

RFI 00116

Piles 2-20, 2-25, and 2-51 were driven to refusal but did not reach the capacity specified in the plans. Pile design loads were determined based on the worst case load on the entire footing. Determine the actual loads on each pile to determine if the pile has enough capacity.

Pile 2-20

Pier 5 (Footing 1)

Transverse offset = 12.0 ft

Longitudinal offset = 5.33 ft

$$\text{Pile group } I_T = 1152 \text{ ft}^2$$

$$\text{Pile group } I_L = 1706.6 \text{ ft}^2$$

$$S_T = \frac{1152 \text{ ft}^2}{12 \text{ ft}} = 96 \text{ ft}$$

$$S_L = \frac{1706.6 \text{ ft}^2}{-5.33 \text{ ft}} = -320.2 \text{ ft}$$

Pile 2-25

(Pier 5 footing 2)

Transverse offset = -12.0 ft

Longitudinal offset = 5.33 ft

$$\text{Pile group } I_T = 1296 \text{ ft}^2$$

$$\text{Pile group } I_L = 2161.7 \text{ ft}^2$$

$$S_T = \frac{1296 \text{ ft}^2}{-12.0 \text{ ft}} = -108 \text{ ft}$$

$$S_L = \frac{2161.7 \text{ ft}^2}{5.33 \text{ ft}} = 405.3 \text{ ft}$$

Pile 2-51

(Pier 6 Footing 1)

Transverse offset = 16.0 ft

Longitudinal offset = 9.0 ft

$$\text{Pile group } I_T = 2816 \text{ ft}^2$$

$$\text{Pile group } I_L = 3046 \text{ ft}^2$$

$$S_T = \frac{2816 \text{ ft}^2}{16.0 \text{ ft}} = 176 \text{ ft}$$

$$S_L = \frac{3046 \text{ ft}^2}{9.0 \text{ ft}} = 338.4 \text{ ft}$$

Max Pile Loads

$$\text{Pile 2-20} = 1577 \text{ kip}$$

$$\text{Pile 2-25} = 1098 \text{ kip}$$

$$\text{Pile 2-51} = 1193 \text{ kip}$$

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	Checked	KDG	Date	10/18/2011			
	For	Cleveland Innerbelt	Backch'kd	DSB	Date	10/18/2011	Sheet No.

N:\49633\Bridges\Design\Final Design\Unit 2\Excel\Substructure\Pile Bending\RFI 00116\HP18x204_Pier5_6_Pile2-20.xls\Pile Bending

Pier Design - Pile Group Combined Pile Stresses

Main Viaduct (Pier 5) Pile 2-20

Pile Size = **HP18x204**

No. of Trans. Strong Axis Piles = **0** (N_{TS})
 No. of Trans. Weak Axis Piles = **12** (N_{TW})

No. of Long. Strong Axis Piles = **12** (N_{LS})
 No. of Long. Weak Axis Piles = **0** (N_{LW})

Total No. of Piles = **12** ea.

Trans. Pile Batter = horiz. in vertical
 Long. Pile Batter = horiz. in vertical

Transverse Battered Piles

Pile	No. of	SM _T
Row	Piles *	(ft)
1		
2		
3		
4		

Longitudinal Battered Piles

Pile	No. of	SM _L
Row	Piles *	(ft)
1		
2		
3		
4		

F_y = **60** ksi
 E = **29,000** ksi
 k = **1.2**
 L_b = **10.00** ft (assumed initially, calc. from Lpile analysis)
 Ag = **60** (consider using 10.7.3.13.4-1 & 2)
 Φ_t = **1.00** LRFD §6.5.4.2
 ST Φ_c = **0.70** LRFD §6.5.4.2
 EX Φ_c = **1.00** LRFD §6.5.5
 r_y = **4.32** in
 kL/r = **33.3** Nonslender: Q = 1.0
 P_e = **15456** kips
 P_o = **3600** kips
 λ = **0.0** Set equal to 0 per AASHTO 10.7.3.13.1
 Q = **1.0** LRFD §6.9.4
 Redundancy Reduct. = **0%** LRFD §10.5.5.2.3

Footing Properties

Width = **30.00** ft
 Length = **38.00** ft
 Depth = **12.00** ft
 Overburden = **3.00** ft
 Column Area = **164.00** ft²
 Unit Weight of Concrete = **0.150** kcf
 Unit Weight of Backfill = **0.120** kcf
 k_p = **4.14** (per S&W)
 fraction of full mobilization = **0.00** (Curve B)
 Φ_{ep} = **0.75** 10.5.5.2.2-1
 effective soil wt = **0.056** kcf (per S&W) ST
 Equivalent Fluid Wt = **0.232** kcf (per S&W) EX
 Pp = **16.7** k/ft
 Passive Resistance = **0** kips
 direction to apply passive resistance = **LONG** LONG or TRANS

Pile / Group Properties

SM_T = **96.0** ft
 SM_L = **-320.2** ft

Strong Axis Properties

I_x = **3450** in.⁴
 M_{rx} = **2087** kip-ft

Weak Axis Properties

I_y = **1119** in.⁴
 M_{ry} = **926** kip-ft

P_r = ΦP_n = **2520.0** kips LRFD §6.9.4.1
 P_r = ΦP_n = **3600.0** kips (2008 eqns)

Notes:

* Use the actual number of battered piles which may be mobilized in the indicated direction.

