \frac{0.7(4936.6)}{64.1} = 53.9 > 1.5$ OK

RESULTANT $= \frac{(54302.6 - 3349.5)}{4936.6} = 10.3'$

$5.5' < 10.3' < 16.5'$ OK

LOAD CASE 1

GRAVITY FORCES

ITEM	LOAD (Kips)	ARM PT. A (feet)	MOMENT (K·ft)
FOOTING	430.7	11	4737.7
PIER	1105.6	11	12161.6
	1536.3		16899.3

LATERAL FORCES

ITEM	LOAD (Kips)	ARM PT. A (feet)	MOMENT (K·ft)
WIND ON SUBSTRUCTURE	51.8	44.85	2323.2
	51.8		2323.2

OVERTURNING $FS = \dfrac{16899.3}{2323.2} = 7.27 > 2.0$ OK

SLIDING $FS = \dfrac{0.7(1536.3)}{51.8} = 20.76 > 1.5$ OK

RESULTANT $= \dfrac{(16899.3 - 2323.2)}{1536.3} = 9.49'$

$\dfrac{B}{4} = \dfrac{22}{4} = 5.5'$

$\dfrac{B}{4} < R < \dfrac{3B}{4}$

$\dfrac{3B}{4} = \dfrac{3(22)}{4} = 16.5'$

$5.5' < 9.49' < 16.5'$ OK

LOAD CASE 3

GRAVITY FORCES

ITEM	LOAD (Kips)	ARM. PT. A (feet)	MOMENT (K. ft)
FOOTING	430.7	11	4737.7
PIER	1105.6	11	12161.6
DEAD LOAD	3400.3	11	37403.3
LIVE LOAD & IMPACT	261.4	11	2875.4
	5198.0		57178.0

LATERAL FORCES

ITEM	LOAD (Kips)	ARM PT. A (feet)	MOMENT (K ft)
WIND ON SUBSTRUCTURE	51.8	44.85	2323.2
WIND ON SUPERSTRUCTURE	12.3	83.44	1026.3
BRAKING	35.9	91.14	3271.9
WIND ON LIVE LOAD	2.4	91.14	218.7
	102.4		6840.1

OVERTURNING $FS = \frac{57178.0}{6840.1} = 8.4 > 2.0$ OK

SLIDING $FS = \frac{0.7(5198.0)}{102.4} = 35.5 > 1.5$ OK

RESULTANT $= \frac{(57178.0 - 6840.1)}{5198.0} = 9.7$

$5.5' < 9.7' < 16.5'$ OK

CHECK #10 dowel in footing:

using std. hook

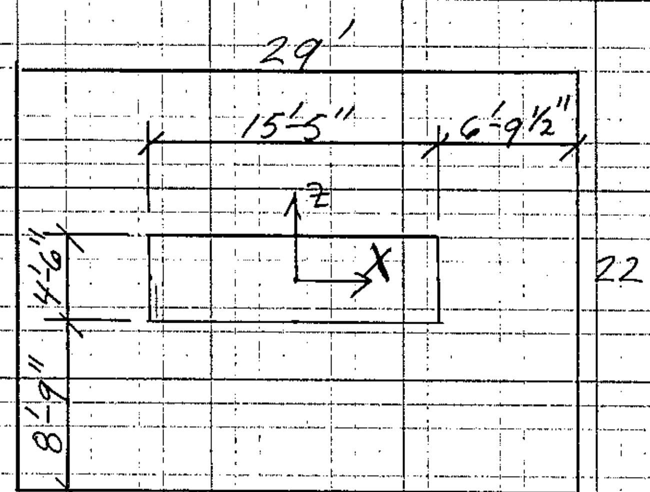
$$\ell_d = \frac{1200(1.27'')(1.2)}{\sqrt{4000}} = 28.9'' < 48''$$

EPOXY M.F. PRV'D

∴ O.K.

FOOTING THICK. = 54"

CHECK DEVELOPMENT OF FOOTING REIN.:



$$\ell_{d\,\#9} = \frac{0.04(1.00)(60000)(1.5)}{(4000)^{0.5}} = 56.9'' < 78.5''$$

M.F.

∴ FULLY DEVELOPED AT COLUMN FACE USING STRAIGHT BAR

$$\ell_{d\,\#10} = \frac{0.04(1.27)(60000)(1.5)}{(4000)^{0.5}} = 72.3'' < 102''$$

M.F.

∴ FULLY DEVELOPED AT COLUMN FACE USING STRAIGHT BAR

$$A_s > \frac{1.3bh}{2(b+h)f_y}$$ LRFD Eq. 5.10.8-1

for $b_z = 29' = 348''$

$$A_{s_z} \geq \frac{1.3(348'')(54'')}{2(348+54)(60\ ksi)} = 0.51$$

PROVIDE #6 @ 9" EA. WAY

for $b_x = 22' = 264''$

A_s prvd $= 0.59$

$$A_{s_x} \geq \frac{1.3(264)(54)}{2(264+54)(60)} = 0.49$$

LIMITS ON A_s

$$0.11 \leq A_s \leq 0.6$$

REFER TO ODOT STD. DWG. A-1-69 (SHEETS 1 & 5) AND TABLE A
$V_u = 0.2$(TOTAL DEAD LOAD)

FROM TABLE A, CALCULATE PEDESTAL HEIGHT

AT PIERS 1 & 3:

DL PER BEAM = 390.8 K
\# BEAMS = 5
TOTAL DL = 1954.0 K
V = 0.2DL = 390.8 K
V_u = 1.3(390.8) = 508.0 K
FACTORED

PROVIDE ADDITIONAL REINFORCING SINCE $V_u = 508 > 294$

AT PIER 2:

DL PER BEAM = 372.8 K
\# BEAMS = 5
TOTAL DL = 1864.0 K
V = 0.2DL = 372.8 K
V_u = 1.3(372.8) = 484.6 K
FACTORED

PROVIDE ADDITIONAL REINFORCING SINCE $V_u = 485 > 294$

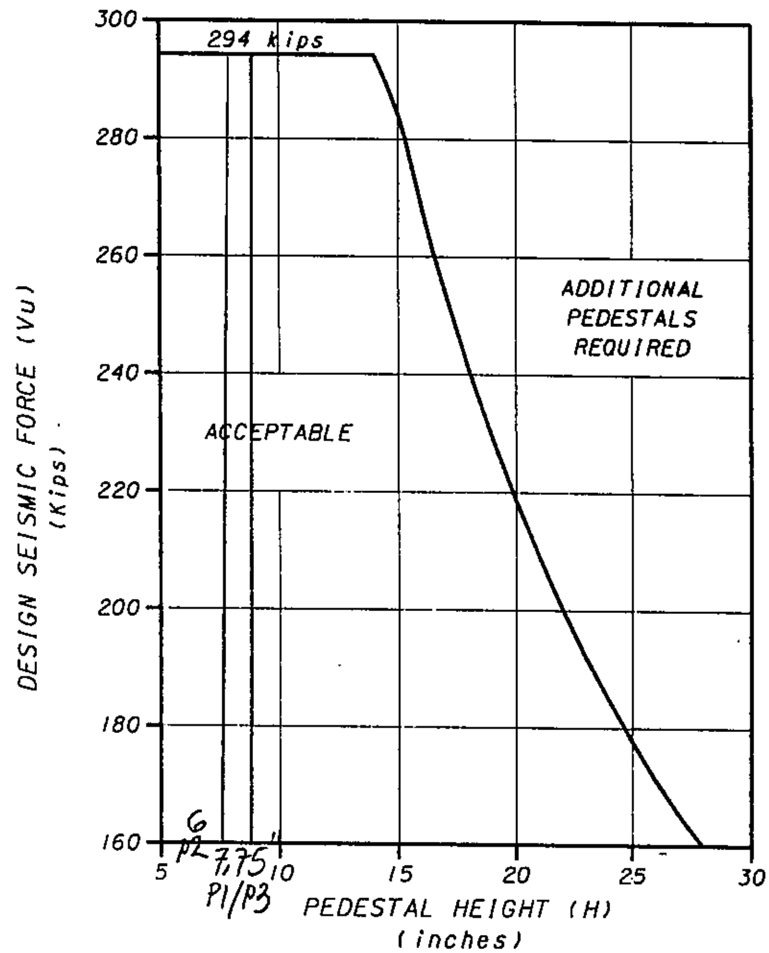


TABLE A

AASHTO I-A SEISMIC DESIGN

$V_n = A_{vf} f_y u$ AASHTO Eq. 8-56

$$A_{vf} = \frac{V_u}{\phi f_y u} = \frac{508\ K}{0.85(60\ ksi)(1.0)} = \underline{9.96\ in^2}$$

PROVIDED = 11-#9 + 6-#6

$(11.0\ in^2) + (2.64\ in^2) = 13.64\ in^2 > 9.96$

$\therefore$ O.K.

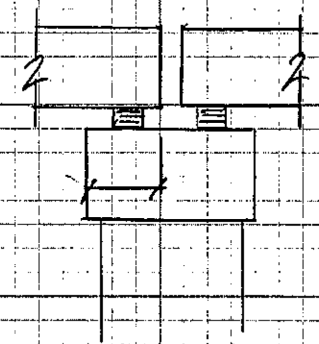
CHECK MINIMUM SEAT WIDTH: (AASHTO I-A SEISMIC DESIGN, 3.10 & (5-1A))

$N = (8 + 0.02L + 0.08H)(1 + 0.000125S^2)$

ODOT BDM

S = SKEW = 13°

@ PIERS:



$N_{PRVD} = 28.5'' - 4.5\cos 13° = \underline{24.1''}$

$L = \frac{430.84'}{2} = 215.42'$

$H = (706.58 - 628.4) = 78.2'$

$N = [(8 + 0.02(215.4') + 0.08(78.2')][1 + 0.000125(13°)^2]$

$= \underline{18.96''} < 24.1''$

$\therefore$ O.K.

301.4.3 SEISMIC DESIGN

Outlined in this section, are general Seismic design requirements for Ohio. Ohio is considered to be in Zone A based on acceleration coefficients below 0.09. The following information is only meant to highlight AASHTO requirements. The designer should refer to AASHTO for complete requirements.

Zone A structure designs are to comply with two requirements:

A. Connection of the superstructure to the substructure shall be designed to resist a horizontal seismic force equal to 0.20 times the dead load reaction force in the restrained direction. The restrained direction for an expansion bearing is transverse to the structure.

B. Bearing seats shall be designed to provide minimum support length N, measured nor-mal to the face of an abutment or pier. N shall not be less than computed by the following formula:

$$N(in) = (8+0.02L+0.08H)(1+0.000125S^2)$$

$$\boxed{N(mm) = (203+1.67L+6.67H)(1+0.000125S^2)}$$

Where:

L = length, in feet [meters], of the bridge deck to the adjacent expansion joint or to the end of the bridge deck.

S = Angle of skew of support in degrees, measured from a line normal to the span.

For Abutments:

H = average height, in feet [meters], of columns supporting the bridge deck to the next expansion joint. For single span bridges, H = 0.

For columns and/or piers:

H = column or pier height , in feet [meters].

For hinges within a span:

H = Average height of the adjacent two columns or piers, in feet [meters].

Abutment and pier designs with level caps and raised pedestal bearing seats shall not be used.

Section 5

DESIGN REQUIREMENTS FOR BRIDGES IN SEISMIC PERFORMANCE CATEGORY A

5.1 GENERAL

Bridges classified as SPC A in accordance with Table 3.4 of Article 3.4 shall conform to all the requirements of this Section.

5.2 DESIGN FORCES FOR SEISMIC PERFORMANCE CATEGORY A

If a mechanical device is used to connect the superstructure to the substructure it shall be designed to resist a horizontal seismic force in each restrained direction equal to 0.20 times the tributary weight.

For each segment of a superstructure, the tributary weight at the line of fixed bearings, used to determine the longitudinal connection design force, is defined as the total weight of the segment.

If each bearing supporting a segment or simply supported span is restrained in the transverse direction, the tributary weight used to determine the transverse connection design force is defined as the dead load reaction at that bearing.

5.3 DESIGN DISPLACEMENTS FOR SEISMIC PERFORMANCE CATEGORY A

Minimum bearing support lengths as determined in this Article shall be provided for the expansion ends of all girders.

Bridges classified as SPC A shall meet the following requirement: Bearing seats supporting the expansion ends of girders, as shown in Figure 3.10, shall be designed to provide a minimum support length N (in. or mm), measured normal to the face of an abutment or pier, not less than that specified below.

$$N = (8 + 0.02L + 0.08H)(1 + 0.000125S^2) \text{ (in)} \qquad (5\text{-}1A)$$

or,

$$N = (203 + 1.67L + 6.66H)(1 + 0.000125S^2) \text{ (mm)} \qquad (5\text{-}1B)$$

where,

L = length, in feet for Eq. 5-1A or meters for Eq. 5-1B, of the bridge deck to the adjacent expansion joint, or to the end of the bridge deck. For hinges within a span, L shall be the sum of L_1 and L_2, the distances to either side of the hinge. For single span bridges L equals the length of the bridge deck. These lengths are shown in Figure 3.10.

S = angle of skew of support in degrees, measured from a line normal to the span.

and H is given by one of the following:

for abutments, H is the average height, in feet for Eq. 5-1A or meters for Eq. 5-1B, of columns supporting the bridge deck to the next expansion joint. H = 0 for single span bridges.

for columns and/or piers, H is the column or pier height in feet for Eq. 5-1A or meters for Eq. 5-1B.

for hinges within a span, H is the average height of the adjacent two columns or piers in feet for Eq. 5-1A or meters for Eq. 5-1B.

5.4 FOUNDATION AND ABUTMENT DESIGN REQUIREMENTS FOR SEISMIC PERFORMANCE CATEGORY A

There are no special seismic design requirements for the foundations and abutments of bridges in this category.

Nevertheless, compliance is assumed with all requirements that are necessary to provide support for vertical and lateral loads other than those due to earthquake motions. These include, but are not limited to, provisions for

TABLE 3.7 Response Modifications Factor (R)

Substructure[1]	R	Connections[3]	R
Wall-type pier[2]	2	Superstructure to abutment	0.8
Reinforced concrete pile bents		Expansion joints within a span of the superstructure	0.8
a. Vertical piles only	3	Columns, piers or pile bents to cap beam or superstructure[4]	1.0
b. One or more batter piles	2	Columns or piers to foundations[4]	1.0
Single columns	3		
Steel or composite steel and concrete pile bents			
a. Vertical piles only	5		
b. One or more batter piles	3		
Multiple column bent	5		

[1] The R-Factor is to be used for both orthogonal axes of the substructure.

[2] A wall-type pier may be designed as a column in the weak direction of the pier provided all the provisions for columns in Article 6.6 or 7.6, as appropriate, are followed. The R-Factor for a single column may then be used.

[3] Connections are those mechanical devices which transfer shear and axial forces from one structural component to another. They generally do not include moment connections and thus comprise bearings and shear keys. The R factors in this Table are applied to the elastic forces in the restrained directions only.

[4] For bridges classified as SPC C or D, it is recommended that the connections be designed for the maximum forces capable of being developed by plastic hinging of the column or column bent as specified in Article 7.2.5. These forces will often be significantly less than those obtained using an R-Factor of 1.

motions and the simultaneous occurrences of earthquake forces in two perpendicular horizontal directions. The elastic seismic forces and moments resulting from analyses in the two perpendicular directions of Article 3.8 shall be combined to form two load cases as follows:

LOAD CASE 1: Seismic forces and moments on each of the principal axes of a member shall be obtained by adding 100 percent of the absolute value of the member elastic seismic forces and moments resulting from the analysis in one of the perpendicular (longitudinal) directions to 30 percent of the absolute value of the corresponding member elastic seismic forces and moments resulting from the analysis in the second perpendicular direction (transverse). (NOTE: The absolute values are used because a seismic force can be positive or negative.)

LOAD CASE 2: Seismic forces and moments on each of the principal axes of a member shall be obtained by adding 100 percent of the absolute value of the member elastic seismic forces and moments resulting from the analysis in the second perpendicular direction (transverse) to 30 percent of the absolute value of the corresponding member elastic seismic forces and moments resulting from the analysis in the first perpendicular direction (longitudinal).

EXCEPTION:
For SPC C and D when foundation and/or column connection forces are determined from plastic hinging of the columns (Article 7.2.2) the resulting forces need not be combined as specified in this section. If a pier is designed as a column per Article 7.2.4 this exception only applies for the weak direction of the pier when forces resulting from plastic hinging are used. The combination specified must be used for the strong direction of the pier.

3.10 MINIMUM SEAT-WIDTH REQUIREMENTS

All bridges, regardless of Seismic Performance Category (SPC) and number of spans, shall satisfy minimum support length requirements at the expansion ends of all girders. These support lengths are defined in Figure 3.10 as dimension N. The minimum value for N is given for SPC A in Article 5.3; for SPC B in Article 6.3; and for SPC C and D in Article 7.3.

3.11 DESIGN REQUIREMENTS FOR SINGLE SPAN BRIDGES

The detailed analysis and design requirements of Sections 4, 5, 6, and 7 are not required for single span bridges. In lieu of rigorous analysis, the connections between the bridge span and the abutments shall be designed to resist the tributary weight at the abutment multiplied by the Acceleration Coefficient and the Site Coefficient for the site. This force must be considered to act in each horizontally restrained direction. The minimum support lengths shall be as specified in Article 3.10.

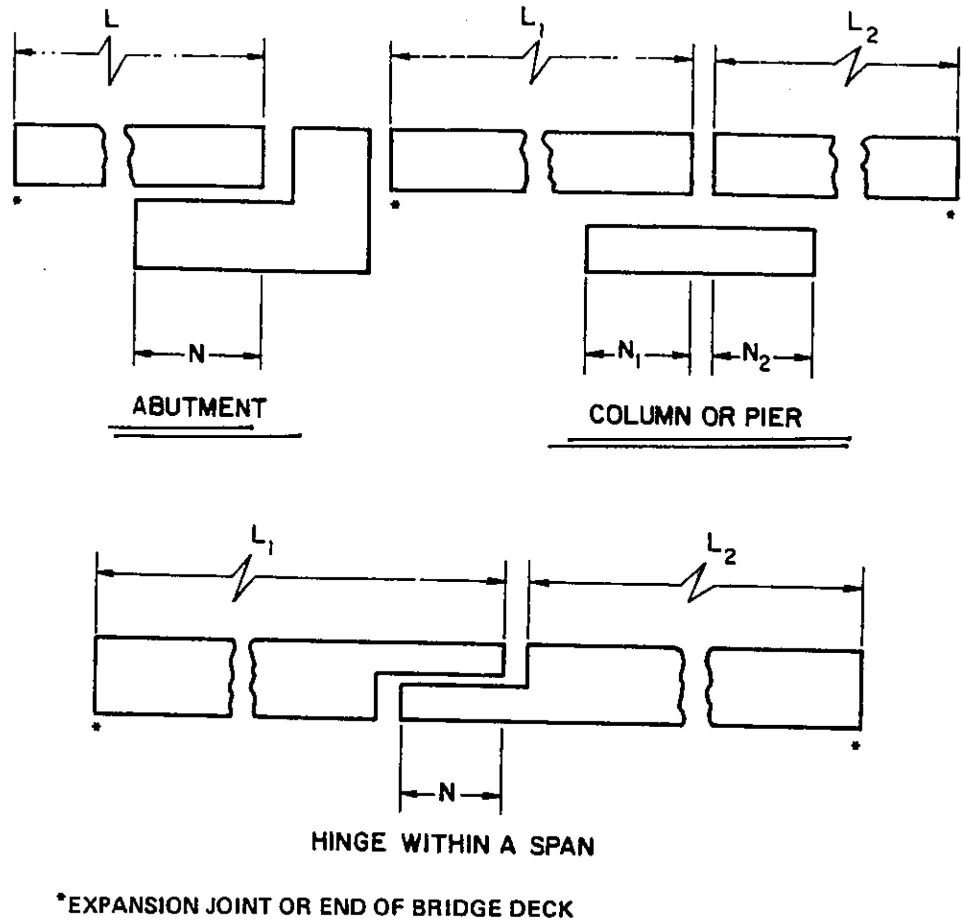


FIGURE 3.10 Dimensions for Minimum Support Length Requirements

3.12 REQUIREMENTS FOR TEMPORARY BRIDGES AND STAGED CONSTRUCTION

The requirement that an earthquake shall not cause collapse of all or part of a bridge as stated in Article 1.1, applies to temporary bridges which are expected to carry traffic and/or pass over routes that carry traffic. It also applies to those bridges that are constructed in stages and expected to carry traffic and/or pass over routes that carry traffic. However, in view of the limited exposure period, the Acceleration Coefficient given in Article 3.2 may be reduced by a factor of not more than 2 in order to calculate the component elastic forces and displacements. Note that Acceleration Coefficients for construction sites that are close to active faults shall be the subject of special study. Further, the Response Modification Factors given in Article 3.7 may be increased by a factor of not more than 1.5 in order to calculate the design forces. This factor shall not be applied to connections as defined in Table 3.7.

The minimum seat-width provisions of Article 3.10 shall apply to all temporary bridges and staged construction.

Any bridge or partially constructed bridge that is expected to be temporary for more than 5 years shall be designed using the requirements for permanent structures and shall not use the provisions of this Article.

