D A T A R E P O R T

REPORT ON DRILLED SHAFT LOAD TESTING (OSTERBERG METHOD)

***Shaft Profile by* SONICALIPER**

TS-2 - US95 / CC-215 Interchange
Las Vegas, NV (LT-1302-2)

Prepared for: **Aggregate Industries**
3101 E. Craig Road
N. Las Vegas, NV, 89030

Attention: **Mr. Ernesto Rivera**

PROJECT NO: **LT-1302-2, July 03, 2014**

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July 03, 2014

Aggregate Industries
3101 E. Craig Road
N. Las Vegas, NV, 89030

Attention: Mr. Ernesto Rivera

Load Test Report: TS-2 - US95 / CC-215 Interchange
Location: Las Vegas, NV (LT-1302-2)

Dear Mr. Rivera,

The enclosed report contains the data and analysis summary for the Osterberg Cell (O-cell) test performed on TS-2 - US95 / CC-215 Interchange, on June 25, 2014. For your convenience, we have included an executive summary of the test results in addition to our standard detailed data report.

We would like to express our gratitude for the on-site and off-site assistance provided by your team and we look forward to working with you on future projects.

We trust that the information contained herein will suit your current project needs. If you have any questions or require further technical assistance, please do not hesitate to contact us at 352-378-3717.

Best Regards,

Robert C. Simpson, M. S.
Regional Manager, Loadtest USA

EXECUTIVE SUMMARY

On June 25, 2014, Loadtest USA performed an O-cell test on a nominal 60.0-inch diameter test shaft TS-2. Aggregate Industries completed construction of the 99.8-foot deep shaft on June 18, 2014. Sub-surface conditions at the test shaft location consist primarily of lean clays. Representatives of Nevada Department of Transportation (NDOT) observed construction and testing of the shaft.

The maximum sustained bi-directional load applied to the shaft was 5,238 kips. At the maximum load, the displacements above and below the O-cell assembly were 0.403 inches and 1.694 inches, respectively. Unit side shear data calculated from strain gages indicated a maximum mobilized net side shear of 15.8 ksf between the O-cell and Strain Gage Level 4. The load distribution calculated from strain gages indicated no appreciable load was transmitted to end bearing at the above-noted maximum downward displacement. Unit values correspond to the above respective displacements.

Using the procedures described in the report text and in Appendix C, an equivalent top load curve for the test shaft was constructed. For a top loading of 4,750 kips, the adjusted test data indicate this shaft would displace approximately 0.25 inches. For a top loading of 8,250 kips, the adjusted test data indicate this shaft would displace approximately 0.50 inches.

A sonar caliper (SONICALIPER) was used to generate profiles of the shaft excavation sidewalls prior to installation of the O-cell assembly. A summary of the caliper data and the dimensions used in the analyses are included in Appendix F.

LIMITATIONS OF EXECUTIVE SUMMARY

We include this executive summary to provide a very brief presentation of some of the key elements of this O-cell test. It is by no means intended to be a comprehensive or stand-alone representation of the test results. The full text of the report and the attached appendices contain important information which the engineer can use to come to more informed conclusions about the data presented herein.

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TABLES AND FIGURES

SITE CONDITIONS AND SHAFT CONSTRUCTION

Site Sub-surface Conditions: The sub-surface stratigraphy at the general location of the test shaft is reported to consist primarily of lean clays with layers of caliche. The generalized subsurface profile is included in Figure A and a boring log indicating conditions near the shaft is presented in Appendix E. More detailed geologic information can be obtained from NDOT.

Test Shaft Construction: Aggregate Industries completed construction of the dedicated test shaft on June 18, 2014. The nominal 60.0-inch diameter test shaft was excavated to a base elevation of +2,325.5 ft. After reaching the base of the shaft, polymer slurry was added to lower half of the shaft to ensure stabilization. An auger was used for drilling the shaft, and a clean-out bucket for cleaning the base. After cleaning, the SONICALIPER was used to profile the shaft excavation (Appendix F). After the shaft was approved for concrete placement, the bottom section of reinforcing cage was inserted into the excavation and temporarily supported from the ground surface. The upper section of the reinforcing cage with attached O-cell assembly was then spliced to the lower section over the excavation, lowered to the desired elevation and temporarily supported from the crane. Concrete was then delivered by pump through a 5.5-inch pipe into the base of the shaft until the top of the concrete reached an elevation of +2,421.3 ft. Representatives of NDOT observed construction of the shaft.

OSTERBERG CELL TESTING

Shaft Instrumentation: Loadtest USA assisted Aggregate Industries with the assembly and installation of test shaft instrumentation. The loading assembly consisted of one 34-inch diameter O-cell located 35.3 feet above the shaft base. The Osterberg cell was calibrated to approximately 3,000 kips and then welded closed prior to shipping by American Equipment and Fabricating Corporation. Calibrations of the O-cell and instrumentation used for this test are included in Appendix B. Embedded O-cell testing instrumentation included the following:

- Four upper compression telltale casings (nominal ½-inch steel pipe) attached at 90° spacing to the reinforcing cage, extending from the top of the O-cell assembly to ground level.
- Four Linear Vibrating Wire Displacement Transducers (LVWDTs, Geokon Model 4450 series) positioned between the lower and upper plates of the O-cell assembly.
- Two Embedded Toe Telltales (ETT), consisting of ¼-inch telltale rods in ½-inch steel pipe casings, attached diametrically opposed to the reinforcing cage, with

an LVWDT attached, positioned between the top of the O-cell assembly and the shaft base.

- Three levels of four sister bar vibrating wire strain gages (Geokon Model 4911 Series) attached at 90° spacing to the reinforcing cage below the base of the O-cell assembly.

- Five levels of four sister bar vibrating wire strain gages (Geokon Model 4911 Series) attached at 90° spacing to the reinforcing cage above the top of the O-cell assembly.

- Two lengths of steel pipe, extending from the top of the shaft to the top of the bottom plate, to vent the break in the shaft formed by the expansion of the O-cell.

Details concerning the instrumentation placement appear in Table B and Figures A and B.

Test Arrangement: Throughout the load test, key elements of shaft displacement response were monitored using the equipment and instruments detailed below:

- Top of shaft displacement was monitored using a pair of automated digital survey levels (Leica NA3000 series) from a distance of approximately 40 feet (Appendix A, Pages 1 & 2).

- Upper compression displacement was measured using ¼-inch telltale rods positioned inside the casings and monitored by Linear Vibrating Wire Displacement Transducers (LVWDTs, Geokon Model 4450 series) attached to the top of the shaft (Appendix A, Pages 1 & 2).

- Expansion of the O-cell assembly was measured using the four Expansion LVWDTs described under Shaft Instrumentation (Appendix A, Pages 3 & 4).

- Shaft base displacement was calculated using ¼-inch telltale rods positioned inside the casings and monitored by Linear Vibrating Wire Displacement Transducers (LVWDTs, Geokon Model 4450 series) attached to the top plate of the O-cell assembly (Appendix A, Pages 3 & 4).

A Bourdon pressure gage, a vibrating wire pressure transducer, and a voltage pressure transducer were used to measure the pressure applied to the O-cell at each load interval. The voltage pressure transducer was used for automatically setting and maintaining loads, the vibrating wire pressure transducer was used for real time plotting and for data analysis and the Bourdon pressure gage readings were used as a real-time visual reference and as a check on the transducers. There was close agreement between the Bourdon gage and the pressure transducers.

Data Acquisition: All instrumentation were connected through a data logger (Data Electronics 80g GeoLogger) to a laptop computer allowing data to be recorded and stored automatically at 30-second intervals and displayed in real time. The same laptop computer synchronized to the data logging system was used to acquire the Leica NA3000 data.

Testing Procedures: Loadtest USA technical staff conducted the load test. Testing was begun by pressurizing the O-cell in order to break the tack welds that hold it closed (for handling and for placement in the shaft) and to form the fracture plane in the concrete surrounding the base of the O-cell. After the break occurred, the pressure was immediately released and the testing recommenced from zero pressure. Zero readings for all instrumentation were taken prior to the preliminary weld-breaking load-unload cycle, which in this case involved a maximum load of 456 kips at the O-cell.

The Osterberg cell load test was conducted as follows: The 34-inch diameter O-cell, with its base located 35.3 feet above the shaft base, was pressurized in 18 nominally equal increments, resulting in a maximum bi-directional load of 5,238 kips applied to the shaft above and below the O-cell. The loading was halted after increment 1L-18 because the combined end bearing and lower side shear was approaching ultimate capacity. The O-cell was then de-pressurized in five decrements and the test was concluded.

The load increments were applied using the Quick Load Test Method for Individual Piles (ASTM D1143 *Standard Test Method for Piles Under Static Axial Load*). Each successive load increment was held constant for eight minutes by manually adjusting the O-cell pressure. The data logger automatically recorded the instrument readings every 30 seconds, but herein only the 1, 2, 4 and 8 minute readings during each increment of maintained load are reported.

TEST RESULTS AND ANALYSES

General: The loads applied by the O-cell assembly act in two opposing directions, counteracted by the resistance of the shaft above and below. For the purpose of the analysis herein, it is assumed that the O-cell assembly does not impose an additional upward load until its expansion force exceeds the buoyant weight of the shaft above the O-cell assembly. Therefore, *net load*, which is defined as gross O-cell load minus the buoyant weight of the shaft above, is used to determine side shear resistance above the O-cell and to construct the equivalent top load displacement curve. For this test a shaft buoyant weight of 177 kips above the O-cell was calculated.

Shaft Profile and Dimensions: SONICALIPER profiles were taken of the excavation to determine the geometry of the shaft. A summary of the sonar caliper data and the dimensions used in the analyses are included in Appendix F.

Upper Side Shear Resistance: The O-cell assembly applied a maximum upward *net load* of 5,061 kips to the upper side shear at load interval 1L-18 (Appendix A, Page 5, Figures 1 to 3). At this loading, the upward displacement of the top of the O-cell was 0.403 inches.

Strain Gage Analysis: The strain gage data appear in Appendix A, Pages 7 through 22. Because no concrete breaks were performed on the day of the test, the unconfined compressive strength f'_c was estimated to be 6,320 psi by comparison to the concrete logs from TS-1, see Appendix G. Assuming a concrete unit weight γ_c of 145 pcf, the ACI formula ($E_c = 0.033 \times \gamma_c^{1.5} \times \sqrt{f'_c}$) was used to calculate an elastic modulus of 4,581 ksi for the concrete. This, combined with the area of reinforcing steel and nominal shaft diameter, provided an average shaft stiffness (AE) of 13,711,000 kips in the shaft. Shaft stiffness estimates for each strain gage level computed from this modulus plus reinforcing steel details and calipered shaft dimensions are listed in Table B. Figure 4 plots the average of each strain gage level during the test. Figure 5 plots the load distribution curves for each load increment based on applied O-cell load and computed strain gage loads. Mobilized net unit side shear vs. displacement (t-z) curves based on the strain gage data and estimated ACI shaft stiffness are presented in Figures 6 & 7. Shear values for loading increment 1L-18 follow in Table A:

TABLE A: Average Net Unit Side Shear Values for 1L-18

Load Transfer Zone	Displacement[1]	Net Unit Side Shear[2]
Zero Shear to Strain Gage Level 8	↑ 0.30 in	3.4 ksf
Strain Gage Level 8 to Strain Gage Level 7	↑ 0.32 in	2.4 ksf
Strain Gage Level 7 to Strain Gage Level 6	↑ 0.33 in	4.3 ksf
Strain Gage Level 6 to Strain Gage Level 4[3]	↑ 0.35 in	3.7 ksf
Strain Gage Level 4 to O-cell	↑ 0.38 in	15.8 ksf
O-cell to Strain Gage Level 3	↓ 1.67 in	8.6 ksf (10.9 ksf at 1L-15)
Strain Gage Level 3 to Strain Gage Level 2	↓ 1.62 in	5.7 ksf
Strain Gage Level 2 to Strain Gage Level 1	↓ 1.57 in	13.2 ksf

1 Average displacement of load transfer zone.
2 For upward-loaded shear, the buoyant weight of shaft in each zone has been subtracted from the load shed in the respective zone. Note that net unit shear values derived from the strain gages may not be ultimate values. See Figures 6 & 7 for unit shear vs. displacement (t-z) plots.
3 NOTE: Level 5 strain gage data yielded higher loads than applied by the O-cell and are not included in the analysis.

Combined End Bearing and Lower Side Shear Resistance: The O-cell assembly applied a maximum downward load of 5,238 kips at load interval 1L-18 (Appendix A, Page 5, Figures 1 to 3). At this loading, the average downward displacement of the

O-cell base was 1.694 inches. A graphical extrapolation of the load distribution in Figure 5 indicates that no appreciable load was transferred to end bearing at the above-noted maximum downward displacement.

Equivalent Top Load-Displacement: Figure 8 presents the equivalent top load curves. The lighter curve, described in Procedure Part I of Appendix C, was generated by using the measured upward top of O-cell and downward base of O-cell data. Because it is often an important component of the displacements involved, the equivalent top load curve requires an adjustment for the additional elastic compression that would occur in a top-load test. The darker curve as described in Procedure Part II of Appendix C includes this adjustment.

A combined side shear and end-bearing resistance of 10,299 kips was mobilized during the test. For a top loading of 4,750 kips, the adjusted test data indicate this shaft would displace approximately 0.25 inches. For a top loading of 8,250 kips, the adjusted test data indicate this shaft would displace approximately 0.50 inches.

Note that the equivalent top load curve applies to incremental loading durations of eight minutes. Creep effects will reduce the ultimate resistance of both components and increase shaft top displacement for a given loading over longer times. The Engineer can estimate such additional creep effects by suitable extrapolation of time effects using the creep data presented herein.