**Torsion not accounted for in this spreadsheet. Must examine torsional effects separately if significant loads exist.

***Earth + Footing Cap weight.

****Assumed fixed fixed pile condition.

Footing No.	Load Group	Load Case	F _V (kips)	F _T (kips)	Top of Footing Loads				F _{add} *** (kips)	Lateral Resistance from Batter		Lateral Resistance from Pile Bending		P _w /Pile (kips)	F _{TS} /Pile (kips)	Strong**** Bending		Weak**** Bending		Strong**** Bending		Weak**** Bending		P _u /P _r	Trans. Strong M _{ux} /M _{rx}	Tran. Weak M _{uy} /M _{ry}	Long. Strong M _{ux} /M _{rx}	Long. Weak M _{uy} /M _{ry}	Trans. Strong Interaxn. (6.9.2.2)	Long. Strong Interaxn. (6.9.2.2)	
					M _T (kip-ft)	M _L (kip-ft)	T** (kip-ft)	F _{TB} (kips)		F _{LB} (kips)	F _{TP} (kips)	F _{LP} (kips)	M _{TS} /Pile (kip-ft)			F _{TW} /Pile (kips)	M _{TW} /Pile (kip-ft)	F _{LS} /Pile (kips)	M _{LS} /Pile (kip-ft)	F _{LW} /Pile (kips)	M _{LS} /Pile (kip-ft)										
1	STR I	80273	-12648	146	546	4369	-48412	-916	-3022	0	0	146	546	1541.2	0.0	0.0	12.2	60.8	45.5	227.5	0.0	0.0	0.61	0.00	0.07	0.11	0.00	0.00	0.77	≤ 1.0	O.K.
1	STR I	80274	-11474	238	507	8311	-45718	-161	-3022	0	0	238	507	1486.1	0.0	0.0	19.8	99.2	42.3	211.3	0.0	0.0	0.59	0.00	0.11	0.10	0.00	0.00	0.77	≤ 1.0	O.K.
1	STR I	80282	-12518	116	567	4807	-51141	-131	-3022	0	0	116	567	1540.5	0.0	0.0	9.7	48.3	47.3	236.3	0.0	0.0	0.61	0.00	0.05	0.11	0.00	0.00	0.76	≤ 1.0	O.K.
1	STR I	80288	-12674	139	546	3994	-48433	-928	-3022	0	0	139	546	1538.7	0.0	0.0	11.6	57.9	45.5	227.5	0.0	0.0	0.61	0.00	0.06	0.11	0.00	0.00	0.76	≤ 1.0	O.K.
1	STR I	80297	-12565	103	568	4118	-51179	-151	-3022	0	0	103	568	1535.8	0.0	0.0	8.6	42.9	47.3	236.7	0.0	0.0	0.61	0.00	0.05	0.11	0.00	0.00	0.75	≤ 1.0	O.K.
1	STR I	80348	-12673	40	-382	-1474	32964	1669	-3022	0	0	40	382	1180.3	0.0	0.0	3.3	16.7	31.8	159.2	0.0	0.0	0.47	0.00	0.02	0.08	0.00	0.00	0.55	≤ 1.0	O.K.
1	STR I	80353	-11855	-92	-376	-3665	32652	1306	-3022	0	0	92	376	1074.0	0.0	0.0	7.7	38.3	31.3	156.7	0.0	0.0	0.43	0.00	0.04	0.08	0.00	0.00	0.53	≤ 1.0	O.K.
1	STR I	80378	-12673	40	-449	-1474	39614	1099	-3022	0	0	40	449	1157.0	0.0	0.0	3.3	16.7	37.4	187.1	0.0	0.0	0.46	0.00	0.02	0.09	0.00	0.00	0.55	≤ 1.0	O.K.
1	STR I	80387	-12563	4	-457	-1350	41165	345	-3022	0	0	4	457	1139.5	0.0	0.0	0.3	1.7	38.1	190.4	0.0	0.0	0.45	0.00	0.00	0.09	0.00	0.00	0.53	≤ 1.0	O.K.
1	STR I	80395	-5770	159	256	7843	-23972	713	-3022	0	0	159	256	918.7	0.0	0.0	13.3	66.3	21.3	106.7	0.0	0.0	0.36	0.00	0.07	0.05	0.00	0.00	0.47	≤ 1.0	O.K.
1	STIII	80681	-9011	458	413	22146	-37871	508	-3022	0	0	458	413	1424.4	0.0	0.0	38.2	190.8	34.4	172.1	0.0	0.0	0.57	0.00	0.21	0.08	0.00	0.00	0.82	≤ 1.0	O.K.
1	STIII	80682	-9998	432	478	19842	-42476	117	-3022	0	0	432	478	1496.2	0.0	0.0	36.0	180.0	39.8	199.2	0.0	0.0	0.59	0.00	0.19	0.10	0.00	0.00	0.85	≤ 1.0	O.K.
1	STIII	80687	-10702	117	551	5009	-46474	-76	-3022	0	0	117	551	1376.2	0.0	0.0	9.8	48.8	45.9	229.6	0.0	0.0	0.55	0.00	0.05	0.11	0.00	0.00	0.69	≤ 1.0	O.K.
1	STIII	80691	-11358	-175	511	-8749	-44343	-250	-3022	0	0	175	511	1242.9	0.0	0.0	14.6	72.9	42.6	212.9	0.0	0.0	0.49	0.00	0.08	0.10	0.00	0.00	0.65	≤ 1.0	O.K.
1	STIII	80693	-11421	-247	450	-12748	-39989	-630	-3022	0	0	247	450	1181.6	0.0	0.0	20.6	102.9	37.5	187.5	0.0	0.0	0.47	0.00	0.11	0.09	0.00	0.00	0.65	≤ 1.0	O.K.
1	STIII	80694	-11407	-199	443	-9827	-40635	-259	-3022	0	0	199	443	1218.7	0.0	0.0	16.6	82.9	36.9	184.6	0.0	0.0	0.48	0.00	0.09	0.09	0.00	0.00	0.64	≤ 1.0	O.K.
1	STIII	80717	-11420	-346	-398	-18215	35324	720	-3022	0	0	346	398	845.3	0.0	0.0	28.8	144.2	33.2	165.8	0.0	0.0	0.34	0.00	0.16	0.08	0.00	0.00	0.54	≤ 1.0	O.K.
1	STIII	80719	-11356	-274	-502	-14217	43478	267	-3022	0	0	274	502	861.2	0.0	0.0	22.8	114.2	41.8	209.2	0.0	0.0	0.34	0.00	0.12	0.10	0.00	0.00	0.54	≤ 1.0	O.K.
1	STIII	80720	-11229	-218	-529	-11552	45298	217	-3022	0	0	218	529	878.7	0.0	0.0	18.2	90.8	44.1	220.4	0.0	0.0	0.35	0.00	0.10	0.11	0.00	0.00	0.53	≤ 1.0	O.K.
1	STIII	80723	-10701	18	-551	-459	46474	76	-3022	0	0	18	551	975.2	0.0	0.0	1.5	7.5	45.9	229.6	0.0	0.0	0.39	0.00	0.01	0.11	0.00	0.00	0.49	≤ 1.0	O.K.
1	STIII	80729	-4235	432	188	21494	-17618	543	-3022	0	0	432	188	944.7	0.0	0.0	36.0	180.0	15.7	78.3	0.0	0.0	0.37	0.00	0.19	0.04	0.00	0.00	0.58	≤ 1.0	O.K.
1	STIII	80765	-6644	-372	-225	-18867	19737	595	-3022	0	0	372	225	492.4	0.0	0.0	31.0	155.0	18.8	93.8	0.0	0.0	0.20	0.00	0.17	0.04	0.00	0.00	0.31	≤ 1.0	O.K.
1	STRIV	80827	-12512	124	533	5186	-48080	-82	-3535	0	0	124	533	1576.8	0.0	0.0	10.3	51.7	44.4	222.1	0.0	0.0	0.63	0.00	0.06	0.11	0.00	0.00	0.77	≤ 1.0	O.K.
1	STRIV	80828	-12511	25	-381	-281	34310	380	-3535	0	0	25	381	1215.9	0.0	0.0	2.1	10.4	31.8	158.8	0.0	0.0	0.48	0.00	0.01	0.08	0.00	0.00	0.56	≤ 1.0	O.K.
1	STRIV	80829	-10859	111	434	4842	-39145	-67	-3535	0	0	111	434	1402.3	0.0	0.0	9.3	46.3	36.2	180.8	0.0	0.0	0.56	0.00	0.05	0.09	0.00	0.00	0.68	≤ 1.0	O.K.
1	STRIV	80831	-12512	124	533	5186	-48080	-82	-3535	0	0	124	533	1576.8	0.0	0.0	10.3	51.7	44.4	222.1	0.0	0.0	0.63	0.00	0.06	0.11	0.00	0.00	0.77	≤ 1.0	O.K.
1	STRIV	80832	-12511	25	-381	-281	34310	380	-3535	0	0	25	381	1215.9	0.0	0.0	2.1	10.4	31.8	158.8	0.0	0.0	0.48	0.00	0.01	0.08	0.00	0.00	0.56	≤ 1.0	O.K.

