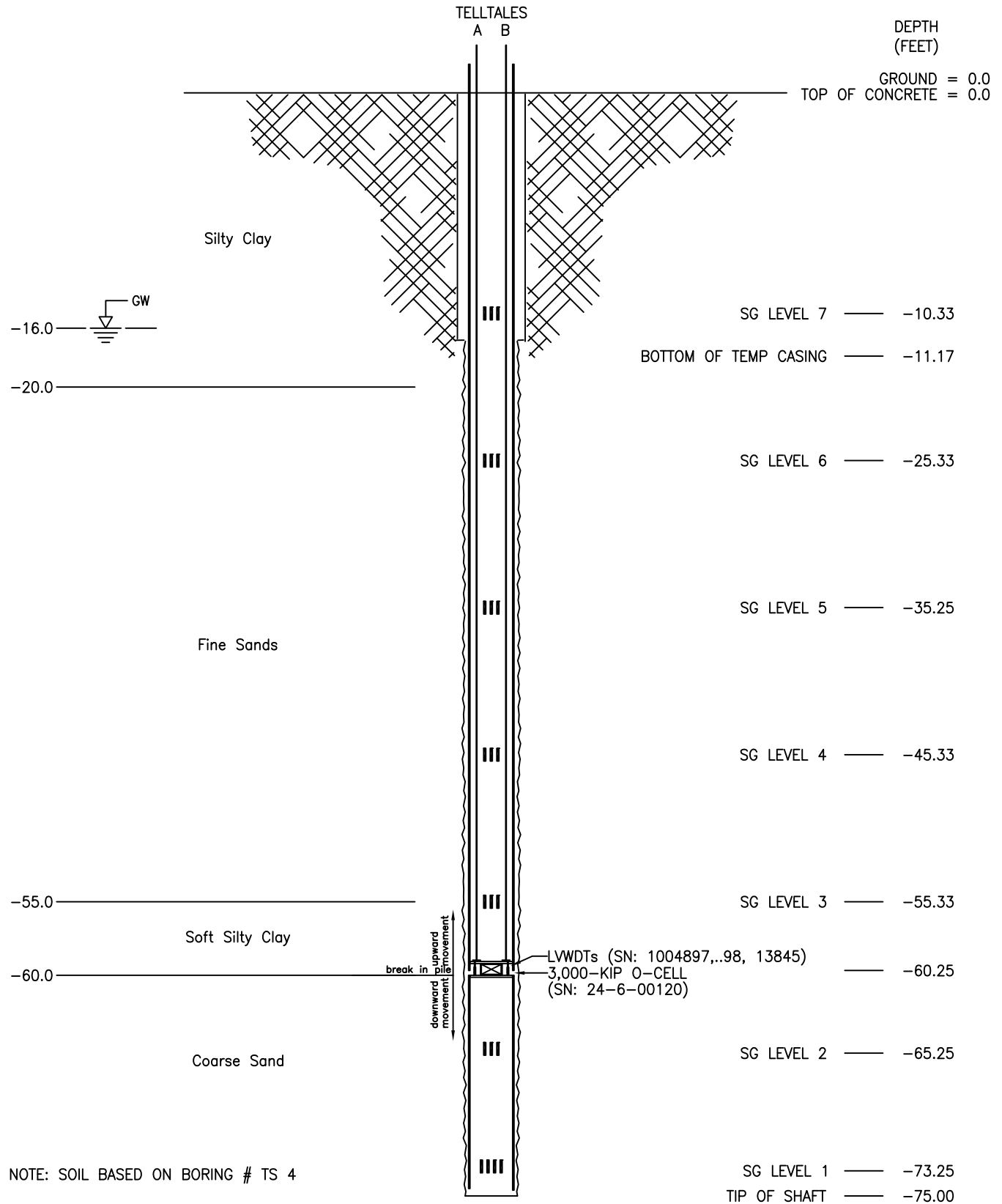


NOTE: NOMINAL SHAFT DIAMETER 60"Ø  
GROUND ELEVATION +987.65



NOTE: SOIL BASED ON BORING # TS 4



2631-D NW 41st St.  
Gainesville, FL 32606  
Phone: 800-368-1138  
FAX: 352-378-3934