GENERAL NOTES

GENERAL: THESE DRAWINGS PROVIDE INFORMATION FOR THE DESIGNER AND ARE NOT INTENDED FOR USE AS CONSTRUCTION DRAWINGS. THE PROJECT PLANS FOR EACH STRUCTURE WILL SHOW SPAN LENGTHS, ROADWAY WIDTHS, SKEW, CURVE AND SUPERELEVATION (IF ANY), ELEVATIONS, SLAB REINFORCEMENT DETAILS IN PLAN AND CROSS SECTIONS, ESTIMATED QUANTITIES, CONCRETE SEALING LIMITS, SEISMIC PEDESTAL DETAILS, REINFORCING STEEL LIST AND OTHER NECESSARY DETAILS AND SPECIAL NOTES.

THE DETAILS SHOWN ARE TYPICAL FOR THE AVERAGE STEEL BEAM AND SHALLOW STEEL GIRDER BRIDGE ABUTMENTS SUPPORTED ON PILES, ON NEWLY COMPACTED EMBANKMENT, OR ON BEDROCK. (IF THE TOP SURFACE OF BEDROCK IS NEAR THE BRIDGE SEAT ELEVATION THESE DETAILS WILL NOT APPLY.)

FOR DEEP GIRDER BRIDGES OR SUPERELEVATED BEAM BRIDGES, THE BACKWALLS, WINGWALLS AND WINGWALL FOOTINGS MAY REQUIRE WIDENING AND/OR ADDITIONAL REINFORCING. WINGWALL FOOTINGS MAY REQUIRE AN ADDITIONAL ROW OF PILES.

DESIGN DATA:

CONCRETE - COMPRESSIVE STRENGTH 4000 PSI (SUBSTRUCTURE)

REINFORCING STEEL - CMS 709.00 GRADE 60, MINIMUM YIELD STRENGTH 60 KSI.

SEISMIC PEDESTALS:
THE DESIGN CONFORMS TO THE "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1996, INCLUDING THE 1997, 1998 AND 1999 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

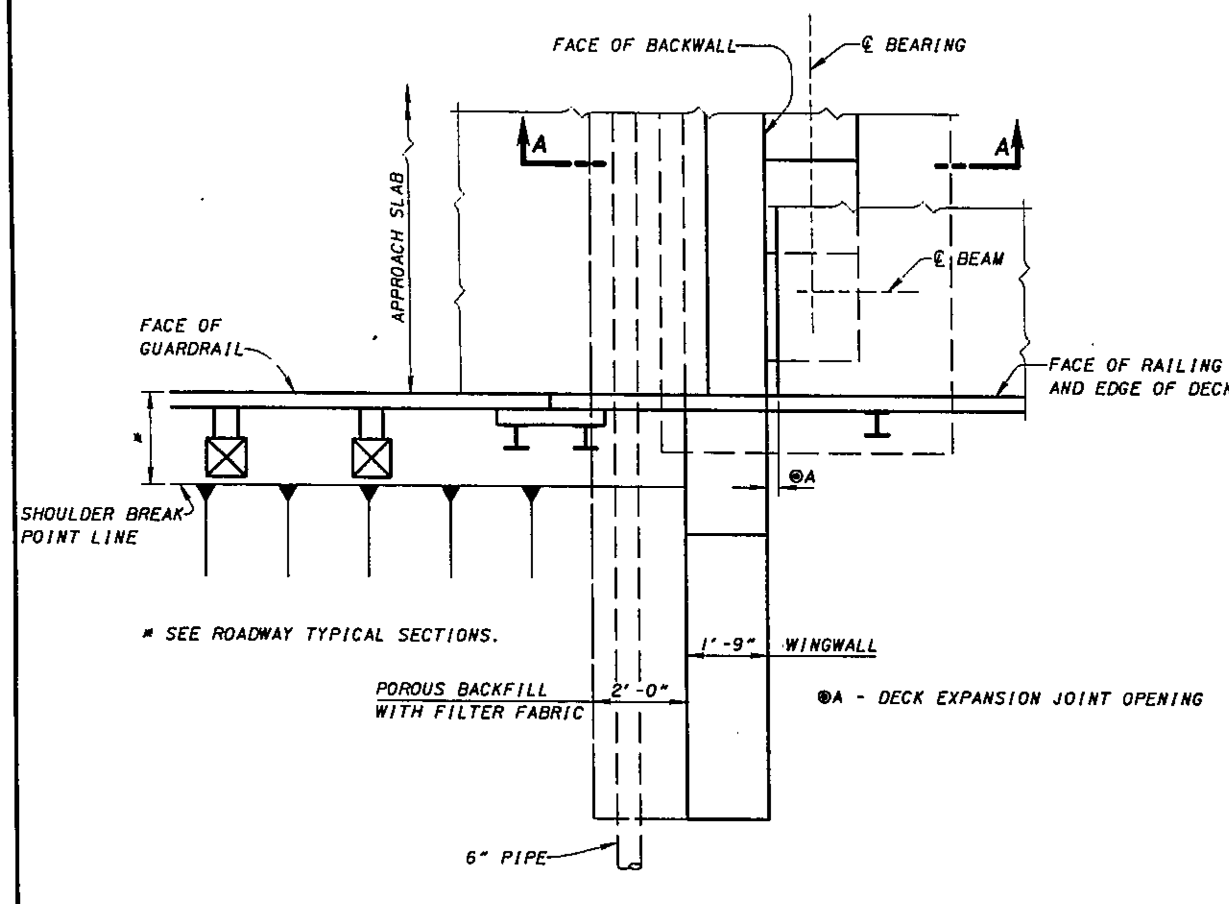
SEISMIC PEDESTALS: (CONTINUED)

TABLE A ON SHEET 5 OF 5 PROVIDES THE MAXIMUM ALLOWABLE SEISMIC LOAD PER PEDESTAL VERSUS PEDESTAL HEIGHT. DESIGN SEISMIC LOAD (SHOWN AS Vu IN TABLE A) SHALL BE CALCULATED AS 0.2 TIMES THE TOTAL FACTORED DEAD LOAD AT THE ABUTMENT (INCLUDING FUTURE WEARING SURFACE) DIVIDED BY THE COSINE OF THE SKEW ANGLE. CALCULATED LOADS EXCEEDING THOSE SHOWN IN TABLE A WILL REQUIRE ADDITIONAL PEDESTALS. THE MAXIMUM RESISTANCE PROVIDED IN ONE DIRECTION BY MULTIPLE PEDESTALS IS EQUAL TO THE SUM OF THE INDIVIDUAL CAPACITIES OF EACH PEDESTAL IN THE SAME DIRECTION.

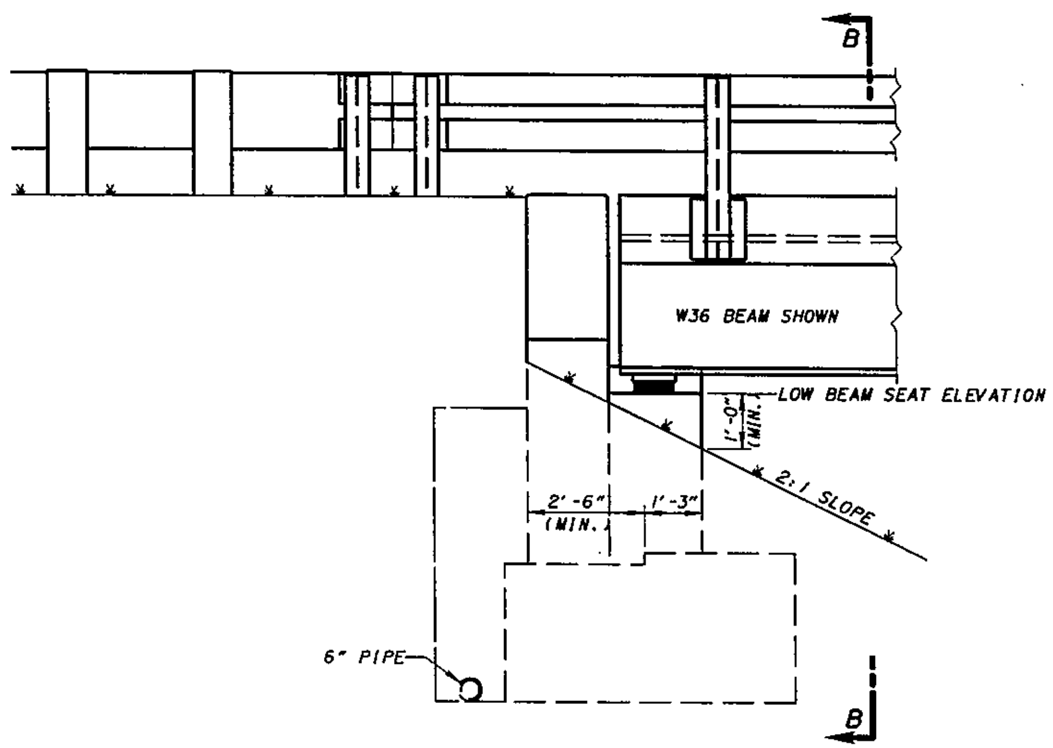
A MINIMUM OF TWO PEDESTALS ARE ALWAYS REQUIRED AND SHALL BE PLACED ON THE INSIDE OF EACH FASCIA BEAM. ANY ADDITIONAL PEDESTALS SHALL BE PLACED IN PAIRS IN ORDER TO RESIST LATERAL LOADS IN BOTH DIRECTIONS. ADDITIONAL PEDESTALS FOR RESTRAINT DURING PART-WIDTH CONSTRUCTION SHALL NOT BE USED.

PEDESTALS ARE REQUIRED FOR ALL BEARING TYPES, BOTH EXPANSION AND FIXED, UNLESS THE BEARING, ITS INDIVIDUAL COMPONENTS AND ITS ATTACHMENT TO BOTH THE SUPERSTRUCTURE AND SUBSTRUCTURE ARE SPECIFICALLY DESIGNED FOR THE DESIGN SEISMIC LOAD.

THE DESIGNER SHALL DETERMINE IF THE STANDARD END CROSS-FRAMES WILL CLEAR THE PEDESTALS. IF NOT, THE CROSSFRAME LAYOUT SHALL BE MODIFIED TO CLEAR THE PEDESTALS BY PLAN DETAILS.



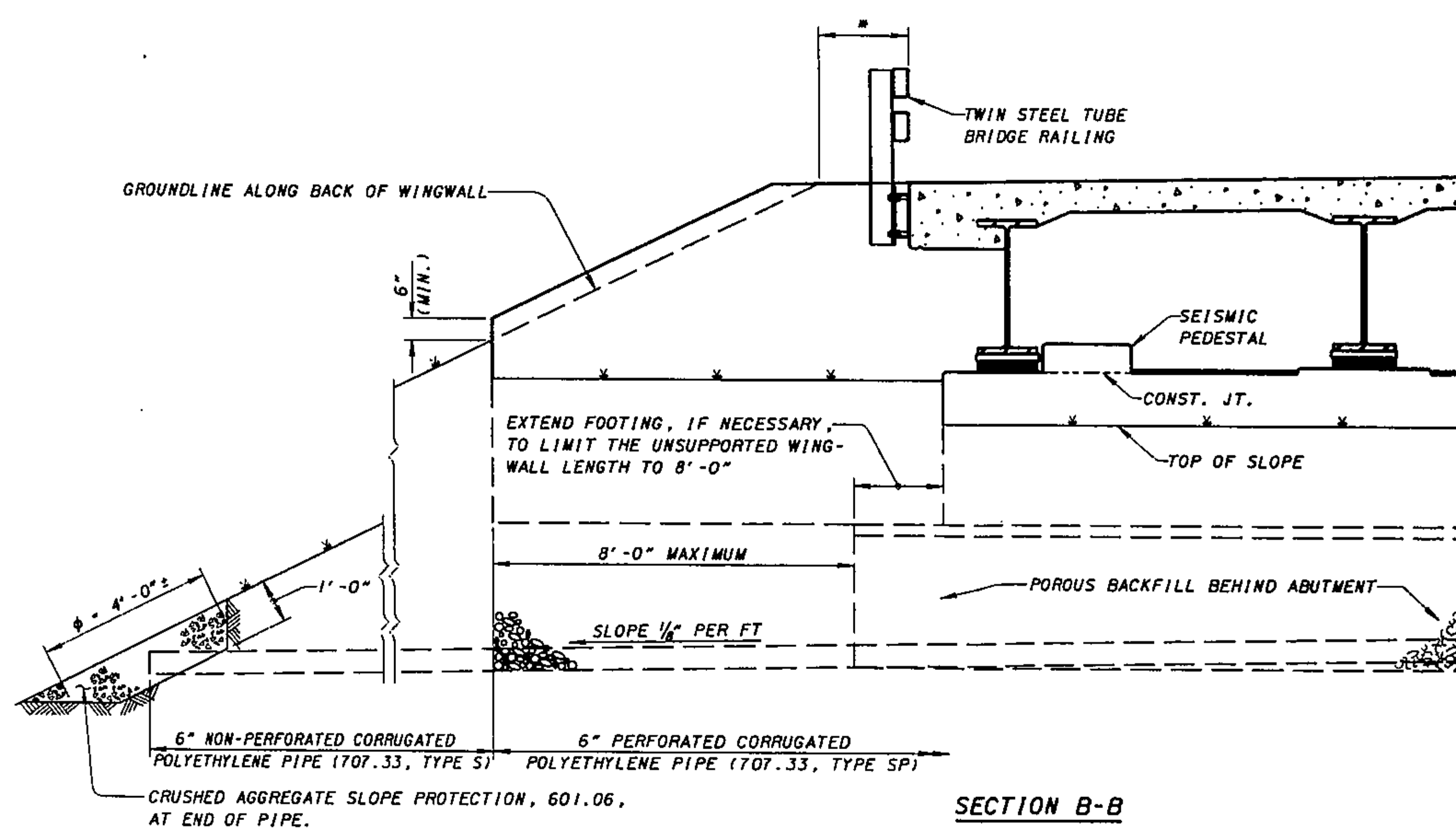
PART PLAN



ELEVATION

SEE SHEET 4\5 FOR SECTION A-A.

SEE SHEET 5\5 FOR PEDESTAL DETAILS.



SECTION B-B

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING

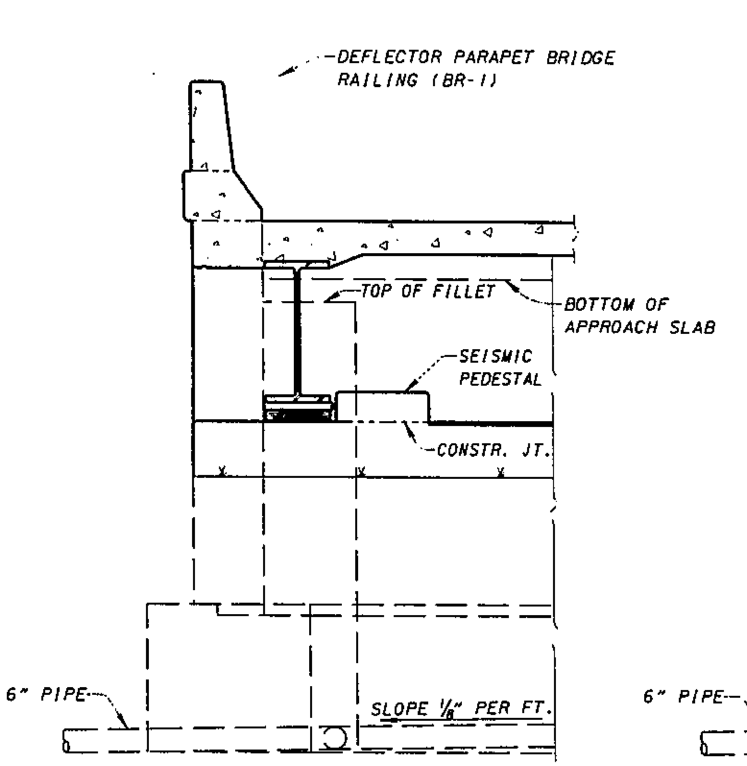
STATE OF OHIO DEPARTMENT OF TRANSPORTATION

ADMINISTRATOR — DATE 03-20-95

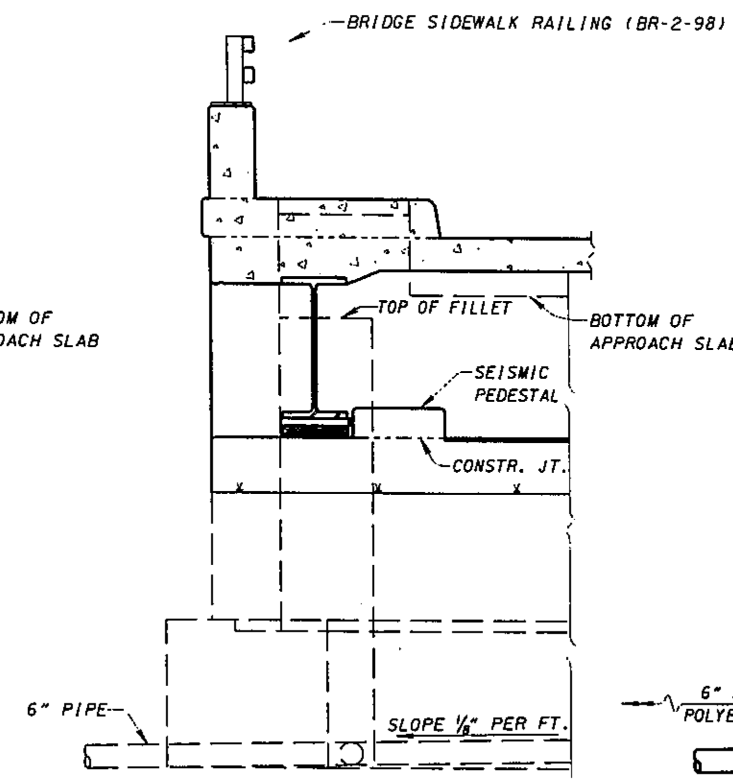
REVISIONS: 04-20-01, 07-19-02 | DESIGNED: CPD/SAM | CHECKED: NAA/SDS | REVIEWED: MPB/LMW | DRAWN: SAM | A-1-69