HNTB The HNTB Companies Engineers Architects Planners	Made	DSB	Date	10/14/2011	Job Number	49633	
	Checked	KDG	Date	10/18/2011			
For	Cleveland Innerbelt	Backchk'd	DSB	Date	10/18/2011	Sheet No.	4

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Pier Design - Pile Group Combined Pile Stresses
Main Viaduct (Pier 5)

Footing No.	Load Group	Load Case	Top of Footing Loads						Lateral Resistance from Batter			Lateral Resistance from Pile Bending		Trans. Axial Force P _{uT/Pile} (kips)	Trans. Strong Bending M _{TS/Pile} (kip-ft)	Trans. Weak Bending M _{TW/Pile} (kip-ft)	Long. Strong Bending M _{LS/Pile} (kip-ft)	Long. Weak Bending M _{LW/Pile} (kip-ft)	P _u /P _r	Trans. Strong M _{ux} /M _{rx}	Tran. Weak M _{uy} /M _{ry}	Long. Strong M _{ux} /M _{rx}	Long. Weak M _{uy} /M _{ry}	Trans. Strong Interaxn. (6.9.2.2)	Long. Strong Interaxn. (6.9.2.2)						
			F _v (kips)	F _T (kips)	F _L (kips)	M _T (kip-ft)	M _L (kip-ft)	T (kip-ft)	F _{add.} (kips)	F _{TB} (kips)	F _{LB} (kips)	F _{TP} (kips)	F _{LP} (kips)																		
1	STR V	83713	-11906	260	524	10303	-46673	-631	-3022	0	0	260	524	1549.2	0.0	0.0	21.7	108.3	43.7	218.3	0.0	0.0	0.61	0.00	0.12	0.10	0.00	0.00	0.81	≤ 1.0	O.K.
1	STR V	83714	-11000	331	493	13344	-44595	-49	-3022	0	0	331	493	1506.6	0.0	0.0	27.6	137.9	41.1	205.4	0.0	0.0	0.60	0.00	0.15	0.10	0.00	0.00	0.82	≤ 1.0	O.K.
1	STR V	83722	-11806	237	540	10641	-48779	-25	-3022	0	0	237	540	1548.7	0.0	0.0	19.8	98.8	45.0	225.0	0.0	0.0	0.61	0.00	0.11	0.11	0.00	0.00	0.81	≤ 1.0	O.K.
1	STR V	84088	-12224	134	553	4226	-48266	-734	-3022	0	0	134	553	1502.7	0.0	0.0	11.2	55.8	46.1	230.4	0.0	0.0	0.60	0.00	0.06	0.11	0.00	0.00	0.75	≤ 1.0	O.K.
1	STR V	84337	-12383	7	559	-451	-49823	-209	-3022	0	0	7	559	1456.5	0.0	0.0	0.6	2.9	46.6	232.9	0.0	0.0	0.58	0.00	0.00	0.11	0.00	0.00	0.68	≤ 1.0	O.K.
1	STR V	84448	-12521	14	530	-1563	-47032	-824	-3022	0	0	14	530	1447.4	0.0	0.0	1.2	5.8	44.2	220.8	0.0	0.0	0.57	0.00	0.01	0.11	0.00	0.00	0.67	≤ 1.0	O.K.
1	STR V	84457	-12436	-14	546	-1467	-49151	-225	-3022	0	0	14	546	1445.1	0.0	0.0	1.2	5.8	45.5	227.5	0.0	0.0	0.57	0.00	0.01	0.11	0.00	0.00	0.68	≤ 1.0	O.K.
1	STR V	85833	-11854	-174	-366	-8073	31969	1290	-3022	0	0	174	366	1020.2	0.0	0.0	14.5	72.5	30.5	152.5	0.0	0.0	0.40	0.00	0.08	0.07	0.00	0.00	0.54	≤ 1.0	O.K.
1	STR V	85888	-12520	-85	-381	-7030	33256	1352	-3022	0	0	85	381	1093.2	0.0	0.0	7.1	35.4	31.8	158.8	0.0	0.0	0.43	0.00	0.04	0.08	0.00	0.00	0.54	≤ 1.0	O.K.
1	STR V	85918	-12520	-85	-436	-7030	38561	988	-3022	0	0	85	436	1074.5	0.0	0.0	7.1	35.4	36.3	181.7	0.0	0.0	0.43	0.00	0.04	0.09	0.00	0.00	0.54	≤ 1.0	O.K.
1	STR V	86047	-12382	-93	-480	-5918	42699	347	-3022	0	0	93	480	1059.0	0.0	0.0	7.8	38.8	40.0	200.0	0.0	0.0	0.42	0.00	0.04	0.10	0.00	0.00	0.54	≤ 1.0	O.K.
1	STR V	86107	-12334	-73	-493	-4993	43720	318	-3022	0	0	73	493	1063.5	0.0	0.0	6.1	30.4	41.1	205.4	0.0	0.0	0.42	0.00	0.03	0.10	0.00	0.00	0.54	≤ 1.0	O.K.
1	STR V	86278	-12222	35	-499	-1242	43388	828	-3022	0	0	35	499	1107.5	0.0	0.0	2.9	14.6	41.6	207.9	0.0	0.0	0.44	0.00	0.02	0.10	0.00	0.00	0.54	≤ 1.0	O.K.
1	STR V	86595	-5508	264	248	12834	-23191	634	-3022	0	0	264	248	959.2	0.0	0.0	22.0	110.0	20.7	103.3	0.0	0.0	0.38	0.00	0.12	0.05	0.00	0.00	0.53	≤ 1.0	O.K.

HNTB The HNTB Companies Engineers Architects Planners	Made	DSB	Date	10/14/2011	Job No.	49633	
	Checked	KDG	Date	10/18/2011			
For	Cleveland Innerbelt	Backch'kd	DSB	Date	10/18/2011	Sheet No.	1

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Pier Design - Pile Group Combined Pile Stresses
Main Viaduct (Pier 5) Pile 2-25

Pile Size = **HP18x204**
No. of Trans. Strong Axis Piles = **0** (N_{TS})
No. of Trans. Weak Axis Piles = **16** (N_{TW})
No. of Long. Strong Axis Piles = **16** (N_{LS})
No. of Long. Weak Axis Piles = **0** (N_{LW})
Total No. of Piles = **16** ea.

Trans. Pile Batter = **0** horiz. in **0** vertical
Long. Pile Batter = **0** horiz. in **0** vertical

Transverse Battered Piles

Pile Row	No. of Piles *	SM _T (ft)
1		
2		
3		
4		

Longitudinal Battered Piles

Pile Row	No. of Piles *	SM _L (ft)
1		
2		
3		
4		

F_y = **60** ksi
E = **29,000** ksi
k = **1.2**
L_b = **10.00** ft (assumed initially, calc. from Lpile analysis)
Ag = **60** (consider using 10.7.3.13.4-1 & 2)
Φ_y = **1.00** LRFD §6.5.4.2
ST Φ_c = **0.70** LRFD §6.5.4.2
EX Φ_c = **1.00** LRFD §6.5.5
r_y = **4.32** in
kL/r = **33.3** Nonslender: Q = 1.0
P_e = **15456** kips
P₀ = **3600** kips
λ = **0.0** Set equal to 0 per AASHTO 10.7.3.13.1
Q = **1.0** LRFD §6.9.4
Redundancy Reduct. = **0%** LRFD §10.5.5.2.3

Footing Properties

Width = **30.00** ft
Length = **38.00** ft
Depth = **12.00** ft
Overburden = **3.00** ft
Column Area = **164.00** ft²
Unit Weight of Concrete = **0.150** kcf
Unit Weight of Backfill = **0.120** kcf
k_p = **0.00** (per S&W)
fraction of full mobilization = **0.00** (Curve B)
Φ_{ep} = **0.00** 10.5.5.2.2-1
effective soil wt = **0.00** kcf (per S&W)
Equivalent Fluid WT = **0.000** kcf (per S&W)
Pp = **0.0** k/ft
Passive Resistance = **0** kips
direction to apply passive resistance = **LONG** LONG or TRANS