## SCHEMATIC SECTION OF TEST SHAFT

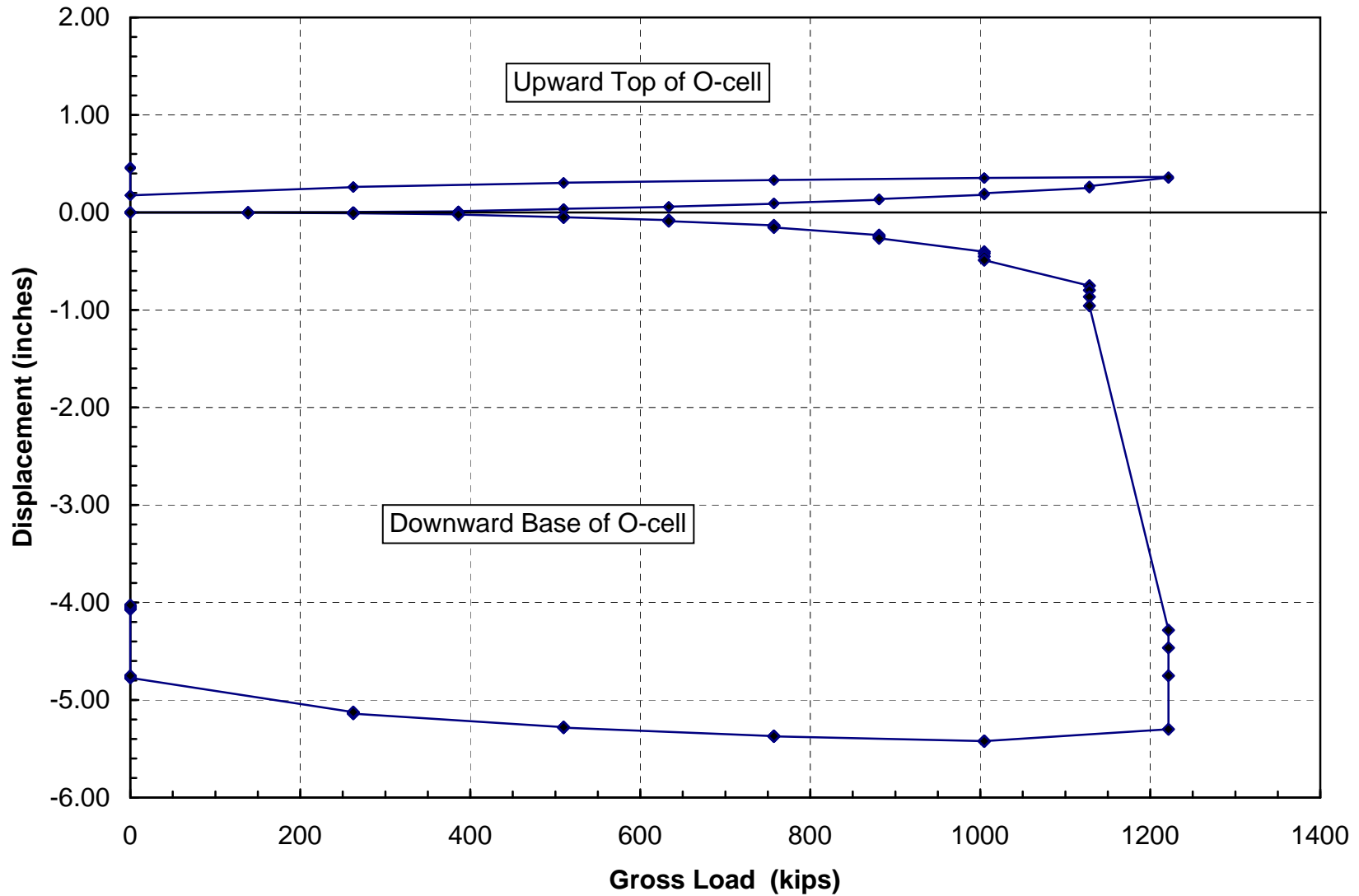
Broadyway Viaduct - Council Bluffs, IA

DWN BY: BDH	DATE: 06 Nov 2009	CHECKED BY:	LT-9640-1
REVISED BY: AJ5	DATE: 10 May 2010	SCALE: NTS	<b>FIGURE A</b>



## Osterberg Cell Load vs. Displacement Plots

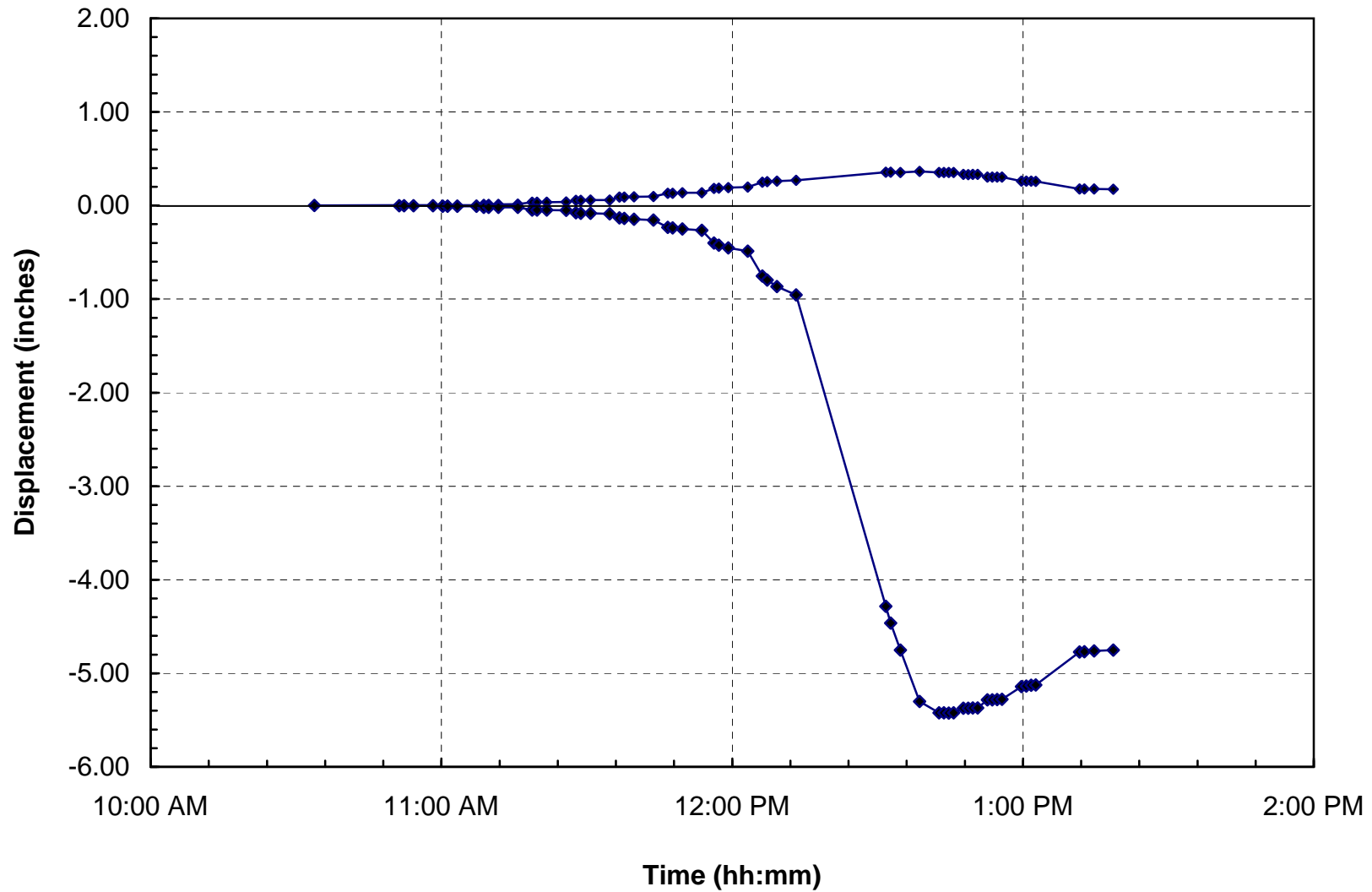
Broadway Viaduct - Council Bluffs, IA - TS 4





## Osterberg Cell Time vs. Displacement Plots

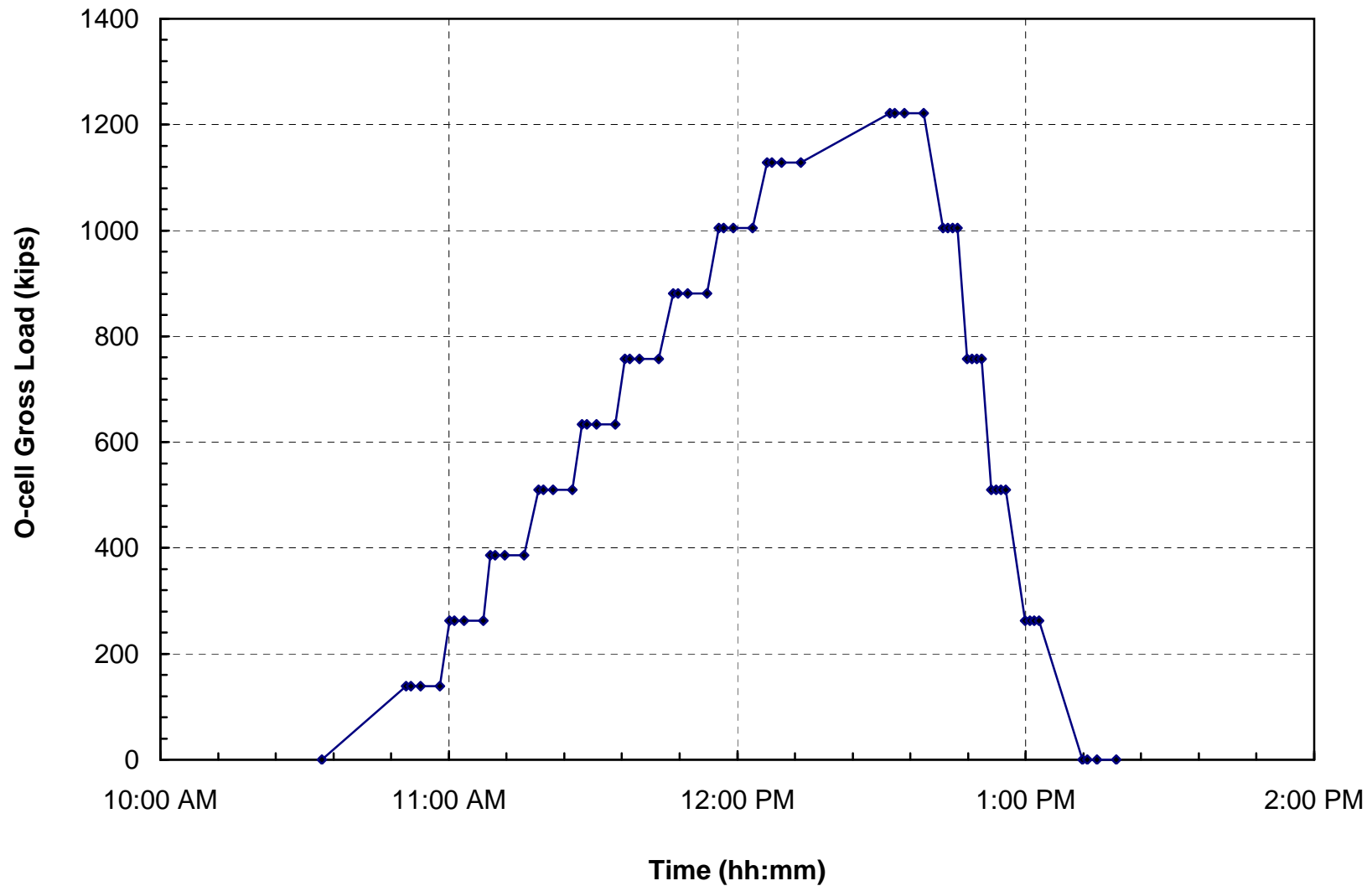
Broadway Viaduct - Council Bluffs, IA - TS 4





## Osterberg Cell Load vs. Time

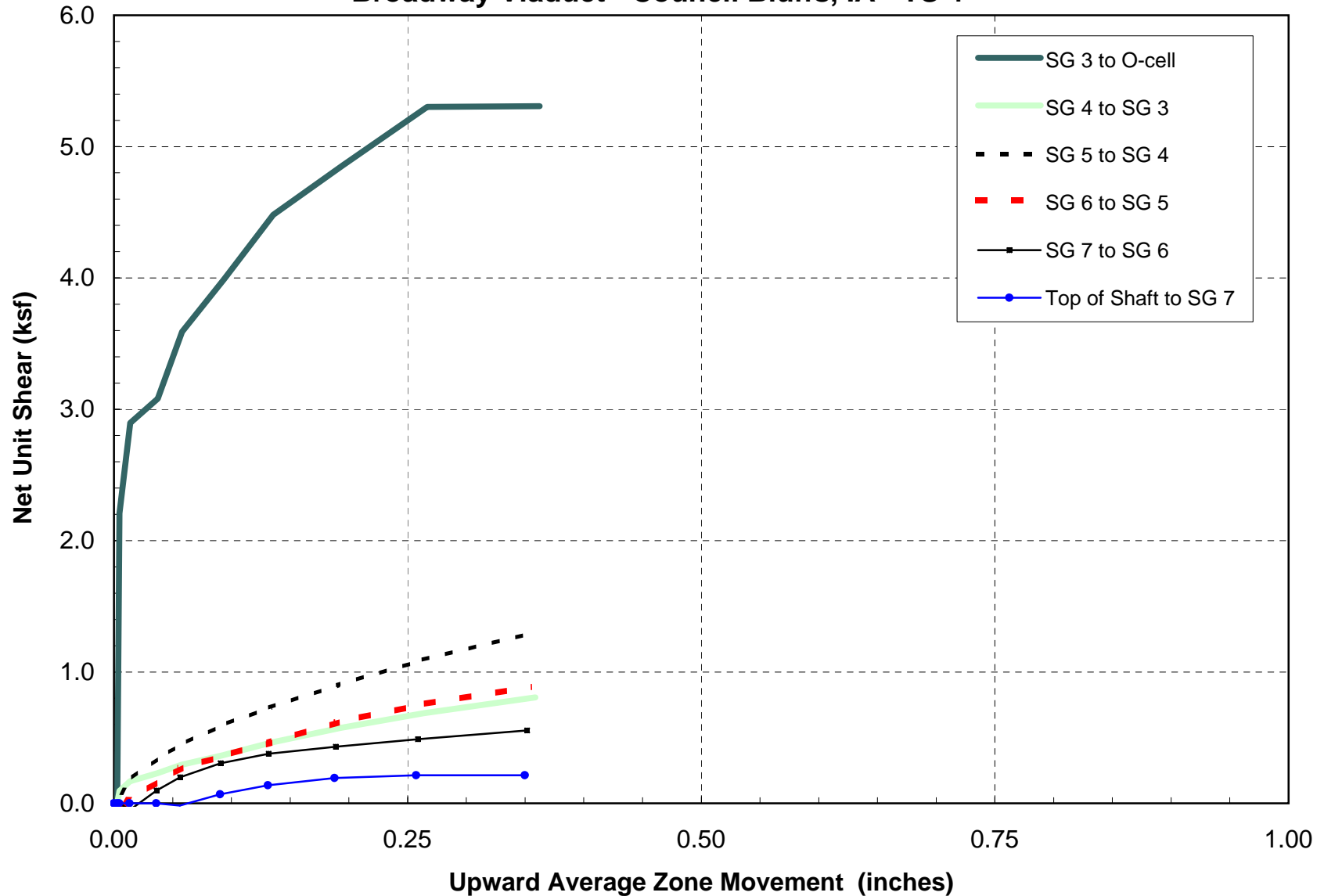
Broadway Viaduct - Council Bluffs, IA - TS 4