STANDARD: TYPICAL ABUTMENT DETAILS FOR STEEL BEAM AND GIRDER BRIDGES

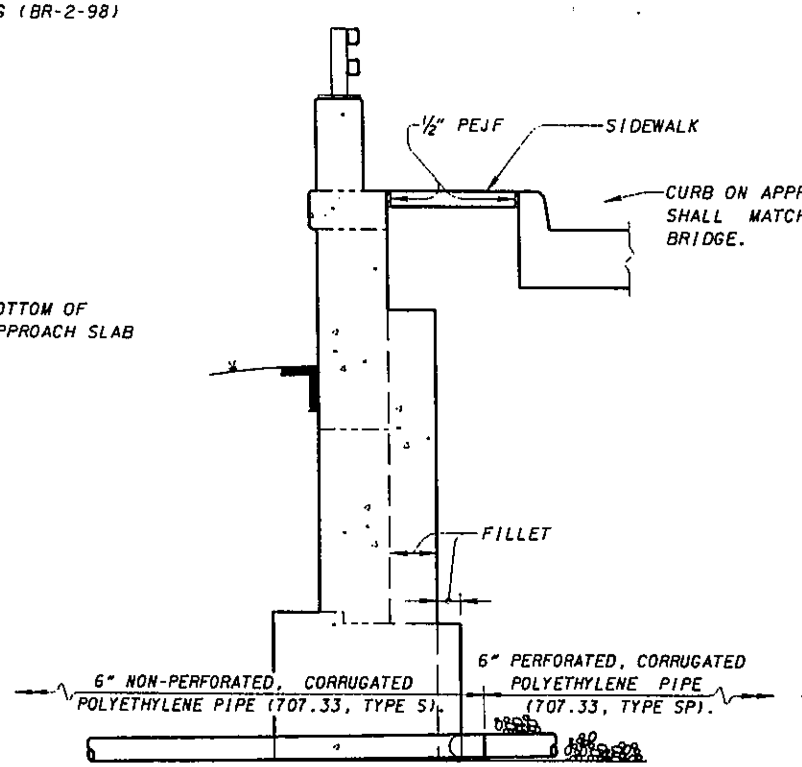
1/5



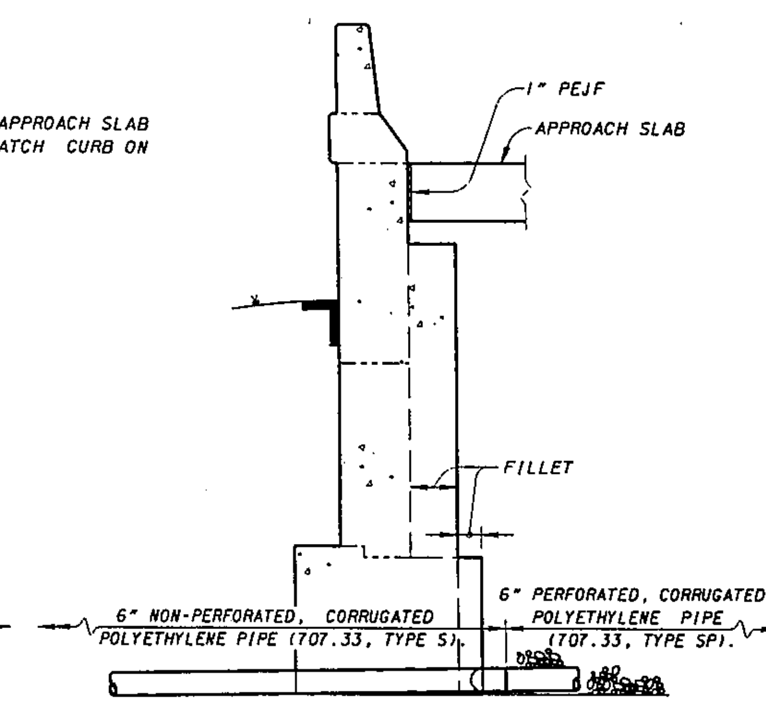
SECTION D-D



SECTION G-G



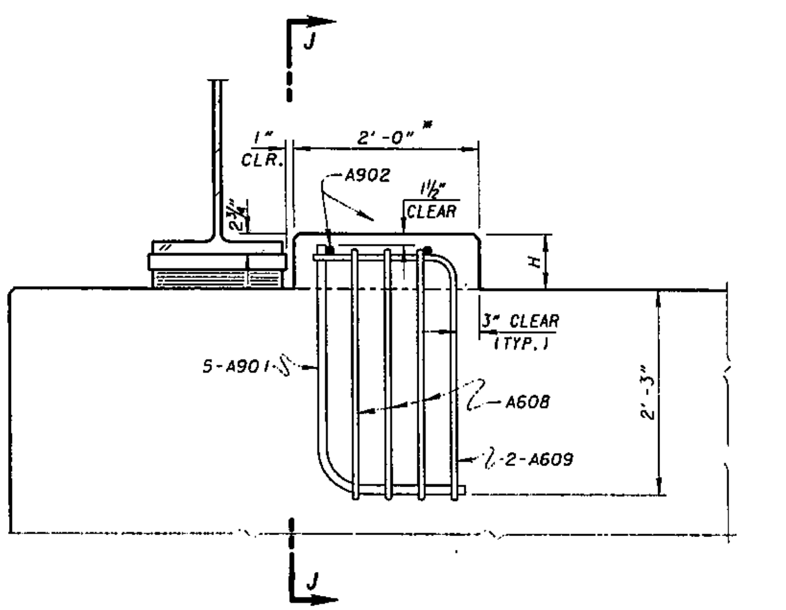
SECTION F-F



SECTION H-H

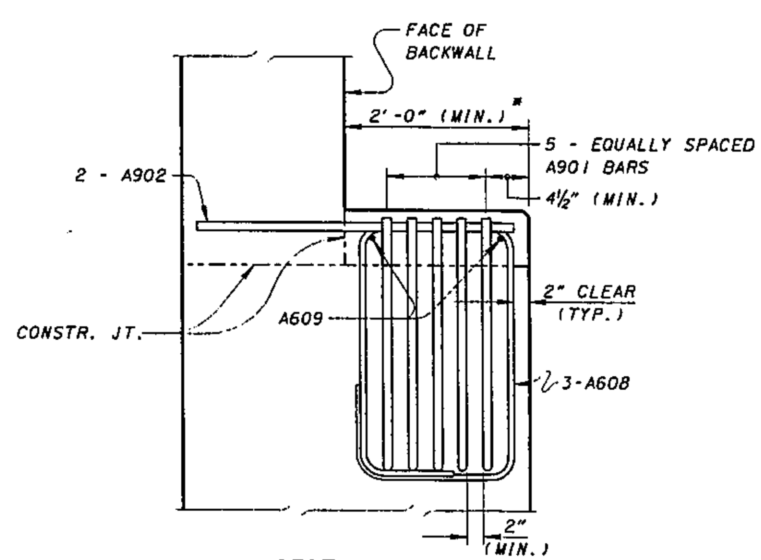
SEE SHEET 1\5 FOR DRAINAGE PIPE OUTLET DETAIL.

PEJF - PREFORMED EXPANSION JOINT FILLER.



FRONT VIEW OF SEISMIC PEDESTAL

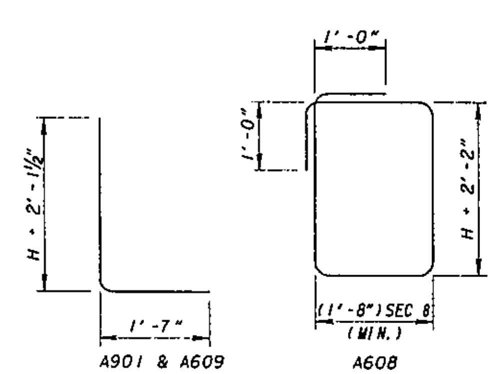
THE 2'-0" WIDTH OF THE PEDESTAL SHALL BE MEASURED PARALLEL TO THE CENTERLINE OF BEARING. THE A901 & A609 BARS SHALL BE PLACED PARALLEL TO THE CENTERLINE OF BEARING. THE A902 & A608 BARS SHALL BE PLACED PARALLEL TO THE BEAMS OR GIRDERS.



SECTION J-J

THE LOCATION OF THE MAIN REINFORCEMENT IN THE BEAM SEAT MAY BE ADJUSTED HORIZONTALLY ±1" TO ACCOMMODATE THE A901 BARS.

* - THE SURFACE OF THE BEAM SEAT IN THIS AREA SHALL BE FINISHED WITH A SERRATED TROWEL. THE SERRATIONS SHALL BE ¼" DEEP MINIMUM.



BENDING DIAGRAMS

θ - SKEW ANGLE

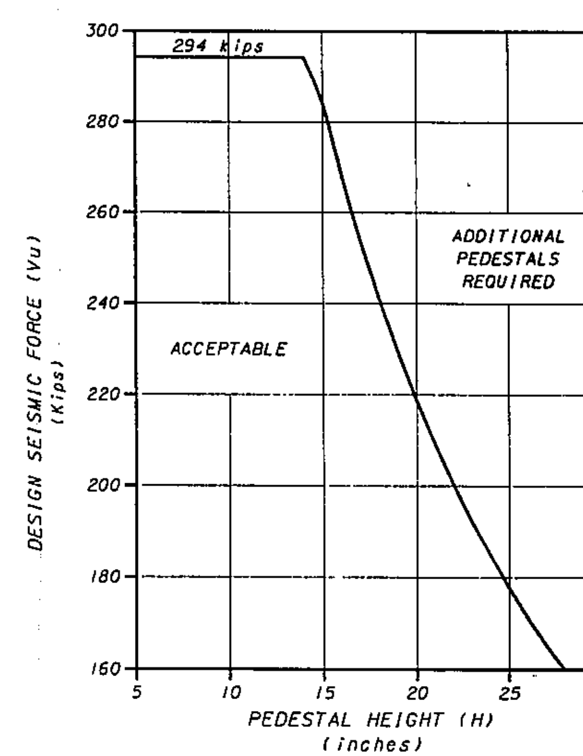


TABLE A

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

ADMINISTRATOR

03-20-95 DATE

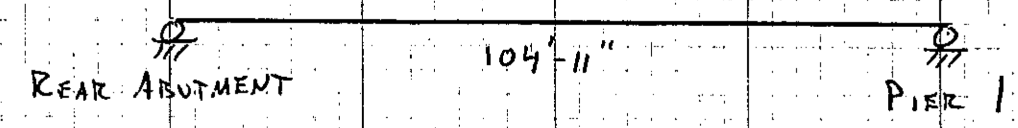
REVISIONS	DESIGNED	CHECKED	REVIEWED
04-20-01	CPD/SAM	HAA/SDS	MPB/LMW
07-19-02	DRAWN SAM	A-1-69	

STANDARD

TYPICAL ABUTMENT DETAILS FOR STEEL BEAM AND GIRDER BRIDGES

F. BEARING PAD DESIGN

REAR ABUTMENT



(PER BEAM LINE)

1. Beam Self Weight (CONSPAN OUTPUT)

$= 52.2^{k}$

2. Dead Load on Precast (CONSPAN OUTPUT)

$= 63.2 + 11.9 + 6.8 = 81.9^{k}$

3. Superimposed Dead Load (CONSPAN OUTPUT)

$= \frac{171.1}{5} = 34.2^{k}$

4. Abutment Diaphragm

$$= \frac{0.15^{kcf}\left[\left(\frac{48.5}{\cos 13}\right)(3.5)(6+1) - (5)(2.5)(956\,in^2)\right]}{5 \text{ beams}} = 34.1^{k}$$

5. Live Load & Impact (CONSPAN OUTPUT)

$= 80.1^{k}$ [Per Lane, No DF, No IMPACT]

$LL = (80.1)(1)(0.939) = 75.2^{k}$

~~$LL+I = (80.1)(1.217)(0.939) = 91.5^{k}$~~

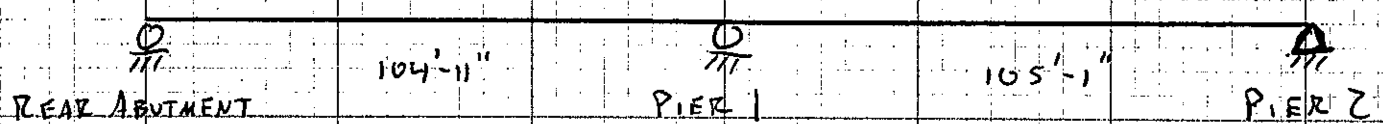
I BF

$\boxed{\begin{array}{l} DL = 202.4^{k} \\ LL+I = 91.5^{k} \end{array}}$

$\boxed{\begin{array}{l} DL = 202.4^{k} \\ LL = 75.2^{k} \end{array}}$

PER BEARING

PIER 1



(PER BEAM LINE)

1. Beam Self Weight (CONSPAN OUTPUT)

$$= \frac{52.2 + 52.3}{2} = 52.3^{k}$$

2. Dead Load on Precast (CONSPAN OUTPUT)

$$= \frac{81.9 + 82}{2} = 82.0^{k}$$

3. Superimposed Dead Load (CONSPAN OUTPUT)

$$= \frac{\left(\frac{499.4}{10}\right) + \left(\frac{499.4}{10}\right)}{2} = 49.9^{k}$$

4. Pier Diaphragm

$$= \frac{0.15^{kcf}\left[\left(\frac{48.5}{\cos 13}\right)(3)\left(6 - \frac{8}{12} + \frac{2}{12}\right) - (10)(1.125)(956\ in^2)\right]}{10\ \text{beams}} = 11.2^{k}$$

5. Live Load & Impact (CONSPAN OUTPUT)

$$= \frac{137.2 + 137.2}{2} = 137.2^{k}$$ [Per Lane, No DF, No Impact]

$LL = (137.2)(1)(0.939) = 128.8^{k}$

$LL + I = (137.2)(1.217)(0.939) = 156.8^{k}$

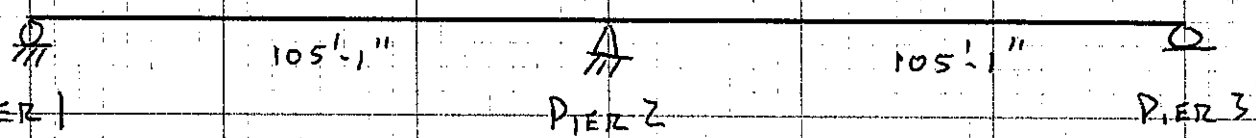
$\quad\quad\quad\quad\quad\quad\quad$ I $\quad$ DF

$\boxed{DL = 195.4^{k} \quad LL + I = 156.8^{k}}$

$\boxed{DL = 195.4^{k} \quad LL = 128.8^{k}}$

PER BEARING

PIER 2



(PER BEAM LINE)

1. Beam Self Weight (CONSPAN OUTPUT)

$= 52.3^{k}$

2. Dead Load on Precast (CONSPAN OUTPUT)

$= 63.3 + 11.9 + 6.8 = 82^{k}$

3. Superimposed Dead Load (CONSPAN OUTPUT)

$= \frac{409.1}{10} = 40.9^{k}$

4. Pier Diaphragm

$$\approx \frac{0.15^{kcf}\left[\left(\frac{48.5}{105.13}\right)(3)\left(b - \frac{8}{12} + \frac{2}{12}\right) - (10)(1.125)(956 in^2)\right]}{10 \text{ beams}} = 11.2^{k}$$

5. Live Load & Impact (CONSPAN OUTPUT)

$= 130.7^{k}$ [Per Lane, No DF, No Impact]

$LL = (130.7)(1)(0.939) = 122.7^{k}$

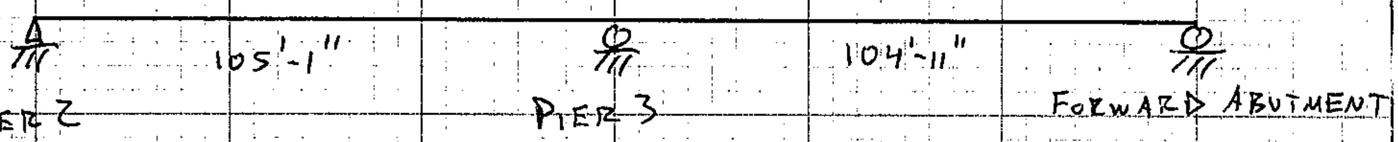
$LL + I = (130.7)\underbrace{(1.217)}_{I}\underbrace{(0.939)}_{DF} = 149.4^{k}$

$\boxed{DL = 186.4^{k} \quad LL + I = 149.4^{k}}$

$\boxed{DL = 186.4^{k} \quad LL = 122.7^{k}}$

PER BEARING

PIER 3



(PER BEAM LINE)

1. Beam Self Weight (CONSPAN OUTPUT)

$$= \frac{52.3+52.2}{2} = 52.3^{k}$$

2. Dead Load on Precast (CONSPAN OUTPUT)

$$= \frac{82+81.8}{2} = 81.9^{k}$$

3. Superimposed Dead Load (CONSPAN OUTPUT)

$$= \frac{\left(\frac{499.4}{10}\right)+\left(\frac{499.4}{10}\right)}{2} = 49.9^{k}$$

4. Pier Diaphragm

$$= \frac{0.15^{kcf}\left[\left(\frac{48.5}{\cos 13}\right)(3)\left(6-\frac{8}{12}+\frac{2}{12}\right)-(10)(1.125)(956 in^2)\right]}{10 \text{ beams}} = 11.2^{k}$$

5. Live Load & Impact (CONSPAN OUTPUT)

$$= \frac{137.2+137.2}{2} = 137.2^{k} \text{ [Per Lane, No DF, No IMPACT]}$$

$LL = (137.2)(1)(0.939) = 128.8^{k}$

$LL+I = (137.2)(1.217)(0.939) = 156.8^{k}$

I DF

$\boxed{DL = 195.3^{k} \quad LL+I = 156.8^{k}}$

$\boxed{DL = 195.3^{k} \quad LL = 128.8^{k}}$

PER BEARING

FORWARD ABUTMENT

104'-11"

PIER 3 — FORWARD ABUTMENT

(PER BEAM LINE)

1. Beam Self Weight (CONSPAN OUTPUT)
   $= 52.2^k$
2. Dead Load on Precast (CONSPAN OUTPUT)
   $= 63.2 + 11.9 + 6.8 = 81.9^k$
3. Superimposed Dead Load (CONSPAN OUTPUT)
   $= \frac{171.1}{5} = 34.2^k$
4. Abutment Diaphragm
   $$= \frac{0.15^{kcf}\left[\left(\frac{48.5}{\cos 13}\right)(3.5)(6+1) - (5)(2.5)(956\ in^2)\right]}{5 \text{ beams}} = 34.1^k$$
5. Live Load & Impact (CONSPAN OUTPUT)
   $= 80.1^k$ [PER LANE, No DF, No IMPACT]

$LL = (80.1)(1)(0.939) = 75.2^k$

$LL+I = (80.1)(1.217)(0.939) = 91.5^k$

$\boxed{DL = 202.4^k \quad LL+I = 91.5^k}$

$\boxed{DL = 202.4^k \quad LL = 75.2^k}$

PER BEARING

PROJECT: Portsmouth Bypass

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 2, SERVICE 1

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Self wt.	: M	0.0	60.2	174.1	462.1	859.0	1142.5	1312.6	1369.3
	V	52.2	51.0	48.8	42.5	31.9	21.2	10.6	0.0
Prec.	: M	-0.0	7.8	22.6	60.0	111.5	148.3	170.4	177.7
DL+ADL	V	6.8	6.6	6.3	5.5	4.1	2.8	1.4	0.0
Deck	: M	0.0	72.9	210.8	559.6	1040.3	1383.6	1589.6	1658.3
+ Haunch	V	63.2	61.8	59.1	51.5	38.6	25.7	12.9	0.0
Diaphragm	: M	-0.0	15.3	44.2	115.8	210.0	273.4	325.9	325.9
	V	11.9	11.9	11.9	11.9	5.9	5.9	0.0	0.0
Comp.	: M	31.0	69.5	141.6	318.7	544.4	676.9	716.4	662.8
DL+ADL	V	33.5	32.5	30.7	25.5	16.8	8.1	0.7	9.4
LL + I	: M+	82.7	185.1	376.2	841.1	1415.3	1743.1	1878.2	1832.6
	V	90.5	89.3	86.6	79.4	67.4	49.3	37.7	47.5
LL + I	: M-	-7.2	-16.5	-34.5	-84.4	-168.8	-253.3	-337.7	-422.1
	V	84.4	75.4	57.5	8.0	8.0	8.1	8.2	8.3
LL + I	: Vmx	90.5	89.3	86.6	79.4	67.4	55.8	44.6	54.3
	M	82.7	185.1	376.2	841.1	1415.3	1737.6	1830.2	1777.9
Total	: M+	113.7	411.0	969.4	2357.3	4180.4	5367.8	5993.2	6026.7
	V	258.1	253.1	243.3	216.3	164.8	113.1	63.3	56.9
Total	: M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	: Vmx	257.0	252.2	242.6	216.3	164.8	119.5	70.1	63.7
	M	113.7	411.0	969.4	2357.3	4180.4	5362.3	5945.2	5971.9

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.13	73.81	84.48	95.16	101.47	103.75	104.92
Self wt.	: M	1312.6	1142.5	859.0	462.1	174.1	60.2	0.0
	V	10.6	21.2	31.9	42.5	48.8	51.0	52.2
Prec.	: M	170.4	148.3	111.5	60.0	22.6	7.8	-0.0
DL+ADL	V	1.4	2.8	4.1	5.5	6.3	6.6	6.8
Deck	: M	1589.6	1383.6	1040.3	559.6	210.8	72.9	0.0
+ Haunch	V	12.9	25.7	38.6	51.5	59.1	61.8	63.2
Diaphragm	: M	325.9	273.4	210.0	115.8	44.2	15.3	-0.0
	V	0.0	5.9	5.9	11.9	11.9	11.9	11.9
Comp.	: M	516.2	276.4	-56.4	-482.3	-777.9	-892.7	-953.1
DL+ADL	V	18.1	26.8	35.5	44.3	49.4	51.3	52.2
LL + I	: M+	1631.7	1267.6	783.6	316.5	220.5	205.7	207.6
	V	58.2	67.8	76.1	31.9	14.1	7.7	9.0
LL + I	: M-	-506.5	-591.0	-675.4	-1031.5	-1422.6	-1593.9	-1687.6
	V	8.2	8.1	8.0	57.4	71.2	76.2	78.7
LL + I	: Vmx	65.3	75.2	84.0	91.4	94.7	95.9	96.9
	M	1607.7	1261.5	780.3	212.3	-113.5	-229.5	-1192.1
Total	: M+	5546.4	4491.8	2948.0	1031.6	0.0	0.0	0.0
	V	101.2	150.3	192.2	187.5	0.0	0.0	0.0
Total	: M-	0.0	0.0	0.0	-316.4	-1748.8	-2330.3	-2640.7
	V	0.0	0.0	0.0	213.0	246.7	258.9	265.0
Total	: Vmx	108.3	157.7	200.1	247.0	270.1	278.5	283.2
	M	5522.4	4485.7	2944.6	927.4	-439.7	-965.9	-2145.2

PROJECT: Portsmouth Bypass

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	52.2	52.2
Deck+Haunch	63.2	63.2
Diaphragm	11.9	11.9
Prec. DL+ADL	6.8	6.8
Comp. DL+ADL	171.1	499.4
Live (Max)	80.1	137.2
Live (Min)	-7.2	-11.2
Pedestrian (Max)	-0.0	-0.0
Pedestrian (Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