Pile / Group Properties

SM_T = **-108.0** ft
SM_L = **405.3** ft
Strong Axis Properties
I_x = **3450** in.⁴
M_{rx} = **2076** kip-ft
Weak Axis Properties
I_y = **1119** in.⁴
M_{ry} = **926** kip-ft

P_r = ΦP_n = **2520.0** kips LRFD §6.9.4.1
P_r = ΦP_n = **3600.0** kips (2008 eqns)

Notes:

- * Use the actual number of battered piles which may be mobilized in the indicated direction.
- **Torsion not accounted for in this spreadsheet. Must examine torsional effects separately if significant loads exist.
- ***Earth + Footing Cap weight. -1071
- ****Assumed fixed fixed pile condition. -12624

Footing No.	Load Group	Load Case	F _y (kips)	F _T (kips)	Top of Footing Loads					F _{add.**} (kips)	Lateral Resistance from Batter		Lateral Resistance from Pile Bending		Axial Force (kips)	P _{u/Pile} (kips)	Strong**** Bending		Weak**** Bending		Strong**** Bending		Weak**** Bending		P _u /P _r	Trans. Strong M _{ux} /M _{rx}	Tran. Weak M _{uy} /M _{ry}	Long. Strong M _{ux} /M _{rx}	Long. Weak M _{uy} /M _{ry}	Trans. Strong Interaxn. (6.9.2.2)	Long. Strong Interaxn. (6.9.2.2)	O.K.
					M _T (kip-ft)	M _L (kip-ft)	T** (kip-ft)	F _{TB} (kips)	F _{LB} (kips)		F _{TP} (kips)	F _{LP} (kips)	F _{TS/Pile} (kips)	M _{TS/Pile} (kip-ft)			F _{TW/Pile} (kips)	M _{TW/Pile} (kip-ft)	F _{LS/Pile} (kips)	M _{LS/Pile} (kip-ft)	F _{LW/Pile} (kips)	M _{LW/Pile} (kip-ft)										
2	STR I	80277	-12623	-148	549	-4406	-48380	880	-3022	0	0	148	549	899.4	0.0	0.0	9.3	46.3	34.3	171.6	0.0	0.0	0.36	0.00	0.05	0.08	0.00	0.00	0.47	≤ 1.0	O.K.	
2	STR I	80285	-12499	-116	570	-4851	-51180	77	-3022	0	0	116	570	884.7	0.0	0.0	7.3	36.3	35.6	178.1	0.0	0.0	0.35	0.00	0.04	0.09	0.00	0.00	0.46	≤ 1.0	O.K.	
2	STR I	80289	-11424	-244	509	-8551	-45729	100	-3022	0	0	244	509	881.2	0.0	0.0	15.3	76.3	31.8	159.1	0.0	0.0	0.35	0.00	0.08	0.08	0.00	0.00	0.49	≤ 1.0	O.K.	
2	STR I	80292	-12597	-155	548	-4791	-48360	868	-3022	0	0	155	548	902.2	0.0	0.0	9.7	48.4	34.3	171.3	0.0	0.0	0.36	0.00	0.05	0.08	0.00	0.00	0.48	≤ 1.0	O.K.	
2	STR I	80300	-12453	-130	570	-5556	-51143	56	-3022	0	0	130	570	890.0	0.0	0.0	8.1	40.6	35.6	178.1	0.0	0.0	0.35	0.00	0.04	0.09	0.00	0.00	0.47	≤ 1.0	O.K.	
2	STR I	80337	-12624	-48	-360	1006	31623	-1002	-3022	0	0	48	360	1062.6	0.0	0.0	3.0	15.0	22.5	112.5	0.0	0.0	0.42	0.00	0.02	0.05	0.00	0.00	0.48	≤ 1.0	O.K.	
2	STR I	80338	-11514	85	-301	3009	28373	1116	-3022	0	0	85	301	950.1	0.0	0.0	5.3	26.6	18.8	94.1	0.0	0.0	0.38	0.00	0.03	0.05	0.00	0.00	0.44	≤ 1.0	O.K.	
2	STR I	80367	-12624	-48	-451	1006	39555	-1060	-3022	0	0	48	451	1084.8	0.0	0.0	3.0	15.0	28.2	140.9	0.0	0.0	0.43	0.00	0.02	0.07	0.00	0.00	0.51	≤ 1.0	O.K.	
2	STR I	80375	-12500	-17	-459	561	41160	-282	-3022	0	0	17	459	1081.9	0.0	0.0	1.1	5.3	28.7	143.4	0.0	0.0	0.43	0.00	0.01	0.07	0.00	0.00	0.50	≤ 1.0	O.K.	
2	STR I	80415	-5731	-164	257	-8107	-24029	-767	-3022	0	0	164	257	573.4	0.0	0.0	10.3	51.3	16.1	80.3	0.0	0.0	0.23	0.00	0.06	0.04	0.00	0.00	0.31	≤ 1.0	O.K.	
2	STIII	80683	-11328	183	513	8975	-44340	193	-3022	0	0	183	513	668.8	0.0	0.0	11.4	57.2	32.1	160.3	0.0	0.0	0.27	0.00	0.06	0.08	0.00	0.00	0.39	≤ 1.0	O.K.	
2	STIII	80687	-10672	-117	553	-5063	-46469	8	-3022	0	0	117	553	784.7	0.0	0.0	7.3	36.6	34.6	172.8	0.0	0.0	0.31	0.00	0.04	0.08	0.00	0.00	0.42	≤ 1.0	O.K.	
2	STIII	80692	-9968	-441	480	-20197	-42501	-177	-3022	0	0	441	480	928.8	0.0	0.0	27.6	137.8	30.0	150.0	0.0	0.0	0.37	0.00	0.15	0.07	0.00	0.00	0.57	≤ 1.0	O.K.	
2	STIII	80693	-8982	-468	415	-22563	-37926	-568	-3022	0	0	468	415	905.3	0.0	0.0	29.3	146.3	25.9	129.7	0.0	0.0	0.36	0.00	0.16	0.06	0.00	0.00	0.56	≤ 1.0	O.K.	
2	STIII	80704	-11377	208	445	10073	-40649	215	-3022	0	0	208	445	670.1	0.0	0.0	13.0	65.0	27.8	139.1	0.0	0.0	0.27	0.00	0.07	0.07	0.00	0.00	0.39	≤ 1.0	O.K.	
2	STIII	80705	-11393	357	-400	18461	35303	-688	-3022	0	0	357	400	789.3	0.0	0.0	22.3	111.6	25.0	125.0	0.0	0.0	0.31	0.00	0.12	0.06	0.00	0.00	0.47	≤ 1.0	O.K.	
2	STIII	80723	-10673	-18	-553	350	46469	-8	-3022	0	0	18	553	985.7	0.0	0.0	1.1	5.6	34.6	172.8	0.0	0.0	0.39	0.00	0.01	0.08	0.00	0.00	0.47	≤ 1.0	O.K.	
2	STIII	80726	-11201	225	-531	11668	45291	-156	-3022	0	0	225	531	883.4	0.0	0.0	14.1	70.3	33.2	165.9	0.0	0.0	0.35	0.00	0.08	0.08	0.00	0.00	0.49	≤ 1.0	O.K.	
2	STIII	80727	-11329	283	-504	14387	43474	-211	-3022	0	0	283	504	854.5	0.0	0.0	17.7	88.4	31.5	157.5	0.0	0.0	0.34	0.00	0.10	0.08	0.00	0.00	0.49	≤ 1.0	O.K.	
2	STIII	80741	-4215	-443	189	-21874	-17664	-577	-3022	0	0	443	189	654.9	0.0	0.0	27.7	138.4	11.8	59.1	0.0	0.0	0.26	0.00	0.15	0.03	0.00	0.00	0.42	≤ 1.0	O.K.	
2	STIII	80753	-6626	382	-226	19150	19709	-583	-3022	0	0	382	226	438.5	0.0	0.0	23.9	119.4	14.1	70.6	0.0	0.0	0.17	0.00	0.13	0.03	0.00	0.00	0.25	≤ 1.0	O.K.	
2	STRIV	80826	-10823.6	-11	-382	509	34279	-118	-3535	0	0	11	382	989.8	0.0	0.0	0.7	3.4	23.9	119.4	0.0	0.0	0.39	0.00	0.00	0.06	0.00	0.00	0.45	≤ 1.0	O.K.	
2	STRIV	80827	-12476.6	-124	535	-5257	-48102	22	-3535	0	0	124	535	928.6	0.0	0.0	7.8	38.8	33.4	167.2	0.0	0.0	0.37	0.00	0.04	0.08	0.00	0.00	0.48	≤ 1.0	O.K.	
2	STRIV	80828	-12477.6	-25	-380	156	34194	-261	-3535	0	0	25	380	1097.7	0.0	0.0	1.6	7.8	23.8	118.8	0.0	0.0	0.44	0.00	0.01	0.06	0.00	0.00	0.49	≤ 1.0	O.K.	
2	STRIV	80829	-10822.6	-111	436	-4903	-39163	18	-3535	0	0	111	436	845.5	0.0	0.0	6.9	34.7	27.3	136.3	0.0	0.0	0.34	0.00	0.04	0.07	0.00	0.00	0.43	≤ 1.0	O.K.	
2	STRIV	80831	-12476.6	-124	535	-5257	-48102	22	-3535	0	0	124	535	928.6	0.0	0.0	7.8	38.8	33.4	167.2	0.0	0.0	0.37	0.00	0.04	0.08	0.00	0.00	0.48	≤ 1.0	O.K.	
2	STRIV	80832	-12477.6	-25	-380	156	34194	-261	-3535	0	0	25	380	1097.7	0.0	0.0	1.6	7.8	23.8	118.8	0.0	0.0	0.44	0.00	0.01	0.06	0.00	0.00	0.49	≤ 1.0	O.K.	