## Net Unit Shear vs. Upward Average Zone Movement

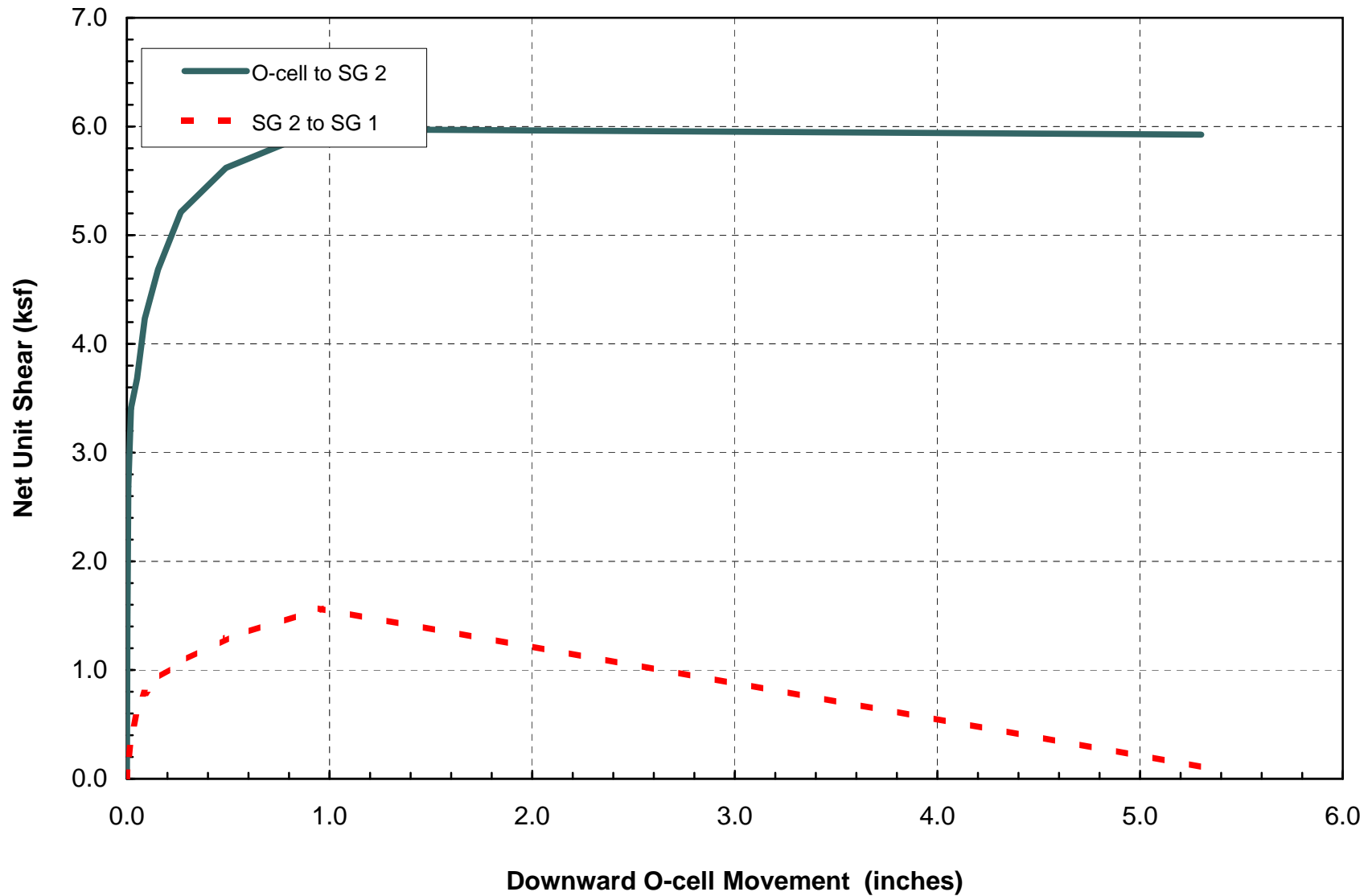
Broadway Viaduct - Council Bluffs, IA - TS 4





## Net Unit Shear vs. Downward O-cell Movement

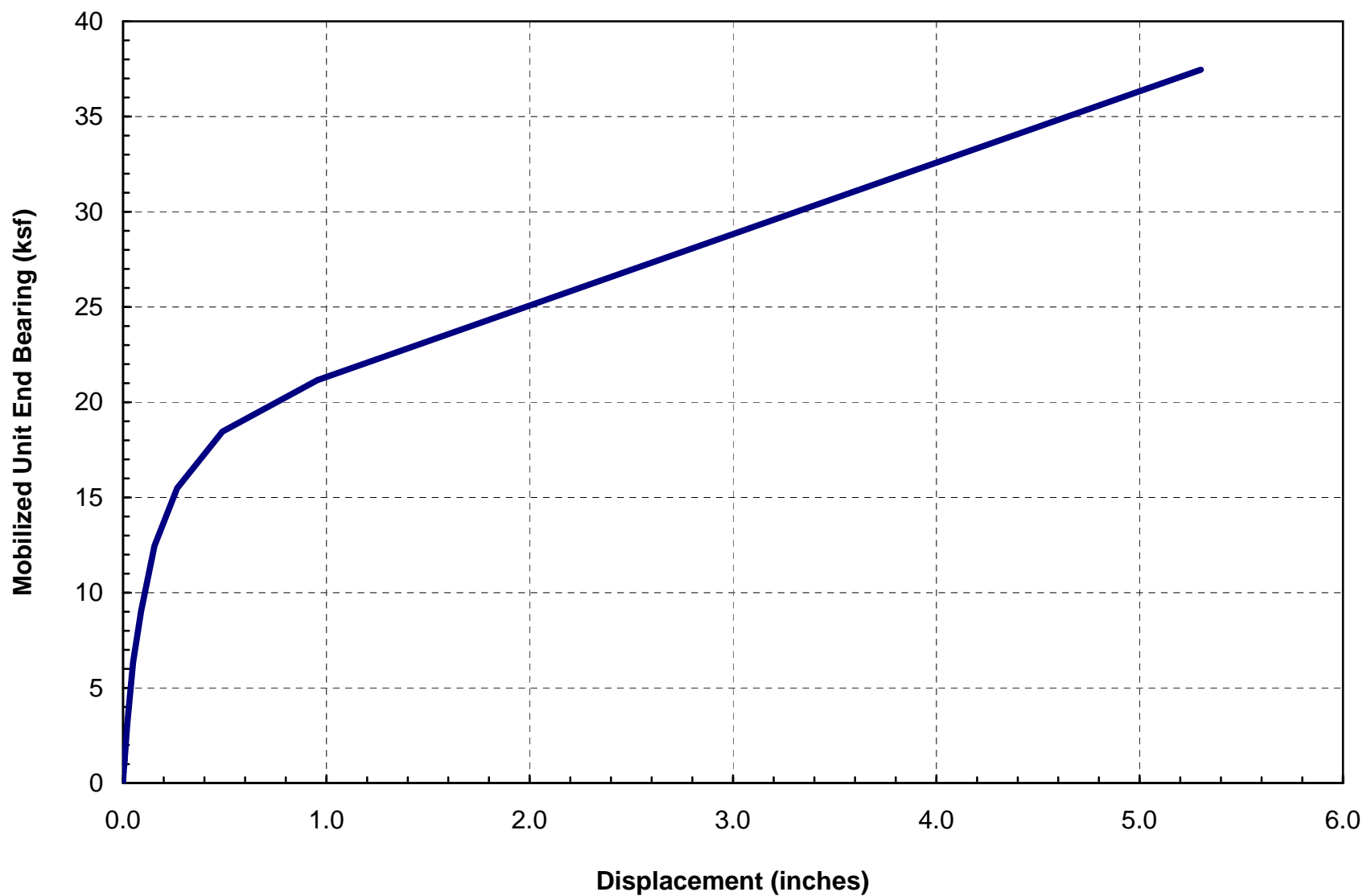
Broadway Viaduct - Council Bluffs, IA - TS 4