PROJECT: Portsmouth Bypass

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 2, SERVICE 1

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Self wt.	: M	0.0	64.6	174.4	466.4	863.4	1146.9	1317.0	1373.7
	V	52.3	51.0	48.9	42.5	31.9	21.2	10.6	0.0
Prec.	: M	0.0	8.4	22.6	60.5	112.1	148.9	170.9	178.3
DL+ADL	V	6.8	6.6	6.3	5.5	4.1	2.8	1.4	0.0
Deck	: M	0.0	78.2	211.2	564.8	1045.5	1388.9	1594.9	1663.6
+ Haunch	V	63.3	61.8	59.2	51.5	38.6	25.7	12.9	0.0
Diaphragm	: M	0.0	16.4	44.2	116.8	211.0	274.3	326.9	326.9
	V	11.9	11.9	11.9	11.9	5.9	5.9	0.0	0.0
Comp.	: M	-945.2	-888.5	-791.8	-532.9	-175.2	89.5	261.1	339.6
DL+ADL	V	45.9	44.9	43.1	37.9	29.2	20.4	11.7	3.0
LL + I	: M+	215.4	207.0	212.1	313.1	842.1	1243.9	1484.9	1545.6
	V	13.9	17.3	10.1	40.8	30.5	12.4	0.4	37.3
LL + I	: M-	-1667.8	-1573.1	-1418.4	-1053.9	-811.9	-705.6	-682.3	-659.1
	V	74.6	71.1	64.9	46.7	13.1	2.2	2.3	2.3
LL + I	: Vmx	94.5	92.9	89.8	83.6	74.3	63.2	51.7	44.0
	M	-1189.3	-1113.1	-980.6	235.1	790.3	1164.5	1364.8	1485.6
Total	: M+	0.0	0.0	0.0	988.7	2898.9	4292.3	5155.7	5427.6
	V	0.0	0.0	0.0	190.0	140.2	88.5	37.0	40.3
Total	: M-	-2613.0	-2294.0	-1757.8	-378.2	0.0	0.0	0.0	0.0
	V	254.8	247.4	234.2	195.9	0.0	0.0	0.0	0.0
Total	: Vmx	274.7	269.1	259.1	232.9	184.0	139.3	88.2	47.0
	M	-2134.5	-1834.0	-1320.0	910.8	2847.0	4213.0	5035.6	5367.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.22	73.89	84.57	95.24	101.64	103.83	105.08
Self wt.	: M	1317.0	1146.9	863.4	466.4	174.4	64.6	0.0
	V	10.6	21.2	31.9	42.5	48.9	51.0	52.3
Prec.	: M	170.9	148.9	112.1	60.5	22.6	8.4	0.0
DL+ADL	V	1.4	2.8	4.1	5.5	6.3	6.6	6.8
Deck	: M	1594.9	1388.9	1045.5	564.8	211.2	78.2	0.0
+ Haunch	V	12.9	25.7	38.6	51.5	59.2	61.8	63.3
Diaphragm	: M	326.9	274.3	211.0	116.8	44.2	16.4	0.0
	V	0.0	5.9	5.9	11.9	11.9	11.9	11.9
Comp.	: M	325.1	217.4	16.7	-277.1	-495.5	-579.6	-629.5
DL+ADL	V	5.7	14.4	23.2	31.9	37.1	38.9	39.9
LL + I	: M+	1469.2	1213.6	802.6	465.3	424.4	429.3	436.5
	V	1.7	13.6	24.5	7.4	11.0	12.3	13.0
LL + I	: M-	-635.9	-612.7	-682.6	-919.4	-1272.2	-1421.6	-1513.0
	V	2.3	2.2	10.8	43.5	61.7	68.0	71.5
LL + I	: Vmx	53.0	64.5	75.4	84.5	90.3	92.3	93.4
	M	1351.8	1135.0	749.6	191.3	-100.0	-192.6	-243.6
Total	: M+	5203.9	4390.0	3051.2	1396.8	381.3	17.3	0.0
	V	32.3	83.7	128.2	150.6	174.4	182.5	0.0
Total	: M-	0.0	0.0	0.0	0.0	-1315.3	-1833.7	-2142.6
	V	0.0	0.0	0.0	0.0	225.1	238.3	245.7
Total	: Vmx	83.6	134.6	179.1	227.7	253.6	262.6	267.6
	M	5086.5	4311.4	2998.2	1122.8	350.3	-26.5	-244.5

PROJECT: Portsmouth Bypass

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	52.3	52.3
Deck+Haunch	63.3	63.3
Diaphragm	11.9	11.9
Prec. DL+ADL	6.8	6.8
Comp. DL+ADL	499.4	409.1
Live (Max)	137.2	130.7
Live (Min)	-11.2	-23.4
Pedestrian (Max)	-0.0	-0.0
Pedestrian (Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

KZF Design Inc | PHONE: 513-621-6211 | SHEET# 1
655 Eden Park Dr | Cincinnati, OH 45202 | JOB NO. KZF #5355.02
PROGRAM: CONSPAN Rating-v8.0.0 Bentley Systems, Inc., Tampa, | BY RBK DATE May/1/2009
PHONE : TOLL-FREE 1-800-451-5327 TAMPA AREA: 813-985-9170 | CKD. DATE

PROJECT: Portsmouth Bypass

SHEAR AND MOMENT ENVELOPE : Span : 3, Beam : 2, SERVICE 1

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.45	9.84	20.52	31.19	41.87	52.54
Self wt.	: M	0.0	64.6	174.4	466.4	863.4	1146.9	1317.0	1373.7
	V	52.3	51.0	48.9	42.5	31.9	21.2	10.6	0.0
Prec.	: M	0.0	8.4	22.6	60.5	112.1	148.9	170.9	178.3
DL+ADL	V	6.8	6.6	6.3	5.5	4.1	2.8	1.4	0.0
Deck	: M	0.0	78.2	211.2	564.8	1045.5	1388.9	1594.9	1663.6
+ Haunch	V	63.3	61.8	59.2	51.5	38.6	25.7	12.9	0.0
Diaphragm	: M	0.0	16.4	44.2	116.8	211.0	274.3	326.9	326.9
	V	11.9	11.9	11.9	11.9	5.9	5.9	0.0	0.0
Comp.	: M	-629.5	-579.6	-495.5	-277.1	16.7	217.4	325.1	339.6
DL+ADL	V	39.9	38.9	37.1	31.9	23.2	14.4	5.7	3.0
LL + I	: M+	436.5	429.3	424.4	465.3	802.6	1213.6	1469.2	1545.6
	V	13.0	12.3	11.0	7.4	24.5	13.6	1.7	37.3
LL + I	: M-	-1512.9	-1421.5	-1271.9	-918.9	-682.6	-612.7	-636.0	-659.2
	V	83.2	78.3	69.3	43.3	10.8	2.2	2.3	2.3
LL + I	: Vmx	93.4	92.3	90.3	84.5	75.4	64.5	53.0	44.0
	M	-243.6	-192.6	-100.0	191.3	749.6	1135.0	1351.8	1485.6
Total	: M+	0.0	17.3	381.3	1396.8	3051.2	4390.0	5203.9	5427.6
	V	0.0	182.5	174.4	150.6	128.2	83.7	32.3	40.3
Total	: M-	-2142.5	-1833.5	-1315.0	0.0	0.0	0.0	0.0	0.0
	V	257.4	248.5	232.7	0.0	0.0	0.0	0.0	0.0
Total	: Vmx	267.6	262.6	253.6	227.7	179.1	134.6	83.6	47.0
	M	-244.5	-26.5	350.3	1122.8	2998.3	4311.4	5086.5	5367.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.22	73.89	84.57	95.24	101.64	103.83	105.08
Self wt.	: M	1317.0	1146.9	863.4	466.4	174.4	64.6	0.0
	V	10.6	21.2	31.9	42.5	48.9	51.0	52.3
Prec.	: M	170.9	148.9	112.1	60.5	22.6	8.4	0.0
DL+ADL	V	1.4	2.8	4.1	5.5	6.3	6.6	6.8
Deck	: M	1594.9	1388.9	1045.5	564.8	211.2	78.2	0.0
+ Haunch	V	12.9	25.7	38.6	51.5	59.2	61.8	63.3
Diaphragm	: M	326.9	274.3	211.0	116.8	44.2	16.4	0.0
	V	0.0	5.9	5.9	11.9	11.9	11.9	11.9
Comp.	: M	261.1	89.5	-175.2	-532.9	-791.8	-888.5	-945.2
DL+ADL	V	11.7	20.4	29.2	37.9	43.1	44.9	45.9
LL + I	: M+	1484.9	1243.9	842.1	313.1	212.1	207.0	215.4
	V	0.4	12.4	30.5	40.8	10.1	17.3	13.9
LL + I	: M-	-682.4	-705.6	-811.9	-1054.2	-1418.7	-1573.4	-1668.1
	V	2.3	2.2	13.1	46.9	65.1	71.3	74.8
LL + I	: Vmx	51.7	63.2	74.3	83.6	89.8	92.9	94.5
	M	1364.8	1164.5	790.3	235.1	-980.6	-1113.1	-1189.3
Total	: M+	5155.7	4292.3	2898.9	988.7	0.0	0.0	0.0
	V	37.0	88.5	140.2	190.0	0.0	0.0	0.0
Total	: M-	0.0	0.0	0.0	-378.5	-1758.1	-2294.3	-2613.3
	V	0.0	0.0	0.0	196.1	234.4	247.6	255.0
Total	: Vmx	88.2	139.3	184.0	232.9	259.1	269.1	274.7
	M	5035.6	4213.0	2847.0	910.8	-1320.0	-1834.0	-2134.5

PROJECT: Portsmouth Bypass

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	52.3	52.3
Deck+Haunch	63.3	63.3
Diaphragm	11.9	11.9
Prec. DL+ADL	6.8	6.8
Comp. DL+ADL	409.1	499.4
Live (Max)	130.7	137.2
Live (Min)	-23.4	-11.2
Pedestrian (Max)	-0.0	-0.0
Pedestrian (Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

KZF Design Inc PHONE: 513-621-6211 | SHEET# 1
655 Eden Park Dr Cincinnati, OH 45202 | JOB NO. KZF #5355.02
PROGRAM: CONSPAN Rating-v8.0.0 Bentley Systems, Inc., Tampa, | BY RBK DATE May/1/2009
PHONE : TOLL-FREE 1-800-451-5327 TAMPA AREA: 813-985-9170 | CKD. DATE

PROJECT: Portsmouth Bypass

SHEAR AND MOMENT ENVELOPE : Span : 4, Beam : 2, SERVICE 1

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.17	3.45	9.76	20.43	31.11	41.78	52.46
Self wt.	: M	0.0	60.2	174.1	462.1	859.0	1142.5	1312.6	1369.3
	V	52.2	51.0	48.8	42.5	31.9	21.2	10.6	0.0
Prec.	: M	-0.0	7.8	22.6	60.0	111.5	148.3	170.4	177.7
DL+ADL	V	6.8	6.6	6.3	5.5	4.1	2.8	1.4	0.0
Deck	: M	0.0	72.9	210.8	559.6	1040.3	1383.6	1589.6	1658.3
+ Haunch	V	63.2	61.8	59.1	51.5	38.6	25.7	12.9	0.0
Diaphragm	: M	-0.0	15.3	44.0	115.3	208.9	271.6	323.5	322.9
	V	11.8	11.8	11.8	11.8	5.9	5.9	0.1	0.1
Comp.	: M	-933.6	-873.5	-759.4	-465.8	-43.2	286.4	522.9	666.3
DL+ADL	V	51.9	51.0	49.1	44.0	35.2	26.5	17.8	9.1
LL + I	: M+	202.2	205.9	221.3	320.1	794.5	1275.2	1635.6	1832.4
	V	2.6	3.3	4.7	8.5	29.6	20.8	10.7	0.6
LL + I	: M-	-1656.6	-1563.7	-1394.3	-1010.1	-672.4	-588.0	-503.6	-419.2
	V	78.0	75.6	70.7	57.3	8.0	8.1	8.2	8.3
LL + I	: Vmx	96.2	94.8	93.2	89.1	81.2	72.1	61.9	50.7
	M	-1188.2	-230.8	-136.3	150.4	719.7	1190.8	1517.0	1658.7
Total	: M+	0.0	0.0	0.0	1051.2	2971.0	4507.6	5554.6	6026.9
	V	0.0	0.0	0.0	163.7	145.3	102.9	53.4	9.7
Total	: M-	-2590.2	-2281.0	-1702.2	-279.0	0.0	0.0	0.0	0.0
	V	263.9	257.9	245.8	212.6	0.0	0.0	0.0	0.0
Total	: Vmx	282.1	277.1	268.3	244.3	196.9	154.3	104.6	59.8
	M	-2121.7	-948.0	-444.2	881.4	2896.2	4423.2	5436.0	5853.3

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	63.13	73.81	84.48	95.16	101.47	103.75	104.92
Self wt.	: M	1312.6	1142.5	859.0	462.1	174.1	60.2	0.0
	V	10.6	21.2	31.9	42.5	48.8	51.0	52.2
Prec.	: M	170.4	148.3	111.5	60.0	22.6	7.8	0.0
DL+ADL	V	1.4	2.8	4.1	5.5	6.3	6.6	6.8
Deck	: M	1589.6	1383.6	1040.3	559.6	210.8	72.9	0.0
+ Haunch	V	12.9	25.7	38.6	51.5	59.1	61.8	63.2
Diaphragm	: M	322.3	275.1	211.2	116.4	44.4	15.4	0.0
	V	0.1	6.0	6.0	11.9	11.9	11.9	11.9
Comp.	: M	716.6	673.9	538.0	309.1	129.1	55.8	16.7
DL+ADL	V	0.4	8.4	17.1	25.8	31.0	32.8	33.8
LL + I	: M+	1864.6	1725.1	1390.4	811.6	343.9	151.8	48.9
	V	37.7	49.3	67.4	79.4	86.9	89.6	90.9
LL + I	: M-	-334.7	-250.3	-165.9	-81.5	-31.6	-13.5	-4.3
	V	8.2	8.1	8.0	8.0	59.4	77.9	87.2
LL + I	: Vmx	44.6	55.8	67.4	79.4	86.9	89.6	90.9
	M	1814.2	1717.2	1390.4	811.6	343.9	151.8	48.9
Total	: M+	5976.2	5348.5	4150.4	2318.7	924.8	364.0	65.5
	V	63.0	113.4	165.1	216.6	243.9	253.9	258.8
Total	: M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	: Vmx	69.8	119.9	165.1	216.6	243.5	253.3	258.2
	M	5925.7	5340.6	4150.4	2318.7	924.8	364.0	65.5

PROJECT: Portsmouth Bypass

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	52.2	52.2
Deck+Haunch	63.2	63.2
Diaphragm	11.8	11.9
Prec. DL+ADL	6.8	6.8
Comp. DL+ADL	499.4	171.1
Live (Max)	137.2	80.1
Live (Min)	-11.2	-7.2
Pedestrian (Max)	-0.0	-0.0
Pedestrian (Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

ELASTOMERIC BEARING PAD DESIGN (ABUTMENTS)

Project: SCI-823-0837

Input Data:

width =	24.00	in
length =	16.00	in
interior layer thick. =	0.4401	in
exterior layer thick. =	0.3081	in
number of interior layers =	6	
exterior shim thick. =	0.0747	in
interior shim thick. =	0.0747	in
effective rubber thick. =	3.26	in
shear mod. "G" =	130	psi
maximum stress =	1000	psi
creep factor =	1.35	
beta factor =	1.00	

Output Data:

shape factor "S"
L*W/2*T(L+W) = 10.91

allowable stress
G*S/beta = 1418 psi design based on 1000 psi maximum

compressive deflection "delta"

compressive strain = 0.039 from AASHTO FIG. 14.6.5.3.3-1

"delta" elastic = 0.127 in
long term = 0.171 in

max. movement = 1.63 in $\geq \frac{2}{3}(210')(80°)(6\times10^{-6})(12) = 0.81''$

OK

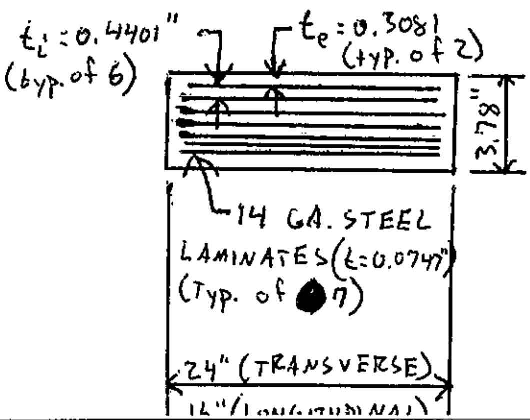
max. rotation
2*delta/L = 0.01588 radians

bearing thickness = 3.78 in

minimum plan dimension = 11.34 in

bearing capacity = 384.00 K * based on max. stress of 1000 psi
544.46 K based on allowable stress

horizontal force
at maximum movement = 24.96 K



*DL: 202.4^k
LL: 75.2^k
$277.6^K \leq 384^K$

OK

ELASTOMERIC BEARING PAD DESIGN (PIERS 1 & 3)

Project: SCI-823-0837

<u>Input Data:</u>

width =	24.00	in
length =	16.00	in
interior layer thick. =	0.4401	in
exterior layer thick. =	0.3081	in
number of interior layers =	4	
exterior shim thick. =	0.0747	in
interior shim thick. =	0.0747	in
effective rubber thick. =	2.38	in
shear mod. "G" =	130	psi
maximum stress =	1000	psi
creep factor =	1.35	
beta factor =	1.00	

<u>Output Data:</u>

shape factor "S"
L*W/2*T(L+W) = 10.91

allowable stress
G*S/beta = 1418 psi — design based on 1000 psi maximum

compressive deflection "delta"

compressive strain = 0.039 from AASHTO FIG. 14.6.5.3.3-1

"delta" elastic = 0.093 in
long term = 0.125 in

max. movement = 1.19 in $\geq 3/4(2/3)(210')(80°)(6\times10^{-6})(12) = 0.60"$

OK

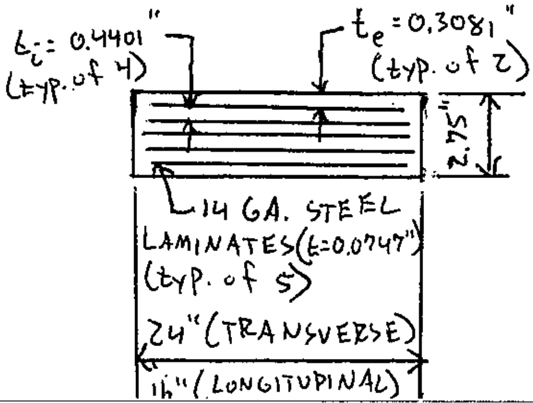
max. rotation
2*delta/L = 0.01159 radians

bearing thickness = 2.75 in

minimum plan dimension = 8.25 in

bearing capacity = 384.00 K * based on max. stress of 1000 psi
544.46 K based on allowable stress

horizontal force
at maximum movement = 24.96 K



* DL = 195.4^K
LL = 128.8^K

$324.2^K \leq 384^K$

OK

ELASTOMERIC BEARING PAD DESIGN (PIER 2)

Project: SCI-823-0837

Input Data:

width =	24.00	in
length =	16.00	in
interior layer thick. =	0.4401	in
exterior layer thick. =	0.3081	in
number of interior layers =	2	
exterior shim thick. =	0.0747	in
interior shim thick. =	0.0747	in
effective rubber thick. =	1.50	in
shear mod. "G" =	130	psi
maximum stress =	1000	psi
creep factor =	1.35	
beta factor =	1.00	

Output Data:

shape factor "S"
L*W/2*T(L+W) = 10.91

allowable stress
G*S/beta = 1418 psi design based on 1000 psi maximum

compressive deflection "delta"

compressive strain = 0.039 from AASHTO FIG. 14.6.5.3.3-1

"delta" elastic = 0.058 in
long term = 0.079 in

max. movement = 0.75 in $\geq \frac{1}{2}\left(\frac{2}{3}\right)(210')(80^\circ)(6\times10^{-6})(12) = 0.40''$

OK

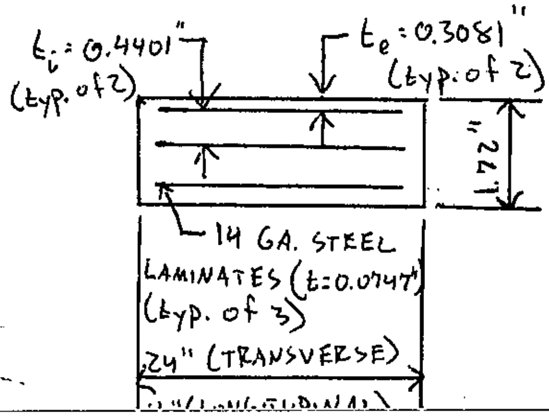
max. rotation
2*delta/L = 0.00729 radians

bearing thickness = 1.72 in

minimum plan dimension = 5.16 in

bearing capacity = 384.00 K * based on max. stress of 1000 psi
544.46 K based on allowable stress

horizontal force
at maximum movement = 24.96 K



* DL = 186.4^K
LL = 122.7^K
$309.1^K \leq 384^K$

OK

G. SUBSURFACE EXPLORATION

(PREPARED BY HDR ENGINEERING, INC. APRIL, 2008)

GEOTECHNICAL EXPLORATION
Bridge No. SCI-823-0837L
SR 823 over Swauger Valley-Minford Road

SCI-823-6.81
Portsmouth Bypass – Phase 1
PID No. 19415

PREPARED FOR:
Ohio Department of Transportation
District 9
650 Eastern Avenue
Chillicothe, Ohio 45601

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

PREPARED BY:

HDR

HDR Engineering, Inc.
9987 Carver Road, Suite 200
Cincinnati, Ohio 45242
513-984-7500

April 2008

Table 1: Substructure and Boring Locations					
Substructure		**Associated Borings**			
Description	**Station**	**Boring Number**	**Station**	**Top of Boring Elevation**	**Top of Rock Elevation**
Rear Abutment	441+01.4, CL	B-001-0-08	441+05.0, 63.0 ft. RT	670.2	660.1
		TR-23	441+30.3, 48.1 ft. LT	661.0	653.5
Pier 1	441+98.3, CL	B-9	441+98.6, 66.2 ft. LT	647.5	643.5
Pier 2	442+95.0, CL	B-6	443+23.0, 34.6 ft. RT	635.9	629.9
		B-8	443+05.8, 34.6 ft. LT	638.4	630.9
Pier 3	443+91.8, CL	TR-21	443+67.0, 46.5 ft. LT	639.0	637.5
		B-5	444+30.2, 63.3 ft. RT	644.0	642.5
		B-7	444+00.8, 65.4 ft. LT	658.0	655.5
Forward Abutment	444+88.6, CL	B-002-0-08	444+75.0, 72.0 ft. LT	670.5	660.3
		TR-20	444+69.7, 42.1 ft. RT	650.0	645.0

Table 2 presents the proposed design elevations as noted in the Structure Type Study Report (KZF, 2008) for the individual substructure units and the top of rock as encountered at the nearby boring locations. Based on the encountered subsurface conditions, the depth to bedrock varies from approximately 2 to 11 feet below the existing ground surface at the bridge site. The top of rock was encountered from approximate El. 629 to El. 632 along the valley floor (Borings B-6, B-8, TR-22) and climbs to approximate El. 660 at both the rear and forward abutments as currently located on the valley wall (Borings B-001-0-08, B-002-0-08).