HNTB The HNTB Companies Engineers Architects Planners	Made	DSB	Date	10/14/2011	Job Number	49633	
	Checked	KDG	Date	10/18/2011			
For	Cleveland Innerbelt	Backch'k'd	DSB	Date	10/18/2011	Sheet No.	2

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Pier Design - Pile Group Combined Pile Stresses
Main Viaduct (Pier 5)

Footing No.	Load Group	Load Case	Top of Footing Loads						Lateral Resistance from Batter			Lateral Resistance from Pile Bending		Trans. Axial Force P _{uT/Pile} (kips)	Trans. Strong Bending M _{TS/Pile} (kip-ft)	Trans. Weak Bending M _{TW/Pile} (kip-ft)	Long. Strong Bending M _{LS/Pile} (kip-ft)	Long. Weak Bending M _{LW/Pile} (kip-ft)	P _u /P _r	Trans. Strong M _{ux} /M _{rx}	Tran. Weak M _{uy} /M _{ry}	Long. Strong M _{ux} /M _{rx}	Long. Weak M _{uy} /M _{ry}	Trans. Strong Interaxn. (6.9.2.2)	Long. Strong Interaxn. (6.9.2.2)						
			F _v (kips)	F _r (kips)	F _L (kips)	M _T (kip-ft)	M _L (kip-ft)	T (kip-ft)	F _{add.} (kips)	F _{TB} (kips)	F _{LB} (kips)	F _{TP} (kips)	F _{LP} (kips)																		
2	STR V	83725	-12379	8	549	1008	-49150	158	-3022	0	0	8	549	814.8	0.0	0.0	0.5	2.5	34.3	171.6	0.0	0.0	0.32	0.00	0.00	0.08	0.00	0.00	0.40	≤ 1.0	O.K.
2	STR V	83845	-12326	-14	561	-30	-49819	139	-3022	0	0	14	561	821.5	0.0	0.0	0.9	4.4	35.1	175.3	0.0	0.0	0.33	0.00	0.00	0.08	0.00	0.00	0.41	≤ 1.0	O.K.
2	STR V	84077	-12177	-141	555	-4556	-48223	680	-3022	0	0	141	555	872.4	0.0	0.0	8.8	44.1	34.7	173.4	0.0	0.0	0.35	0.00	0.05	0.08	0.00	0.00	0.46	≤ 1.0	O.K.
2	STR V	84452	-11860	-270	526	-10760	-46644	580	-3022	0	0	270	526	929.1	0.0	0.0	16.9	84.4	32.9	164.4	0.0	0.0	0.37	0.00	0.09	0.08	0.00	0.00	0.52	≤ 1.0	O.K.
2	STR V	84455	-10240	-297	475	-13850	-43504	-674	-3022	0	0	297	475	868.7	0.0	0.0	18.6	92.8	29.7	148.4	0.0	0.0	0.34	0.00	0.10	0.07	0.00	0.00	0.50	≤ 1.0	O.K.
2	STR V	84460	-11748	-251	542	-11350	-48791	-46	-3022	0	0	251	542	919.7	0.0	0.0	15.7	78.4	33.9	169.4	0.0	0.0	0.36	0.00	0.08	0.08	0.00	0.00	0.51	≤ 1.0	O.K.
2	STR V	85157	-12476	83	-373	6764	32638	-1071	-3022	0	0	83	373	988.3	0.0	0.0	5.2	25.9	23.3	116.6	0.0	0.0	0.39	0.00	0.03	0.06	0.00	0.00	0.47	≤ 1.0	O.K.
2	STR V	85187	-12476	83	-438	6764	38513	-950	-3022	0	0	83	438	1004.8	0.0	0.0	5.2	25.9	27.4	136.9	0.0	0.0	0.40	0.00	0.03	0.07	0.00	0.00	0.48	≤ 1.0	O.K.
2	STR V	85278	-11566	164	-275	7271	26382	1040	-3022	0	0	164	275	899.4	0.0	0.0	10.3	51.3	17.2	85.9	0.0	0.0	0.36	0.00	0.06	0.04	0.00	0.00	0.44	≤ 1.0	O.K.
2	STR V	86267	-12179	-41	-501	856	43342	-780	-3022	0	0	41	501	1068.4	0.0	0.0	2.6	12.8	31.3	156.6	0.0	0.0	0.42	0.00	0.01	0.08	0.00	0.00	0.50	≤ 1.0	O.K.
2	STR V	86455	-12280	66	-495	4438	43712	-254	-3022	0	0	66	495	1030.4	0.0	0.0	4.1	20.6	30.9	154.7	0.0	0.0	0.41	0.00	0.02	0.07	0.00	0.00	0.49	≤ 1.0	O.K.
2	STR V	86507	-12423	61	-475	5726	41454	-885	-3022	0	0	61	475	1021.8	0.0	0.0	3.8	19.1	29.7	148.4	0.0	0.0	0.41	0.00	0.02	0.07	0.00	0.00	0.49	≤ 1.0	O.K.
2	STR V	87335	-5474	-271	250	-13161	-23243	-683	-3022	0	0	271	250	618.2	0.0	0.0	16.9	84.7	15.6	78.1	0.0	0.0	0.25	0.00	0.09	0.04	0.00	0.00	0.36	≤ 1.0	O.K.