## Mobilized Unit End Bearing vs. Downward O-cell Displacement

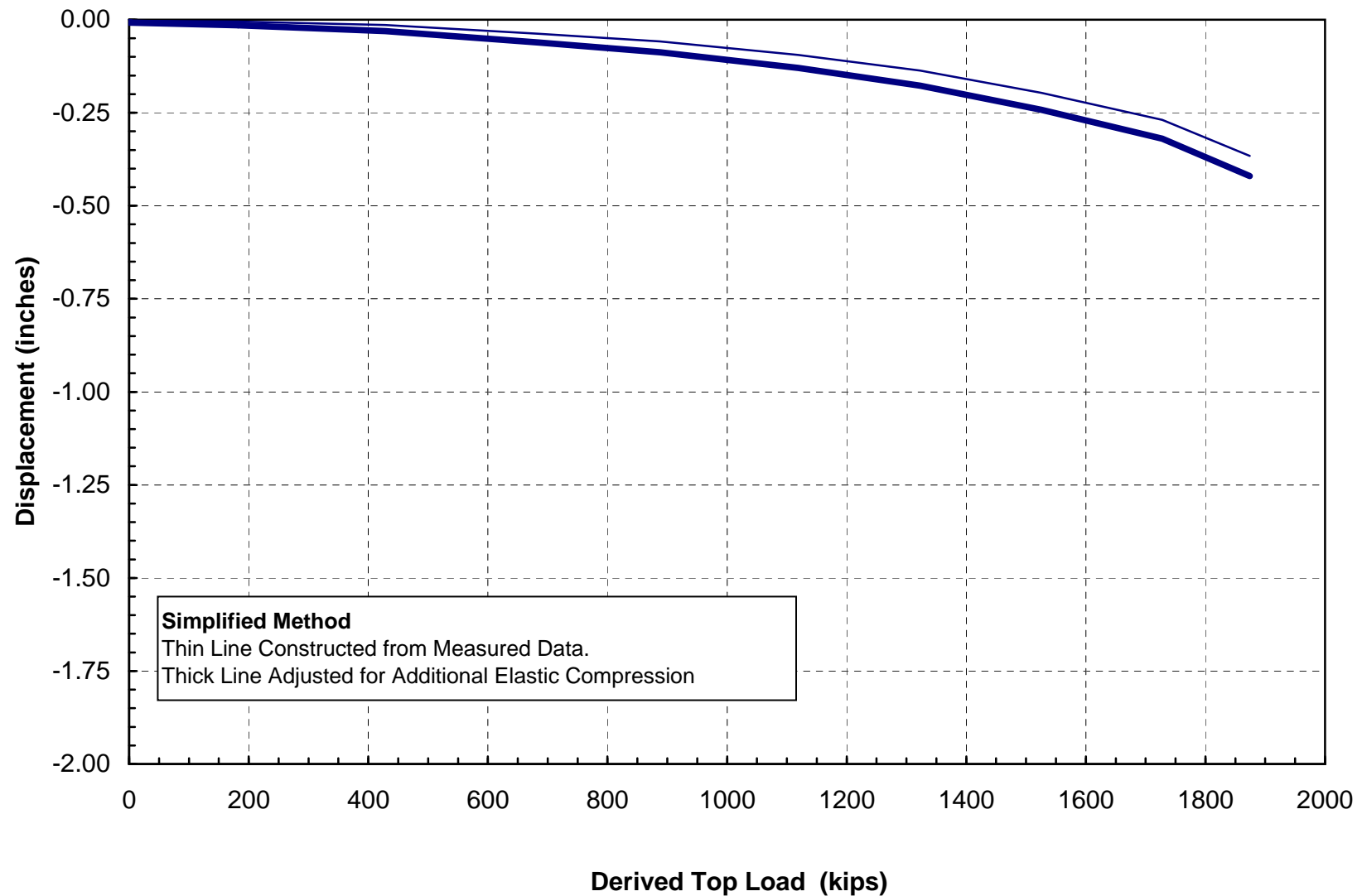
### Broadway Viaduct - Council Bluffs, IA - TS 4





## Derived Top Load-Displacement Plots

Broadway Viaduct - Council Bluffs, IA - TS 4





# Top of Shaft Movement and Compression

## Broadway Viaduct - Council Bluffs, IA - TS 4

Load Test Increment	Time (h:m:s)	Time After Start Minutes	O-cell Pressure (psi)	Applied Load (kips)	Net Load (kips)	TOS Indicator Readings			Telltale Compression		
						Side A (inches)	Side B (inches)	Average (inches)	Side A (inches)	Side B (inches)	Average (inches)
1L -0	10:34:00	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000
1L -1	10:51:30	1	400	139	0	0.003	0.002	0.003	0.001	0.000	0.001
1L -1	10:52:30	2	400	139	0	0.002	0.000	0.001	0.001	0.000	0.001
1L -1	10:54:30	4	400	139	0	0.003	0.002	0.003	0.001	0.000	0.001
1L -1	10:58:30	8	400	139	0	0.002	0.002	0.002	0.001	0.000	0.001
1L -2	11:00:30	1	800	262	121	0.003	0.002	0.003	0.001	0.000	0.001
1L -2	11:01:30	2	800	262	121	0.003	0.003	0.003	0.001	0.000	0.001
1L -2	11:03:30	4	800	262	121	0.004	0.004	0.004	0.001	0.000	0.001
1L -2	11:07:30	8	800	262	121	0.004	0.004	0.004	0.001	0.000	0.001
1L -3	11:09:00	1	1,200	386	244	0.010	0.010	0.010	0.002	0.001	0.002
1L -3	11:10:00	2	1,200	386	244	0.010	0.010	0.010	0.003	0.001	0.002
1L -3	11:12:00	4	1,200	386	244	0.011	0.011	0.011	0.003	0.001	0.002
1L -3	11:16:00	8	1,200	386	244	0.012	0.012	0.012	0.003	0.001	0.002
1L -4	11:19:00	1	1,600	510	368	0.030	0.029	0.030	0.006	0.004	0.005
1L -4	11:20:00	2	1,600	510	368	0.031	0.029	0.030	0.006	0.004	0.005
1L -4	11:22:00	4	1,600	510	368	0.032	0.030	0.031	0.006	0.004	0.005
1L -4	11:26:00	8	1,600	510	368	0.033	0.032	0.033	0.007	0.004	0.005
1L -5	11:28:00	1	2,000	634	492	0.050	0.048	0.049	0.009	0.006	0.007
1L -5	11:29:00	2	2,000	634	492	0.049	0.048	0.049	0.009	0.006	0.007
1L -5	11:31:00	4	2,000	634	492	0.052	0.049	0.051	0.009	0.006	0.007
1L -5	11:35:00	8	2,000	634	492	0.051	0.050	0.051	0.009	0.007	0.008
1L -6	11:37:00	1	2,400	757	616	0.079	0.079	0.079	0.012	0.009	0.010
1L -6	11:38:00	2	2,400	757	616	0.081	0.080	0.081	0.012	0.009	0.010
1L -6	11:40:00	4	2,400	757	616	0.084	0.082	0.083	0.012	0.009	0.010
1L -6	11:44:00	8	2,400	757	616	0.086	0.083	0.085	0.012	0.008	0.010
1L -7	11:47:00	1	2,800	881	739	0.118	0.117	0.118	0.014	0.010	0.012
1L -7	11:48:00	2	2,800	881	739	0.120	0.119	0.120	0.014	0.010	0.012
1L -7	11:50:00	4	2,800	881	739	0.123	0.122	0.123	0.014	0.011	0.013
1L -7	11:54:00	8	2,800	881	739	0.125	0.124	0.125	0.014	0.011	0.013
1L -8	11:56:30	1	3,200	1,005	863	0.168	0.167	0.168	0.017	0.012	0.014
1L -8	11:57:30	2	3,200	1,005	863	0.173	0.171	0.172	0.017	0.012	0.015
1L -8	11:59:30	4	3,200	1,005	863	0.177	0.176	0.177	0.017	0.012	0.015
1L -8	12:03:30	8	3,200	1,005	863	0.183	0.181	0.182	0.017	0.012	0.015
1L -9	12:06:30	1	3,600	1,128	987	0.234	0.234	0.234	0.019	0.014	0.017
1L -9	12:07:30	2	3,600	1,128	987	0.240	0.238	0.239	0.019	0.014	0.017
1L -9	12:09:30	4	3,600	1,128	987	0.246	0.244	0.245	0.019	0.014	0.017
1L -9	12:13:30	8	3,600	1,128	987	0.254	0.251	0.253	0.019	0.014	0.017
1L -10	12:32:00	1	3,900	1,221	1,079	0.339	0.338	0.339	0.022	0.015	0.019
1L -10	12:33:00	2	3,900	1,221	1,079	0.338	0.334	0.336	0.022	0.015	0.019
1L -10	12:35:00	4	3,900	1,221	1,079	0.337	0.330	0.334	0.023	0.015	0.019
1L -10	12:39:00	8	3,900	1,221	1,079	0.348	0.346	0.347	0.023	0.015	0.019
1U - 1	12:43:00	1	3,200	1,005	863	0.336	0.334	0.335	0.021	0.015	0.018
1U - 1	12:44:00	2	3,200	1,005	863	0.336	0.333	0.335	0.021	0.015	0.018
1U - 1	12:45:00	3	3,200	1,005	863	0.335	0.333	0.334	0.021	0.015	0.018
1U - 1	12:46:00	4	3,200	1,005	863	0.336	0.334	0.335	0.021	0.015	0.018
1U - 2	12:48:00	1	2,400	757	616	0.318	0.313	0.316	0.019	0.013	0.016
1U - 2	12:49:00	2	2,400	757	616	0.316	0.313	0.315	0.019	0.013	0.016
1U - 2	12:50:00	3	2,400	757	616	0.317	0.314	0.316	0.019	0.013	0.016
1U - 2	12:51:00	4	2,400	757	616	0.318	0.313	0.316	0.019	0.013	0.016
1U - 3	12:53:00	1	1,600	510	368	0.292	0.289	0.291	0.017	0.011	0.014
1U - 3	12:54:00	2	1,600	510	368	0.291	0.288	0.290	0.017	0.011	0.014
1U - 3	12:55:00	3	1,600	510	368	0.291	0.288	0.290	0.017	0.011	0.014
1U - 3	12:56:00	4	1,600	510	368	0.291	0.288	0.290	0.017	0.011	0.014
1U - 4	13:00:00	1	800	262	121	0.252	0.249	0.251	0.013	0.008	0.011
1U - 4	13:01:00	2	800	262	121	0.252	0.249	0.251	0.013	0.008	0.011
1U - 4	13:02:00	3	800	262	121	0.250	0.248	0.249	0.013	0.008	0.011
1U - 4	13:03:00	4	800	262	121	0.250	0.247	0.249	0.013	0.008	0.011
1U - 5	13:12:00	1	0	0	0	0.172	0.169	0.171	0.008	0.005	0.006
1U - 5	13:13:00	2	0	0	0	0.171	0.168	0.170	0.008	0.005	0.006
1U - 5	13:15:00	4	0	0	0	0.171	0.168	0.170	0.008	0.005	0.006
1U - 5	13:19:00	8	0	0	0	0.170	0.167	0.169	0.008	0.005	0.006