Table 2: Design Elevations for Individual Substructure Units					
Substructure Unit	**Existing Grade at Centerline (Estimated)**	**Proposed Ground Surface At Centerline**	**Top of Rock[1] (El.)**	**Approximate Depth to Bedrock[2] (ft)**	**Proposed Bottom of Footing/ Concrete Cap**
Rear Abutment	El. 665.1	El. 709.9	660.1 – 653.5	50 to 57	El. 696.57
Pier 1	El. 648.3	El. 655.0	643.5	12	El. 643.00
Pier 2	El. 636.9	El. 636.9	630.9 - 629.9	6 to 7	El. 630.40
Pier 3 (L)	El. 647.2	El. 647.2	655.5 - 637.5	2 to3	El. 631.20
Pier 3 (R)	El. 647.2	El. 647.2	642.5 - 629.9	2 to 6	El. 631.20
Forward Abutment	El. 660.7	El. 699.8	659.3 - 645.0	41 to 55	El. 686.45
Notes: 1. As encountered in the nearest test borings					
2. Below proposed ground surface					

6.0 ANALYSES AND DISCUSSSIONS

Spread footings and driven piles are viable options for support of Bridge No. SCI-823-0837-L based upon the encountered subsurface conditions at the site as well as the economics of construction. As such, analyses were performed to determine the bearing capacity of shallow spread footings and the allowable axial stress of steel H-piles. The results of these and other related analyses are presented in Appendix E.

6.1 Rear Abutment

As shown in Table 2, the proposed bottom of footing/pile cap for the rear abutment is El. 696.57, approximately 31 feet above the existing ground surface (at the centerline) and roughly 50 to 57 feet above the top of rock based on borings B-001-0-08 and TR-23. Approximately 40 to 45 feet of fill will be required to attain the proposed profile grade (El. 709.9) at the abutment location based on the bridge plan provided in Figure 2. The overall depth of the embankment fill would preclude the use of spread footings bearing on rock and excess differential settlement would be a concern if the spread footings would be located within the fill. As such, steel H-piles driven to refusal on bedrock appear to be the most feasible and cost effective foundation to support the rear abutment. For steel piles driven to bedrock, refusal is achieved when a minimum driving resistance of 20 blows per inch is achieved per Section 606.1 of the ODOT *Bridge Design Manual.*

Top of rock was encountered ranging from El. 660.1 to El. 653.5 in borings B-001-0-08 and TR-23, respectively. The bedrock consists of slightly weathered to unweathered siltstone and decomposed to slightly weathered, very fine to fine grained sandstone with the degree of weathering decreasing with depth. Refusal of the driven piles is expected to be obtained relatively quickly once the top of rock is encountered, with approximately 0.5 to 2 feet of penetration into the overlying weathered rock anticipated. As such, hardened steel pile driving tips should be utilized per Section 202.2.3.2.a of the ODOT *Bridge Design Manual* to protect the H-piles from damage and to minimize slippage on the sloping bedrock surface.

For piles driven to refusal on competent rock, the structural capacity of the piles will control the design. Based on Section 4.5.7.3 of the *Standard Specifications for Highway Bridges* (AASHTO, 2002), an allowable axial stress of 12.5 ksi ($0.25f_y$) is recommended for a Grade 50 H-pile bearing on bedrock. Foundation settlement at the rear abutment as a result of elastic compression of the piles is anticipated to be negligible. It should be noted that lateral loads will be resisted by battered piles without relying on lateral resistance from the vertical piles.

Special construction measures will be required to allow for the installation of the driven piles through the approach embankments as the embankment material is expected to contain appreciable quantities of durable rock. As such, it is recommended that the steel H-piles be installed through pile windows constructed during placement of the approach embankment fills. The pile window should extend 3 feet laterally beyond the outer edges of the piles in all directions, with the vertical extent of the window from the bottom of the abutment pile cap to the existing ground surface. The pile window should be constructed of Granular Material Type C (Item 703.16 of the *Construction and Material Specifications*) as the maximum 3-inch particle size should not impede pile penetration and the requirement for prebored holes through the embankment material per Section 202.2.3.2.g of the ODOT *Bridge Design Manual* could be eliminated. It is anticipated that the Type C Granular Material can be processed on site using the hard, durable sandstone and siltstone from the nearby rock cuts.

6.2 Forward Abutment

As shown in Table 2, the proposed elevation for the bottom of footing/pile cap at the forward abutment is 686.45 feet, roughly 18 to 30 feet above the existing ground surface and approximately 27 to 42 feet above the top of rock. The proposed profile grade at the abutment is El. 699.83, indicating that approximately 30 to 45 feet of embankment fill will be required at the abutment location based on the bridge plan provided in Figure 2. As such, steel H-piles driven to refusal on bedrock appear to be the most feasible and cost effective foundation to support the forward abutment as the overall depth of the embankment fill would preclude the use of spread footings bearing upon rock and excess differential settlement would be a concern if the spread footings would be located within the fill.

The top of rock was encountered from El. 659.3 to El. 645.0 at borings B-002-0-08 and TR-20, respectively. The bedrock consists of slightly weathered to unweathered siltstone and slightly weathered, very fine to fine grained sandstone. Refusal is expected to be obtained relatively quickly once the top of rock is encountered, with approximately 4 to 6 inches of penetration expected. As such, hardened steel pile driving tips should be utilized per Section 202.2.3.2.a of the ODOT *Bridge Design Manual* to protect the H-piles from damage and to minimize slippage on the sloping bedrock surface.

For piles driven to refusal on competent rock, the structural capacity of the piles will generally control the design. Based on Section 4.5.7.3 of the *Standard Specifications for Highway Bridges* (AASHTO, 2002), an allowable axial stress of 12.5 ksi ($0.25f_y$) is recommended for a Grade 50 H-pile bearing on bedrock. Foundation settlement at the forward abutment as a result of elastic compression of the piles is anticipated to be negligible. It should be noted that lateral loads will be resisted by battered piles without relying on lateral resistance from the vertical piles.

Special construction measures will be required to allow for the installation of the driven piles through the approach embankments as the embankment material is expected to contain appreciable quantities of durable rock. As such, it is recommended that the steel H-piles be installed through pile windows constructed during placement of the approach embankment fills. The pile window should extend 3 feet laterally beyond the outer edges of the piles in all directions, with the vertical extent of the window from the bottom of the abutment pile cap to the existing ground surface. The pile window should be constructed of Granular Material Type C (Item 703.16 of the *Construction and Material Specifications*) as the maximum 3-inch particle size should not impede pile penetration and the requirement for prebored holes through the embankment material per Section 202.2.3.2.g of the ODOT *Bridge Design Manual* could be eliminated. It is anticipated that the Type C Granular Material can be processed on site using the hard, durable sandstone and siltstone from the nearby rock cuts.

6.3 Bridge Piers

Based on the subsurface conditions encountered at the pier locations, bedrock is expected to be encountered within approximately 2 to 12 feet below final grade at Pier 1, 2 and 3 (See Table 2). As such, spread footings bearing upon competent rock are considered to be the most feasible foundation alternative at the bridge piers.

6.3.1 Pier 1

The top of rock at Pier 1 is anticipated at approximate El. 643.5 based on test boring B-9. However, some variation in the bedrock elevation should be expected as the boring is located approximately 40 feet from the left bridge pier and about 90 feet from the right pier. (See Figure 2.) The bedrock encountered at boring B-9 was described as medium hard to hard, very fine to fine grained, argillaceous, micaceous sandstone. The sandstone is moderately to highly weathered and noted to be highly fractured with decomposed argillaceous zones from El. 638.8 to El. 638.5. Based upon the bedrock description provided in the boring log, it is recommended that the proposed bottom of footing be located at El. 641.5 or lower.

Analyses were performed to verify the allowable bearing capacity of 40 tsf for spread footings bearing upon competent bedrock as recommended by DLZ in their previous geotechnical report for the site (DLZ, 2006). These analyses were based upon the Geomechanics Classification System of Rock Mass Rating, and using the rock descriptions, RQD, and unconfined compression test data as provided in DLZ's final boring logs. As shown in the analyses presented in Appendix E, a reduced allowable bearing capacity of 29 tsf is recommended.

Due to the potential for variations in the top of bedrock beneath the footing from that encountered in Boring B-9, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to competent rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

6.3.2 Pier 2

Based on Borings B-6 and B-8, the top of rock was encountered from El. 629.9 to El. 630.9 across Pier 2, with the bedrock described as medium hard to hard, very fine to fine grained, argillaceous, micaceous, sandstone. At Boring B-8, the recovery rate was 81% for the first core run (El. 630.9 to El. 621.9), with SPT sampling terminated at El. 630.9 at a blow count of 50 blows for the last 4 inches of penetration. As such, the 21 inches of rock core that was not recovered likely represents decomposed to highly weathered sandstone from El. 630.9 to El. 629.2. At Boring B-6, several rust stained, low angle fractures were noted from El. 629.1 to El. 628.0.

A recommended bearing elevation of 627.9 at Boring B-8 and elevation 627.4 at Boring B-6 is provided in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Swauger Valley-Minford Road, SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006). Based upon review of the boring logs and the previously recommended bearing elevations, it is recommended that the proposed bottom of footing for Pier 2 be set at El. 627.9 or lower.

Analyses were performed to verify the allowable bearing capacity of 40 tsf for spread footings bearing upon competent bedrock as recommended by DLZ in their previous geotechnical report for the site (DLZ, 2006). These analyses were based upon the Geomechanics Classification System of Rock Mass Rating, and using the rock descriptions, RQD, and unconfined compression test data of the bedrock as provided in DLZ's final boring logs. As shown in the analyses presented in Appendix E, a reduced allowable bearing capacity of 29 tsf is recommended.

Due to the potential for variations in the top of bedrock beneath the footing from that encountered in Borings B-6 and B-8, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to competent rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

6.3.3 Pier 3

As shown in Figure 2, Harrison Furnace Creek is located adjacent to Pier 3, with the elevation of the creek bed at approximate El. 633 and the top of bank at approximate El. 635. The existing ground surface varies from El. 635 to El. 655 at the pier location, with the top of bedrock varying from approximate El. 629.9 to El. 655.5 based on borings TR-21, B-5, B-6, B-7 and B-8. The bedrock was described as medium hard to hard, very fine to fine grained, argillaceous, micaceous sandstone. The bedrock at boring TR-21 was noted to be highly fractured to broken from El. 637.5 to El. 635.1, with a clay filled fracture noted from El. 635.7 to El. 635.6. At Boring B-5, the bedrock was noted to be highly to moderately weathered with a high angle fracture noted from El. 640.9 to El. 640.7. The bedrock at boring B-7 was noted to be highly fractured with a broken zone noted from El. 655.5 to El. 653.0. General information on the bedrock encountered at B-6 and B-8 is provided in Section 6.3.2.

Given the individual pier locations in relation to Harrison Furnace Creek and the existing bedrock conditions, it is recommended that the proposed bottom of footing for Pier 3 (L) be located at El. 633.0 or lower. For Pier 3 (R), the bottom of footing should be located at El. 628.0 or lower.

Analyses were performed to verify the allowable bearing capacity of 40 tsf for spread footings bearing upon competent bedrock as recommended by DLZ in their previous geotechnical report for the site (DLZ, 2006). These analyses were based upon the Geomechanics Classification System of Rock Mass Rating, and using the rock descriptions, RQD, and unconfined compression test data of the bedrock as provided in DLZ's final boring logs. As shown in the analyses presented in Appendix E, a reduced allowable bearing capacity of 29 tsf is recommended.

Due to the potential for variations in the top of bedrock beneath the footing from that encountered at the test borings, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to competent rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

6.4 Bridge Approach Embankments

As over 3 million cubic yards of waste material is currently estimated for Phase I of the Portsmouth Bypass project, consideration should be given to using durable rock fill to construct the bridge approach embankments. The use of durable rock rather than random fill materials will help to limit settlement at the bridge approaches (thus avoiding the bump that commonly occurs at the ends of the structure), as well as reduce the quarantine period for the embankments as settlement of the rock fill itself should occur relatively quickly. In addition, the stability of the embankment slopes will be improved as the rock fill provides a substantial increase in shear strength over that of random fill. It is recommended that the durable rock fill be located within six times the height of the fill at the abutment location, and placed in accordance with Item 203 of the *Construction and Materials Specifications*.

6.4.1 Slope Stability

Based upon recommendations provided in the "*Report of Subsurface Investigation, Embankments (Station 416+00 to 509+50), Project SCI-823-6.81, Phase 1 – Stage 1, Scioto County, Ohio*" (DLZ, 2006), the embankment slope ratios beyond the ends of the bridge were set at 2H:1V. Stability analyses for the planned embankment slopes were conducted in accordance with the guidelines and criteria established by the Ohio Department of Transportation using a minimum target factor of safety of 1.3 for both long and short term conditions as the abutments will be supported on pile foundations.

The soil and rock properties used in the stability analyses for the various strata encountered at the site are presented in Table 3. These parameters are based on previous values reported by DLZ in their "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Swauger*

Valley-Minford Road, SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio" and their "*Response to Stage I Geotechnical Review Comments, Phase I*" dated March 7, 2008, as well as standard geotechnical correlations and engineering judgment.

Table 3: Soil Parameters Used in Stability Analyses							
Zone	Soil Type	Unit Weight (pcf)	Strength Parameters			
			Undrained		Drained	
			c (psf)	φ	c' (psf)	φ'
Fill	Compacted Embankment Fill	125	0	35	0	35[a]
Foundation Soil (Rear Abutment)	Medium Dense to Very Dense Silt	120	0	29	0	29
Foundation Soil (Forward Abutment)	Medium Dense to Very Dense Silt	120	0	29	0	29
Bedrock	Sandstone and Siltstone	130	3500	45	3500	45
Notes: Embankment fill will consist primarily of excavated rock (per DLZ reports)						

The stability analyses were performed using the software package GSTABL7 with STEDwin. This program is a Windows version of the computer program STABL as developed by Purdue University through the support of the Indiana State Highway Commission. The program's capacity to analyze circular failure surfaces using the Modified Bishop's Method of Slices was used in these analyses.

The results of the stability analyses for the planned 2H:1V embankment slopes are presented in Appendix E. As shown in Appendix E, the slopes are stable under both short and long-term conditions, exceeding the ODOT standard minimum required factor of safety of 1.3.

6.4.2 Embankment Settlement

Due to roadway design and grading requirements, the bridge abutments will be constructed on relatively large approach embankments. Based on the provided bridge plan (Figure 2), up to 45 feet of compacted fill is expected at the centerline of the rear abutment, and over 38 feet of fill at the centerline of the forward abutment. The magnitude of the embankment settlement will be a function of the consolidation of the existing foundation soils under the influence of the overlying fill and consolidation of the embankment fill itself under the influence of successive lifts. It is difficult to analyze settlement of the compacted embankment fill as the amount of settlement experienced will be dependent upon the materials, placement and construction controls used to place the embankments. As such, a quarantine period and settlement monitoring is often recommended for critical embankment areas near project structures as inherent impacts such as downdrag and bending of piles, and rotation/differential stresses on the substructure units can occur if settlement is not allowed to progress to completion, or near completion, prior to substructure construction. Based upon research performed by the United States Bureau of Reclamation (Sherard et. al., 1963), consolidation within compacted embankment fill generally ranges between approximately one to four percent of the embankment height. Using proper placement and compaction of the embankment materials, and assuming one percent consolidation as the embankments will be constructed primarily of excavated rock, approximately 5 to 6 inches of settlement at the rear abutment and 4 to 5 inches of settlement at the forward abutment can be expected. However, it is anticipated that most of this settlement will occur with load application during construction.

Settlement analyses were performed at Station 441+01 and Station 444+89 to assess the magnitude and duration of the expected settlement for the encountered foundation soils at the site as a result of the new embankment loading. As shown in Appendix E, settlement as a result of primary consolidation is estimated to be approximately 2.2 inches at Station 441+01 and approximately 1.0 inch at Station 444+89. The time needed to reach 90% consolidation is estimated at 130 to 106 days respectively.

Due to the estimated 1.0 to 2.2 inches of settlement expected at the approach embankments, additional loading due to downdrag on the pile supported abutments is a concern. It is estimated that consolidation will take approximately 3 months from completion of the embankments to progress to the point where less than ½ inch of settlement has yet to occur (the point at which loading due to downdrag is no longer a concern). As such, the embankments should be quarantined and monitored for a minimum of 90 days to allow the settlement to take place prior to the substructure construction. Provisions should be included in the contract to allow for an extension of the monitoring period without penalty if the settlement has not slowed to an acceptable rate over the 90 days.

6.4.3 Settlement Monitoring

Settlement monitoring should consist of the placement and monitoring of surface monuments to establish the time-settlement characteristics of the embankment fill and the underlying foundation soils once the embankments are complete. Surface monuments typically consist of a 6-inch diameter augured hole that is backfilled with concrete. A section of steel rebar (minimum length of 36 inches) is centered in the concrete, with the top of the reinforcing bar approximately ½ inch above the ground surface. (See Figure 4.) Recommended locations for the surface monuments are provided in Table 4.

Table 4 Recommended Locations for Surface Monuments

Approach Embankment	Station	Location
Rear	440+60, 40 feet LT	Roadway Shoulder
	440+75, 40 feet RT	Roadway Shoulder
Forward	445+20, 40 feet LT	Roadway Shoulder
	445+30, 40 feet RT	Roadway Shoulder

Weekly settlement monitoring should be performed, and the survey data collected over the quarantine period reviewed by the District to establish the time-settlement characteristics of each approach embankment. The quarantine period could be refined and possibly shortened at the direction of the District should the data collected during the quarantine period show negligible settlement at a time less than the recommended 90 days. Conversely, if the data shows that settlement is continuing at a magnitude or rate deemed unacceptable by the District at the end of the 90 day period, than the quarantine period should be extended as appropriate.

7.0 RECOMMENDATIONS

General and specific recommendations are provided in this section and include foundation details as well as locations for geotechnical treatments for the approach embankments based on the proposed bridge designs.

7.1 Foundation Design

Table 5 provides a summary of the foundation design parameters for Bridge No. SCI-823-0837 L, based on review of the previous geotechnical exploration programs at the site, the encountered subsurface conditions, laboratory tests performed on representative soil and rock samples, and our engineering analyses. Driven H-piles are recommended to support the rear and forward abutments, and spread footings are recommended at the bridge piers.

Table 5: Summary of Foundation Design Parameters

Substructure Unit	Rear Abutment	Forward Abutment	Pier 1	Pier 2	Pier 3 (L)	Pier 3 (R)
Foundation Type	Driven Piles	Driven Piles	Spread Footing	Spread Footing	Spread Footing	Spread Footing
Proposed Bottom of Footing/Pile Cap (El.)	696.57	686.45	641.5	627.9	633.0	628.0
Top of Bedrock (El.)	660.0 to 653.5	659.0 to 645.0	643.5	631.0 to 630.0	655.5 to 637.5	642.5 to 630.0
Estimated Tip Elevation (El.)	659.5 to 651.5	658.5 to 644.5	NA	NA	NA	NA
Estimated Pile Length [1,2]	42 ft	36 ft	NA	NA	NA	NA
Allowable Axial Stress [3,4]	12.5 ksi	12.5 ksi	NA	NA	NA	NA
Allowable Bearing Capacity	NA	NA	30 tsf	30 tsf	30 tsf	30 tsf

Notes: 1. Average Length based on encountered bedrock elevation at the test boring locations
2. Includes 1-foot embedment into cap
3. Allowable horizontal or lateral load to be developed in battered piles
4. Allowable Axial Stress does not include section loss due to corrosivity
5. NA = not applicable

7.1.1 Rear Abutment

- It is recommended that the rear abutment be founded upon steel H piles driven to absolute refusal on the underlying bedrock. An allowable axial stress of 12.5 ksi is recommended for a Grade 50 H-pile bearing on bedrock.
- The allowable pile capacities provided in Section 202.2.3.2a of the *Bridge Design Manual* do not include section loss due to corrosion. As corrosivity testing was not performed on the potential embankment material, a corrosive environment should be assumed, and the pile dimensions should be reduced by 1/16 inch when computing the area of the pile.
- Standard pile tip reinforcement is recommended per Section 202.2.3.2.a of the ODOT *Bridge Design Manual.*
- An average pile length of 42 feet is anticipated based on the encountered subsurface conditions at Borings B-001-0-08 and TR-23, and the design elevations presented in Table 5.
- It is recommended that the steel H-piles be installed through pile windows constructed during placement of the approach abutment fill. The pile window should extend 3 feet laterally beyond the outer edges of the piles in all directions, with the vertical extent of the window from the bottom of the abutment pile cap to the existing ground surface. The

pile window should be constructed of Type C Granular Material (Item 703.16 of the *Construction and Material Specifications*).