HNTB The HNTB Companies Engineers Architects Planners	Made	DSB	Date	10/14/2011	Job No.	49633	
	Checked	KDG	Date	10/18/2011			
For	Cleveland Innerbelt	Backchk'd	DSB	Date	10/18/2011	Sheet No.	3

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Pier Design - Pile Group Combined Pile Stresses
Main Viaduct (Pier 6) Pile 2-51

Pile Size = **HP18x204**
 No. of Trans. Strong Axis Piles = **0** (N_{TS})
 No. of Trans. Weak Axis Piles = **18** (N_{TW})
 No. of Long. Strong Axis Piles = **18** (N_{LS})
 No. of Long. Weak Axis Piles = **0** (N_{LW})
 Total No. of Piles = **18** ea.

Trans. Pile Batter = horiz. in vertical
 Long. Pile Batter = horiz. in vertical

Transverse Battered Piles

Pile Row	No. of Piles *	SM _T (ft)
1		
2		
3		
4		

Longitudinal Battered Piles

Pile Row	No. of Piles *	SM _L (ft)
1		
2		
3		
4		

F_y = **60** ksi
 E = **29,000** ksi
 k = **1.2**
 L_b = **14.70** ft (assumed initially, calc. from Lpile analysis)
 Ag = **60** (consider using 10.7.3.13.4-1 & 2)
 Φ_r = **1.00** LRFD §6.5.4.2
 ST Φ_c = **0.70** LRFD §6.5.4.2
 EX Φ_c = **1.00** LRFD §6.5.5
 r_y = **4.32** in
 kL/r = **49.0** Nonslender: Q = 1.0
 P_e = **7152** kips
 P₀ = **3600** kips
 λ = **0.0** Set equal to 0 per AASHTO 10.7.3.13.1
 Q = **1.0** LRFD §6.9.4
 Redundancy Reduct. = **0%** LRFD §10.5.5.2.3

Footing Properties
 Width = **38.00** ft
 Length = **38.00** ft
 Depth = **12.00** ft
 Overburden = **4.00** ft
 Column Area = **164.00** ft²
 Unit Weight of Concrete = **0.150** kcf
 Unit Weight of Backfill = **0.120** kcf
 k_p = **3.95** (per S&W)
 fraction of full mobilization = **0.18** (Curve B)
 Φ_{ep} = **0.75** 10.5.5.2.2-1
 effective soil wt = **0.053** kcf (per S&W) ST
 Equivalent Fluid WT = **0.209** kcf (per S&W) EX
 P_p = **15.1** k/ft
 Passive Resistance = **77** kips
 direction to apply passive resistance = **LONG** LONG or TRANS

Pile / Group Properties
 SM_T = **176.0** ft
 SM_L = **338.4** ft
Strong Axis Properties
 I_x = **3450** in.⁴
 M_{rx} = **2002** kip-ft
Weak Axis Properties
 I_y = **1119** in.⁴
 M_{ry} = **926** kip-ft
 P_r = ΦP_n = **2520.0** kips LRFD §6.9.4.1
 P_r = ΦP_n = **3600.0** kips (2008 eqns)

Notes:
 * Use the actual number of battered piles which may be mobilized in the indicated direction.
 **Torsion not accounted for in this spreadsheet. Must examine torsional effects separately if significant loads exist.
 ***Earth + Footing Cap weight. -11264
 ****Assumed fixed fixed pile condition -12172.6