Creep Limit: See Appendix D for our O-cell method for determining creep limit loading. The combined end bearing and lower side shear creep data (Appendix A, Page 5, Figure D-1) indicate that a creep limit of 4,400 kips was reached at a displacement of 0.24 inches. The upper side shear creep data (Appendix A, Page 5, Figure D-2) indicate that a creep limit of 4,000 kips was reached at a displacement of 0.15 inches. A top loaded shaft will not begin creep until both components begin creep displacement. This will occur at the maximum of the displacements required to reach the creep limit for each component

Shaft Compression Comparison: The measured maximum shaft compression, averaged from four telltales, is 0.10 inches at 1L-18 (Appendix A, Page 1). Using a weighted average shaft stiffness of 13,587,100 kips and the load distribution in Figure 5 at 1L-18, an elastic compression of 0.09 inches over the length of the compression telltales is calculated.

LIMITATIONS AND STANDARD OF CARE

The instrumentation, testing services and data analysis provided by Loadtest USA, outlined in this report, were performed in accordance with the accepted standards of care recognized by professionals in the drilled shaft and foundation engineering industry.

Please note that some of the information contained in this report is based on data (i.e. nominal shaft diameter, elevations and concrete strength) provided by others. The engineer, therefore, should come to his or her own conclusions with regard to the analyses as they depend on this information. In particular, Loadtest USA typically does not observe and record drilled shaft construction details to the level of precision that the project engineer may require. In many cases, we may not be present for the entire duration of shaft construction. Since construction technique can play a significant role in determining the load bearing capacity of a drilled shaft, the engineer should pay close attention to the drilled shaft construction details that were recorded elsewhere.

We trust that this information will meet your current project needs. If you have any questions, please do not hesitate to contact us at 352-378-3717.

Prepared for Loadtest USA by

Michael Crumpton

Reviewed for Loadtest USA by

Aditya Ayithi, Ph. D.

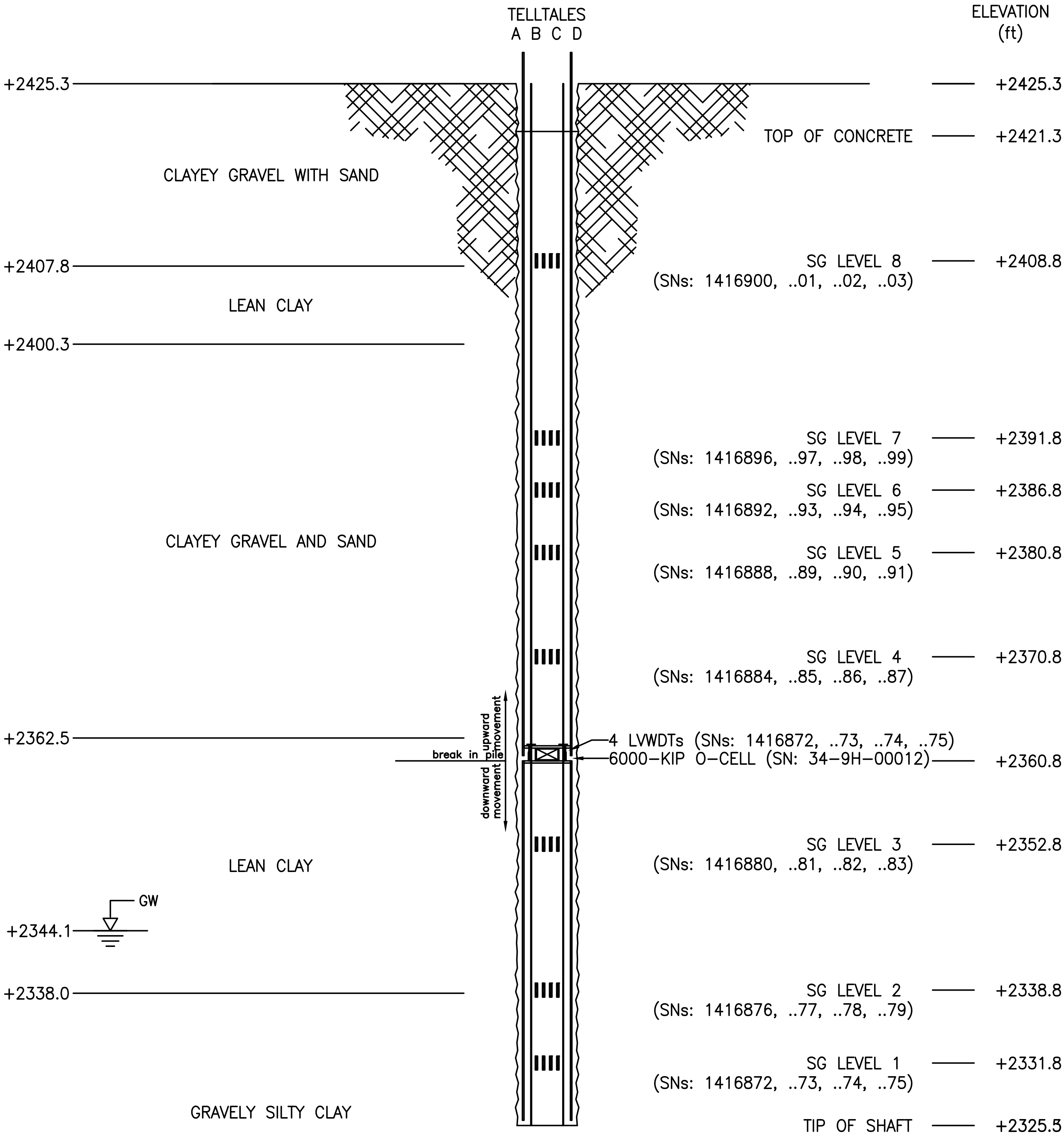
David J. Jakstis, P.E.

TABLE B
SUMMARY OF DIMENSIONS, ELEVATIONS & SHAFT PROPERTIES

Shaft: (TS-2 - US95 / CC-215 Interchange - Las Vegas, NV)		
Nominal shaft diameter (EL +2,421.3 ft to +2,325.5 ft)	=	60 in
Calipered shaft diameters (EL +2,423.3 ft to +2,325.5 ft)	=	Appendix F
O-cell: 34-9H-00012	=	34 in
Length of shaft zone above break at base of O-cell	=	60.5 ft
Length of shaft zone below break at base of O-cell	=	35.3 ft
Side shear area above O-cell base	=	956.1 ft²
Side shear area below O-cell base	=	559.2 ft²
Shaft base area	=	19.6 ft²
Bouyant weight of shaft above base of O-cell	=	177 kips
Estimated ACI average shaft stiffness, AE (EL +2,421.3 ft to +2,325.5 ft)	=	13,711,000 kips
Elevation of ground surface	=	+2,425.3 ft
Elevation of top of shaft concrete	=	+2,421.3 ft
Elevation of base of O-cell assembly [1]	=	+2,360.8 ft
Elevation of water table	=	+2,344.1 ft
Elevation of shaft base	=	+2,325.5 ft
Telltale Sections:		
Elevation of top of telltale used for upper shaft compression	=	+2,425.3 ft
Elevation of bottom of telltale used for upper shaft compression	=	+2,362.0 ft
Elevation of top of telltale used for shaft base movement	=	+2,362.0 ft
Elevation of bottom of telltale used for shaft base movement	=	+2,325.5 ft
Strain Gages:		
Elevation of Strain Gage Level 8 (AE = 14,347,000 kips)	=	+2,408.8 ft
Elevation of Strain Gage Level 7 (AE = 13,423,000 kips)	=	+2,391.8 ft
Elevation of Strain Gage Level 6 (AE = 13,423,000 kips)	=	+2,386.8 ft
Elevation of Strain Gage Level 5 (AE = 13,423,000 kips)	=	+2,380.8 ft
Elevation of Strain Gage Level 4 (AE = 13,423,000 kips)	=	+2,370.8 ft
Elevation of Strain Gage Level 3 (AE = 13,951,000 kips)	=	+2,352.8 ft
Elevation of Strain Gage Level 2 (AE = 13,423,000 kips)	=	+2,338.8 ft
Elevation of Strain Gage Level 1 (AE = 13,687,000 kips)	=	+2,331.8 ft
Miscellaneous:		
Top plate diameter (2.0 inch thick)	=	43.5 in
Bottom plate diameter (2.0 inch thick)	=	43.5 in
Reinforcing Cage Vertical Bar Size (EL. +2,420.80 ft to +2,326.63, 16 No.)	=	# 10
Spiral size (6.0 in spacing)	=	# 6
Rebar Cage Diameter	=	47.5 in
Assumed concrete unit weight	=	145 pcf
Estimated 7-day unconfined compressive concrete strength	=	6,320 psi
Estimated 7-day concrete modulus	=	4,581 ksi
O-cell LVWDTs @ 0°, 90°, 180° and 270° with radius	=	20.0 in

[1] The break between upward and downward movement at the O-cell assembly

NOTE: NOMINAL SHAFT DIAMETER 60in



NOTE: SOIL BASED ON BORING # TS-3A

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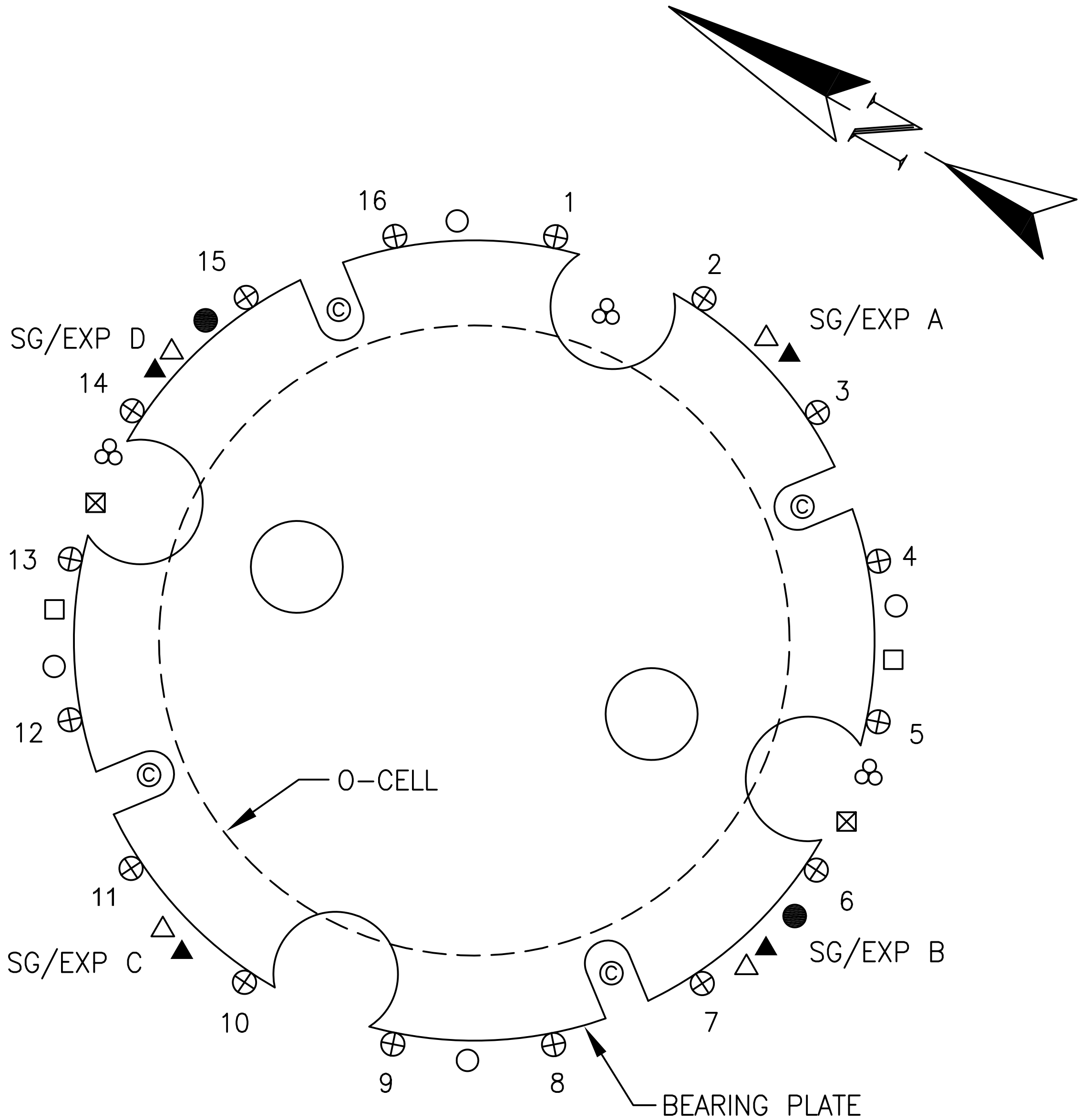
AS-BUILT SECTION OF TEST SHAFT TS-2

US95 / CC-215 INTERCHANGE - LAS VEGAS, NV

DWN BY: BDH	DATE: 22 May 2014	CHECKED BY: DR	LT-1302-2
REVISED BY: MC	DATE: 30 June 2014	SCALE: NTS	FIGURE A



LEGEND:

ETT	●
CSL PIPE	©
COMPRESSION	○
STRAIN GAGE	△
LVWDT	▲
VENT PIPE	□
HYDRAULIC HOSES	⊠
REBAR	⊗
CABLE BUNDLE	ஃ

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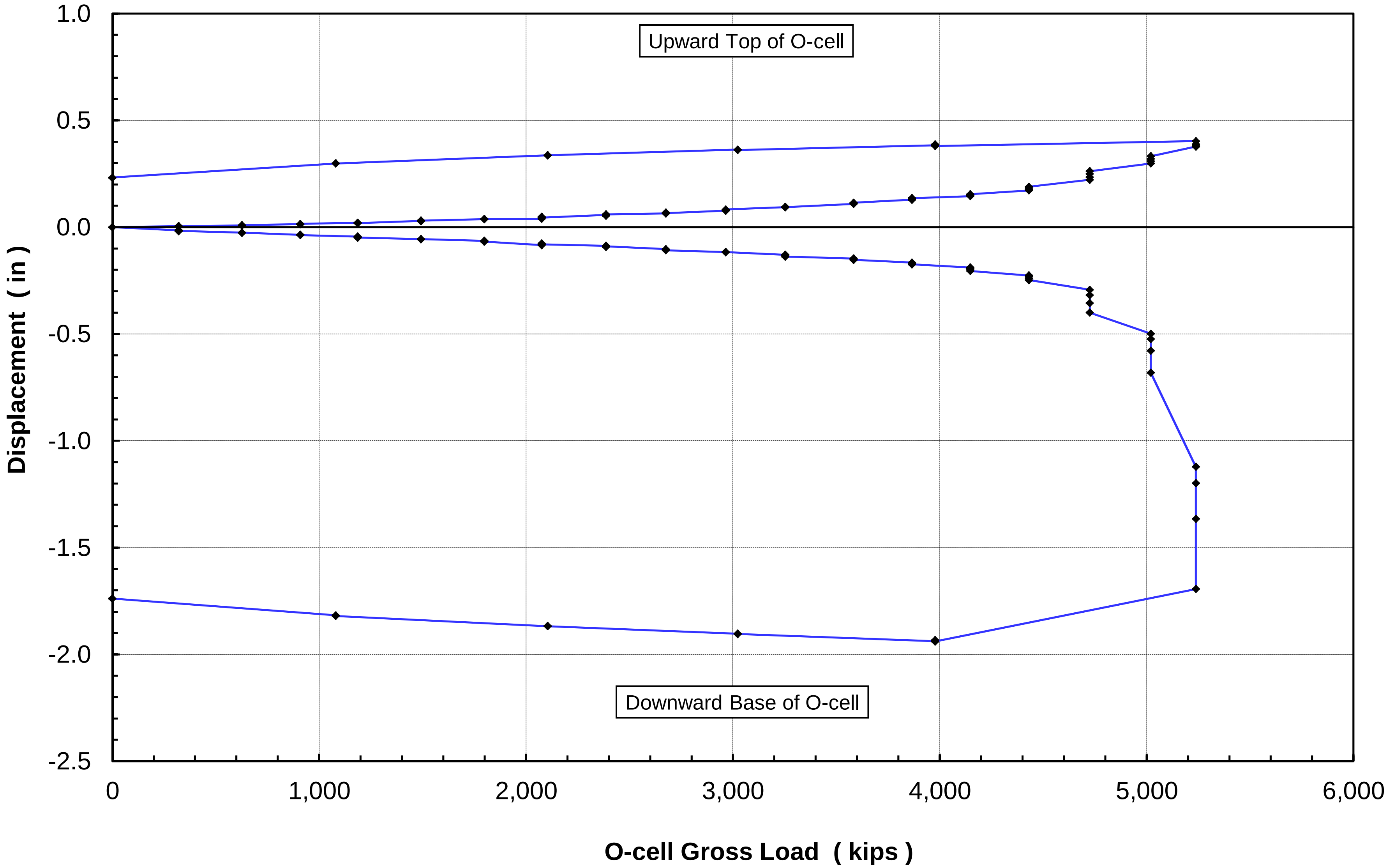
INSTRUMENTATION LAYOUT TS-2

US95 / CC-215 INTERCHANGE - LAS VEGAS, NV

DWN BY: ABE	DATE: 23 Jun 2014	CHECKED BY: DR	LT-1302-2
REVISED BY:	DATE:	SCALE: NTS	FIGURE B

Osterberg Cell Load-Displacement

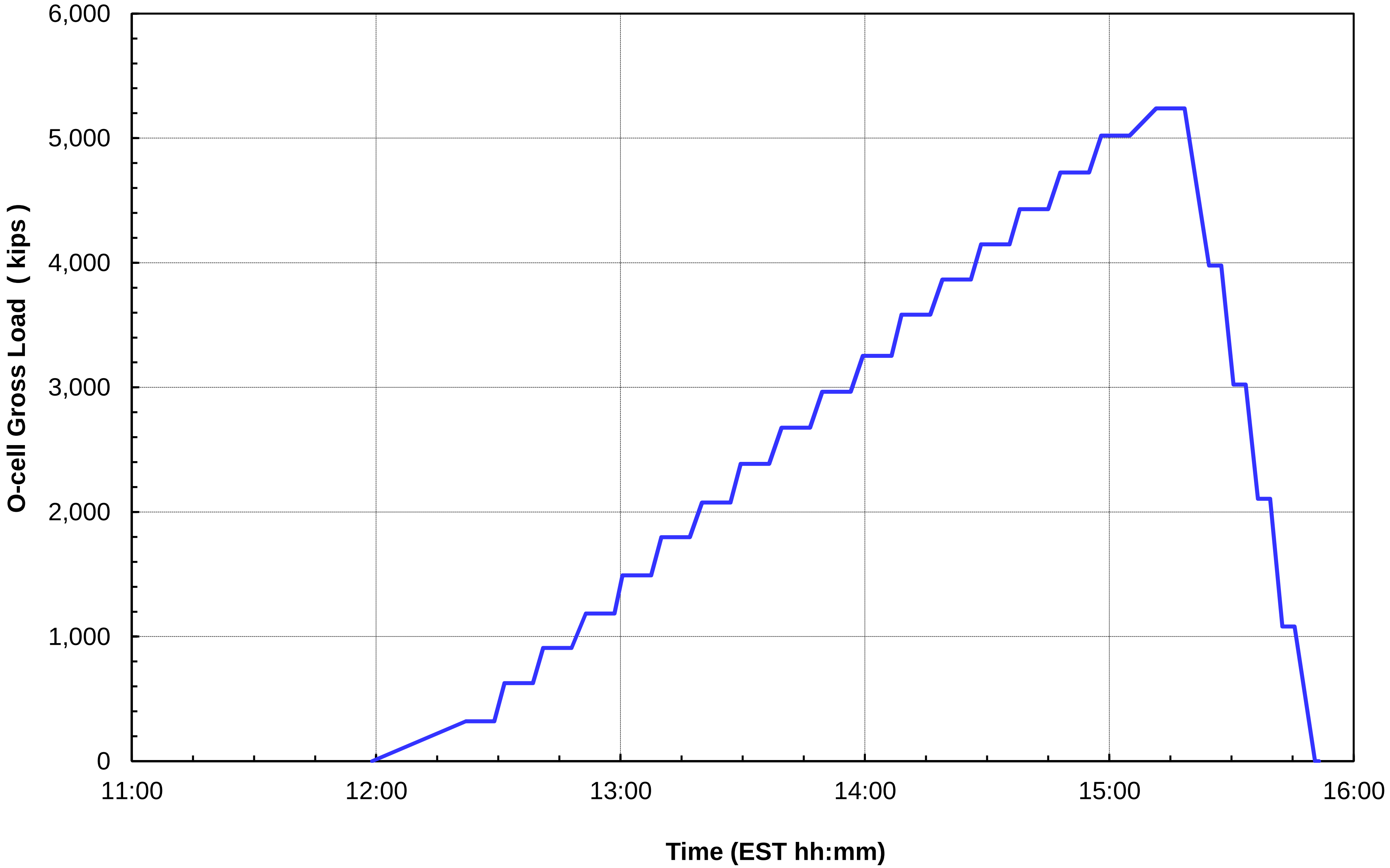
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV



Loadtest USA Project No. LT-1302-2

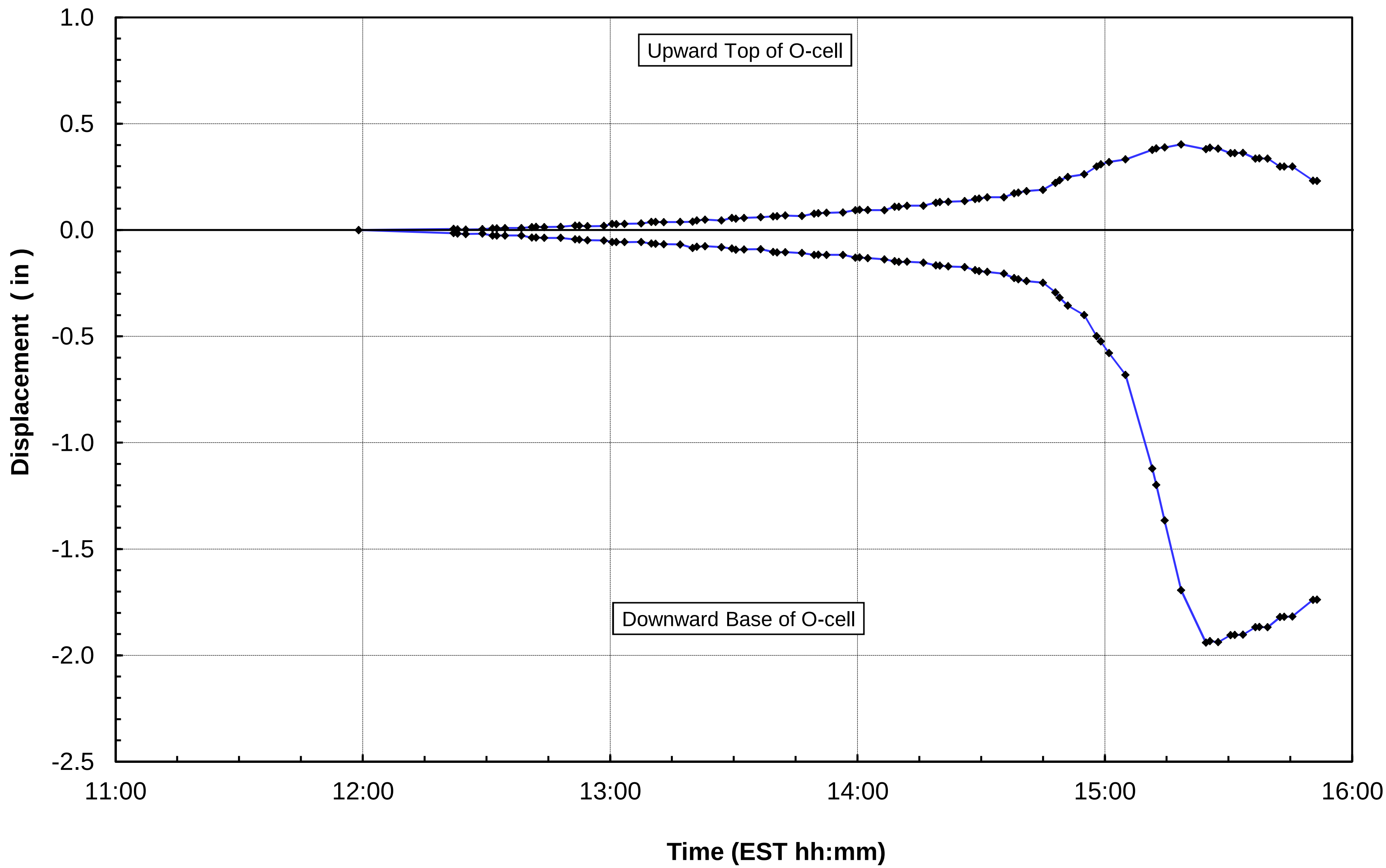
Time-Osterberg Cell Load

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV



Time-Osterberg Cell Displacement

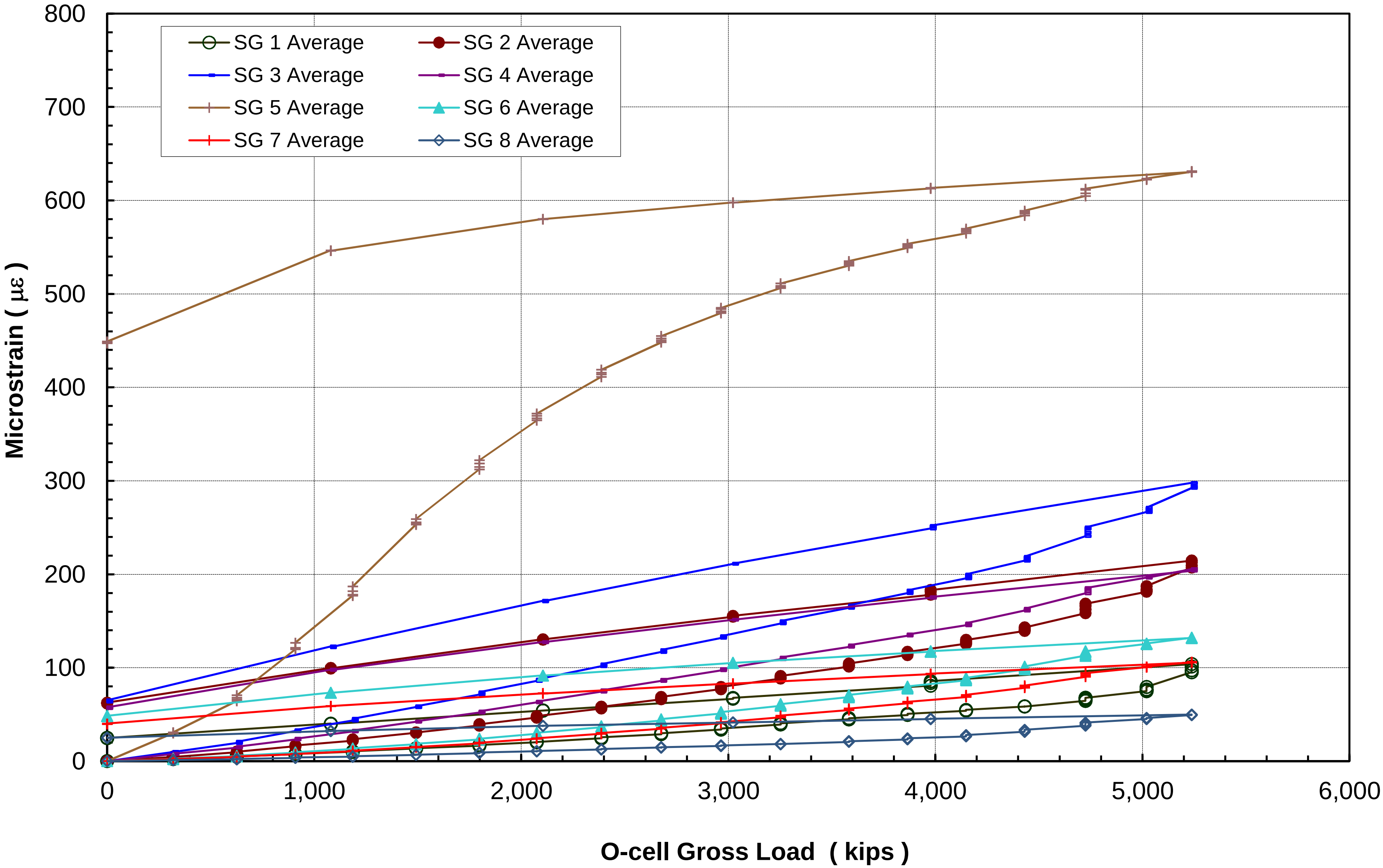
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV



Loadtest USA Project No. LT-1302-2

Osterberg Cell Load-Strain Gage Microstrain

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

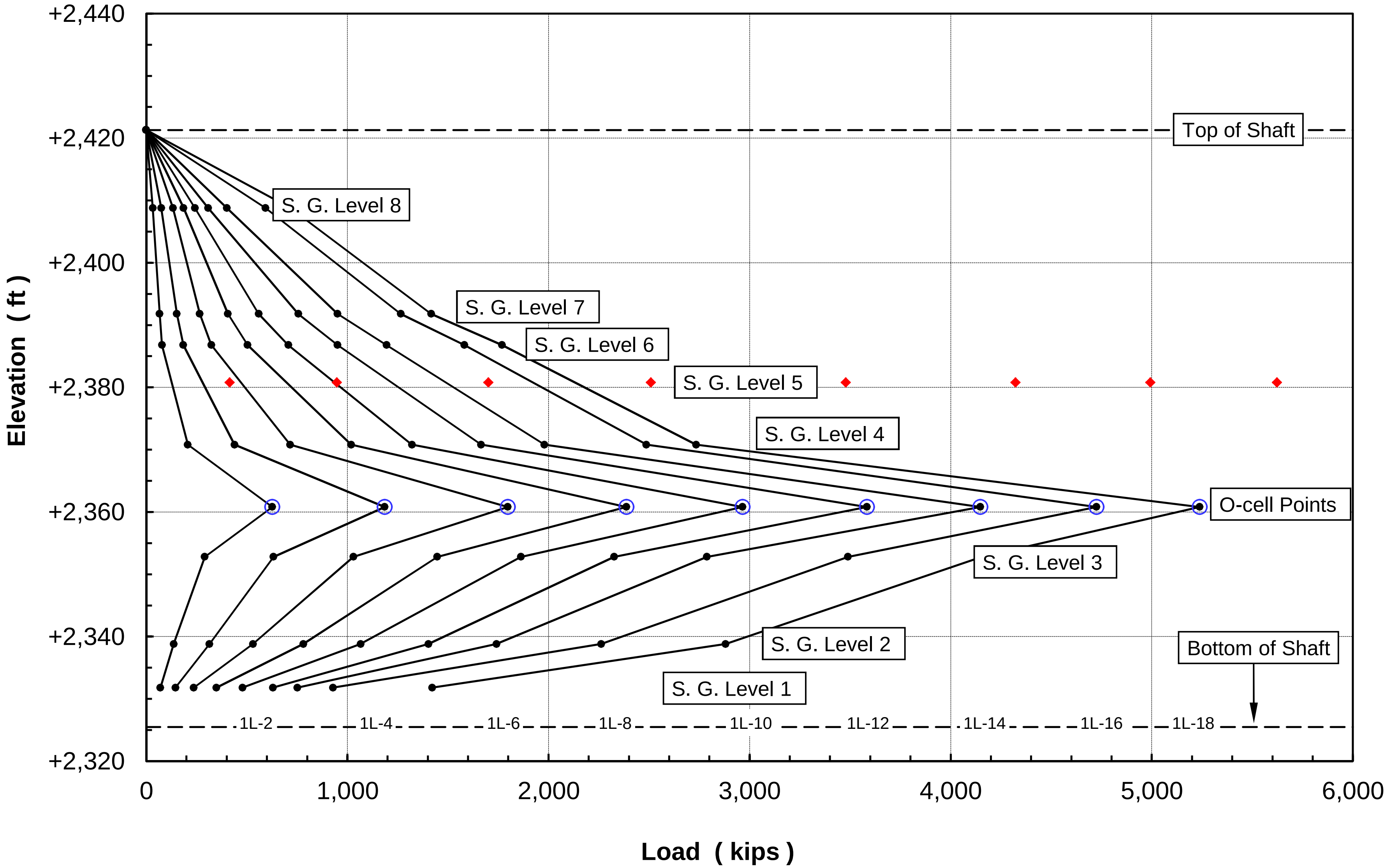


Loadtest USA Project No. LT-1302-2

Figure 4 of 8

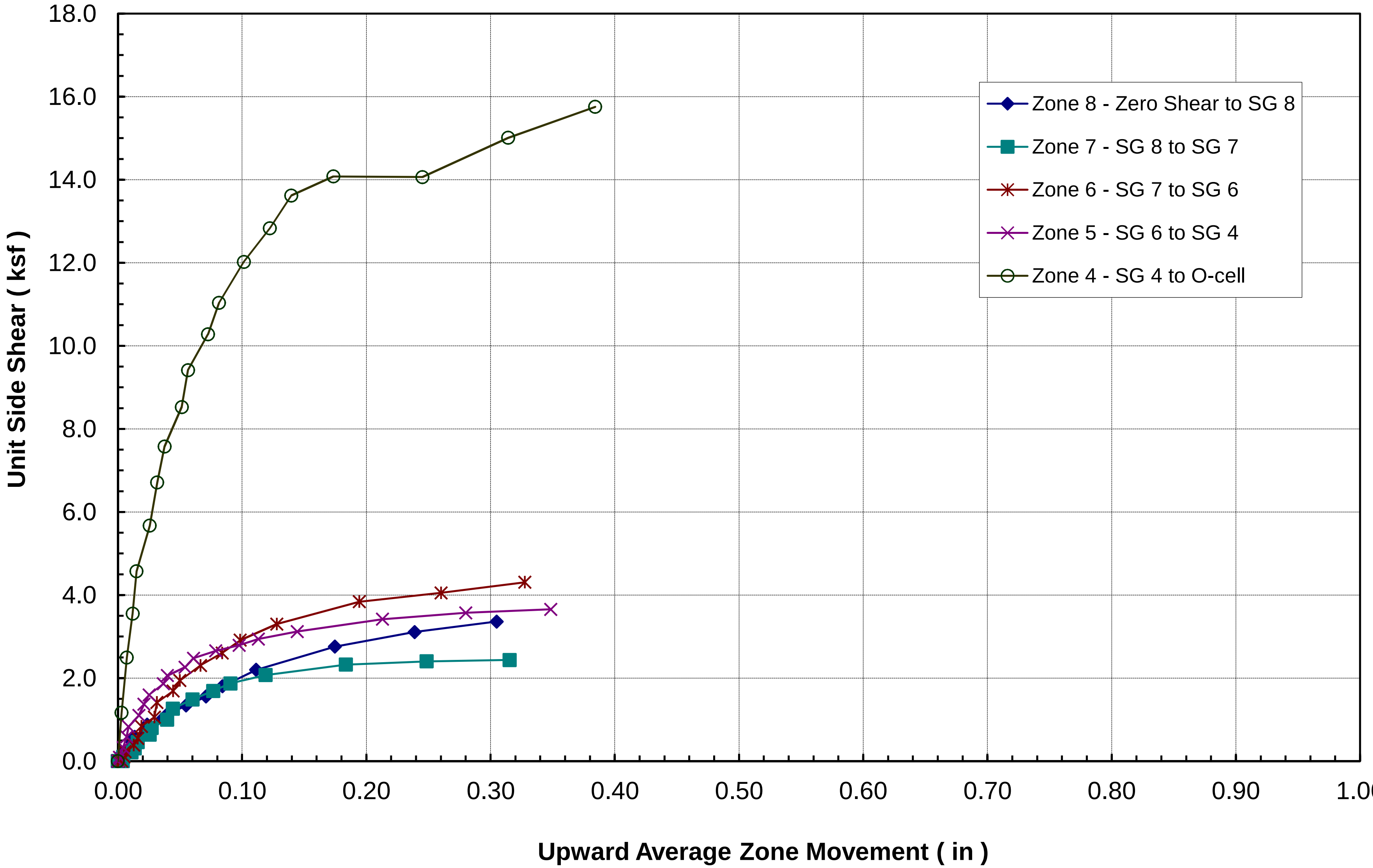
Strain Gage Load Distribution

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV



Mobilized Upward Net Unit Side Shear

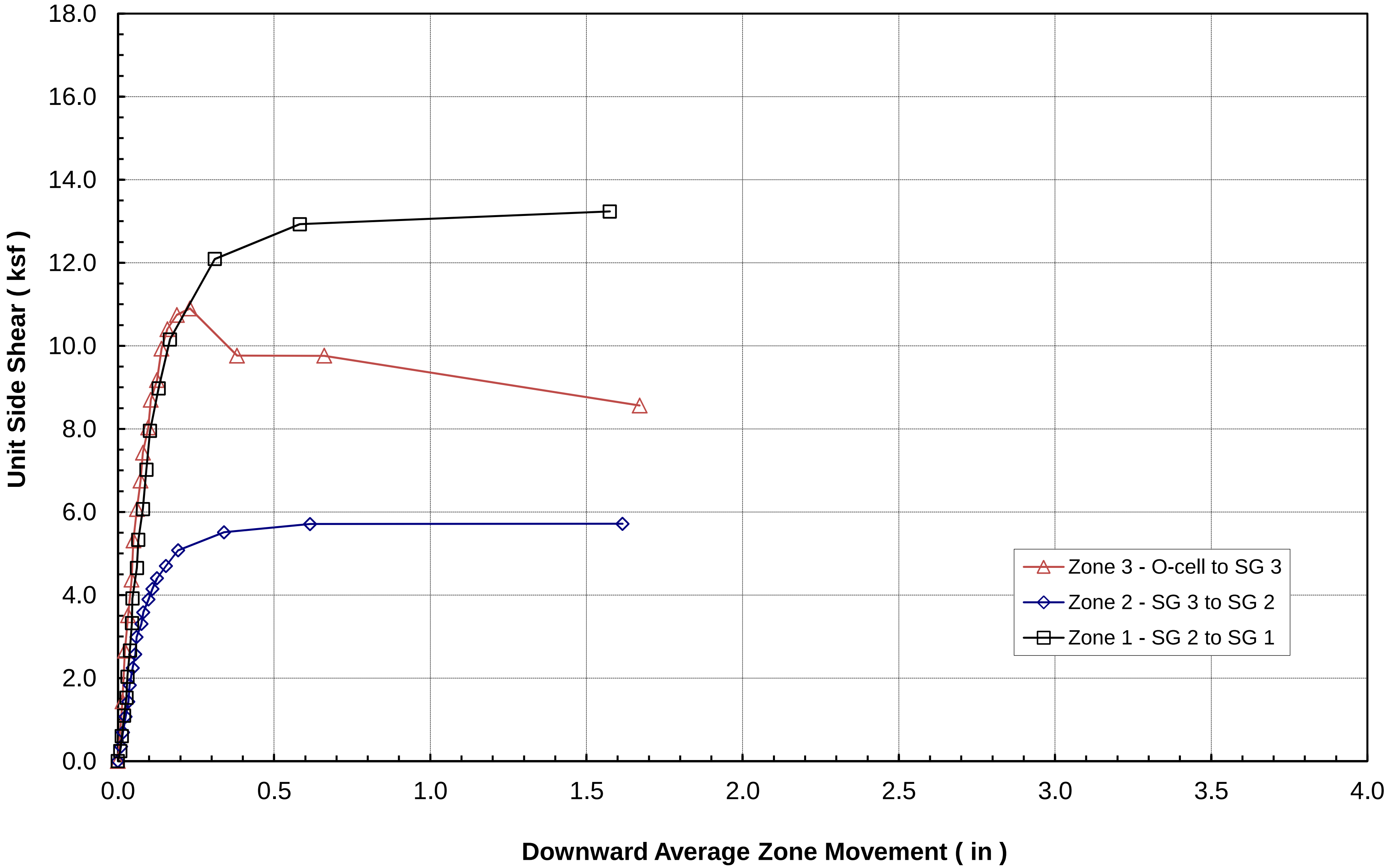
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV



Loadtest USA Project No. LT-1302-2

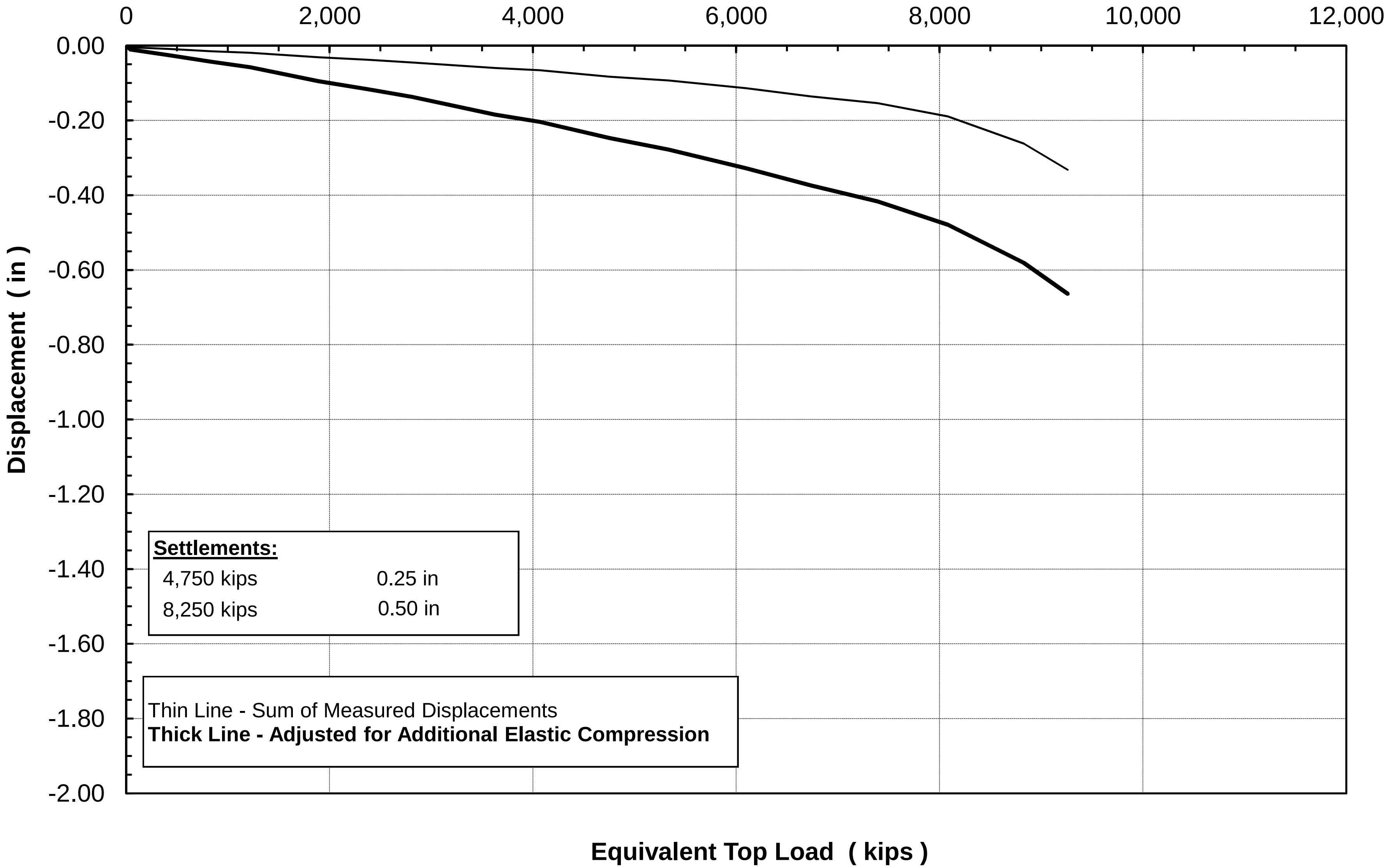
Mobilized Downward Unit Side Shear

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV



Equivalent Top Load-Displacement

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV



APPENDIX A

FIELD DATA AND DATA REDUCTION TABLES

Upward Top of Shaft Movement and Upper Shaft Compression
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load	Hold		O-cell		Top of Shaft			Upper Compression Telltales				
Test Increment	Time (minutes)	Time (EST) (hh:mm:ss)	Pressure (psi)	Load (kips)	A-Leica A (in)	B-Leica B (in)	Average (in)	A-04-12345 (in)	B-08-23842 (in)	C-1314998 (in)	D-1314999 (in)	Average (in)
1 L - 0	-	11:59:00	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1 L - 1	1	12:22:00	520	320	0.000	0.001	0.001	0.004	0.003	0.003	0.004	0.004
1 L - 1	2	12:23:00	520	320	-0.001	-0.002	-0.001	0.004	0.003	0.003	0.004	0.004
1 L - 1	4	12:25:00	520	320	-0.002	-0.001	-0.002	0.004	0.003	0.003	0.004	0.004
1 L - 1	8	12:29:00	520	320	0.000	-0.001	0.000	0.004	0.003	0.003	0.005	0.004
1 L - 2	1	12:31:30	1,040	627	0.001	0.001	0.001	0.007	0.006	0.006	0.008	0.007
1 L - 2	2	12:32:30	1,040	627	0.002	0.000	0.001	0.007	0.006	0.007	0.008	0.007
1 L - 2	4	12:34:30	1,040	627	0.002	0.002	0.002	0.008	0.006	0.007	0.009	0.007
1 L - 2	8	12:38:30	1,040	627	0.001	0.002	0.002	0.008	0.006	0.007	0.009	0.007
1 L - 3	1	12:41:00	1,520	909	0.003	0.003	0.003	0.012	0.010	0.011	0.013	0.011
1 L - 3	2	12:42:00	1,520	909	0.004	0.004	0.004	0.012	0.010	0.011	0.013	0.011
1 L - 3	4	12:44:00	1,520	909	0.001	0.002	0.002	0.012	0.010	0.011	0.013	0.012
1 L - 3	8	12:48:00	1,520	909	0.003	0.003	0.003	0.013	0.011	0.011	0.014	0.012
1 L - 4	1	12:51:30	1,990	1,186	0.004	0.005	0.005	0.017	0.013	0.015	0.018	0.016
1 L - 4	2	12:52:30	1,990	1,186	0.003	0.004	0.004	0.017	0.013	0.015	0.018	0.016
1 L - 4	4	12:54:30	1,990	1,186	0.001	0.002	0.002	0.017	0.014	0.016	0.018	0.016
1 L - 4	8	12:58:30	1,990	1,186	0.004	0.002	0.003	0.017	0.014	0.016	0.018	0.016
1 L - 5	1	13:00:30	2,510	1,492	0.007	0.008	0.008	0.022	0.018	0.021	0.023	0.021
1 L - 5	2	13:01:30	2,510	1,492	0.006	0.008	0.007	0.022	0.018	0.021	0.023	0.021
1 L - 5	4	13:03:30	2,510	1,492	0.006	0.010	0.008	0.023	0.019	0.022	0.023	0.021
1 L - 5	8	13:07:30	2,510	1,492	0.007	0.011	0.009	0.023	0.019	0.022	0.023	0.022
1 L - 6	1	13:10:00	3,030	1,798	0.010	0.014	0.012	0.027	0.021	0.027	0.028	0.026
1 L - 6	2	13:11:00	3,030	1,798	0.012	0.012	0.012	0.028	0.022	0.027	0.028	0.026
1 L - 6	4	13:13:00	3,030	1,798	0.009	0.012	0.011	0.028	0.022	0.027	0.029	0.026
1 L - 6	8	13:17:00	3,030	1,798	0.010	0.013	0.011	0.028	0.023	0.027	0.029	0.027
1 L - 7	1	13:20:00	3,500	2,075	0.007	0.009	0.008	0.033	0.027	0.032	0.034	0.031
1 L - 7	2	13:21:00	3,500	2,075	0.010	0.016	0.013	0.033	0.027	0.032	0.034	0.032
1 L - 7	4	13:23:00	3,500	2,075	0.016	0.018	0.017	0.033	0.028	0.033	0.034	0.032
1 L - 7	8	13:27:00	3,500	2,075	0.011	0.015	0.013	0.034	0.028	0.033	0.034	0.032
1 L - 8	1	13:29:30	4,030	2,387	0.018	0.021	0.020	0.038	0.032	0.038	0.039	0.037
1 L - 8	2	13:30:30	4,030	2,387	0.015	0.017	0.016	0.038	0.032	0.038	0.040	0.037
1 L - 8	4	13:32:30	4,030	2,387	0.018	0.021	0.020	0.039	0.032	0.039	0.040	0.037
1 L - 8	8	13:36:30	4,030	2,387	0.019	0.024	0.022	0.039	0.033	0.039	0.041	0.038
1 L - 9	1	13:39:30	4,520	2,676	0.020	0.023	0.022	0.043	0.037	0.044	0.045	0.042
1 L - 9	2	13:40:30	4,520	2,676	0.021	0.025	0.023	0.043	0.037	0.044	0.046	0.042
1 L - 9	4	13:42:30	4,520	2,676	0.022	0.027	0.025	0.043	0.037	0.044	0.046	0.043
1 L - 9	8	13:46:30	4,520	2,676	0.021	0.025	0.023	0.044	0.038	0.044	0.047	0.043
1 L - 10	1	13:49:30	5,010	2,965	0.026	0.033	0.030	0.047	0.042	0.049	0.051	0.047
1 L - 10	2	13:50:30	5,010	2,965	0.028	0.033	0.031	0.048	0.042	0.049	0.051	0.048
1 L - 10	4	13:52:30	5,010	2,965	0.030	0.036	0.033	0.048	0.042	0.050	0.052	0.048
1 L - 10	8	13:56:30	5,010	2,965	0.033	0.037	0.035	0.048	0.043	0.050	0.052	0.048
1 L - 11	1	13:59:30	5,500	3,253	0.037	0.042	0.040	0.052	0.047	0.055	0.057	0.053
1 L - 11	2	14:00:30	5,500	3,253	0.038	0.046	0.042	0.052	0.047	0.055	0.057	0.053
1 L - 11	4	14:02:30	5,500	3,253	0.039	0.043	0.041	0.052	0.047	0.055	0.058	0.053
1 L - 11	8	14:06:30	5,500	3,253	0.035	0.042	0.039	0.053	0.047	0.056	0.058	0.054
1 L - 12	1	14:09:00	6,060	3,583	0.049	0.052	0.051	0.057	0.052	0.061	0.063	0.058
1 L - 12	2	14:10:00	6,060	3,583	0.046	0.053	0.050	0.058	0.053	0.061	0.064	0.059
1 L - 12	4	14:12:00	6,060	3,583	0.052	0.058	0.055	0.058	0.053	0.062	0.064	0.059
1 L - 12	8	14:16:00	6,060	3,583	0.050	0.058	0.054	0.058	0.054	0.062	0.065	0.060
1 L - 13	1	14:19:00	6,540	3,866	0.061	0.067	0.064	0.063	0.058	0.067	0.069	0.064
1 L - 13	2	14:20:00	6,540	3,866	0.062	0.069	0.066	0.063	0.058	0.067	0.070	0.065
1 L - 13	4	14:22:00	6,540	3,866	0.066	0.069	0.068	0.063	0.058	0.068	0.070	0.065
1 L - 13	8	14:26:00	6,540	3,866	0.067	0.073	0.070	0.064	0.059	0.068	0.071	0.066
1 L - 14	1	14:28:30	7,020	4,148	0.073	0.079	0.076	0.067	0.062	0.072	0.075	0.069
1 L - 14	2	14:29:30	7,020	4,148	0.076	0.080	0.078	0.068	0.063	0.073	0.076	0.070
1 L - 14	4	14:31:30	7,020	4,148	0.080	0.085	0.083	0.069	0.064	0.074	0.077	0.071
1 L - 14	8	14:35:30	7,020	4,148	0.081	0.085	0.083	0.069	0.065	0.074	0.077	0.071
1 L - 15	1	14:38:00	7,500	4,431	0.093	0.096	0.095	0.075	0.070	0.079	0.083	0.077
1 L - 15	2	14:39:00	7,500	4,431	0.096	0.099	0.098	0.077	0.071	0.079	0.084	0.078
1 L - 15	4	14:41:00	7,500	4,431	0.102	0.106	0.104	0.078	0.072	0.080	0.085	0.079
1 L - 15	8	14:45:00	7,500	4,431	0.107	0.112	0.110	0.079	0.072	0.081	0.086	0.079
1 L - 16	1	14:48:00	8,000	4,725	0.135	0.136	0.136	0.086	0.078	0.087	0.092	0.086
1 L - 16	2	14:49:00	8,000	4,725	0.144	0.148	0.146	0.087	0.080	0.089	0.094	0.088
1 L - 16	4	14:51:00	8,000	4,725	0.157	0.165	0.161	0.088	0.081	0.091	0.096	0.089
1 L - 16	8	14:55:00	8,000	4,725	0.170	0.176	0.173	0.089	0.081	0.091	0.096	0.089
1 L - 17	1	14:58:00	8,500	5,020	0.202	0.206	0.204	0.094	0.086	0.096	0.102	0.094
1 L - 17	2	14:59:00	8,500	5,020	0.211	0.216	0.214	0.094	0.086	0.096	0.102	0.095
1 L - 17	4	15:01:00	8,500	5,020	0.221	0.228	0.225	0.094	0.086	0.096	0.102	0.095
1 L - 17	8	15:05:00	8,500	5,020	0.232	0.241	0.237	0.095	0.086	0.097	0.103	0.095
1 L - 18	1	15:11:30	8,870	5,238	0.276	0.280	0.278	0.099	0.091	0.101	0.107	0.099
1 L - 18	2	15:12:30	8,870	5,238	0.282	0.285	0.284	0.099	0.091	0.101	0.107	0.100
1 L - 18	4	15:14:30	8,870	5,238	0.286	0.290	0.288	0.099	0.091	0.101	0.107	0.100
1 L - 18	8	15:18:30	8,870	5,238	0.300	0.305	0.303	0.099	0.091	0.101	0.107	0.100