- The abutment should be designed based on an active earth pressure condition using a unit weight of 125 pcf and an angle of internal friction of 35 degrees plus any surface surcharge. To account for traffic loading, a surcharge equivalent to 2 feet of soil ($\gamma = 120$ pcf) should be applied. Please note that no hydrostatic pressure has been included in the recommended design earth pressure. As such, drainage provisions for the abutment should be provided.

7.1.2 Forward Abutment

- It is recommended that the forward abutment be founded upon steel H piles driven to absolute refusal on the underlying bedrock. As allowable axial stress of 12.5 ksi is recommended for a Grade 50 H-pile bearing on bedrock.
- The allowable pile capacities provided in Section 202.2.3.2a of the *Bridge Design Manual* do not include section loss due to corrosion. As corrosivity testing was not performed on the potential embankment material, a corrosive environment should be assumed, and the pile dimensions should be reduced by 1/16 inch when computing the area of the pile.
- Standard pile tip reinforcement is recommended per Section 202.2.3.2.a of the ODOT *Bridge Design Manual.*
- An average pile length of 36 feet is anticipated based on the encountered subsurface conditions at Borings B-002-0-08 and TR-20, and the design elevations presented in Table 5.
- It is recommended that the steel H-piles be installed through pile windows constructed during placement of the approach abutment fill. The pile window should extend 3 feet laterally beyond the outer edges of the piles in all directions, with the vertical extent of the window from the bottom of the abutment pile cap to the existing ground surface. The pile window should be constructed of Type C Granular Material (Item 703.16 of the *Construction and Material Specifications*).
- The abutment should be designed based on an active earth pressure condition using a unit weight of 125 pcf and an angle of internal friction of 35 degrees plus any surface surcharge. To account for traffic loading, a surcharge equivalent to 2 feet of soil ($\gamma = 120$ pcf) should be applied. Please note that no hydrostatic pressure has been included in the recommended design earth pressure. As such, drainage provisions for the abutment should be provided.

7.1.3 Pier 1

- It is recommended that the pier be supported on spread footings bearing on rock. A bottom of footing elevation of 641.5 is recommended based on the subsurface conditions encountered at Boring B-9.
- The footings should be designed using an allowable bearing capacity of 29 tsf. For cast-in-place footings on sound bedrock, a friction factor of 0.7 recommended. Settlement of the pier footing is expected to be nominal.
- Due to the potential for variations in the top of bedrock beneath the footing from that encountered in Boring B-9, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable material should be removed to competent rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

- As the approach embankment will be placed prior to construction of the substructure units, an excavation of approximately 16 feet will be required to place the bottom of footing at a consistent elevation. As such, the footing excavation for Pier 1 may require temporary shoring, particularly on the upslope side of the excavation.

7.1.4 Pier 2

- It is recommended that the pier be supported on spread footings bearing on rock. A bottom of footing elevation of 627.9 is recommended based on the subsurface conditions encountered at borings B-6 and B-8.
- The footings should be designed using an allowable bearing capacity of 29 tsf. For cast-in-place footings on sound bedrock, a friction factor of 0.7 recommended. Settlement of the pier footing is expected to be nominal.
- Due to the potential for variations in the top of bedrock beneath the footing from that encountered in Borings B-6 and B-8, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable material should be removed to competent rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

7.1.5 Pier 3

- Based on the subsurface conditions encountered at Pier 3, it is recommended that the pier be supported on spread footings bearing on rock. Given the individual pier locations in relation to Harrison Furnace Creek, the sloping bedrock surface at the pier locations, and the subsurface conditions encountered at borings B-5, B-6, B-7, B-8 and TR-21, it is recommended that the proposed bottom of footing be located at El. 633.0 for Pier 3 (L) and at El. 628.0 for Pier 3 (R).
- The spread footings should be designed using an allowable bearing capacity of 29 tsf. A friction factor of 0.7 is recommended for cast-in-place footings on sound bedrock. Settlement is expected to be nominal.
- Based on the existing ground surface at the site, an excavation of approximately 17 to 22 feet through soil and rock is expected in order to place the bottom of the footing at a consistent elevation. As such, the footing excavation for Pier 3 may require temporary shoring, particularly on the upslope side of the excavation.
- Due to the potential for variations in the top of bedrock beneath the footing from that encountered in the test borings, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable material should be removed to competent rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

7.1.6 Temporary Construction Issues for Excavations

All temporary excavations at the site should comply with the requirements of OSHA 29 CFR, part 1926, Subpart P, "Excavations and Trenches" and other applicable codes. The excavations are anticipated to encounter natural silts and sands, as well as newly placed embankment fill. Temporary slopes should be observed daily for signs of distress as exposure to the environment may weaken the soils should the excavations remain open for extended periods of time.

7.1.7 Groundwater Considerations

Based on review of the geotechnical recommendations provided in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Swauger Valley-Minford Road, SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006), seepage and/or groundwater was not encountered in any of the previous borings performed at the site. However, based on experience, groundwater is likely to be encountered near the top of rock with some variation expected due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were completed. In addition, groundwater is expected to vary with the water level within nearby Harrison Furnace Creek. As such, the Contractor should anticipate that the pier foundation excavations will likely require dewatering. Any excavations near Harrison Furnace Creek should also be protected from stream and storm water flow.

7.2 Approach Embankments

The approach embankments at both the Forward and Rear Abutments should be constructed in accordance with the recommendations provided in the "*Report of Subsurface Investigation, Embankments (Station 416+00 to 509+50), Project SCI-823-6.81, Phase 1-Stage 1, Scioto County, Ohio*" (DLZ, 2006) with the following exceptions.

- It is recommended that the approach embankments be constructed of durable rock fill in order to limit settlement at the bridge approaches and potentially reduce the quarantine period for the embankments. The durable rock fill should extend a distance of six times the height of the fill (at the abutment) from the abutment location. The rock fill should be placed in accordance with Item 203 of the *Construction and Materials Specifications*.
- It is recommended that the rear and forward approach embankments incorporate special benching in accordance with ODOT's Office of Geotechnical Engineering "*Geotechnical Bulletin GB2 - Special Benching and Sidehill Embankment Fills*" as the existing hillsides are steeper than 4H:1V. Per GB2, the special benching is to be shown on the cross-sections in the project plans, and is performed in addition to, and in place of, standard specification benching (Item 203.05). In addition, Plan Note G110 from the ODOT *Location and Design Manual, Volume 3* needs to be included in the General Notes.
- It is currently anticipated that the approach embankments will be in-place prior to the start of construction of the proposed bridge structure. However, to ensure that settlement of the embankment fill and underlying soils has progressed sufficiently to avoid the effects of downdrag on the pile supported abutments, it is recommended that the embankments be quarantined and monitored for a minimum of 90 days after construction of the embankment fill is complete or prior to the start of pile driving for the abutments. A settlement monitoring program is recommended to establish the time-settlement characteristics of the embankment fill and underlying foundation soils. The recommended locations of the surface monuments are given in Table 4. If the data collected during the quarantine period shows negligible settlement at a time less than the recommended 90 days, than the quarantine period may be shortened at the direction of the District. Conversely, if the data shows settlement to be continuing at a magnitude or rate deemed unacceptable by the District at the end of the 90 day period, the quarantine period should be extended as appropriate.

8.0 LIMITATIONS

This report documents the findings and conclusions of HDR Engineering, Inc., for the geotechnical aspects related to the design of the proposed bridge No. SCI-823-0837L crossing Swauger Valley-Minford Road in Scioto County, Ohio. The report has been prepared for the use of the Ohio Department of Transportation for specific application to the project, in accordance

HDR

LOG OF BORING

Boring No.: B-001-0-08 | Baseline, Station & Offset: 441+05, 63' RT | Surface Elev. (ft) 670.2 | Project ID.: SCI-823-6.81 PID 19415

Date Started: 5-Feb-08 | Coordinates: | Water Elev. (ft) 662.2

Date Completed: 5-Feb-08 | Drilling Method: 3.25" HSA/NQ | Sealing & Backfilling Type: Cement | Hammer System Type: CME Automatic

Quantity: | Calibration Date: 10-25-07 | ER: 74%

Elev. ft 0.0	Depth ft 0	Std. Pen /RQD	N_{60}	Rec. ft	Loss ft	Description	Sample Type & No.	% Rec	% Agg	% C.S.	% F.S.	% Silt	% Clay	P.L	L.L	P.I	W.C.	ODOT Class
669.2		Augered				1.0'												
668.2	2	2/2/5	9			Medium stiff, brown, SILTY CLAY, Moderately organic, damp	S-1	87	0	3	13	42	42	21	37	16	24.7	A-6b (10)
667.2						3.0'												
666.2	4	6/9/12	26				S-2	100				Same as S-3					18	A-4b (VISUAL)
665.2																		
664.2	6	11/11/15	32															
663.2						Medium dense to very dense, light brown with red staining, SILT, little to trace clay and stone fragments, slightly to moderately organic, damp.	S-3	100	0	1	3	65	31	23	24	1	15.3	A-4b (8)
662.2	8																	
661.2		34/50/.4																
660.2	10	50/.1				Top of Rock 10.1'	S-4	50				Same as S-3					8.8	A-4b (VISUAL)
							S-5	100				Same as S-4					10.4	A-4b (VISUAL)
659.2																		
658.2	12	81%		2.6	0.4													
657.2																		
656.2	14					Argillaceous Siltstone, light gray with dark gray streaks, slightly weathered to unweathered, strong to moderately strong, very fine to fine sand texture, very thin to thinly bedded, Unit RQD=92%, Loss=5%												
655.2		92%		2.4	0.0													
654.2	16																	
653.2						17.4'												
652.2	18	94%		5.0	0.0	Silty Shale, gray with dark gray streaks, unweathered, weak to slightly strong, fine sand texture, thinly laminated to laminated, Unit RQD=82%, Loss=0%												
651.2						19.1'												
650.2	20																	
649.2																		
648.2	22					Siltstone, Light gray with dark gray streaks, strong, very fine to fine sand texture, very thick bedding Unit RQD=100%, Loss=0%												
647.2		100%		5.0	0.0													
646.2	24																	
645.2																		

Bottom of Boring = 25.5'

NOTES:
1) Clay infilling at 10.3'/10.5' (Bedding separation 0-15°)

HDR

LOG OF BORING

Boring No.: B-002-0-08
Date Started: 5-Feb-08
Date Completed: 5-Feb-08

Baseline, Station & Offset: 444+75, 72' LT
Coordinates:
Drilling Method: 3.25" HSA/NQ
Sealing & Backfilling Type: Cement
Quantity:

Surface Elev. (ft) 670.5
Water Elev. (ft) 666.5
Project ID.: SCI-823-6.81, PID 19415
Hammer System Type: CME Automatic
Calibration Date: 10-25-07
ER: 74%

Elev. ft	Depth ft	Std. Pen /RQD	N_{60}	Rec. ft	Loss ft	Description	Sample Type & No.	% Rec	% Agg	% C.S.	% F.S.	% Silt	% Clay	P.L	L.L	P.I	W.C.	ODOT Class
0.0	0																	
669.5		Augered					S-1	100	2	3	3	62	30	9	26	17	15.8	A-4b (8)
668.5	2	4/5/10	19			Medium dense, light brown, SILT, some clay, slightly organic, damp												
667.5																		
666.5	4	4/6/8	17				S-2	100				Same as S-1						A-4b (VISUAL)
665.5						5.5'												
664.5	6	30/30/33	78				S-3	100	0	5	4	63	28	21	32	11	12.4	A-6a (8)
663.5																		
662.5	8					Very dense, light brown with red staining, SILT and CLAY slightly to moderately organic, damp.												
661.5		22/50/.4					S-4	50				Same as S-3					12.4	A-6a (VISUAL)
660.5	10					Top of Rock 11.2'	S-5	100				Same as S-4					6.6	A-6a (VISUAL)
659.5		50/.2				Siltstone, gray with heavy red staining, medium to highly weathered, moderately strong to strong, very fine to fine sand texture, thinly bedded, Unit RQD=77%, Loss=0% 12.5'												
658.5	12	90%		3.0	0.0													
657.5																		
656.5	14																	
655.5																		
654.5	16	88%		5.1	0.0	Siltstone, light gray with dark gray streaks, slightly strong to unweathered, strong, fine to very fine sand texture, thin to medium bedding, Unit RQD = 93%, LOSS = 0%												
653.5																		
652.5	18																	
651.5																		
650.5	20																	
649.5		100%		2.0	0.0													

Bottom of Boring = 21.6'

NOTES:
1) Clay infilling at 17.5'/17.9'/18.1' (Bedding separation 0-10°)
2) SHELBY TUBE pushed from El. 668.0 to El. 666.0 in offset hole located 3.5 feet south of boring.

I. ESTIMATED CONSTRUCTION COST & ESTIMATED QUANTITIES

Estimate SCI-823-0837L

Estimated Cost: $2,690,234.91

Contingency: 0.00%

Estimated Total: $2,690,234.91

SCI-823-0.00 (PID 19415)--Structure SCI-823-0837 L--SFN 7306458

Base Date: 12/08/10

Spec Year: 08

Unit System: E

Work Type: BRIDGE REPLACEMENT

Highway Type: 404

Urban/Rural Type: RURAL CLASS

Season: SPRING

County: SCIOTO

Midpoint of Latitude: 385100

Midpoint of Longitude: 825203

District: 9

Federal/State Project Number:

Estimate Type: Bridge Construction

Prepared by RBK on 07/24/09

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Exten

Group 9000: Structures over 20' Span

Line #	Item Number / Description / *Supplemental Description*	Quantity	Units	Unit Price	Exten
0001	503E11100 COFFERDAMS, CRIBS AND SHEETING	1.000	LS	$10,000.00000	$10,00
0002	503E22200 UNCLASSIFIED EXCAVATION INCLUDING ROCK AND/OR SHALE	236.000	CY	$24.50959	$5,78
0003	505E11100 PILE DRIVING EQUIPMENT MOBILIZATION	1.000	LS	$15,000.00000	$15,00
0004	507E00100 STEEL PILES HP10X42, FURNISHED	3,420.000	FT	$20.54429	$70,26
0005	507E00150 STEEL PILES HP10X42, DRIVEN	3,060.000	FT	$16.73519	$51,20
0006	507E93301 STEEL POINTS OR SHOES, AS PER PLAN	72.000	EACH	$113.68816	$8,18
0007	509E10000 EPOXY COATED REINFORCING STEEL	465,214.000	LB	$0.75000	$348,91
0008	512E10100 SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	1,421.000	SY	$8.50000	$12,07
0009	515E15051 DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM MEMBERS, LEVEL 3, TYPE 4 MOD. (72"), AS PER PLAN	20.000	EACH	$27,057.76173	$541,15
0010	515E20000 INTERMEDIATE DIAPHRAMS	64.000	EACH	$800.00000	$51,20
0011	516E13600 1" PREFORMED EXPANSION JOINT FILLER	2,468.000	SF	$5.00000	$12,34
0012	516E13900 2" PREFORMED EXPANSION JOINT FILLER	159.000	SF	$6.07441	$96
0013	516E14021 SEMI-INTEGRAL ABUTMENT EXPANSION JOINT SEAL, AS PER PLAN	99.000	FT	$26.76429	$2,64
0014	516E44000 ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE) *24"x16"x1.72" LAMINATED ELASTOMERIC BEARING PAD WITH 26"x17"x1 1/2" LOAD PLATE*	10.000	EACH	$777.57098	$7,77
0015	516E44100 ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE) *24"x16"x2.75" LAMINATED ELASTOMERIC BEARING PAD WITH 26"x17"x1 1/2" LOAD PLATE*	20.000	EACH	$822.09238	$16,44
0016	516E44200 ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE) *24"x16"x3.78" LAMINATED ELASTOMERIC BEARING PAD WITH 26"x18"x2" LOAD PLATE*	10.000	EACH	$915.67406	$9,15
0017	518E21200 POROUS BACKFILL WITH FILTER FABRIC	112.000	CY	$57.65150	$6,45
0018	518E40000 6" PERFORATED CORRUGATED PLASTIC PIPE	130.000	FT	$9.11188	$1,18
0019	518E40010 6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS	18.000	FT	$8.60383	$15
0020	601E32204 ROCK CHANNEL PROTECTION, TYPE C WITH FABRIC FILTER	141.000	CY	$50.92420	$7,18
0021	898E10201 QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (DECK), AS PER PLAN	895.000	CY	$700.00000	$626,50
0022	898E10709 QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (APPROACH SLAB), (T=17"), AS PER PLAN	332.000	SY	$258.86451	$85,94
0023	898E11000 QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET)	67.000	CY	$570.66573	$38,23
0024	898E11001 QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET), AS PER PLAN	76.000	CY	$547.81498	$41,63
0025	898E20100 QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (PIER ABOVE FOOTING)	733.000	CY	$774.96399	$568,04
0026	898E20150 QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (ABUTMENT)	41.000	CY	$685.85515	$28,12
0027	898E20300	396.000	CY	$312.28036	$123,66

Line #	Item Number	Quantity	Units	Unit Price	Exten

Description
Supplemental Description

C/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (FOOTING)

Total for Group 9000: $2,690,234.91

Company:	KZFDESIGN								
Structure :	SCI-823-0837 (left bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
503	11100	SUM	LUMP	COFFERDAMS, CRIBS AND SHEETING				SUM	
503	22200	236	CU YD	UNCLASSIFIED EXCAVATION INCLUDING ROCK AND/OR SHALE		236			
505	11100	SUM	LUMP	PILE DRIVING EQUIPMENT MOBILIZATION				SUM	
507	00100	3420	FT	STEEL PILES HP10X42, FURNISHED	3420				
507	00150	3060	FT	STEEL PILES HP10X42, DRIVEN	3060				
507	93300	72	EACH	STEEL POINTS OR SHOES	72				
509	10000	465214	POUND	EPOXY COATED REINFORCING STEEL	4019	175864	285331		
512	10100	1421	SQ YD	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	101		1320		
515	15051	20	EACH	DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM, AS PER PLAN			20		
				MEMBERS, LEVEL 3, TYPE 4 MOD (72")					
515	20000	64	EACH	INTERMEDIATE DIAPHRAGMS			64		
516	13600	2468	SQ FT	1" PREFORMED EXPANSION JOINT FILLER			2468		
516	13900	159	SQ FT	2" PREFORMED EXPANSION JOINT FILLER	159				
516	14021	99	FT	SEMI-INTEGRAL ABUTMENT EXPANSION JOING SEAL, AS PER PLAN	99				
516	44000	10	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)		10			
				24"X16"X1.72" LAMINATED ELASTOMERIC PAD WITH 26"X16"X1.5" LOAD PLATE					
516	44100	20	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)		20			
				24"X16"X2.75" LAMINATED ELASTOMERIC PAD WITH 26"X16"X1.5" LOAD PLATE					
516	44200	10	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	10				
				24"X16"X3.78" LAMINATED ELASTOMERIC PAD WITH 26"X16"X2" LOAD PLATE					
518	21200	112	CU YD	POROUS BACKFILL WITH FILTER FABRIC	112				
518	40000	130	FT	6" PERFORATED CORRUGATED PLASTIC PIPE	130				
518	40012	18	FT	6" NON-PERFORATED CORRUGATED PLASTIC PIPE	18				
601	32204	141	CU YD	ROCK CHANNEL PROTECTION, TYPE C WITH FABRIC FILTER				141	
898	10200	895	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (DECK)			895		
898	10708	332	SQ YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (APPROACH SLAB), (T=17")			332		
898	11000	67	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET)			67		
898	11001	76	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET), AS PER PLAN			76		
898	20100	733	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (PIER ABOVE FOOTING)		733			
898	20150	41	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (ABUTMENT)	41				
898	20300	396	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (FOOTING)	77	319			

Company:	KZFDESIGN								
Structure :	SCI-823-0837 (left bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
503	11100	SUM	LUMP	COFFERDAMS, CRIBS AND SHEETING					

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
503	22200	236.2963	CU YD	UNCLASSIFIED EXCAVATION INCLUDING ROCK AND/OR SHALE		236.2963			
at pier 1:									
L (ft)	W (ft)	T (ft)	Volume						
22	29	2.5	1595	ft^3					
			59.0741	cu yd		59.07407			
at pier 2:									
L (ft)	W (ft)	T (ft)	Volume						
22	29	2.5	1595	ft^3					
			59.0741	cu yd		59.07407			
at pier 3:									
L (ft)	W (ft)	T (ft)	Volume						
22	29	5	3190	ft^3					
			118.148	cu yd		118.1481			