## O-cell Expansion

### Broadway Viaduct - Council Bluffs, IA - TS 4

Load Test Increment	Time (h:m:s)	Time After Start Minutes	O-cell Pressure (psi)	Applied Load (kips)	Net Load (kips)	LVWDT Readings (Expansion)			
						1004897 (inches)	1004898 (inches)	13845 (inches)	Average <sup>1</sup> (inches)
1L -0	10:34:00	0	0	0	0	0.000	0.000	0.000	0.000
1L -1	10:51:30	1	400	139	0	0.005	0.005	0.005	0.005
1L -1	10:52:30	2	400	139	0	0.005	0.005	0.005	0.005
1L -1	10:54:30	4	400	139	0	0.005	0.005	0.005	0.005
1L -1	10:58:30	8	400	139	0	0.005	0.005	0.005	0.005
1L -2	11:00:30	1	800	262	121	0.011	0.011	0.010	0.011
1L -2	11:01:30	2	800	262	121	0.011	0.011	0.011	0.011
1L -2	11:03:30	4	800	262	121	0.012	0.012	0.011	0.012
1L -2	11:07:30	8	800	262	121	0.012	0.012	0.011	0.012
1L -3	11:09:00	1	1,200	386	244	0.030	0.030	0.028	0.030
1L -3	11:10:00	2	1,200	386	244	0.031	0.032	0.030	0.032
1L -3	11:12:00	4	1,200	386	244	0.033	0.034	0.032	0.034
1L -3	11:16:00	8	1,200	386	244	0.034	0.035	0.033	0.035
1L -4	11:19:00	1	1,600	510	368	0.082	0.083	0.080	0.082
1L -4	11:20:00	2	1,600	510	368	0.083	0.084	0.081	0.084
1L -4	11:22:00	4	1,600	510	368	0.085	0.086	0.083	0.086
1L -4	11:26:00	8	1,600	510	368	0.087	0.088	0.084	0.088
1L -5	11:28:00	1	2,000	634	492	0.134	0.136	0.134	0.135
1L -5	11:29:00	2	2,000	634	492	0.137	0.139	0.137	0.138
1L -5	11:31:00	4	2,000	634	492	0.141	0.143	0.141	0.142
1L -5	11:35:00	8	2,000	634	492	0.146	0.148	0.146	0.147
1L -6	11:37:00	1	2,400	757	616	0.219	0.223	0.220	0.221
1L -6	11:38:00	2	2,400	757	616	0.227	0.231	0.234	0.229
1L -6	11:40:00	4	2,400	757	616	0.237	0.241	0.239	0.239
1L -6	11:44:00	8	2,400	757	616	0.246	0.251	0.248	0.248
1L -7	11:47:00	1	2,800	881	739	0.359	0.366	0.359	0.363
1L -7	11:48:00	2	2,800	881	739	0.369	0.375	0.373	0.372
1L -7	11:50:00	4	2,800	881	739	0.383	0.389	0.383	0.386
1L -7	11:54:00	8	2,800	881	739	0.400	0.406	0.403	0.403
1L -8	11:56:30	1	3,200	1,005	863	0.580	0.587	0.585	0.584
1L -8	11:57:30	2	3,200	1,005	863	0.606	0.613	0.611	0.609
1L -8	11:59:30	4	3,200	1,005	863	0.639	0.647	0.643	0.643
1L -8	12:03:30	8	3,200	1,005	863	0.681	0.689	0.686	0.685
1L -9	12:06:30	1	3,600	1,128	987	0.998	1.008	1.006	1.003
1L -9	12:07:30	2	3,600	1,128	987	1.049	1.057	1.055	1.053
1L -9	12:09:30	4	3,600	1,128	987	1.122	1.132	1.131	1.127
1L -9	12:13:30	8	3,600	1,128	987	1.221	1.230	1.229	1.225
1L -10	12:32:00	1	3,900	1,221	1,079	4.638	4.644	4.655	4.641
1L -10	12:33:00	2	3,900	1,221	1,079	4.816	4.821	4.837	4.819
1L -10	12:35:00	4	3,900	1,221	1,079	5.103	5.104	5.118	5.103
1L -10	12:39:00	8	3,900	1,221	1,079	5.664	5.671	5.684	5.667
1U - 1	12:43:00	1	3,200	1,005	863	5.766	5.786	5.805	5.776
1U - 1	12:44:00	2	3,200	1,005	863	5.765	5.786	5.805	5.775
1U - 1	12:45:00	3	3,200	1,005	863	5.766	5.786	5.805	5.776
1U - 1	12:46:00	4	3,200	1,005	863	5.765	5.786	5.805	5.775
1U - 2	12:48:00	1	2,400	757	616	5.693	5.714	5.734	5.704
1U - 2	12:49:00	2	2,400	757	616	5.693	5.714	5.733	5.703
1U - 2	12:50:00	3	2,400	757	616	5.692	5.713	5.733	5.703
1U - 2	12:51:00	4	2,400	757	616	5.692	5.713	5.733	5.703
1U - 3	12:53:00	1	1,600	510	368	5.577	5.600	5.622	5.588
1U - 3	12:54:00	2	1,600	510	368	5.574	5.597	5.619	5.585
1U - 3	12:55:00	3	1,600	510	368	5.572	5.594	5.617	5.583
1U - 3	12:56:00	4	1,600	510	368	5.570	5.593	5.615	5.582
1U - 4	13:00:00	1	800	262	121	5.391	5.414	5.438	5.403
1U - 4	13:01:00	2	800	262	121	5.387	5.410	5.434	5.399
1U - 4	13:02:00	3	800	262	121	5.374	5.398	5.421	5.386
1U - 4	13:03:00	4	800	262	121	5.373	5.396	5.420	5.384
1U - 5	13:12:00	1	0	0	0	4.937	4.963	4.997	4.950
1U - 5	13:13:00	2	0	0	0	4.931	4.957	5.100	4.944
1U - 5	13:15:00	4	0	0	0	4.924	4.948	4.973	4.936
1U - 5	13:19:00	8	0	0	0	4.914	4.938	4.961	4.926

<sup>1</sup>LVWDT 13845 not included in average due to its orientation. LVWDT 1004897 and 1004898 are 180 degrees opposed.



DEEP FOUNDATION TESTING, EQUIPMENT SERVICES • SPECIALIZING IN OSTERBERG CELL (O-cell®) TECHNOLOGY

LOADTEST, Inc. Project No. LT-8###-#

# Upward and Downward Movement and Creep

## Broadway Viaduct - Council Bluffs, IA - TS 4

Load Test Increment	Time O (h:m:s)	Time After Start Minutes	O-cell Pressure (psi)	Applied Load (kips)	Net Load (kips)	Top O-cell Movement (inches)	Upward Creep (inches)	Bottom O-cell Movement (inches)	Downward Creep (inches)
1L-0	10:34:00	0	0	0	0	0.000		0.000	
1L-1	10:51:30	1	400	139	0	0.003		-0.002	
1L-1	10:52:30	2	400	139	0	0.002		-0.003	
1L-1	10:54:30	4	400	139	0	0.003		-0.002	
1L-1	10:58:30	8	400	139	0	0.003	0.000	-0.002	0.000
1L-2	11:00:30	1	800	262	121	0.003		-0.008	
1L-2	11:01:30	2	800	262	121	0.004		-0.007	
1L-2	11:03:30	4	800	262	121	0.005		-0.007	
1L-2	11:07:30	8	800	262	121	0.005	0.000	-0.007	0.000
1L-3	11:09:00	1	1,200	386	244	0.012		-0.018	
1L-3	11:10:00	2	1,200	386	244	0.012		-0.020	
1L-3	11:12:00	4	1,200	386	244	0.013		-0.021	
1L-3	11:16:00	8	1,200	386	244	0.014	0.001	-0.021	0.000
1L-4	11:19:00	1	1,600	510	368	0.034		-0.048	
1L-4	11:20:00	2	1,600	510	368	0.035		-0.049	
1L-4	11:22:00	4	1,600	510	368	0.036		-0.050	
1L-4	11:26:00	8	1,600	510	368	0.038	0.002	-0.050	0.000
1L-5	11:28:00	1	2,000	634	492	0.056		-0.078	
1L-5	11:29:00	2	2,000	634	492	0.056		-0.082	
1L-5	11:31:00	4	2,000	634	492	0.058		-0.084	
1L-5	11:35:00	8	2,000	634	492	0.059	0.001	-0.088	0.004
1L-6	11:37:00	1	2,400	757	616	0.089		-0.132	
1L-6	11:38:00	2	2,400	757	616	0.091		-0.138	
1L-6	11:40:00	4	2,400	757	616	0.093		-0.145	
1L-6	11:44:00	8	2,400	757	616	0.095	0.001	-0.154	0.008
1L-7	11:47:00	1	2,800	881	739	0.130		-0.233	
1L-7	11:48:00	2	2,800	881	739	0.132		-0.240	
1L-7	11:50:00	4	2,800	881	739	0.135		-0.251	
1L-7	11:54:00	8	2,800	881	739	0.137	0.002	-0.266	0.015
1L-8	11:56:30	1	3,200	1,005	863	0.182		-0.402	
1L-8	11:57:30	2	3,200	1,005	863	0.187		-0.423	
1L-8	11:59:30	4	3,200	1,005	863	0.191		-0.452	
1L-8	12:03:30	8	3,200	1,005	863	0.197	0.005	-0.489	0.037
1L-9	12:06:30	1	3,600	1,128	987	0.251		-0.752	
1L-9	12:07:30	2	3,600	1,128	987	0.256		-0.797	
1L-9	12:09:30	4	3,600	1,128	987	0.262		-0.865	
1L-9	12:13:30	8	3,600	1,128	987	0.269	0.008	-0.956	0.091
1L-10	12:32:00	1	3,900	1,221	1,079	0.357		-4.284	
1L-10	12:33:00	2	3,900	1,221	1,079	0.355		-4.464	
1L-10	12:35:00	4	3,900	1,221	1,079	0.352		-4.751	
1L-10	12:39:00	8	3,900	1,221	1,079	0.366		-5.301	
1U-1	12:43:00	1	3,200	1,005	863	0.353		-5.423	
1U-1	12:44:00	2	3,200	1,005	863	0.353		-5.423	
1U-1	12:45:00	3	3,200	1,005	863	0.352		-5.424	
1U-1	12:46:00	4	3,200	1,005	863	0.353		-5.422	
1U-2	12:48:00	1	2,400	757	616	0.332		-5.372	
1U-2	12:49:00	2	2,400	757	616	0.331		-5.373	
1U-2	12:50:00	3	2,400	757	616	0.332		-5.371	
1U-2	12:51:00	4	2,400	757	616	0.332		-5.371	
1U-3	12:53:00	1	1,600	510	368	0.304		-5.284	
1U-3	12:54:00	2	1,600	510	368	0.303		-5.282	
1U-3	12:55:00	3	1,600	510	368	0.303		-5.280	
1U-3	12:56:00	4	1,600	510	368	0.303		-5.278	
1U-4	13:00:00	1	800	262	121	0.261		-5.141	
1U-4	13:01:00	2	800	262	121	0.261		-5.137	
1U-4	13:02:00	3	800	262	121	0.260		-5.126	
1U-4	13:03:00	4	800	262	121	0.259		-5.125	
1U-5	13:12:00	1	0	0	0	0.177		-4.773	
1U-5	13:13:00	2	0	0	0	0.176		-4.768	
1U-5	13:15:00	4	0	0	0	0.176		-4.760	
1U-5	13:19:00	8	0	0	0	0.175		-4.751	