Footing No.	Load Group	Load Case	Top of Footing Loads							Lateral Resistance from Batter		Lateral Resistance from Pile Bending		Axial Force P _{u/Pile} (kips)	F _{TS/Pile} (kips)	Strong**** Bending M _{TS/Pile} (kip-ft)	Weak**** Bending M _{TW/Pile} (kip-ft)	Strong**** Bending M _{LS/Pile} (kip-ft)	Weak**** Bending M _{LW/Pile} (kip-ft)	P _u /P _r	Trans. Strong M _{ux} /M _{rx}	Tran. Weak M _{uy} /M _{ry}	Long. Strong M _{ux} /M _{rx}	Long. Weak M _{uy} /M _{ry}	Trans. Strong Interaxn. (6.9.2.2)	Long. Strong Interaxn. (6.9.2.2)			
			F _v (kips)	F _T (kips)	F _L (kips)	M _T (kip-ft)	M _L (kip-ft)	T** (kip-ft)	F _{add} *** (kips)	F _{TB} (kips)	F _{LB} (kips)	F _{TP} (kips)	F _{LP} (kips)																
1	STR I	12136	-8607	53	443	-216	-35711	-3054	-4048	0	0	53	366	585.1	0.0	0.0	2.9	21.6	149.3	0.0	0.23	0.00	0.02	0.07	0.00	0.00	0.32	≤ 1.0	O.K.
1	STR I	12140	-8607	55	621	-439	-52212	-1018	-4048	0	0	55	544	528.9	0.0	0.0	3.1	22.5	222.0	0.0	0.21	0.00	0.02	0.11	0.00	0.00	0.33	≤ 1.0	O.K.
1	STR I	12153	-9703	-10	4	-1484	-262	-129	-4048	0	0	10	0	753.9	0.0	0.0	0.6	4.1	0.0	0.0	0.30	0.00	0.00	0.00	0.00	0.00	0.30	≤ 1.0	O.K.
1	STR I	12160	-8607	18	185	-2350	-15146	-1030	-4048	0	0	18	108	640.5	0.0	0.0	1.0	7.4	44.0	0.0	0.25	0.00	0.01	0.02	0.00	0.00	0.28	≤ 1.0	O.K.
1	STR I	12161	-11285	80	994	-2491	-77211	-11264	-4048	0	0	80	917	580.6	0.0	0.0	4.4	32.7	374.3	0.0	0.23	0.00	0.04	0.19	0.00	0.00	0.43	≤ 1.0	O.K.
1	STR I	12172	-11360	95	451	-2205	-38167	-653	-4048	0	0	95	374	722.1	0.0	0.0	5.3	38.8	152.6	0.0	0.29	0.00	0.04	0.08	0.00	0.00	0.39	≤ 1.0	O.K.
1	STR I	12175	-12114	70	597	-1559	-50390	-751	-4048	0	0	70	520	724.6	0.0	0.0	3.9	28.6	212.2	0.0	0.29	0.00	0.03	0.11	0.00	0.00	0.41	≤ 1.0	O.K.
1	STR I	12190	-11283	31	-1254	-3243	106113	1332	-4048	0	0	31	1177	1192.5	0.0	0.0	1.7	12.7	480.5	0.0	0.47	0.00	0.01	0.24	0.00	0.00	0.70	≤ 1.0	O.K.
1	STR I	12191	-12000	55	41	-5601	-1255	-3502	-4048	0	0	55	0	858.8	0.0	0.0	3.1	22.5	0.0	0.0	0.34	0.00	0.02	0.00	0.00	0.00	0.36	≤ 1.0	O.K.
1	STR I	12205	-6669	48	1383	-175	-116827	-1842	-4048	0	0	48	1306	204.3	0.0	0.0	2.7	19.6	533.2	0.0	0.08	0.00	0.02	0.27	0.00	0.00	0.33	≤ 1.0	O.K.
1	STR I	12221	-6615	23	538	-3243	-38475	-11163	-4048	0	0	23	461	443.7	0.0	0.0	1.3	9.4	188.1	0.0	0.18	0.00	0.01	0.09	0.00	0.00	0.19	≤ 1.0	O.K.
1	STR I	12226	-6579	23	-887	-3189	68661	10255	-4048	0	0	23	810	807.3	0.0	0.0	1.3	9.4	330.6	0.0	0.32	0.00	0.01	0.17	0.00	0.00	0.48	≤ 1.0	O.K.
1	STR I	12230	-6614	12	-1274	-2084	107783	1446	-4048	0	0	12	1197	944.1	0.0	0.0	0.7	4.9	488.6	0.0	0.37	0.00	0.01	0.24	0.00	0.00	0.60	≤ 1.0	O.K.
1	STIII	12281	-7177	387	254	15949	-21508	-220	-4048	0	0	387	177	669.0	0.0	0.0	21.5	158.0	72.1	0.0	0.27	0.00	0.17	0.04	0.00	0.00	0.45	≤ 1.0	O.K.
1	STIII	12317	-9464	-323	-181	-18534	15558	-232	-4048	0	0	323	104	674.8	0.0	0.0	17.9	131.9	42.3	0.0	0.27	0.00	0.14	0.02	0.00	0.00	0.41	≤ 1.0	O.K.
1	STIII	12323	-8775	19	-698	-2400	56663	-234	-4048	0	0	19	621	891.3	0.0	0.0	1.1	7.8	253.4	0.0	0.35	0.00	0.01	0.13	0.00	0.00	0.47	≤ 1.0	O.K.
1	STIII	12329	-8819	396	262	15418	-22146	-256	-4048	0	0	396	185	755.6	0.0	0.0	22.0	161.7	75.4	0.0	0.30	0.00	0.17	0.04	0.00	0.00	0.49	≤ 1.0	O.K.
1	STIII	12330	-9773	367	420	12653	-34866	-255	-4048	0	0	367	343	747.7	0.0	0.0	20.4	149.9	139.9	0.0	0.30	0.00	0.16	0.07	0.00	0.00	0.50	≤ 1.0	O.K.
1	STIII	12335	-10417	65	779	-1020	-63251	-254	-4048	0	0	65	702	588.6	0.0	0.0	3.6	26.5	286.5	0.0	0.23	0.00	0.03	0.14	0.00	0.00	0.39	≤ 1.0	O.K.
1	STIII	12337	-10670	-59	768	-6519	-62637	-253	-4048	0	0	59	691	565.2	0.0	0.0	3.3	24.1	282.0	0.0	0.22	0.00	0.03	0.14	0.00	0.00	0.37	≤ 1.0	O.K.
1	STIII	12338	-10899	-161	686	-11243	-56142	-253	-4048	0	0	161	609	566.2	0.0	0.0	8.9	65.7	248.5	0.0	0.22	0.00	0.07	0.12	0.00	0.00	0.40	≤ 1.0	O.K.
1	STIII	12339	-11016	-215	577	-13700	-47504	-253	-4048	0	0	215	500	584.4	0.0	0.0	11.9	87.8	204.0	0.0	0.23	0.00	0.09	0.10	0.00	0.00	0.41	≤ 1.0	O.K.
1	STIII	12341	-11106	-277	262	-17154	-22146	-256	-4048	0	0	277	185	651.7	0.0	0.0	15.4	113.1	75.4	0.0	0.26	0.00	0.12	0.04	0.00	0.00	0.40	≤ 1.0	O.K.
1	STIII	12365	-11106	-314	-174	-19065	14920	-268	-4048	0	0	314	97	761.5	0.0	0.0	17.4	128.2	39.5	0.0	0.30	0.00	0.14	0.02	0.00	0.00	0.44	≤ 1.0	O.K.
1	STIII	12367	-11016	-252	-489	-15611	40278	-270	-4048	0	0	252	412	866.4	0.0	0.0	14.0	102.9	168.1	0.0	0.34	0.00	0.11	0.08	0.00	0.00	0.52	≤ 1.0	O.K.
1	STIII	12369	-10669	-96	-679	-8430	55411	-271	-4048	0	0	96	602	950.1	0.0	0.0	5.3	39.2	245.7	0.0	0.38	0.00	0.04	0.12	0.00	0.00	0.52	≤ 1.0	O.K.
1	STIII	12380	-5265	271	665	10364	-54472	-139	-4048	0	0	271	588	411.1	0.0	0.0	15.1	110.7	240.0	0.0	0.16	0.00	0.12	0.12	0.00	0.00	0.32	≤ 1.0	O.K.
1	STIII	12413	-6436	-333	-194	-17906	16590	-154	-4048	0	0	333	117	513.0	0.0	0.0	18.5	136.0	47.6	0.0	0.20	0.00	0.15	0.02	0.00	0.00	0.36	≤ 1.0	O.K.
1	STIII	12419	-5747	9	-711	-1772	57695	-155	-4048	0	0	9	634	729.5	0.0	0.0	0.5	3.7	258.8	0.0	0.29	0.00	0.00	0.13	0.00	0.00	0.41	≤ 1.0	O.K.

HNTB	The HNTB Companies Engineers Architects Planners	Made	DSB	Date	10/14/2011	Job Number	49633
		Checked	KDG	Date	10/18/2011		
For	Cleveland Innerbelt	Backchk'd	DSB	Date	10/18/2011	Sheet No.	4

N:\49633\Bridges\Design\Final Design\Unit 2\Excel\Substructure\Pile Bending\RFI 00116\HP18x204_Pier6_Pile2-51.xls|Pile Bending

Pier Design - Pile Group Combined Pile Stresses
Main Viaduct (Pier 6)