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
505	11100	SUM	LUMP	PILE DRIVING EQUIPMENT MOBILIZATION					

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
507	00100	3420	FT	STEEL PILES HP10X42, FURNISHED	3420				
Estimated Length = Pile Cutoff Elevation - Pile Tip Elevation									
Round Estimated Length up to the nearest 5 ft [1 m].									
Order Length = Estimated Length + 5 ft [1.5 m]									
Furnished Length = Order Length x No. of Piles									
Driven Length = Estimated Length x No. of Piles									
at rear abutment:									
pile cutoff elevation =		704.14							
pile tip elevation =		660.1							
estimated L =		44.04	ft						
estimated L (rounded) =		45	ft						
order L =		50	ft						
# piles =		36							
furnished L =		1800	ft		1800				
driven L =		1620	ft						
at forward abutment:									
pile cutoff elevation =		699.38							
pile tip elevation =		660.3							
estimated L =		39.08	ft						
estimated L (rounded) =		40	ft						
order L =		45	ft						
# piles =		36							
furnished L =		1620	ft		1620				
driven L =		1440	ft						

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
507	00150	3060	FT	STEEL PILES HP10X42, DRIVEN	3060				
Estimated Length = Pile Cutoff Elevation - Pile Tip Elevation									
Round Estimated Length up to the nearest 5 ft [1 m].									
Order Length = Estimated Length + 5 ft [1.5 m]									
Furnished Length = Order Length x No. of Piles									
Driven Length = Estimated Length x No. of Piles									
at rear abutment:									
pile cutoff elevation =		704.14							
pile tip elevation =		660.1							
estimated L =		44.04	ft						
estimated L (rounded) =		45	ft						
order L =		50	ft						
# piles =		36							
furnished L =		1800	ft						
driven L =		1620	ft		1620				
at forward abutment:		0							
pile cutoff elevation =		699.38							
pile tip elevation =		660.3							
estimated L =		39.08	ft						
estimated L (rounded) =		40	ft						
order L =		45	ft						
# piles =		36							
furnished L =		1620	ft						
driven L =		1440	ft		1440				

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
507	93300	72	EACH	STEEL POINTS OR SHOES	72				
at rear abutment:									
# piles =		36			36				
at forward abutment:									
# piles =		36			36				

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
509	10000	465214	POUND	EPOXY COATED REINFORCING STEEL	4019.442	175864	285330.9		
Note: Calculate the amount of reinforcing steel per Cu.Yd. of concrete and multiply by the concrete volume to obtain the total weight of reinforcing steel (in LBS).									
Note: Laps are not included in these calculations. The approach slab reinforcing is not included in these calculations.									
>>>>>	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (DECK)								
	take the average of the +M and -M reinforcing for the entire bridge length								

Company:	KZFDESIGN								
Structure :	SCI-823-0837 (left bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			
	at -M region:	Note: The abutment and pier diaphragm concrete is included in the pay item for deck volume.							
L (ft)	spacing (in.)	bar size	wt (per ft)	transverse (top)					
48.125	4.75	5	126.807						
L (ft)		bar size	wt (per ft)	transverse (bottom)					
48.125	4.75	5	126.807						
	# bars	bar size	wt (per ft)	top bars (temp & shrinkage)					
	65	4	43.42						
	# bars	bar size	wt (per ft)	top bars (additional)					
	64	4	42.752						
	# bars	bar size	wt (per ft)	bottom bars					
	83	5	86.569						
		total =	426.355	lbs					
	deck volume								
L (ft)	W (ft)	T (ft)	Volume						
48.125	1	0.729167	36.7889	ft^3					
			1.36255	cu yd					
		total =	312.909	lbs/cu yd					
	at +M region:								
L (ft)	spacing (in.)	bar size	wt (per ft)	transverse (top)					
48.125	4.75	5	126.807						
L (ft)		bar size	wt (per ft)	transverse (bottom)					
48.125	4.75	5	126.807						
	# bars	bar size	wt (per ft)	top bars (temp & shrinkage)					
	65	4	43.42						
	# bars	bar size	wt (per ft)						
	# bars	bar size	wt (per ft)	bottom bars					
	83	5	86.569						
		total =	383.603	lbs					
	deck volume								
L (ft)	W (ft)	T (ft)	Volume						
48.125	1	0.729167	36.7889	ft^3					
			1.36255	cu yd					
		total =	281.533	lbs/cu yd					
		avg. total =	297.221	lbs/cu yd			266075.8		
>>>>>	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET)								
L (ft)	spacing (in.)	bar size	wt (per ft)	transverse (dowels)					
4	12	6	6.008						
L (ft)		bar size	wt (per ft)	transverse (main)					
6.8333333	12	5	7.12717						
	# bars	bar size	wt (per ft)	longitudinal bars					
	7	5	7.301						
		total =	20.4362	lbs					
	parapet volume								
	W (ft)	A (ft^2)	Volume						
	1	4.263889	4.26389	ft^3					
			0.15792	cu yd					
		total =	129.407	lbs/cu yd			8657.072		
>>>>>	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET), AS PER PLAN								
L (ft)	spacing (in.)	bar size	wt (per ft)	transverse (dowels)					
11.666667	12	6	17.5233						
L (ft)		bar size	wt (per ft)	transverse (main)					
0	12	5	0						
	# bars	bar size	wt (per ft)	longitudinal bars					
	7	5	7.301						
		total =	24.8243	lbs					
	parapet volume								
	W (ft)	A (ft^2)	Volume						
	1	4.799479	4.79948	ft^3					
			0.17776	cu yd					
		total =	139.652	lbs/cu yd			10598.07		
>>>>>	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (PIER ABOVE FOOTING)								
	take the average of the cap and column reinforcing per cu. yd.								
	at pier cap:								
L (ft)	spacing (in.)	bar size	wt (per ft)	stirrups					
53.666667	9	6	107.476						
	# bars	bar size	wt (per ft)	main top					
	28	10	120.484						
	# bars	bar size	wt (per ft)	main side					
	18	7	36.792						
	# bars	bar size	wt (per ft)	main bottom					
	5	5	5.215						
		total =	269.967	lbs					
	pier cap volume								
H (ft)	W (ft)	T (ft)	Volume						
8.0833333	4.75	1	38.3958	ft^3					
			1.42207	cu yd					
		total =	189.841	lbs/cu yd					
	at column:								
L (ft)	spacing (in.)	bar size	wt (per ft)	outer ties					
81.013272	12	5	84.4968						
L (ft)		bar size	wt (per ft)	inner ties					
48	12	5	50.064						
	# bars	bar size	wt (per ft)	main bars					
	102	10	438.906						
		total =	573.467	lbs					
	column volume								
	W (ft)	A (ft^2)	Volume						
	1	85.27946	85.2795	ft^3					
			3.1585	cu yd					
		total =	181.563	lbs/cu yd					
		avg. total =	185.702	lbs/cu yd		136040.2			

Company:	KZFDESIGN								
Structure :	SCI-823-0837 (left bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			
>>>>>	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (ABUTMENT)								
L (ft)	spacing (in.)	bar size	wt (per ft)	stirrups					
5.8333333	12	5	6.08417						
	# bars	bar size	wt (per ft)	longitudinal bars					
	4	8	10.68						
	# bars	bar size	wt (per ft)	longitudinal bars					
	2	5	2.086						
		total =	18.8502	lbs					
	abutment volume								
H (ft)	W (ft)	L (ft)	Volume						
1.5	3.5	1	5.25	ft^3					
			0.19444	cu yd					
		total =	96.9437	lbs/cu yd	4019.442				
>>>>>	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (FOOTING)								
	take the average of the abutment and pier reinforcing per cu. yd.								
	at abutment:								
L (ft)	spacing (in.)	bar size	wt (per ft)	stirrups					
27	12	5	28.161						
	# bars	bar size	wt (per ft)	main top					
	4	5	4.172						
	# bars	bar size	wt (per ft)	main side					
	2	5	2.086						
	# bars	bar size	wt (per ft)	main bottom					
	4	8	10.68						
		total =	45.099	lbs					
	abutment footing volume								
H (ft)	W (ft)	L (ft)	Volume						
3	6	1	18	ft^3					
			0.66667	cu yd					
		total =	67.6485	lbs/cu yd					
	at pier:								
L (ft)	spacing (in.)	bar size	wt (per ft)	top (longitudinal-dir)					
21.67	9	6	43.3978						
	# bars	bar size	wt (per ft)	top (transverse-dir)					
	30	6	45.06						
L (ft)	spacing (in.)	bar size	wt (per ft)	dowels					
6.25	5	10	64.545						
L (ft)	spacing (in.)	bar size	"	bottom (longitudinal-dir)					
21.67	5	10	223.79						
	# bars	bar size	wt (per ft)	bottom (transverse-dir)					
	33	9	112.2						
		total =	488.993	lbs					
	pier footing volume								
T (ft)	W (ft)	L (ft)	Volume						
4.5	22	1	99	ft^3					
			3.66667	cu yd					
		total =	133.362	lbs/cu yd					
		avg. total =	100.505	lbs/cu yd		39823.79			

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
512	10100	1420.8	SQ YD	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	100.7446		1320.089		
at superstructure (transverse section):									
W (ft)	L (ft)	Area							
27.575906	430.84	11880.8	ft^2						
		1320.089	sq yd				1320.089		
at abutments:									
H (ft)	L (ft)	Area							
7.5	64.87268265	906.7014	ft^2						
		100.7446	sq yd		100.7446				

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
515	15051	20	EACH	DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM, AS PER PLAN			20		
	# spans =	4							
	beams per span =	5							
	# beams =	20							

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
515	20000	64	EACH	INTERMEDIATE DIAPHRAGMS			64		
	# spans =	4							
	diaphragms per span =	4							
	# bays (btw. beams) =	4							
	# diaphragms =	64							

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	13600	2468.4	SQ FT	1" PREFORMED EXPANSION JOINT FILLER					
at superstructure (transverse section):									
H (ft)	L (ft)	Area							
5.7291667	430.84	2468.354	ft^2						

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	13900	158.83	SQ FT	2" PREFORMED EXPANSION JOINT FILLER					
at abutment:				note: include PEJF btw. L/R structures with the Left Bridge (exclude from Right Bridge)					
H (ft)	W (ft)	Area							
11.08	3.59	79.60	ft^2	btw. bridges					
3.00	6.16	36.95	ft^2	btw. bridges					
8.24	2.57	42.28	ft^2	btw. wingwall and abutment diaphragm					
	total =	158.83							

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	14021	99.47	FT	SEMI-INTEGRAL ABUTMENT EXPANSION JOING SEAL, AS PER PLAN					
	at abutment:								
		L							

Company:	KZFDESIGN								
Structure :	SCI-823-0837 (left bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			
		99.47	ft	2 abutments					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	44000	10	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)					
				24"X16"X1.72" LAMINATED ELASTOMERIC PAD WITH 26"X16"X1.5" LOAD PLATE					
	at pier 2:								
	# bearings =	10	each						
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	44100	20	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)					
				24"X16"X2.75" LAMINATED ELASTOMERIC PAD WITH 26"X16"X1.5" LOAD PLATE					
	at piers 1 & 3:								
	# bearings =	20	each						
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	44200	10	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)					
				24"X16"X3.78" LAMINATED ELASTOMERIC PAD WITH 26"X16"X2" LOAD PLATE					
	at abutments:								
	# bearings =	10	each	2 abutments					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
518	21200	111.8	CU YD	POROUS BACKFILL WITH FILTER FABRIC	111.8				
H (ft)	W (ft)	L (ft)	Volume						
12.16	2	62.05035	3018.1	ft^3					
			111.8	cu yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
518	40000	130.0	FT	6" PERFORATED CORRUGATED PLASTIC PIPE	130.0				
		L (ft)							
		129.9694							
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
518	40012	18	FT	6" NON-PERFORATED CORRUGATED PLASTIC PIPE	18				
		L (ft)							
		18							
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
601	32204	140.7	CU YD	ROCK CHANNEL PROTECTION, TYPE C WITH FABRIC FILTER				140.7	
L (ft)	W (ft)	T (ft)	Volume						
47.5	40	2	3600.0	ft^3					
			140.7	cu yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	10200	895.2	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (DECK)			895.2		
note: Includes Deck, Abutment Diaphragm, and Pier Diaphragm concrete.									
deck:									
L (ft)	W (ft)	T (ft)	Volume						
430.84	48.45833333	0.729167	15223.4	ft^3					
			563.829	cu yd					
deck overhang:									
L (ft)	W (ft)	T (ft)	Volume						
430.84	2.083	0.25	448.72	ft^3					
			16.6193	cu yd					
beam haunches:									
L (ft)	W (ft)	T (ft)	Volume						
430.84	15	0.270417	3495.19	ft^3					
			129.451	cu yd					
abutment diaphragms:									
H (ft)	W (ft)	L (ft)	Volume						
7.925	3.5	99.46529	2758.92	ft^3					
			102.182	cu yd					
pier diaphragms:									
H (ft)	W (ft)	L (ft)	Volume						
6	3	129.3051	2244.51	ft^3					
			83.1298	cu yd					
		total =	895.212	cu yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	10706	331.6	SQ YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (APPROACH SLAB), (T=17")			331.6		
	L (ft)	W (ft)	Area						
	60	49.73299	2983.98	sq ft					
			331.553	sq yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	11000	66.9	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET)			66.9		
main parapet:									
	Area (ft^2)	L (ft)	Volume						
	4.2639	402.84	1717.67	ft^3					
			63.6172	cu yd					
transition parapet:									
	Area (ft^2)	L (ft)	Volume						
	3.4514	20	69.0278	ft^3					
			2.55658	cu yd					
end parapet:									
	Area (ft^2)	L (ft)	Volume						
	2.4444	8	19.5556	ft^3					
			0.72428	cu yd					
		total =	66.8981	cu yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	11001	75.9	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET), AS PER PLAN			75.9		
main parapet:									
	Area (ft^2)	L (ft)	Volume						
	4.7995	390.84	1875.83	ft^3					
			69.4751	cu yd					

Company: KZFDESIGN

Structure : SCI-823-0837 (left bridge) Design : DAT Date : 7/23/2009

Subject: Quantities (Stage 2) Checked : Date :

transition parapet:									
	Area (ft^2)	L (ft)	Volume						
	4.3294	40	173.177	ft^3					
			6.41397	cu yd					
		total =	75.8891	cu yd					

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	20100	732.6	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (PIER ABOVE FOOTING)		732.6			
at pier 1:									
	center volume								
H (ft)	W (ft)	T (ft)	Volume						
9.5	19.9167	4.75	898.741	ft^3					
			33.2867	cu yd					
	overhang volume								
H (ft)	W (ft)	T (ft)	Volume						
6.75	26.58334	4.75	852.328	ft^3					
			31.5677	cu yd					
	column volume								
	H (ft)	A (ft^2)	Volume						
	52.67	85.27946	4491.67	ft^3					
			166.358	cu yd					
		subtotal =	231.213	cu yd					
at pier 2:									
	center volume								
H (ft)	W (ft)	T (ft)	Volume						
9.5	19.9167	4.75	898.741	ft^3					
			33.2867	cu yd					
	overhang volume								
H (ft)	W (ft)	T (ft)	Volume						
6.75	26.58334	4.75	852.328	ft^3					
			31.5677	cu yd					
	column volume								
	H (ft)	A (ft^2)	Volume						
	63.9167	85.27946	5450.78	ft^3					
			201.881	cu yd					
		subtotal =	266.735	cu yd					
at pier 3:									
	center volume								
H (ft)	W (ft)	T (ft)	Volume						
9.5	19.9167	4.75	898.741	ft^3					
			33.2867	cu yd					
	overhang volume								
H (ft)	W (ft)	T (ft)	Volume						
6.75	26.58334	4.75	852.328	ft^3					
			31.5677	cu yd					
	column volume								
	H (ft)	A (ft^2)	Volume						
	53.75	85.27946	4583.77	ft^3					
			169.769	cu yd					
		subtotal =	234.624	cu yd					
		total =	732.572	cu yd					

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	20150	41.5	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (ABUTMENT)	41.5				
at beam seat:									
H (ft)	W (ft)	L (ft)	Volume						
1.5	3.5	99.46529	522.193	ft^3					
			19.3405	cu yd					
at wingwalls:									
H (ft)	W (ft)	L (ft)	Volume						
7.39	2.5	32.32858	597.271	ft^3					
			22.1211	cu yd					
		total =	41.4616	cu yd					

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	20300	396.2	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (FOOTING)	77.23633	319			
at abutments:									
H (ft)	W (ft)	L (ft)	Volume						
3.00	6.00	115.8545	2085.38	ft^3					
			77.2363	cu yd	77.23633				
at pier 1:									
	center volume								
L (ft)	W (ft)	T (ft)	Volume						
29	22	4.5	2871	ft^3					
			106.333	cu yd		106.3333			
at pier 2:									
	center volume								
L (ft)	W (ft)	T (ft)	Volume						
29	22	4.5	2871	ft^3					
			106.333	cu yd		106.3333			
at pier 3:									
	center volume								
L (ft)	W (ft)	T (ft)	Volume						
29	22	4.5	2871	ft^3					
			106.333	cu yd		106.3333			

Estimate SCI-823-0837R

Estimated Cost: $2,674,566.07

Contingency: 0.00%

Estimated Total: $2,674,566.07

SCI-823-0.00 (PID 19415)--Structure SCI-823-0837 R--SFN 7306466

Base Date: 12/08/10

Spec Year: 08

Unit System: E

Work Type: BRIDGE REPLACEMENT

Highway Type: 404

Urban/Rural Type: RURAL CLASS

Season: SPRING

County: SCIOTO

Midpoint of Latitude: 385100

Midpoint of Longitude: 825203

District: 9

Federal/State Project Number:

Estimate Type: Bridge Construction

Prepared by RBK on 07/24/09

Group 9000: Structures over 20' Span

Line #	Item Number	Description	Supplemental Description	Quantity	Units	Unit Price	Exten
0001	503E11100	COFFERDAMS, CRIBS AND SHEETING		1.000	LS	$10,000.00000	$10,00
0002	503E22200	UNCLASSIFIED EXCAVATION INCLUDING ROCK AND/OR SHALE		236.000	CY	$24.50959	$5,78
0003	505E11100	PILE DRIVING EQUIPMENT MOBILIZATION		1.000	LS	$15,000.00000	$15,00
0004	507E00100	STEEL PILES HP10X42, FURNISHED		3,420.000	FT	$20.54429	$70,26
0005	507E00150	STEEL PILES HP10X42, DRIVEN		3,060.000	FT	$16.73519	$51,20
0006	507E93301	STEEL POINTS OR SHOES, AS PER PLAN		72.000	EACH	$113.68816	$8,18
0007	509E10000	EPOXY COATED REINFORCING STEEL		464,823.000	LB	$0.75000	$348,61
0008	512E10100	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)		1,421.000	SY	$8.50000	$12,07
0009	515E15051	DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM MEMBERS, LEVEL 3, TYPE 4 MOD. (72"), AS PER PLAN		20.000	EACH	$27,057.76173	$541,15
0010	515E20000	INTERMEDIATE DIAPHRAMS		64.000	EACH	$800.00000	$51,20
0012	516E13900	2" PREFORMED EXPANSION JOINT FILLER		42.000	SF	$6.07441	$25
0013	516E14021	SEMI-INTEGRAL ABUTMENT EXPANSION JOINT SEAL, AS PER PLAN		99.000	FT	$26.76429	$2,64
0014	516E44000	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	*24"x16"x1.72" LAMINATED ELASTOMERIC BEARING PAD WITH 26"x17"x1 1/2" LOAD PLATE*	10.000	EACH	$777.57098	$7,77
0015	516E44100	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	*24"x16"x2.75" LAMINATED ELASTOMERIC BEARING PAD WITH 26"x17"x1 1/2" LOAD PLATE*	20.000	EACH	$822.09238	$16,44
0016	516E44200	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	*24"x16"x3.78" LAMINATED ELASTOMERIC BEARING PAD WITH 26"x18"x2" LOAD PLATE*	10.000	EACH	$915.67406	$9,15
0017	518E21200	POROUS BACKFILL WITH FILTER FABRIC		112.000	CY	$57.65150	$6,45
0018	518E40000	6" PERFORATED CORRUGATED PLASTIC PIPE		130.000	FT	$9.11188	$1,18
0019	518E40010	6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS		18.000	FT	$8.60383	$15
0020	601E32204	ROCK CHANNEL PROTECTION, TYPE C WITH FABRIC FILTER		141.000	CY	$50.92420	$7,18
0021	898E10201	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (DECK), AS PER PLAN		895.000	CY	$700.00000	$626,50
0022	898E10709	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (APPROACH SLAB), (T=17"), AS PER PLAN		332.000	SY	$258.86451	$85,94
0023	898E11000	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET)		67.000	CY	$570.66573	$38,23
0024	898E11001	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET), AS PER PLAN		76.000	CY	$547.81498	$41,63
0025	898E20100	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (PIER ABOVE FOOTING)		730.000	CY	$774.96399	$565,72
0026	898E20150	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (ABUTMENT)		41.000	CY	$685.85515	$28,12
0027	898E20300	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (FOOTING)		396.000	CY	$312.28036	$123,66