Upward Top of Shaft Movement and Upper Shaft Compression
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load	Hold		O-cell		Top of Shaft			Upper Compression Telltales				
Test Increment	Time (minutes)	Time (EST) (hh:mm:ss)	Pressure (psi)	Load (kips)	A-Leica A (in)	B-Leica B (in)	Average (in)	A-04-12345 (in)	B-08-23842 (in)	C-1314998 (in)	D-1314999 (in)	Average (in)
1 U - 1	1	15:24:30	6,730	3,977	0.285	0.288	0.287	0.093	0.088	0.095	0.098	0.093
1 U - 1	2	15:25:30	6,730	3,977	0.293	0.295	0.294	0.093	0.088	0.095	0.097	0.093
1 U - 1	4	15:27:30	6,730	3,977	0.287	0.293	0.290	0.093	0.088	0.095	0.097	0.093
1 U - 2	1	15:30:30	5,110	3,023	0.273	0.276	0.275	0.086	0.082	0.088	0.088	0.086
1 U - 2	2	15:31:30	5,110	3,023	0.273	0.278	0.276	0.086	0.082	0.088	0.088	0.086
1 U - 2	4	15:33:30	5,110	3,023	0.276	0.278	0.277	0.086	0.082	0.088	0.088	0.086
1 U - 3	1	15:36:30	3,550	2,105	0.258	0.257	0.258	0.079	0.076	0.081	0.078	0.078
1 U - 3	2	15:37:30	3,550	2,105	0.257	0.260	0.259	0.079	0.076	0.081	0.078	0.078
1 U - 3	4	15:39:30	3,550	2,105	0.255	0.261	0.258	0.079	0.076	0.081	0.078	0.078
1 U - 4	1	15:42:30	1,810	1,080	0.226	0.233	0.230	0.067	0.068	0.071	0.064	0.068
1 U - 4	2	15:43:30	1,810	1,080	0.228	0.232	0.230	0.067	0.068	0.071	0.064	0.068
1 U - 4	4	15:45:30	1,810	1,080	0.228	0.232	0.230	0.067	0.068	0.071	0.064	0.068
1 U - 5	1	15:50:30	0	0	0.180	0.183	0.182	0.051	0.052	0.053	0.046	0.050
1 U - 5	2	15:51:30	0	0	0.181	0.181	0.181	0.051	0.052	0.053	0.046	0.050
1 U - 5	4	15:53:30	0	0	0.178	0.182	0.180	0.051	0.052	0.053	0.046	0.051
1 U - 5	8	15:57:30	0	0	0.174	0.182	0.178	0.051	0.051	0.053	0.046	0.050

Encased Toe Telltales and O-cell Expansion
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load	Hold		O-cell		Encased Toe Telltales			O-cell Expansion				
Test Increment	Time (minutes)	Time (EST) (hh:mm:ss)	Pressure (psi)	Load (kips)	A-1414878 (in)	B-1414359 (in)	Average (in)	A-1414870 (in)	B-1414871 (in)	C-1414872 (in)	D-1414877 (in)	Average (in)
1 L - 0	-	11:59:00	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1 L - 1	1	12:22:00	520	320	0.010	0.012	0.011	0.024	0.018	0.016	0.023	0.020
1 L - 1	2	12:23:00	520	320	0.010	0.012	0.011	0.024	0.018	0.016	0.023	0.020
1 L - 1	4	12:25:00	520	320	0.010	0.012	0.011	0.024	0.019	0.016	0.023	0.021
1 L - 1	8	12:29:00	520	320	0.010	0.012	0.011	0.024	0.020	0.017	0.023	0.021
1 L - 2	1	12:31:30	1,040	627	0.019	0.019	0.019	0.038	0.032	0.029	0.036	0.034
1 L - 2	2	12:32:30	1,040	627	0.021	0.019	0.020	0.039	0.032	0.030	0.036	0.034
1 L - 2	4	12:34:30	1,040	627	0.021	0.019	0.020	0.039	0.033	0.030	0.037	0.035
1 L - 2	8	12:38:30	1,040	627	0.021	0.021	0.021	0.041	0.034	0.030	0.037	0.035
1 L - 3	1	12:41:00	1,520	909	0.032	0.031	0.032	0.056	0.046	0.043	0.054	0.050
1 L - 3	2	12:42:00	1,520	909	0.032	0.031	0.032	0.056	0.046	0.043	0.054	0.050
1 L - 3	4	12:44:00	1,520	909	0.032	0.031	0.032	0.058	0.047	0.043	0.054	0.051
1 L - 3	8	12:48:00	1,520	909	0.035	0.034	0.034	0.059	0.049	0.044	0.055	0.052
1 L - 4	1	12:51:30	1,990	1,186	0.045	0.040	0.042	0.074	0.061	0.057	0.068	0.065
1 L - 4	2	12:52:30	1,990	1,186	0.045	0.040	0.042	0.074	0.061	0.057	0.068	0.065
1 L - 4	4	12:54:30	1,990	1,186	0.047	0.043	0.045	0.074	0.063	0.059	0.070	0.066
1 L - 4	8	12:58:30	1,990	1,186	0.047	0.043	0.045	0.074	0.064	0.061	0.072	0.068
1 L - 5	1	13:00:30	2,510	1,492	0.061	0.054	0.057	0.094	0.080	0.076	0.089	0.085
1 L - 5	2	13:01:30	2,510	1,492	0.062	0.053	0.058	0.094	0.080	0.076	0.089	0.084
1 L - 5	4	13:03:30	2,510	1,492	0.062	0.054	0.058	0.097	0.081	0.076	0.089	0.086
1 L - 5	8	13:07:30	2,510	1,492	0.063	0.057	0.060	0.097	0.082	0.077	0.091	0.087
1 L - 6	1	13:10:00	3,030	1,798	0.075	0.067	0.071	0.113	0.097	0.091	0.106	0.102
1 L - 6	2	13:11:00	3,030	1,798	0.077	0.067	0.072	0.114	0.098	0.093	0.106	0.103
1 L - 6	4	13:13:00	3,030	1,798	0.078	0.067	0.072	0.116	0.100	0.095	0.106	0.104
1 L - 6	8	13:17:00	3,030	1,798	0.079	0.071	0.075	0.117	0.101	0.095	0.108	0.106
1 L - 7	1	13:20:00	3,500	2,075	0.092	0.080	0.086	0.137	0.117	0.113	0.127	0.123
1 L - 7	2	13:21:00	3,500	2,075	0.093	0.080	0.086	0.137	0.118	0.113	0.127	0.124
1 L - 7	4	13:23:00	3,500	2,075	0.094	0.080	0.087	0.140	0.119	0.114	0.128	0.125
1 L - 7	8	13:27:00	3,500	2,075	0.094	0.082	0.088	0.139	0.120	0.116	0.128	0.126
1 L - 8	1	13:29:30	4,030	2,387	0.111	0.095	0.103	0.156	0.141	0.134	0.147	0.144
1 L - 8	2	13:30:30	4,030	2,387	0.112	0.095	0.104	0.160	0.142	0.135	0.148	0.146
1 L - 8	4	13:32:30	4,030	2,387	0.112	0.095	0.103	0.160	0.144	0.137	0.150	0.148
1 L - 8	8	13:36:30	4,030	2,387	0.112	0.095	0.104	0.164	0.146	0.138	0.151	0.150
1 L - 9	1	13:39:30	4,520	2,676	0.128	0.110	0.119	0.179	0.165	0.157	0.170	0.167
1 L - 9	2	13:40:30	4,520	2,676	0.131	0.110	0.120	0.183	0.166	0.159	0.172	0.170
1 L - 9	4	13:42:30	4,520	2,676	0.131	0.110	0.121	0.185	0.167	0.160	0.175	0.172
1 L - 9	8	13:46:30	4,520	2,676	0.133	0.115	0.124	0.187	0.169	0.163	0.177	0.174
1 L - 10	1	13:49:30	5,010	2,965	0.151	0.131	0.141	0.207	0.190	0.182	0.199	0.194
1 L - 10	2	13:50:30	5,010	2,965	0.152	0.131	0.142	0.207	0.192	0.183	0.200	0.195
1 L - 10	4	13:52:30	5,010	2,965	0.153	0.136	0.145	0.208	0.194	0.186	0.203	0.198
1 L - 10	8	13:56:30	5,010	2,965	0.156	0.135	0.145	0.212	0.196	0.187	0.203	0.200
1 L - 11	1	13:59:30	5,500	3,253	0.173	0.157	0.165	0.238	0.219	0.210	0.227	0.223
1 L - 11	2	14:00:30	5,500	3,253	0.176	0.156	0.166	0.238	0.220	0.212	0.227	0.224
1 L - 11	4	14:02:30	5,500	3,253	0.177	0.158	0.167	0.239	0.222	0.214	0.230	0.226
1 L - 11	8	14:06:30	5,500	3,253	0.181	0.158	0.169	0.245	0.225	0.218	0.235	0.231
1 L - 12	1	14:09:00	6,060	3,583	0.202	0.182	0.192	0.270	0.252	0.242	0.260	0.256
1 L - 12	2	14:10:00	6,060	3,583	0.203	0.183	0.193	0.271	0.255	0.246	0.263	0.259
1 L - 12	4	14:12:00	6,060	3,583	0.207	0.183	0.195	0.278	0.259	0.250	0.266	0.263
1 L - 12	8	14:16:00	6,060	3,583	0.213	0.189	0.201	0.281	0.264	0.254	0.271	0.267
1 L - 13	1	14:19:00	6,540	3,866	0.233	0.213	0.223	0.309	0.290	0.279	0.297	0.294
1 L - 13	2	14:20:00	6,540	3,866	0.237	0.213	0.225	0.315	0.294	0.283	0.299	0.298
1 L - 13	4	14:22:00	6,540	3,866	0.243	0.220	0.231	0.319	0.299	0.288	0.309	0.304
1 L - 13	8	14:26:00	6,540	3,866	0.249	0.220	0.234	0.327	0.304	0.295	0.313	0.310
1 L - 14	1	14:28:30	7,020	4,148	0.271	0.245	0.258	0.350	0.330	0.321	0.336	0.334
1 L - 14	2	14:29:30	7,020	4,148	0.275	0.246	0.261	0.354	0.338	0.329	0.345	0.341
1 L - 14	4	14:31:30	7,020	4,148	0.284	0.256	0.270	0.367	0.346	0.336	0.354	0.351
1 L - 14	8	14:35:30	7,020	4,148	0.294	0.265	0.279	0.374	0.354	0.344	0.364	0.359
1 L - 15	1	14:38:00	7,500	4,431	0.327	0.301	0.314	0.414	0.392	0.384	0.403	0.398
1 L - 15	2	14:39:00	7,500	4,431	0.339	0.313	0.326	0.424	0.403	0.393	0.413	0.408
1 L - 15	4	14:41:00	7,500	4,431	0.351	0.321	0.336	0.443	0.416	0.407	0.426	0.423
1 L - 15	8	14:45:00	7,500	4,431	0.367	0.334	0.350	0.456	0.432	0.422	0.440	0.437
1 L - 16	1	14:48:00	8,000	4,725	0.439	0.401	0.420	0.533	0.510	0.499	0.519	0.515
1 L - 16	2	14:49:00	8,000	4,725	0.474	0.437	0.455	0.573	0.547	0.535	0.554	0.552
1 L - 16	4	14:51:00	8,000	4,725	0.527	0.483	0.505	0.625	0.598	0.588	0.607	0.605
1 L - 16	8	14:55:00	8,000	4,725	0.583	0.550	0.566	0.681	0.657	0.646	0.665	0.662
1 L - 17	1	14:58:00	8,500	5,020	0.712	0.668	0.690	0.818	0.790	0.779	0.799	0.797
1 L - 17	2	14:59:00	8,500	5,020	0.751	0.705	0.728	0.852	0.828	0.816	0.837	0.833
1 L - 17	4	15:01:00	8,500	5,020	0.816	0.781	0.799	0.917	0.893	0.880	0.902	0.898
1 L - 17	8	15:05:00	8,500	5,020	0.927	0.886	0.907	1.032	1.007	0.994	1.019	1.013
1 L - 18	1	15:11:30	8,870	5,238	1.405	1.348	1.377	1.521	1.499	1.474	1.502	1.499
1 L - 18	2	15:12:30	8,870	5,238	1.493	1.423	1.458	1.605	1.585	1.557	1.586	1.583
1 L - 18	4	15:14:30	8,870	5,238	1.664	1.587	1.626	1.777	1.754	1.728	1.758	1.754
1 L - 18	8	15:18:30	8,870	5,238	2.004	1.931	1.968	2.120	2.100	2.070	2.099	2.097