Footing No.	Load Group	Load Case	Top of Footing Loads					Lateral Resistance from Batter			Lateral Resistance from Pile Bending		Trans. Axial Force P _{uT/Pile} (kips)	Trans. Strong Bending M _{TS/Pile} (kip-ft)	Trans. Weak Bending M _{TW/Pile} (kip-ft)	Long. Strong Bending M _{LS/Pile} (kip-ft)	Long. Weak Bending M _{LW/Pile} (kip-ft)	P _u /P _r	Trans. Strong M _{ux} /M _{rx}	Tran. Weak M _{uy} /M _{ry}	Long. Strong M _{ux} /M _{rx}	Long. Weak M _{uy} /M _{ry}	Trans. Strong Interaxn. (6.9.2.2)	Long. Strong Interaxn. (6.9.2.2)					
			F _v (kips)	F _T (kips)	F _L (kips)	M _T (kip-ft)	M _L (kip-ft)	T (kip-ft)	F _{add.} (kips)	F _{TB} (kips)	F _{LB} (kips)	F _{TP} (kips)															F _{LP} (kips)		
1	STRIV	12473	-10530.6	62	262	-851	-22103	-265	-4698	0	0	62	185	771.7	0.0	0.0	3.4	25.3	75.4	0.0	0.31	0.00	0.03	0.04	0.00	0.00	0.36	≤ 1.0	O.K.
1	STRIV	12474	-10530.6	25	-174	-2762	14963	-278	-4698	0	0	25	97	881.5	0.0	0.0	1.4	10.2	39.5	0.0	0.35	0.00	0.01	0.02	0.00	0.00	0.38	≤ 1.0	O.K.
1	STRIV	12475	-12172.6	71	269	-1382	-22741	-301	-4698	0	0	71	192	858.4	0.0	0.0	3.9	29.0	78.3	0.0	0.34	0.00	0.03	0.04	0.00	0.00	0.40	≤ 1.0	O.K.
1	STRIV	12476	-12171.6	34	-166	-3293	14325	-313	-4698	0	0	34	89	968.1	0.0	0.0	1.9	13.9	36.2	0.0	0.38	0.00	0.01	0.02	0.00	0.00	0.41	≤ 1.0	O.K.
1	STRIV	12477	-10530.6	62	262	-851	-22103	-265	-4698	0	0	62	185	771.7	0.0	0.0	3.4	25.3	75.4	0.0	0.31	0.00	0.03	0.04	0.00	0.00	0.36	≤ 1.0	O.K.
1	STRIV	12479	-12172.6	71	269	-1382	-22741	-301	-4698	0	0	71	192	858.4	0.0	0.0	3.9	29.0	78.3	0.0	0.34	0.00	0.03	0.04	0.00	0.00	0.40	≤ 1.0	O.K.
1	STRIV	12480	-12171.6	34	-166	-3293	14325	-313	-4698	0	0	34	89	968.1	0.0	0.0	1.9	13.9	36.2	0.0	0.38	0.00	0.01	0.02	0.00	0.00	0.41	≤ 1.0	O.K.
1	STR V	12496	-8373	169	400	5072	-32465	-2406	-4048	0	0	169	323	621.2	0.0	0.0	9.4	69.0	131.8	0.0	0.25	0.00	0.07	0.07	0.00	0.00	0.37	≤ 1.0	O.K.
1	STR V	12960	-8405	158	483	4300	-40782	-836	-4048	0	0	158	406	590.3	0.0	0.0	8.8	64.5	165.7	0.0	0.23	0.00	0.07	0.08	0.00	0.00	0.37	≤ 1.0	O.K.
1	STR V	13213	-9764	-119	-38	-7043	3354	-153	-4048	0	0	119	0	730.0	0.0	0.0	6.6	48.6	0.0	0.0	0.29	0.00	0.05	0.00	0.00	0.00	0.34	≤ 1.0	O.K.
1	STR V	13220	-8918	-97	101	-7712	-8128	-848	-4048	0	0	97	24	643.2	0.0	0.0	5.4	39.6	9.7	0.0	0.26	0.00	0.04	0.00	0.00	0.00	0.30	≤ 1.0	O.K.
1	STR V	13440	-8404	122	47	2389	-3717	-848	-4048	0	0	122	0	701.6	0.0	0.0	6.8	49.8	0.0	0.0	0.28	0.00	0.05	0.00	0.00	0.00	0.33	≤ 1.0	O.K.
1	STR V	13441	-10814	192	827	3196	-64624	-8748	-4048	0	0	192	750	637.5	0.0	0.0	10.7	78.4	306.1	0.0	0.25	0.00	0.08	0.15	0.00	0.00	0.46	≤ 1.0	O.K.
1	STR V	13452	-10872	204	408	3417	-34505	-562	-4048	0	0	204	331	746.7	0.0	0.0	11.3	83.3	135.0	0.0	0.30	0.00	0.09	0.07	0.00	0.00	0.44	≤ 1.0	O.K.
1	STR V	13455	-11453	184	520	3915	-43934	-638	-4048	0	0	184	443	748.6	0.0	0.0	10.2	75.1	180.8	0.0	0.30	0.00	0.08	0.09	0.00	0.00	0.45	≤ 1.0	O.K.
1	STR V	13561	-11087	76	1004	-2155	-78830	-8747	-4048	0	0	76	927	566.1	0.0	0.0	4.2	31.0	378.4	0.0	0.22	0.00	0.03	0.19	0.00	0.00	0.42	≤ 1.0	O.K.
1	STR V	13605	-11222	25	1316	-3159	-110504	-1566	-4048	0	0	25	1239	459.8	0.0	0.0	1.4	10.2	505.8	0.0	0.18	0.00	0.01	0.25	0.00	0.00	0.35	≤ 1.0	O.K.
1	STR V	13625	-11308	-10	1288	-4816	-108260	-1566	-4048	0	0	10	1211	460.4	0.0	0.0	0.6	4.1	494.4	0.0	0.18	0.00	0.00	0.25	0.00	0.00	0.34	≤ 1.0	O.K.
1	STR V	13655	-11951	-27	629	-5845	-52734	-637	-4048	0	0	27	552	676.5	0.0	0.0	1.5	11.0	225.3	0.0	0.27	0.00	0.01	0.11	0.00	0.00	0.38	≤ 1.0	O.K.
1	STR V	13695	-11999	-47	520	-6786	-43934	-638	-4048	0	0	47	443	702.4	0.0	0.0	2.6	19.2	180.8	0.0	0.28	0.00	0.02	0.09	0.00	0.00	0.38	≤ 1.0	O.K.
1	STR V	14171	-11911	-67	-8	-10341	2442	-2763	-4048	0	0	67	0	830.7	0.0	0.0	3.7	27.4	0.0	0.0	0.33	0.00	0.03	0.00	0.00	0.00	0.36	≤ 1.0	O.K.
1	STR V	14210	-11309	-65	-1115	-7581	94069	965	-4048	0	0	65	1038	1122.3	0.0	0.0	3.6	26.5	423.7	0.0	0.45	0.00	0.03	0.21	0.00	0.00	0.66	≤ 1.0	O.K.
1	STR V	14250	-11179	-11	-1180	-5069	99299	964	-4048	0	0	11	1103	1150.7	0.0	0.0	0.6	4.5	450.3	0.0	0.46	0.00	0.00	0.22	0.00	0.00	0.66	≤ 1.0	O.K.
1	STR V	14465	-6278	124	1268	3451	-106590	-1452	-4048	0	0	124	1191	242.7	0.0	0.0	6.9	50.6	486.2	0.0	0.10	0.00	0.05	0.24	0.00	0.00	0.35	≤ 1.0	O.K.
1	STR V	14485	-6364	89	1295	1795	-108834	-1452	-4048	0	0	89	1218	228.1	0.0	0.0	4.9	36.3	497.2	0.0	0.09	0.00	0.04	0.25	0.00	0.00	0.33	≤ 1.0	O.K.
1	STR V	15121	-6690	-96	371	-8257	-25888	-8646	-4048	0	0	96	294	454.3	0.0	0.0	5.3	39.2	119.9	0.0	0.18	0.00	0.04	0.06	0.00	0.00	0.19	≤ 1.0	O.K.
1	STR V	15246	-6389	19	-905	-2865	70965	7874	-4048	0	0	19	828	805.7	0.0	0.0	1.1	7.8	338.0	0.0	0.32	0.00	0.01	0.17	0.00	0.00	0.48	≤ 1.0	O.K.
1	STR V	15290	-6321	53	-1201	-115	100970	1078	-4048	0	0	53	1124	919.0	0.0	0.0	2.9	21.6	458.8	0.0	0.36	0.00	0.02	0.23	0.00	0.00	0.59	≤ 1.0	O.K.