Line #	Item Number	Quantity	Units	Unit Price	Exten

Description
Supplemental Description

Total for Group 9000: $2,674,566.07

Company:	KZFDESIGN								
Structure :	SCI-823-0837 (right bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
503	11100	SUM	LUMP	COFFERDAMS, CRIBS AND SHEETING				SUM	
503	22200	236	CU YD	UNCLASSIFIED EXCAVATION INCLUDING ROCK AND/OR SHALE		236			
505	11100	SUM	LUMP	PILE DRIVING EQUIPMENT MOBILIZATION				SUM	
507	00100	3420	FT	STEEL PILES HP10X42, FURNISHED	3420				
507	00150	3060	FT	STEEL PILES HP10X42, DRIVEN	3060				
507	93300	72	EACH	STEEL POINTS OR SHOES	72				
509	10000	464823	POUND	EPOXY COATED REINFORCING STEEL	4019	175473	285331		
512	10100	1421	SQ YD	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	101		1320		
515	15051	20	EACH	DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM, AS PER PLAN			20		
				MEMBERS, LEVEL 3, TYPE 4 MOD (72")					
515	20000	64	EACH	INTERMEDIATE DIAPHRAGMS			64		
~~516~~	~~13600~~	~~0~~	~~SQ FT~~	~~1" PREFORMED EXPANSION JOINT FILLER~~			~~0~~		
516	13900	42	SQ FT	2" PREFORMED EXPANSION JOINT FILLER	42				
516	14021	99	FT	SEMI-INTEGRAL ABUTMENT EXPANSION JOING SEAL, AS PER PLAN	99				
516	44000	10	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)		10			
				24"X16"X1.72" LAMINATED ELASTOMERIC PAD WITH 26"X16"X1.5" LOAD PLATE					
516	44100	20	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)		20			
				24"X16"X2.75" LAMINATED ELASTOMERIC PAD WITH 26"X16"X1.5" LOAD PLATE					
516	44200	10	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	10				
				24"X16"X3.78" LAMINATED ELASTOMERIC PAD WITH 26"X16"X2" LOAD PLATE					
518	21200	112	CU YD	POROUS BACKFILL WITH FILTER FABRIC	112				
518	40000	130	FT	6" PERFORATED CORRUGATED PLASTIC PIPE	130				
518	40012	18	FT	6" NON-PERFORATED CORRUGATED PLASTIC PIPE	18				
601	32204	141	CU YD	ROCK CHANNEL PROTECTION, TYPE C WITH FABRIC FILTER				141	
898	10200	895	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (DECK)			895		
898	10708	332	SQ YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (APPROACH SLAB), (T=17")			332		
898	11000	67	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET)			67		
898	11001	76	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET), AS PER PLAN			76		
898	20100	730	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (PIER ABOVE FOOTING)		730			
898	20150	41	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (ABUTMENT)	41				
898	20300	396	CU YD	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (FOOTING)	77	319			

Company:	KZFDESIGN								
Structure :	SCI-823-0637 (right bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
503	11100	SUM	LUMP	COFFERDAMS, CRIBS AND SHEETING					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
503	22200	236.2963	CU YD	UNCLASSIFIED EXCAVATION INCLUDING ROCK AND/OR SHALE		236.2963			
at pier 1:									
L (ft)	W (ft)	T (ft)	Volume						
22	29	2.5	1595	ft^3					
			59.0741	cu yd		59.07407			
at pier 2:									
L (ft)	W (ft)	T (ft)	Volume						
22	29	2.5	1595	ft^3					
			59.0741	cu yd		59.07407			
at pier 3:									
L (ft)	W (ft)	T (ft)	Volume						
22	29	5	3190	ft^3					
			118.148	cu yd		118.1481			
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
505	11100	SUM	LUMP	PILE DRIVING EQUIPMENT MOBILIZATION					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
507	00100	3420	FT	STEEL PILES HP10X42, FURNISHED	3420				
Estimated Length = Pile Cutoff Elevation - Pile Tip Elevation									
Round Estimated Length up to the nearest 5 ft [1 m].									
Order Length = Estimated Length + 5 ft [1.5 m]									
Furnished Length = Order Length x No. of Piles									
Driven Length = Estimated Length x No. of Piles									
at rear abutment:									
pile cutoff elevation =		703.73							
pile tip elevation =		660.1							
estimated L =		43.63	ft						
estimated L (rounded) =		45	ft						
order L =		50	ft						
# piles =		36							
furnished L =		1800	ft		1800				
driven L =		1620	ft						
at forward abutment:									
pile cutoff elevation =		699.35							
pile tip elevation =		660.3							
estimated L =		39.05	ft						
estimated L (rounded) =		40	ft						
order L =		45	ft						
# piles =		36							
furnished L =		1620	ft		1620				
driven L =		1440	ft						
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
507	00150	3060	FT	STEEL PILES HP10X42, DRIVEN	3060				
Estimated Length = Pile Cutoff Elevation - Pile Tip Elevation									
Round Estimated Length up to the nearest 5 ft [1 m].									
Order Length = Estimated Length + 5 ft [1.5 m]									
Furnished Length = Order Length x No. of Piles									
Driven Length = Estimated Length x No. of Piles									
at rear abutment:									
pile cutoff elevation =		703.73							
pile tip elevation =		660.1							
estimated L =		43.63	ft						
estimated L (rounded) =		45	ft						
order L =		50	ft						
# piles =		36							
furnished L =		1800	ft						
driven L =		1620	ft		1620				
at forward abutment:		0							
pile cutoff elevation =		699.35							
pile tip elevation =		660.3							
estimated L =		39.05	ft						
estimated L (rounded) =		40	ft						
order L =		45	ft						
# piles =		36							
furnished L =		1620	ft						
driven L =		1440	ft		1440				
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
507	93300	72	EACH	STEEL POINTS OR SHOES	72				
at rear abutment:									
# piles =		36			36				
at forward abutment:									
# piles =		36			36				
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
509	10000	464823	POUND	EPOXY COATED REINFORCING STEEL	4019.442	175472.9	285330.9		
Note: Calculate the amount of reinforcing steel per Cu.Yd. of concrete and multiply by the concrete volume to obtain the total									
weight of reinforcing steel (in LBS).									
Note: Laps are not included in these calculations. The approach slab reinforcing is not included in these calculations.									
>>>>>	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (DECK)								
	take the average of the +M and -M reinforcing for the entire bridge length								

Company:	KZF DESIGN						
Structure :	SCI-823-0837 (right bridge)			Design :	DAT	Date :	7/23/2009
Subject:	Quantities (Stage 2)			Checked :		Date :	
	at -M region:	Note: The abutment and pier diaphragm concrete is included in the pay item for deck volume.					
L (ft)	spacing (in.)	bar size	wt (per ft)	transverse (top)			
48.125	4.75	5	126.807				
L (ft)		bar size	wt (per ft)	transverse (bottom)			
48.125	4.75	5	126.807				
	# bars	bar size	wt (per ft)	top bars (temp & shrinkage)			
	65	4	43.42				
	# bars	bar size	wt (per ft)	top bars (additional)			
	64	4	42.752				
	# bars	bar size	wt (per ft)	bottom bars			
	83	5	86.569				
		total =	426.355	lbs			
	deck volume						
L (ft)	W (ft)	T (ft)	Volume				
48.125	1	0.729167	36.7889	ft^3			
			1.36255	cu yd			
		total =	312.909	lbs/cu yd			
	at +M region:						
L (ft)	spacing (in.)	bar size	wt (per ft)	transverse (top)			
48.125	4.75	5	126.807				
L (ft)		bar size	wt (per ft)	transverse (bottom)			
48.125	4.75	5	126.807				
	# bars	bar size	wt (per ft)	top bars (temp & shrinkage)			
	65	4	43.42				
	# bars	bar size	wt (per ft)				
	# bars	bar size	wt (per ft)	bottom bars			
	83	5	86.569				
		total =	383.603	lbs			
	deck volume						
L (ft)	W (ft)	T (ft)	Volume				
48.125	1	0.729167	36.7889	ft^3			
			1.36255	cu yd			
		total =	281.533	lbs/cu yd			
		avg. total =	297.221	lbs/cu yd			266075.8
>>>>>	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET)						
L (ft)	spacing (in.)	bar size	wt (per ft)	transverse (dowels)			
4	12	6	6.008				
L (ft)		bar size	wt (per ft)	transverse (main)			
6.8333333	12	5	7.12717				
	# bars	bar size	wt (per ft)	longitudinal bars			
	7	5	7.301				
		total =	20.4362	lbs			
	parapet volume						
	W (ft)	A (ft^2)	Volume				
	1	4.263889	4.26389	ft^3			
			0.15792	cu yd			
		total =	129.407	lbs/cu yd			8657.072
>>>>>	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET), AS PER PLAN						
L (ft)	spacing (in.)	bar size	wt (per ft)	transverse (dowels)			
11.666667	12	6	17.5233				
L (ft)		bar size	wt (per ft)	transverse (main)			
0	12	5	0				
	# bars	bar size	wt (per ft)	longitudinal bars			
	7	5	7.301				
		total =	24.8243	lbs			
	parapet volume						
	W (ft)	A (ft^2)	Volume				
	1	4.799479	4.79948	ft^3			
			0.17776	cu yd			
		total =	139.652	lbs/cu yd			10596.07
>>>>>	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (PIER ABOVE FOOTING)						
	take the average of the cap and column reinforcing per cu. yd.						
	at pier cap:						
L (ft)	spacing (in.)	bar size	wt (per ft)	stirrups			
53.666667	9	6	107.476				
	# bars	bar size	wt (per ft)	main top			
	28	10	120.484				
	# bars	bar size	wt (per ft)	main side			
	18	7	36.792				
	# bars	bar size	wt (per ft)	main bottom			
	5	5	5.215				
		total =	269.967	lbs			
	pier cap volume						
H (ft)	W (ft)	T (ft)	Volume				
8.0833333	4.75	1	38.3958	ft^3			
			1.42207	cu yd			
		total =	189.841	lbs/cu yd			
	at column:						
L (ft)	spacing (in.)	bar size	wt (per ft)	outer ties			
81.013272	12	5	84.4968				
L (ft)		bar size	wt (per ft)	inner ties			
48	12	5	50.064				
	# bars	bar size	wt (per ft)	main bars			
	102	10	438.906				
		total =	573.467	lbs			
	column volume						
	W (ft)	A (ft^2)	Volume				
	1	85.27946	85.2795	ft^3			
			3.1585	cu yd			
		total =	181.563	lbs/cu yd			
		avg. total =	185.702	lbs/cu yd		135649.2	

Company:	KZFDESIGN								
Structure :	SCI-823-0837 (right bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			
>>>>>	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (ABUTMENT)								
L (ft)	spacing (in.)	bar size	wt (per ft)	stirrups					
5.8333333	12	5	6.08417						
	# bars	bar size	wt (per ft)	longitudinal bars					
	4	8	10.68						
	# bars	bar size	wt (per ft)	longitudinal bars					
	2	5	2.086						
		total =	18.8502	lbs					
	abutment volume								
H (ft)	W (ft)	L (ft)	Volume						
1.5	3.5	1	5.25	ft^3					
			0.19444	cu yd					
		total =	96.9437	lbs/cu yd	4019.442				
>>>>>	QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (FOOTING)								
	take the average of the abutment and pier reinforcing per cu. yd.								
	at abutment:								
L (ft)	spacing (in.)	bar size	wt (per ft)	stirrups					
27	12	5	28.161						
	# bars	bar size	wt (per ft)	main top					
	4	5	4.172						
	# bars	bar size	wt (per ft)	main side					
	2	5	2.086						
	# bars	bar size	wt (per ft)	main bottom					
	4	8	10.68						
		total =	45.099	lbs					
	abutment footing volume								
H (ft)	W (ft)	L (ft)	Volume						
3	6	1	18	ft^3					
			0.66667	cu yd					
		total =	67.6485	lbs/cu yd					
	at pier:								
L (ft)	spacing (in.)	bar size	wt (per ft)	top (longitudinal-dir)					
21.67	9	6	43.3978						
	# bars	bar size	wt (per ft)	top (transverse-dir)					
	30	6	45.06						
L (ft)	spacing (in.)	bar size	wt (per ft)	dowels					
6.25	5	10	64.545						
L (ft)	spacing (in.)	bar size		bottom (longitudinal-dir)					
21.67	5	10	223.79						
	# bars	bar size	wt (per ft)	bottom (transverse-dir)					
	33	9	112.2						
		total =	488.993	lbs					
	pier footing volume								
T (ft)	W (ft)	L (ft)	Volume						
4.5	22	1	99	ft^3					
			3.66667	cu yd					
		total =	133.362	lbs/cu yd					
		avg. total =	100.505	lbs/cu yd		39823.79			
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
512	10100	1420.8	SQ YD	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	100.7446		1320.089		
at superstructure (transverse section):									
W (ft)	L (ft)	Area							
27.575906	430.84	11880.8	ft^2						
		1320.089	sq yd				1320.089		
at abutments:									
H (ft)	L (ft)	Area							
7.5	64.87268265	906.7014	ft^2						
		100.7446	sq yd		100.7446				
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
515	15051	20	EACH	DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM, AS PER PLAN			20		
	# spans =	4							
	beams per span =	5							
	# beams =	20							
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
515	20000	64	EACH	INTERMEDIATE DIAPHRAGMS			64		
	# spans =	4							
	diaphragms per span =	4							
	# bays (btw. beams) =	4							
	# diaphragms =	64							
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	13600	0.0	SQ FT	1" PREFORMED EXPANSION JOINT FILLER					
at superstructure (transverse section):				Note: Already included in Left Structure					
H (ft)	L (ft)	Area							
0	430.84	0	ft^2						
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	13900	42.28	SQ FT	2" PREFORMED EXPANSION JOINT FILLER					
at abutment:				note: include PEJF btw. L/R structures with the Left Bridge (exclude from Right Bridge)					
H (ft)	W (ft)	Area							
0.00	3.59	0.00	ft^2	btw. bridges					
0.00	6.16	0.00	ft^2	btw. bridges					
8.24	2.57	42.28	ft^2	btw. wingwall and abutment diaphragm					
	total =	42.28							
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	14021	99.47	FT	SEMI-INTEGRAL ABUTMENT EXPANSION JOING SEAL, AS PER PLAN					
	at abutment:								
		L							

Company:	KZFDESIGN								
Structure :	SCI-823-0837 (right bridge)			Design :	DAT	Date :	7/23/2009		
Subject:	Quantities (Stage 2)			Checked :		Date :			
		99.47	ft	2 abutments					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	44000	10	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)					
				24"X16"X1.72" LAMINATED ELASTOMERIC PAD WITH 26"X16"X1.5" LOAD PLATE					
	at pier 2:								
	# bearings =	10	each						
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	44100	20	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)					
				24"X16"X2.75" LAMINATED ELASTOMERIC PAD WITH 26"X16"X1.5" LOAD PLATE					
	at piers 1 & 3:								
	# bearings =	20	each						
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
516	44200	10	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)					
				24"X16"X3.78" LAMINATED ELASTOMERIC PAD WITH 26"X16"X2" LOAD PLATE					
	at abutments:								
	# bearings =	10	each	2 abutments					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
518	21200	111.8	CU YD	POROUS BACKFILL WITH FILTER FABRIC	111.8				
H (ft)	W (ft)	L (ft)	Volume						
12.16	2	62.05035	3018.1	ft^3					
			111.8	cu yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
518	40000	130.0	FT	6" PERFORATED CORRUGATED PLASTIC PIPE	130.0				
		L (ft)							
		129.9694							
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
518	40012	18	FT	6" NON-PERFORATED CORRUGATED PLASTIC PIPE	18				
		L (ft)							
		18							
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
601	32204	140.7	CU YD	ROCK CHANNEL PROTECTION, TYPE C WITH FABRIC FILTER				140.7	
L (ft)	W (ft)	T (ft)	Volume						
47.5	40	2	3800.0	ft^3					
			140.7	cu yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	10200	895.2	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (DECK)			895.2		
note: Includes Deck, Abutment Diaphragm, and Pier Diaphragm concrete.									
deck:									
L (ft)	W (ft)	T (ft)	Volume						
430.84	48.45833333	0.729167	15223.4	ft^3					
			563.829	cu yd					
deck overhang:									
L (ft)	W (ft)	T (ft)	Volume						
430.84	2.083	0.25	448.72	ft^3					
			16.6193	cu yd					
beam haunches:									
L (ft)	W (ft)	T (ft)	Volume						
430.84	15	0.270417	3495.19	ft^3					
			129.451	cu yd					
abutment diaphragms:									
H (ft)	W (ft)	L (ft)	Volume						
7.925	3.5	99.46529	2758.92	ft^3					
			102.182	cu yd					
pier diaphragms:									
H (ft)	W (ft)	L (ft)	Volume						
6	3	129.3051	2244.51	ft^3					
			83.1298	cu yd					
		total =	895.212	cu yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	10708	331.6	SQ YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (APPROACH SLAB), (T=17")			331.6		
	L (ft)	W (ft)	Area						
	60	49.73299	2983.98	sq ft					
			331.553	sq yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	11000	66.9	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET)			66.9		
main parapet:									
	Area (ft^2)	L (ft)	Volume						
	4.2639	402.84	1717.67	ft^3					
			63.6172	cu yd					
transition parapet:									
	Area (ft^2)	L (ft)	Volume						
	3.4514	20	69.0278	ft^3					
			2.55658	cu yd					
end parapet:									
	Area (ft^2)	L (ft)	Volume						
	2.4444	8	19.5556	ft^3					
			0.72428	cu yd					
		total =	66.8981	cu yd					
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	11001	75.9	CU YD	QC/QA CONCRETE, CLASS QCS2, SUPERSTRUCTURE (PARAPET), AS PER PLAN			75.9		
main parapet:									
	Area (ft^2)	L (ft)	Volume						
	4.7995	390.84	1875.83	ft^3					
			69.4751	cu yd					

Company: KZFDESIGN
Structure : SCI-823-0837 (right bridge) Design : DAT Date : 7/23/2009
Subject: Quantities (Stage 2) Checked : Date :

transition parapet:										
	Area (ft^2)	L (ft)	Volume							
	4.3294	40	173.177	ft^3						
			6.41397	cu yd						
		total =	75.8891	cu yd						
ITEM	EXTENSION	TOTAL	UNIT		DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	20100	730.5	CU YD		QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (PIER ABOVE FOOTING)		730.5			
at pier 1:										
	center volume									
H (ft)	W (ft)	T (ft)	Volume							
9.5	19.9167	4.75	898.741	ft^3						
			33.2867	cu yd						
	overhang volume									
H (ft)	W (ft)	T (ft)	Volume							
6.75	26.58334	4.75	852.328	ft^3						
			31.5677	cu yd						
	column volume									
	H (ft)	A (ft^2)	Volume							
	52.33	85.27946	4462.67	ft^3						
			165.284	cu yd						
		subtotal =	230.139	cu yd						
at pier 2:										
	center volume									
H (ft)	W (ft)	T (ft)	Volume							
9.5	19.9167	4.75	898.741	ft^3						
			33.2867	cu yd						
	overhang volume									
H (ft)	W (ft)	T (ft)	Volume							
6.75	26.58334	4.75	852.328	ft^3						
			31.5677	cu yd						
	column volume									
	H (ft)	A (ft^2)	Volume							
	63.67	85.27946	5429.74	ft^3						
			201.102	cu yd						
		subtotal =	265.956	cu yd						
at pier 3:										
	center volume									
H (ft)	W (ft)	T (ft)	Volume							
9.5	19.9167	4.75	898.741	ft^3						
			33.2867	cu yd						
	overhang volume									
H (ft)	W (ft)	T (ft)	Volume							
6.75	26.58334	4.75	852.328	ft^3						
			31.5677	cu yd						
	column volume									
	H (ft)	A (ft^2)	Volume							
	53.67	85.27946	4576.95	ft^3						
			169.517	cu yd						
		subtotal =	234.371	cu yd						
		total =	730.466	cu yd						
ITEM	EXTENSION	TOTAL	UNIT		DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	20150	41.5	CU YD		QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (ABUTMENT)	41.5				
at beam seat:										
H (ft)	W (ft)	L (ft)	Volume							
1.5	3.5	99.46529	522.193	ft^3						
			19.3405	cu yd						
at wingwalls:										
H (ft)	W (ft)	L (ft)	Volume							
7.39	2.5	32.32858	597.271	ft^3						
			22.1211	cu yd						
		total =	41.4616	cu yd						
ITEM	EXTENSION	TOTAL	UNIT		DESCRIPTION	ABUT	PIER	SUPER	GEN	REF
898	20300	396.2	CU YD		QC/QA CONCRETE, CLASS QCS1, SUBSTRUCTURE (FOOTING)	77.23633	319			
at abutments:										
H (ft)	W (ft)	L (ft)	Volume							
3.00	6.00	115.8545	2085.38	ft^3						
			77.2363	cu yd		77.23633				
at pier 1:										
	center volume									
L (ft)	W (ft)	T (ft)	Volume							
29	22	4.5	2871	ft^3						
			106.333	cu yd			106.3333			
at pier 2:										
	center volume									
L (ft)	W (ft)	T (ft)	Volume							
29	22	4.5	2871	ft^3						
			106.333	cu yd			106.3333			
at pier 3:										
	center volume									
L (ft)	W (ft)	T (ft)	Volume							
29	22	4.5	2871	ft^3						
			106.333	cu yd			106.3333			