DEEP FOUNDATION TESTING, EQUIPMENT SERVICES • SPECIALIZING IN OSTERBERG CELL (O-cell®) TECHNOLOGY

LOADTEST, Inc. Project No. LT-8###-#

**Strain Gage Readings and Loads at Levels 1 and 2**  
**Broadway Viaduct - Council Bluffs, IA - TS 4**

Load Test Increment	Time (h:m:s)	Time After Start Minutes	O-cell Pressure (psi)	Applied Load (kips)	Level 1				Av. Load (kips)	Level 2			Av. Load (kips)
					1004812 $\mu\epsilon$	1004813 $\mu\epsilon$	1004814 $\mu\epsilon$	1004815 $\mu\epsilon$		1004820 $\mu\epsilon$	1004821 $\mu\epsilon$	1004822 $\mu\epsilon$	
1L -0	10:34:00	0	0	0	0	0	0	0	0	0	0	0	0
1L -1	10:51:30	1	400	139	0	2	3	-1	14	-4	1	9	24
1L -1	10:52:30	2	400	139	0	2	3	-1	14	-4	1	9	25
1L -1	10:54:30	4	400	139	0	2	3	-1	14	-4	1	9	25
1L -1	10:58:30	8	400	139	0	2	3	-1	14	-4	2	9	26
1L -2	11:00:30	1	800	262	1	4	5	-1	27	-7	3	16	49
1L -2	11:01:30	2	800	262	1	4	5	-1	27	-7	3	16	50
1L -2	11:03:30	4	800	262	1	4	5	-1	28	-7	3	16	49
1L -2	11:07:30	8	800	262	1	4	5	-1	28	-7	3	16	50
1L -3	11:09:00	1	1,200	386	4	8	9	1	68	-4	8	22	110
1L -3	11:10:00	2	1,200	386	4	8	10	1	69	-3	8	22	110
1L -3	11:12:00	4	1,200	386	4	8	10	1	69	-3	8	22	115
1L -3	11:16:00	8	1,200	386	4	8	10	0	70	-3	8	23	116
1L -4	11:19:00	1	1,600	510	9	15	17	4	139	3	16	33	217
1L -4	11:20:00	2	1,600	510	9	15	17	4	140	3	16	33	217
1L -4	11:22:00	4	1,600	510	9	15	17	4	140	3	16	33	218
1L -4	11:26:00	8	1,600	510	9	15	17	4	142	3	16	33	218
1L -5	11:28:00	1	2,000	634	12	19	24	6	195	7	22	41	293
1L -5	11:29:00	2	2,000	634	12	20	24	6	197	7	21	41	294
1L -5	11:31:00	4	2,000	634	13	20	24	6	197	7	22	41	295
1L -5	11:35:00	8	2,000	634	13	20	24	6	199	7	22	42	298
1L -6	11:37:00	1	2,400	757	17	26	32	10	266	13	28	50	380
1L -6	11:38:00	2	2,400	757	17	26	32	10	266	13	28	50	381
1L -6	11:40:00	4	2,400	757	18	26	32	10	268	13	28	50	384
1L -6	11:44:00	8	2,400	757	18	26	32	10	270	14	28	50	386
1L -7	11:47:00	1	2,800	881	22	31	38	13	329	19	34	57	463
1L -7	11:48:00	2	2,800	881	22	32	37	14	331	19	34	57	463
1L -7	11:50:00	4	2,800	881	23	32	38	14	333	20	34	57	466
1L -7	11:54:00	8	2,800	881	23	32	37	14	334	20	34	57	468
1L -8	11:56:30	1	3,200	1,005	28	37	43	17	394	26	40	65	551
1L -8	11:57:30	2	3,200	1,005	28	38	42	17	396	26	40	65	555
1L -8	11:59:30	4	3,200	1,005	28	38	42	17	395	27	41	65	558
1L -8	12:03:30	8	3,200	1,005	29	38	42	18	398	27	41	66	560
1L -9	12:06:30	1	3,600	1,128	33	43	47	21	453	34	47	72	642
1L -9	12:07:30	2	3,600	1,128	33	43	47	21	453	34	47	72	646
1L -9	12:09:30	4	3,600	1,128	34	43	47	21	457	35	47	73	650
1L -9	12:13:30	8	3,600	1,128	34	44	47	21	459	35	48	73	655
1L -10	12:32:00	1	3,900	1,221	52	65	66	35	688	45	51	80	739
1L -10	12:33:00	2	3,900	1,221	53	66	66	35	696	45	51	80	741
1L -10	12:35:00	4	3,900	1,221	54	66	67	35	701	46	50	80	736
1L -10	12:39:00	8	3,900	1,221	58	68	70	38	739	48	50	81	752
1U - 1	12:43:00	1	3,200	1,005	50	62	60	31	639	39	40	69	624
1U - 1	12:44:00	2	3,200	1,005	49	62	59	31	635	39	40	69	623
1U - 1	12:45:00	3	3,200	1,005	49	62	59	31	633	39	40	69	620
1U - 1	12:46:00	4	3,200	1,005	49	62	58	30	626	39	40	69	617
1U - 2	12:48:00	1	2,400	757	41	53	49	24	525	28	29	55	474
1U - 2	12:49:00	2	2,400	757	41	53	49	24	525	28	30	56	476
1U - 2	12:50:00	3	2,400	757	41	53	49	24	525	28	30	56	476
1U - 2	12:51:00	4	2,400	757	41	53	49	24	526	28	30	55	475
1U - 3	12:53:00	1	1,600	510	31	41	36	16	389	16	18	40	308
1U - 3	12:54:00	2	1,600	510	31	41	36	16	389	16	18	40	309
1U - 3	12:55:00	3	1,600	510	31	41	36	16	388	16	17	40	307
1U - 3	12:56:00	4	1,600	510	30	41	36	15	387	16	17	40	308
1U - 4	13:00:00	1	800	262	19	28	23	7	244	5	7	25	150
1U - 4	13:01:00	2	800	262	19	28	23	7	242	4	6	24	143
1U - 4	13:02:00	3	800	262	18	27	22	6	230	3	6	24	137
1U - 4	13:03:00	4	800	262	19	27	22	6	235	4	6	24	138
1U - 5	13:12:00	1	0	0	4	11	5	-3	54	-10	-7	5	-52
1U - 5	13:13:00	2	0	0	4	11	5	-3	52	-10	-7	5	-52
1U - 5	13:15:00	4	0	0	4	11	5	-3	51	-10	-7	4	-54
1U - 5	13:19:00	8	0	0	4	11	5	-3	52	-10	-7	4	-54