Encased Toe Telltales and O-cell Expansion

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Encased Toe Telltales A-1414878 (in)	Encased Toe Telltales B-1414359 (in)	Encased Toe Telltales Average (in)	O-cell Expansion A-1414870 (in)	O-cell Expansion B-1414871 (in)	O-cell Expansion C-1414872 (in)	O-cell Expansion D-1414877 (in)	O-cell Expansion Average (in)
1 U - 1	1	15:24:30	6,730	3,977	2.257	2.180	2.219	2.356	2.303	2.293	2.329	2.320
1 U - 1	2	15:25:30	6,730	3,977	2.257	2.180	2.218	2.356	2.303	2.294	2.329	2.320
1 U - 1	4	15:27:30	6,730	3,977	2.257	2.180	2.218	2.355	2.304	2.294	2.329	2.321
1 U - 2	1	15:30:30	5,110	3,023	2.227	2.180	2.204	2.299	2.248	2.239	2.280	2.266
1 U - 2	2	15:31:30	5,110	3,023	2.227	2.180	2.204	2.299	2.248	2.239	2.280	2.266
1 U - 2	4	15:33:30	5,110	3,023	2.227	2.179	2.203	2.299	2.247	2.239	2.280	2.266
1 U - 3	1	15:36:30	3,550	2,105	2.171	2.125	2.148	2.233	2.188	2.180	2.215	2.204
1 U - 3	2	15:37:30	3,550	2,105	2.171	2.125	2.148	2.234	2.187	2.179	2.215	2.204
1 U - 3	4	15:39:30	3,550	2,105	2.171	2.125	2.148	2.234	2.187	2.179	2.215	2.204
1 U - 4	1	15:42:30	1,810	1,080	2.091	2.050	2.070	2.147	2.101	2.096	2.127	2.118
1 U - 4	2	15:43:30	1,810	1,080	2.092	2.049	2.071	2.147	2.100	2.094	2.127	2.117
1 U - 4	4	15:45:30	1,810	1,080	2.092	2.049	2.071	2.146	2.099	2.093	2.124	2.115
1 U - 5	1	15:50:30	0	0	1.971	1.936	1.954	1.999	1.959	1.954	1.974	1.971
1 U - 5	2	15:51:30	0	0	1.968	1.930	1.949	1.997	1.955	1.952	1.972	1.969
1 U - 5	4	15:53:30	0	0	1.962	1.930	1.946	1.997	1.951	1.947	1.969	1.966
1 U - 5	8	15:57:30	0	0	1.958	1.924	1.941	1.991	1.947	1.944	1.967	1.962

O-cell Plate Movements and Creep (calculated)
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	O-cell Net Load (kips)	Top of Shaft Movement (in)	Total Comp. (in)	Upward Movement (in)	O-cell Expansion (in)	Downward Movement (in)	Shaft Base Movement[1] (in)	Creep Up Per Hold (in)	Creep Dn Per Hold (in)
1 L - 0	-	11:59:00	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000		
1 L - 1	1	12:22:00	520	320	143	0.001	0.004	0.005	0.020	-0.015	-0.006		
1 L - 1	2	12:23:00	520	320	143	-0.001	0.004	0.003	0.020	-0.017	-0.008		
1 L - 1	4	12:25:00	520	320	143	-0.002	0.004	0.002	0.021	-0.019	-0.009		
1 L - 1	8	12:29:00	520	320	143	0.000	0.004	0.004	0.021	-0.017	-0.007	0.002	0.000
1 L - 2	1	12:31:30	1,040	627	450	0.001	0.007	0.008	0.034	-0.026	-0.011		
1 L - 2	2	12:32:30	1,040	627	450	0.001	0.007	0.008	0.034	-0.026	-0.012		
1 L - 2	4	12:34:30	1,040	627	450	0.002	0.007	0.009	0.035	-0.026	-0.011		
1 L - 2	8	12:38:30	1,040	627	450	0.002	0.007	0.009	0.035	-0.026	-0.012	0.000	0.000
1 L - 3	1	12:41:00	1,520	909	732	0.003	0.011	0.014	0.050	-0.036	-0.018		
1 L - 3	2	12:42:00	1,520	909	732	0.004	0.011	0.015	0.050	-0.035	-0.017		
1 L - 3	4	12:44:00	1,520	909	732	0.002	0.012	0.014	0.051	-0.037	-0.018		
1 L - 3	8	12:48:00	1,520	909	732	0.003	0.012	0.015	0.052	-0.037	-0.019	0.001	0.000
1 L - 4	1	12:51:30	1,990	1,186	1,009	0.005	0.016	0.021	0.065	-0.044	-0.021		
1 L - 4	2	12:52:30	1,990	1,186	1,009	0.004	0.016	0.020	0.065	-0.045	-0.022		
1 L - 4	4	12:54:30	1,990	1,186	1,009	0.002	0.016	0.018	0.066	-0.048	-0.027		
1 L - 4	8	12:58:30	1,990	1,186	1,009	0.003	0.016	0.019	0.068	-0.049	-0.026	0.001	0.001
1 L - 5	1	13:00:30	2,510	1,492	1,315	0.008	0.021	0.029	0.085	-0.056	-0.028		
1 L - 5	2	13:01:30	2,510	1,492	1,315	0.007	0.021	0.028	0.084	-0.056	-0.030		
1 L - 5	4	13:03:30	2,510	1,492	1,315	0.008	0.021	0.029	0.086	-0.057	-0.029		
1 L - 5	8	13:07:30	2,510	1,492	1,315	0.009	0.022	0.031	0.087	-0.056	-0.029	0.002	0.000
1 L - 6	1	13:10:00	3,030	1,798	1,621	0.012	0.026	0.038	0.102	-0.064	-0.033		
1 L - 6	2	13:11:00	3,030	1,798	1,621	0.012	0.026	0.038	0.103	-0.065	-0.034		
1 L - 6	4	13:13:00	3,030	1,798	1,621	0.011	0.026	0.037	0.104	-0.067	-0.035		
1 L - 6	8	13:17:00	3,030	1,798	1,621	0.011	0.027	0.038	0.106	-0.068	-0.037	0.001	0.001
1 L - 7	1	13:20:00	3,500	2,075	1,898	0.008	0.031	0.039	0.123	-0.084	-0.047		
1 L - 7	2	13:21:00	3,500	2,075	1,898	0.013	0.032	0.045	0.124	-0.079	-0.041		
1 L - 7	4	13:23:00	3,500	2,075	1,898	0.017	0.032	0.049	0.125	-0.076	-0.038		
1 L - 7	8	13:27:00	3,500	2,075	1,898	0.013	0.032	0.045	0.126	-0.081	-0.043	0.000	0.005
1 L - 8	1	13:29:30	4,030	2,387	2,210	0.020	0.037	0.057	0.144	-0.087	-0.046		
1 L - 8	2	13:30:30	4,030	2,387	2,210	0.016	0.037	0.053	0.146	-0.093	-0.051		
1 L - 8	4	13:32:30	4,030	2,387	2,210	0.020	0.037	0.057	0.148	-0.091	-0.046		
1 L - 8	8	13:36:30	4,030	2,387	2,210	0.022	0.038	0.060	0.150	-0.090	-0.044	0.003	0.000
1 L - 9	1	13:39:30	4,520	2,676	2,499	0.022	0.042	0.064	0.167	-0.103	-0.055		
1 L - 9	2	13:40:30	4,520	2,676	2,499	0.023	0.042	0.065	0.170	-0.105	-0.055		
1 L - 9	4	13:42:30	4,520	2,676	2,499	0.025	0.043	0.068	0.172	-0.104	-0.053		
1 L - 9	8	13:46:30	4,520	2,676	2,499	0.023	0.043	0.066	0.174	-0.108	-0.058	0.000	0.004
1 L - 10	1	13:49:30	5,010	2,965	2,788	0.030	0.047	0.077	0.194	-0.117	-0.064		
1 L - 10	2	13:50:30	5,010	2,965	2,788	0.031	0.048	0.079	0.195	-0.116	-0.063		
1 L - 10	4	13:52:30	5,010	2,965	2,788	0.033	0.048	0.081	0.198	-0.117	-0.064		
1 L - 10	8	13:56:30	5,010	2,965	2,788	0.035	0.048	0.083	0.200	-0.117	-0.062	0.002	0.000
1 L - 11	1	13:59:30	5,500	3,253	3,076	0.040	0.053	0.093	0.223	-0.130	-0.072		
1 L - 11	2	14:00:30	5,500	3,253	3,076	0.042	0.053	0.095	0.224	-0.129	-0.071		
1 L - 11	4	14:02:30	5,500	3,253	3,076	0.041	0.053	0.094	0.226	-0.132	-0.073		
1 L - 11	8	14:06:30	5,500	3,253	3,076	0.039	0.054	0.093	0.231	-0.138	-0.076	0.000	0.006
1 L - 12	1	14:09:00	6,060	3,583	3,406	0.051	0.058	0.109	0.256	-0.147	-0.083		
1 L - 12	2	14:10:00	6,060	3,583	3,406	0.050	0.059	0.109	0.259	-0.150	-0.084		
1 L - 12	4	14:12:00	6,060	3,583	3,406	0.055	0.059	0.114	0.263	-0.149	-0.081		
1 L - 12	8	14:16:00	6,060	3,583	3,406	0.054	0.060	0.114	0.267	-0.153	-0.087	0.000	0.004
1 L - 13	1	14:19:00	6,540	3,866	3,689	0.064	0.064	0.128	0.294	-0.166	-0.095		
1 L - 13	2	14:20:00	6,540	3,866	3,689	0.066	0.065	0.131	0.298	-0.167	-0.094		
1 L - 13	4	14:22:00	6,540	3,866	3,689	0.068	0.065	0.133	0.304	-0.171	-0.098		
1 L - 13	8	14:26:00	6,540	3,866	3,689	0.070	0.066	0.136	0.310	-0.174	-0.098	0.003	0.003
1 L - 14	1	14:28:30	7,020	4,148	3,971	0.076	0.069	0.145	0.334	-0.189	-0.113		
1 L - 14	2	14:29:30	7,020	4,148	3,971	0.078	0.070	0.148	0.341	-0.193	-0.113		
1 L - 14	4	14:31:30	7,020	4,148	3,971	0.083	0.071	0.154	0.351	-0.197	-0.116		
1 L - 14	8	14:35:30	7,020	4,148	3,971	0.083	0.071	0.154	0.359	-0.205	-0.125	0.000	0.008
1 L - 15	1	14:38:00	7,500	4,431	4,254	0.095	0.077	0.172	0.398	-0.226	-0.142		
1 L - 15	2	14:39:00	7,500	4,431	4,254	0.098	0.078	0.176	0.408	-0.232	-0.150		
1 L - 15	4	14:41:00	7,500	4,431	4,254	0.104	0.079	0.183	0.423	-0.240	-0.153		
1 L - 15	8	14:45:00	7,500	4,431	4,254	0.110	0.079	0.189	0.437	-0.248	-0.161	0.006	0.008
1 L - 16	1	14:48:00	8,000	4,725	4,548	0.136	0.086	0.222	0.515	-0.293	-0.198		
1 L - 16	2	14:49:00	8,000	4,725	4,548	0.146	0.088	0.234	0.552	-0.318	-0.221		
1 L - 16	4	14:51:00	8,000	4,725	4,548	0.161	0.089	0.250	0.605	-0.355	-0.255		
1 L - 16	8	14:55:00	8,000	4,725	4,548	0.173	0.089	0.262	0.662	-0.400	-0.304	0.012	0.045
1 L - 17	1	14:58:00	8,500	5,020	4,843	0.204	0.094	0.298	0.797	-0.499	-0.392		
1 L - 17	2	14:59:00	8,500	5,020	4,843	0.214	0.095	0.309	0.833	-0.524	-0.419		
1 L - 17	4	15:01:00	8,500	5,020	4,843	0.225	0.095	0.320	0.898	-0.578	-0.479		
1 L - 17	8	15:05:00	8,500	5,020	4,843	0.237	0.095	0.332	1.013	-0.681	-0.575	0.012	0.103
1 L - 18	1	15:11:30	8,870	5,238	5,061	0.278	0.099	0.377	1.499	-1.122	-1.000		
1 L - 18	2	15:12:30	8,870	5,238	5,061	0.284	0.100	0.384	1.583	-1.199	-1.074		
1 L - 18	4	15:14:30	8,870	5,238	5,061	0.288	0.100	0.388	1.754	-1.366	-1.238		
1 L - 18	8	15:18:30	8,870	5,238	5,061	0.303	0.100	0.403	2.097	-1.694	-1.565	0.015	0.328

O-cell Plate Movements and Creep (calculated)
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	O-cell Net Load (kips)	Top of Shaft Movement (in)	Total Comp. (in)	Upward Movement (in)	O-cell Expansion (in)	Downward Movement (in)	Shaft Base Movement[1] (in)	Creep Up Per Hold (in)	Creep Dn Per Hold (in)
1 U - 1	1	15:24:30	6,730	3,977	3,800	0.287	0.093	0.380	2.320	-1.940	-1.839		
1 U - 1	2	15:25:30	6,730	3,977	3,800	0.294	0.093	0.387	2.320	-1.933	-1.831		
1 U - 1	4	15:27:30	6,730	3,977	3,800	0.290	0.093	0.383	2.321	-1.938	-1.835		
1 U - 2	1	15:30:30	5,110	3,023	2,846	0.275	0.086	0.361	2.266	-1.905	-1.843		
1 U - 2	2	15:31:30	5,110	3,023	2,846	0.276	0.086	0.362	2.266	-1.904	-1.842		
1 U - 2	4	15:33:30	5,110	3,023	2,846	0.277	0.086	0.363	2.266	-1.903	-1.840		
1 U - 3	1	15:36:30	3,550	2,105	1,928	0.258	0.078	0.336	2.204	-1.868	-1.812		
1 U - 3	2	15:37:30	3,550	2,105	1,928	0.259	0.078	0.337	2.204	-1.867	-1.811		
1 U - 3	4	15:39:30	3,550	2,105	1,928	0.258	0.078	0.336	2.204	-1.868	-1.812		
1 U - 4	1	15:42:30	1,810	1,080	903	0.230	0.068	0.298	2.118	-1.820	-1.772		
1 U - 4	2	15:43:30	1,810	1,080	903	0.230	0.068	0.298	2.117	-1.819	-1.773		
1 U - 4	4	15:45:30	1,810	1,080	903	0.230	0.068	0.298	2.115	-1.817	-1.773		
1 U - 5	1	15:50:30	0	0	0	0.182	0.050	0.232	1.971	-1.739	-1.722		
1 U - 5	2	15:51:30	0	0	0	0.181	0.050	0.231	1.969	-1.738	-1.718		
1 U - 5	4	15:53:30	0	0	0	0.180	0.051	0.231	1.966	-1.735	-1.715		
1 U - 5	8	15:57:30	0	0	0	0.178	0.050	0.228	1.962	-1.734	-1.713		