# Strain Gage Readings and Loads at Levels 3 and 4

## Broadway Viaduct - Council Bluffs, IA - TS 4

Load Test Increment	Time (h:m:s)	Time After Start Minutes	O-cell Pressure (psi)	Applied Load (kips)	Level 3				Level 4			
					1004826 με	1004827 με	1004828 με	Av. Load (kips)	1004832 με	1004833 με	1004834 με	Av. Load (kips)
1L-0	10:34:00	0	0	0	0	0	0	0	0	0	0	0
1L-1	10:51:30	1	400	139	-3	1	11	42	-1	1	5	26
1L-1	10:52:30	2	400	139	-3	1	11	42	-1	1	5	26
1L-1	10:54:30	4	400	139	-3	1	11	42	0	1	5	25
1L-1	10:58:30	8	400	139	-3	1	11	43	0	1	5	26
1L-2	11:00:30	1	800	262	-4	3	19	78	-1	2	8	43
1L-2	11:01:30	2	800	262	-4	3	20	79	0	2	8	46
1L-2	11:03:30	4	800	262	-4	3	19	79	-1	2	8	44
1L-2	11:07:30	8	800	262	-4	3	20	80	0	2	9	47
1L-3	11:09:00	1	1,200	386	0	8	25	142	2	6	13	95
1L-3	11:10:00	2	1,200	386	0	8	25	145	3	7	13	99
1L-3	11:12:00	4	1,200	386	0	8	25	148	3	7	13	102
1L-3	11:16:00	8	1,200	386	0	8	26	150	3	7	13	104
1L-4	11:19:00	1	1,600	510	7	17	35	256	9	14	21	199
1L-4	11:20:00	2	1,600	510	7	17	35	256	9	15	21	201
1L-4	11:22:00	4	1,600	510	7	17	36	258	9	15	21	203
1L-4	11:26:00	8	1,600	510	7	17	36	259	9	15	21	204
1L-5	11:28:00	1	2,000	634	11	23	43	335	14	20	27	271
1L-5	11:29:00	2	2,000	634	12	24	43	338	14	20	27	273
1L-5	11:31:00	4	2,000	634	12	24	43	340	14	20	27	275
1L-5	11:35:00	8	2,000	634	12	24	43	343	14	21	27	277
1L-6	11:37:00	1	2,400	757	17	31	51	426	18	26	33	348
1L-6	11:38:00	2	2,400	757	17	31	51	428	19	27	33	352
1L-6	11:40:00	4	2,400	757	17	31	51	432	19	27	34	355
1L-6	11:44:00	8	2,400	757	17	32	52	435	19	27	34	358
1L-7	11:47:00	1	2,800	881	21	38	59	511	23	32	39	423
1L-7	11:48:00	2	2,800	881	21	38	59	513	23	32	39	422
1L-7	11:50:00	4	2,800	881	21	38	59	517	23	32	40	425
1L-7	11:54:00	8	2,800	881	22	39	60	520	23	33	40	428
1L-8	11:56:30	1	3,200	1,005	26	45	68	605	27	38	46	497
1L-8	11:57:30	2	3,200	1,005	26	46	69	609	27	38	47	499
1L-8	11:59:30	4	3,200	1,005	26	46	69	612	27	38	47	501
1L-8	12:03:30	8	3,200	1,005	26	46	69	614	27	39	47	504
1L-9	12:06:30	1	3,600	1,128	30	53	77	695	30	44	53	568
1L-9	12:07:30	2	3,600	1,128	30	53	77	695	30	44	54	569
1L-9	12:09:30	4	3,600	1,128	30	54	78	700	30	44	54	572
1L-9	12:13:30	8	3,600	1,128	30	54	78	703	30	45	54	575
1L-10	12:32:00	1	3,900	1,221	32	62	85	781	30	52	60	635
1L-10	12:33:00	2	3,900	1,221	32	63	86	783	30	52	61	636
1L-10	12:35:00	4	3,900	1,221	32	63	85	779	29	52	61	634
1L-10	12:39:00	8	3,900	1,221	32	64	87	795	29	54	62	648
1U-1	12:43:00	1	3,200	1,005	24	54	76	672	23	47	55	560
1U-1	12:44:00	2	3,200	1,005	24	54	76	669	23	46	55	558
1U-1	12:45:00	3	3,200	1,005	24	54	76	669	23	46	55	557
1U-1	12:46:00	4	3,200	1,005	24	54	76	667	23	46	55	556
1U-2	12:48:00	1	2,400	757	15	42	63	521	17	37	46	448
1U-2	12:49:00	2	2,400	757	15	42	63	523	17	38	46	449
1U-2	12:50:00	3	2,400	757	15	42	63	523	17	38	46	449
1U-2	12:51:00	4	2,400	757	15	42	63	523	17	38	46	451
1U-3	12:53:00	1	1,600	510	6	27	48	354	9	27	35	320
1U-3	12:54:00	2	1,600	510	6	27	49	355	9	27	35	319
1U-3	12:55:00	3	1,600	510	6	28	48	354	9	27	35	319
1U-3	12:56:00	4	1,600	510	6	27	49	354	9	27	35	319
1U-4	13:00:00	1	800	262	-3	14	35	200	3	15	25	192
1U-4	13:01:00	2	800	262	-3	13	35	192	2	14	24	182
1U-4	13:02:00	3	800	262	-3	12	35	188	2	14	24	181
1U-4	13:03:00	4	800	262	-3	13	35	190	2	15	24	182
1U-5	13:12:00	1	0	0	-14	-4	20	10	-6	0	12	27
1U-5	13:13:00	2	0	0	-14	-4	20	10	-6	0	12	26
1U-5	13:15:00	4	0	0	-14	-4	20	9	-6	0	12	26
1U-5	13:19:00	8	0	0	-14	-4	20	9	-6	0	12	27



# Strain Gage Readings and Loads at Levels 5 and 6

## Broadway Viaduct - Council Bluffs, IA - TS 4

Load Test Increment	Time (h:m:s)	Time After Start Minutes	O-cell Pressure (psi)	Applied Load (kips)	Level 5				Level 6			
					1004838 $\mu\epsilon$	1004839 $\mu\epsilon$	1004840 $\mu\epsilon$	Av. Load (kips)	1004844 $\mu\epsilon$	1004845 $\mu\epsilon$	1004846 $\mu\epsilon$	Av. Load (kips)
1L-0	10:34:00	0	0	0	0	0	0	0	0	0	0	0
1L-1	10:51:30	1	400	139	1	1	1	10	0	0	0	4
1L-1	10:52:30	2	400	139	0	1	1	10	1	0	0	4
1L-1	10:54:30	4	400	139	1	1	1	10	1	1	0	6
1L-1	10:58:30	8	400	139	0	1	1	10	1	0	0	5
1L-2	11:00:30	1	800	262	1	1	2	18	1	1	0	8
1L-2	11:01:30	2	800	262	1	1	2	19	1	1	0	8
1L-2	11:03:30	4	800	262	1	1	2	19	1	1	0	9
1L-2	11:07:30	8	800	262	1	1	2	19	1	1	0	9
1L-3	11:09:00	1	1,200	386	3	4	4	49	2	2	1	29
1L-3	11:10:00	2	1,200	386	3	4	5	52	2	2	1	30
1L-3	11:12:00	4	1,200	386	3	4	5	54	2	3	2	32
1L-3	11:16:00	8	1,200	386	3	4	5	56	3	2	2	32
1L-4	11:19:00	1	1,600	510	8	10	10	128	6	6	5	81
1L-4	11:20:00	2	1,600	510	8	10	10	129	6	6	5	82
1L-4	11:22:00	4	1,600	510	8	10	11	131	6	6	5	83
1L-4	11:26:00	8	1,600	510	8	10	11	129	6	6	5	84
1L-5	11:28:00	1	2,000	634	12	14	14	180	9	9	7	120
1L-5	11:29:00	2	2,000	634	12	14	15	182	9	9	7	123
1L-5	11:31:00	4	2,000	634	12	14	15	183	9	9	7	123
1L-5	11:35:00	8	2,000	634	12	14	15	185	9	9	7	123
1L-6	11:37:00	1	2,400	757	16	19	18	237	12	12	10	161
1L-6	11:38:00	2	2,400	757	16	19	19	240	12	12	10	164
1L-6	11:40:00	4	2,400	757	16	19	19	241	12	12	10	164
1L-6	11:44:00	8	2,400	757	16	19	19	242	12	12	10	166
1L-7	11:47:00	1	2,800	881	19	23	22	286	14	15	11	195
1L-7	11:48:00	2	2,800	881	19	23	22	286	14	15	11	194
1L-7	11:50:00	4	2,800	881	19	23	22	288	15	15	11	195
1L-7	11:54:00	8	2,800	881	19	23	22	289	15	15	11	196
1L-8	11:56:30	1	3,200	1,005	22	27	26	333	16	17	12	221
1L-8	11:57:30	2	3,200	1,005	22	27	26	334	17	17	12	219
1L-8	11:59:30	4	3,200	1,005	22	27	26	336	17	17	12	220
1L-8	12:03:30	8	3,200	1,005	22	27	26	338	17	17	12	220
1L-9	12:06:30	1	3,600	1,128	24	30	29	375	18	19	13	242
1L-9	12:07:30	2	3,600	1,128	24	31	29	376	18	19	13	242
1L-9	12:09:30	4	3,600	1,128	24	31	29	378	18	18	13	239
1L-9	12:13:30	8	3,600	1,128	24	31	29	378	18	18	13	238
1L-10	12:32:00	1	3,900	1,221	24	35	32	409	19	20	13	252
1L-10	12:33:00	2	3,900	1,221	25	35	32	412	18	20	13	251
1L-10	12:35:00	4	3,900	1,221	24	35	32	409	18	20	13	251
1L-10	12:39:00	8	3,900	1,221	24	36	33	417	19	21	14	255
1U-1	12:43:00	1	3,200	1,005	21	32	29	367	17	19	12	229
1U-1	12:44:00	2	3,200	1,005	21	32	29	366	17	19	12	228
1U-1	12:45:00	3	3,200	1,005	21	32	29	366	17	19	12	228
1U-1	12:46:00	4	3,200	1,005	21	32	29	366	17	19	12	227
1U-2	12:48:00	1	2,400	757	17	27	24	305	14	17	10	196
1U-2	12:49:00	2	2,400	757	17	27	24	306	15	16	10	196
1U-2	12:50:00	3	2,400	757	17	27	24	306	15	16	10	197
1U-2	12:51:00	4	2,400	757	17	27	24	306	15	17	10	199
1U-3	12:53:00	1	1,600	510	12	20	18	229	12	14	7	160
1U-3	12:54:00	2	1,600	510	12	21	18	231	12	13	7	158
1U-3	12:55:00	3	1,600	510	12	21	18	230	12	14	7	159
1U-3	12:56:00	4	1,600	510	13	21	18	230	12	14	7	159
1U-4	13:00:00	1	800	262	8	14	12	148	9	10	4	114
1U-4	13:01:00	2	800	262	7	13	11	142	9	10	4	109
1U-4	13:02:00	3	800	262	7	13	11	142	9	10	4	110
1U-4	13:03:00	4	800	262	8	13	11	143	9	10	4	111
1U-5	13:12:00	1	0	0	2	3	2	32	5	4	-1	37
1U-5	13:13:00	2	0	0	2	3	2	32	5	4	-1	38
1U-5	13:15:00	4	0	0	2	3	2	32	5	4	-1	38
1U-5	13:19:00	8	0	0	2	3	2	32	5	4	-1	36



# Strain Gage Readings and Loads at Level 7

## Broadway Viaduct - Council Bluffs, IA - TS 4

Load Test Increment	Time 0 (h:m:s)	Time After Start Minutes	O-cell Pressure (psi)	Applied Load (kips)	Level 7			Av. Load (kips)
					1004850 $\mu\epsilon$	1004851 $\mu\epsilon$	1004852 $\mu\epsilon$	
1L-0	10:34:00	0	0	0	0	0	0	0
1L-1	10:51:30	1	400	139	0	0	0	0
1L-1	10:52:30	2	400	139	0	0	0	1
1L-1	10:54:30	4	400	139	0	0	0	0
1L-1	10:58:30	8	400	139	0	0	0	-1
1L-2	11:00:30	1	800	262	0	0	0	1
1L-2	11:01:30	2	800	262	0	0	0	1
1L-2	11:03:30	4	800	262	0	0	0	1
1L-2	11:07:30	8	800	262	0	0	0	1
1L-3	11:09:00	1	1,200	386	1	0	0	7
1L-3	11:10:00	2	1,200	386	1	0	0	7
1L-3	11:12:00	4	1,200	386	1	0	0	7
1L-3	11:16:00	8	1,200	386	1	0	0	6
1L-4	11:19:00	1	1,600	510	2	1	1	21
1L-4	11:20:00	2	1,600	510	2	1	1	22
1L-4	11:22:00	4	1,600	510	2	1	1	22
1L-4	11:26:00	8	1,600	510	2	1	1	21
1L-5	11:28:00	1	2,000	634	3	1	2	33
1L-5	11:29:00	2	2,000	634	3	1	2	33
1L-5	11:31:00	4	2,000	634	3	1	2	34
1L-5	11:35:00	8	2,000	634	4	1	2	34
1L-6	11:37:00	1	2,400	757	5	2	3	48
1L-6	11:38:00	2	2,400	757	5	2	3	48
1L-6	11:40:00	4	2,400	757	5	2	3	48
1L-6	11:44:00	8	2,400	757	5	2	3	50
1L-7	11:47:00	1	2,800	881	6	3	3	61
1L-7	11:48:00	2	2,800	881	6	3	3	62
1L-7	11:50:00	4	2,800	881	6	3	3	62
1L-7	11:54:00	8	2,800	881	6	3	3	62
1L-8	11:56:30	1	3,200	1,005	7	4	3	71
1L-8	11:57:30	2	3,200	1,005	7	3	3	71
1L-8	11:59:30	4	3,200	1,005	7	3	4	71
1L-8	12:03:30	8	3,200	1,005	8	4	3	72
1L-9	12:06:30	1	3,600	1,128	8	3	4	78
1L-9	12:07:30	2	3,600	1,128	8	3	4	78
1L-9	12:09:30	4	3,600	1,128	8	3	4	77
1L-9	12:13:30	8	3,600	1,128	9	3	4	76
1L-10	12:32:00	1	3,900	1,221	8	3	3	74
1L-10	12:33:00	2	3,900	1,221	8	3	3	75
1L-10	12:35:00	4	3,900	1,221	8	3	3	74
1L-10	12:39:00	8	3,900	1,221	8	4	3	76
1U-1	12:43:00	1	3,200	1,005	8	3	3	70
1U-1	12:44:00	2	3,200	1,005	8	3	3	68
1U-1	12:45:00	3	3,200	1,005	8	3	3	70
1U-1	12:46:00	4	3,200	1,005	8	3	3	67
1U-2	12:48:00	1	2,400	757	8	2	3	62
1U-2	12:49:00	2	2,400	757	8	3	3	63
1U-2	12:50:00	3	2,400	757	8	3	3	63
1U-2	12:51:00	4	2,400	757	8	3	3	63
1U-3	12:53:00	1	1,600	510	7	2	2	53
1U-3	12:54:00	2	1,600	510	7	2	2	53
1U-3	12:55:00	3	1,600	510	7	2	2	54
1U-3	12:56:00	4	1,600	510	7	2	2	54
1U-4	13:00:00	1	800	262	6	1	1	43
1U-4	13:01:00	2	800	262	6	2	1	43
1U-4	13:02:00	3	800	262	6	1	1	42
1U-4	13:03:00	4	800	262	6	1	1	43
1U-5	13:12:00	1	0	0	4	0	0	20
1U-5	13:13:00	2	0	0	4	0	0	21
1U-5	13:15:00	4	0	0	4	0	0	19
1U-5	13:19:00	8	0	0	4	0	0	20



**Earth Pressure Cells**  
**Broadway Viaduct - Council Bluffs, IA - TS 4**

Load Test Increment	Time 0 (h:m:s)	Time After Start Minutes	O-cell Pressure (psi)	Applied Load (kips)	NAT - EPC			
					1001598 (psi)	1001599 (psi)	1001600 (psi)	1001601 (psi)
1L -0	10:34:00	0	0	0	0	0	0	0
1L -1	10:51:30	1	400	139	0	1	0	0
1L -1	10:52:30	2	400	139	0	1	0	0
1L -1	10:54:30	4	400	139	0	1	0	0
1L -1	10:58:30	8	400	139	0	1	0	1
1L -2	11:00:30	1	800	262	0	1	0	1
1L -2	11:01:30	2	800	262	0	1	0	1
1L -2	11:03:30	4	800	262	0	1	0	1
1L -2	11:07:30	8	800	262	0	1	0	1
1L -3	11:09:00	1	1,200	386	0	1	0	2
1L -3	11:10:00	2	1,200	386	0	1	0	2
1L -3	11:12:00	4	1,200	386	0	1	0	2
1L -3	11:16:00	8	1,200	386	0	1	0	2
1L -4	11:19:00	1	1,600	510	1	2	1	5
1L -4	11:20:00	2	1,600	510	1	2	1	5
1L -4	11:22:00	4	1,600	510	1	3	1	5
1L -4	11:26:00	8	1,600	510	1	3	1	5
1L -5	11:28:00	1	2,000	634	2	4	1	11
1L -5	11:29:00	2	2,000	634	2	4	1	10
1L -5	11:31:00	4	2,000	634	2	4	1	10
1L -5	11:35:00	8	2,000	634	2	4	1	9
1L -6	11:37:00	1	2,400	757	5	7	2	16
1L -6	11:38:00	2	2,400	757	4	7	2	15
1L -6	11:40:00	4	2,400	757	4	7	2	14
1L -6	11:44:00	8	2,400	757	4	7	2	14
1L -7	11:47:00	1	2,800	881	7	10	2	20
1L -7	11:48:00	2	2,800	881	7	10	2	19
1L -7	11:50:00	4	2,800	881	7	10	2	19
1L -7	11:54:00	8	2,800	881	8	10	3	19
1L -8	11:56:30	1	3,200	1,005	12	14	3	26
1L -8	11:57:30	2	3,200	1,005	12	14	3	25
1L -8	11:59:30	4	3,200	1,005	12	14	4	25
1L -8	12:03:30	8	3,200	1,005	11	14	4	24
1L -9	12:06:30	1	3,600	1,128	16	18	5	34
1L -9	12:07:30	2	3,600	1,128	16	18	5	34
1L -9	12:09:30	4	3,600	1,128	16	19	5	35
1L -9	12:13:30	8	3,600	1,128	16	19	5	35
1L -10	12:32:00	1	3,900	1,221	38	107	27	108
1L -10	12:33:00	2	3,900	1,221	38	120	30	111
1L -10	12:35:00	4	3,900	1,221	37	109	27	107
1L -10	12:39:00	8	3,900	1,221	43	145	36	118
1U - 1	12:43:00	1	3,200	1,005	32	114	28	80
1U - 1	12:44:00	2	3,200	1,005	31	112	28	78
1U - 1	12:45:00	3	3,200	1,005	31	110	27	77
1U - 1	12:46:00	4	3,200	1,005	30	109	27	76
1U - 2	12:48:00	1	2,400	757	23	90	23	62
1U - 2	12:49:00	2	2,400	757	23	90	22	62
1U - 2	12:50:00	3	2,400	757	22	89	22	62
1U - 2	12:51:00	4	2,400	757	22	88	22	62
1U - 3	12:53:00	1	1,600	510	13	67	17	41
1U - 3	12:54:00	2	1,600	510	13	66	16	43
1U - 3	12:55:00	3	1,600	510	13	66	16	44
1U - 3	12:56:00	4	1,600	510	13	65	16	44
1U - 4	13:00:00	1	800	262	4	43	11	25
1U - 4	13:01:00	2	800	262	3	38	9	13
1U - 4	13:02:00	3	800	262	4	41	10	24
1U - 4	13:03:00	4	800	262	4	41	10	25
1U - 5	13:12:00	1	0	0	0	20	5	-2
1U - 5	13:13:00	2	0	0	0	20	5	0
1U - 5	13:15:00	4	0	0	0	20	5	1
1U - 5	13:19:00	8	0	0	0	20	5	2