1 - Shaft Base Movement calculated as Upward Movement minus Encased Toe Telltale Average

Strain Gage Readings and Loads at Level 1
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 1: 1A-1416872 (με)	1B-1416873 (με)	1C-1416874 (με)	1D-1416875 (με)	Av. Strain (με)	Load (kips)
1 L - 0	-	11:59:00	0	0	0.0	0.0	0.0	0.0	0.0	0
1 L - 1	1	12:22:00	520	320	2.8	2.8	1.6	1.7	2.3	31
1 L - 1	2	12:23:00	520	320	2.7	3.4	1.8	1.9	2.4	33
1 L - 1	4	12:25:00	520	320	2.9	2.9	2.0	1.8	2.4	33
1 L - 1	8	12:29:00	520	320	3.1	3.0	1.9	1.7	2.4	33
1 L - 2	1	12:31:30	1,040	627	5.2	4.9	4.1	4.4	4.7	64
1 L - 2	2	12:32:30	1,040	627	5.1	5.2	4.6	4.9	5.0	68
1 L - 2	4	12:34:30	1,040	627	5.4	5.5	4.9	5.0	5.2	71
1 L - 2	8	12:38:30	1,040	627	5.1	5.6	4.9	4.9	5.1	70
1 L - 3	1	12:41:00	1,520	909	7.5	7.8	6.9	7.5	7.4	102
1 L - 3	2	12:42:00	1,520	909	7.4	7.7	7.2	7.4	7.4	102
1 L - 3	4	12:44:00	1,520	909	7.8	7.9	7.2	7.5	7.6	104
1 L - 3	8	12:48:00	1,520	909	7.8	7.8	7.4	7.7	7.7	105
1 L - 4	1	12:51:30	1,990	1,186	10.4	10.3	9.8	10.3	10.2	139
1 L - 4	2	12:52:30	1,990	1,186	10.1	9.8	10.1	10.4	10.1	138
1 L - 4	4	12:54:30	1,990	1,186	10.0	9.8	9.9	10.5	10.1	138
1 L - 4	8	12:58:30	1,990	1,186	10.9	10.5	10.3	10.9	10.6	146
1 L - 5	1	13:00:30	2,510	1,492	13.7	13.1	13.5	14.0	13.6	186
1 L - 5	2	13:01:30	2,510	1,492	13.5	12.9	13.2	13.9	13.4	183
1 L - 5	4	13:03:30	2,510	1,492	14.2	13.0	13.3	14.1	13.6	187
1 L - 5	8	13:07:30	2,510	1,492	14.3	13.5	13.7	13.8	13.8	189
1 L - 6	1	13:10:00	3,030	1,798	17.1	16.1	15.9	16.9	16.5	226
1 L - 6	2	13:11:00	3,030	1,798	17.6	16.5	16.0	17.6	16.9	231
1 L - 6	4	13:13:00	3,030	1,798	17.8	16.7	16.1	17.7	17.1	234
1 L - 6	8	13:17:00	3,030	1,798	18.5	16.7	16.2	17.8	17.3	237
1 L - 7	1	13:20:00	3,500	2,075	21.5	19.7	18.9	20.8	20.2	277
1 L - 7	2	13:21:00	3,500	2,075	21.6	19.5	19.0	21.1	20.3	278
1 L - 7	4	13:23:00	3,500	2,075	21.8	20.5	19.4	21.5	20.8	285
1 L - 7	8	13:27:00	3,500	2,075	21.9	20.6	19.4	20.5	20.6	282
1 L - 8	1	13:29:30	4,030	2,387	26.2	24.0	23.0	24.9	24.5	336
1 L - 8	2	13:30:30	4,030	2,387	26.1	24.4	23.0	25.0	24.6	337
1 L - 8	4	13:32:30	4,030	2,387	26.4	24.4	23.2	25.5	24.9	340
1 L - 8	8	13:36:30	4,030	2,387	27.0	25.4	23.6	26.1	25.5	349
1 L - 9	1	13:39:30	4,520	2,676	31.0	28.8	26.7	28.9	28.9	395
1 L - 9	2	13:40:30	4,520	2,676	31.8	29.1	27.2	29.4	29.4	402
1 L - 9	4	13:42:30	4,520	2,676	31.4	29.4	27.1	29.4	29.3	401
1 L - 9	8	13:46:30	4,520	2,676	32.6	30.0	27.7	29.7	30.0	410
1 L - 10	1	13:49:30	5,010	2,965	36.6	33.4	31.6	33.6	33.8	463
1 L - 10	2	13:50:30	5,010	2,965	36.9	34.3	31.7	34.0	34.2	468
1 L - 10	4	13:52:30	5,010	2,965	37.4	34.9	32.3	35.3	35.0	479
1 L - 10	8	13:56:30	5,010	2,965	37.5	35.2	32.2	35.0	35.0	478
1 L - 11	1	13:59:30	5,500	3,253	42.7	39.8	35.7	38.9	39.3	538
1 L - 11	2	14:00:30	5,500	3,253	42.9	39.8	35.8	38.6	39.3	538
1 L - 11	4	14:02:30	5,500	3,253	43.5	40.3	35.8	38.7	39.6	542
1 L - 11	8	14:06:30	5,500	3,253	44.8	41.0	36.7	39.8	40.6	555
1 L - 12	1	14:09:00	6,060	3,583	50.3	45.5	39.7	43.6	44.8	613
1 L - 12	2	14:10:00	6,060	3,583	51.0	45.8	40.0	43.4	45.0	616
1 L - 12	4	14:12:00	6,060	3,583	51.3	46.8	40.4	43.6	45.5	623
1 L - 12	8	14:16:00	6,060	3,583	51.8	47.6	40.6	44.1	46.0	630
1 L - 13	1	14:19:00	6,540	3,866	56.7	51.1	43.0	47.1	49.5	677
1 L - 13	2	14:20:00	6,540	3,866	57.0	51.3	43.0	47.4	49.7	680
1 L - 13	4	14:22:00	6,540	3,866	57.4	52.3	43.3	47.8	50.2	687
1 L - 13	8	14:26:00	6,540	3,866	58.1	52.4	43.7	48.2	50.6	692
1 L - 14	1	14:28:30	7,020	4,148	62.4	55.5	46.2	51.5	53.9	738
1 L - 14	2	14:29:30	7,020	4,148	63.2	55.6	46.4	52.2	54.4	744
1 L - 14	4	14:31:30	7,020	4,148	63.0	55.8	46.8	52.0	54.4	745
1 L - 14	8	14:35:30	7,020	4,148	63.9	56.0	47.1	52.6	54.9	752
1 L - 15	1	14:38:00	7,500	4,431	68.0	59.8	50.3	55.8	58.5	800
1 L - 15	2	14:39:00	7,500	4,431	68.0	59.7	50.7	56.3	58.6	803
1 L - 15	4	14:41:00	7,500	4,431	67.9	59.4	51.0	56.3	58.7	803
1 L - 15	8	14:45:00	7,500	4,431	67.3	59.2	51.1	56.6	58.6	802
1 L - 16	1	14:48:00	8,000	4,725	72.7	64.3	57.8	63.3	64.5	883
1 L - 16	2	14:49:00	8,000	4,725	74.5	65.6	59.5	64.6	66.1	904
1 L - 16	4	14:51:00	8,000	4,725	74.9	66.8	61.3	66.1	67.3	921
1 L - 16	8	14:55:00	8,000	4,725	74.8	67.1	62.3	67.2	67.9	929
1 L - 17	1	14:58:00	8,500	5,020	82.2	73.6	69.8	74.2	75.0	1,026
1 L - 17	2	14:59:00	8,500	5,020	82.7	75.0	71.2	74.5	75.8	1,038
1 L - 17	4	15:01:00	8,500	5,020	83.3	75.8	72.6	75.2	76.7	1,050
1 L - 17	8	15:05:00	8,500	5,020	84.9	78.9	76.2	77.8	79.5	1,088
1 L - 18	1	15:11:30	8,870	5,238	95.5	94.1	96.4	95.0	95.3	1,304
1 L - 18	2	15:12:30	8,870	5,238	96.0	96.6	100.2	96.6	97.3	1,332
1 L - 18	4	15:14:30	8,870	5,238	96.8	99.9	106.5	101.7	101.2	1,385
1 L - 18	8	15:18:30	8,870	5,238	96.9	100.4	111.6	106.6	103.9	1,422

Strain Gage Readings and Loads at Level 1
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 1 1A-1416872 (με)	1B-1416873 (με)	1C-1416874 (με)	1D-1416875 (με)	Av. Strain (με)	Load (kips)
1 U - 1	1	15:24:30	6,730	3,977	79.7	82.3	92.9	87.6	85.6	1,172
1 U - 1	2	15:25:30	6,730	3,977	77.7	80.8	90.9	85.2	83.6	1,145
1 U - 1	4	15:27:30	6,730	3,977	75.1	78.6	87.5	81.8	80.7	1,105
1 U - 2	1	15:30:30	5,110	3,023	64.9	66.8	71.5	67.5	67.7	926
1 U - 2	2	15:31:30	5,110	3,023	64.2	66.6	71.0	67.2	67.3	921
1 U - 2	4	15:33:30	5,110	3,023	63.5	66.3	70.5	66.9	66.8	914
1 U - 3	1	15:36:30	3,550	2,105	54.9	55.1	54.2	52.2	54.1	740
1 U - 3	2	15:37:30	3,550	2,105	54.9	55.3	54.5	52.1	54.2	742
1 U - 3	4	15:39:30	3,550	2,105	54.8	54.8	54.5	52.1	54.0	740
1 U - 4	1	15:42:30	1,810	1,080	45.4	42.7	35.4	35.8	39.8	545
1 U - 4	2	15:43:30	1,810	1,080	45.0	43.2	35.6	36.2	40.0	548
1 U - 4	4	15:45:30	1,810	1,080	45.5	43.5	36.0	36.2	40.3	551
1 U - 5	1	15:50:30	0	0	34.0	29.5	16.1	19.2	24.7	338
1 U - 5	2	15:51:30	0	0	33.6	29.5	16.2	19.6	24.7	338
1 U - 5	4	15:53:30	0	0	34.3	29.5	16.3	19.5	24.9	341
1 U - 5	8	15:57:30	0	0	33.7	29.7	16.7	19.7	25.0	342

Strain Gage Readings and Loads at Level 2
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 2 2A-1416876 (με)	2B-1416877 (με)	2C-1416878 (με)	2D-1416879 (με)	Av. Strain (με)	Load (kips)
1 L - 0	-	11:59:00	0	0	0.0	0.0	0.0	0.0	0.0	0
1 L - 1	1	12:22:00	520	320	4.9	4.6	4.5	3.7	4.4	59
1 L - 1	2	12:23:00	520	320	5.0	4.7	4.7	4.2	4.6	62
1 L - 1	4	12:25:00	520	320	5.2	4.5	4.5	5.0	4.8	65
1 L - 1	8	12:29:00	520	320	5.3	4.1	4.9	3.7	4.5	60
1 L - 2	1	12:31:30	1,040	627	9.8	9.5	9.4	9.5	9.5	128
1 L - 2	2	12:32:30	1,040	627	10.3	9.7	9.4	9.6	9.7	131
1 L - 2	4	12:34:30	1,040	627	10.4	9.5	9.6	9.7	9.8	132
1 L - 2	8	12:38:30	1,040	627	11.0	9.4	10.2	10.1	10.2	137
1 L - 3	1	12:41:00	1,520	909	17.0	15.8	15.3	16.1	16.0	215
1 L - 3	2	12:42:00	1,520	909	16.8	15.6	15.1	16.1	15.9	213
1 L - 3	4	12:44:00	1,520	909	16.9	15.9	15.6	16.4	16.2	217
1 L - 3	8	12:48:00	1,520	909	17.6	17.2	16.1	16.5	16.9	226
1 L - 4	1	12:51:30	1,990	1,186	23.3	21.4	21.2	21.9	21.9	295
1 L - 4	2	12:52:30	1,990	1,186	23.3	21.8	21.3	22.5	22.2	298
1 L - 4	4	12:54:30	1,990	1,186	24.0	21.8	21.4	23.1	22.6	303
1 L - 4	8	12:58:30	1,990	1,186	24.8	23.2	22.1	23.6	23.4	314
1 L - 5	1	13:00:30	2,510	1,492	31.9	29.5	28.2	32.0	30.4	408
1 L - 5	2	13:01:30	2,510	1,492	31.9	29.2	28.3	31.3	30.2	405
1 L - 5	4	13:03:30	2,510	1,492	32.1	29.5	28.4	31.8	30.5	409
1 L - 5	8	13:07:30	2,510	1,492	32.7	30.2	28.7	31.5	30.8	413
1 L - 6	1	13:10:00	3,030	1,798	40.0	37.6	35.4	39.3	38.1	511
1 L - 6	2	13:11:00	3,030	1,798	40.5	37.8	36.0	39.2	38.4	515
1 L - 6	4	13:13:00	3,030	1,798	41.2	38.1	36.2	40.1	38.9	522
1 L - 6	8	13:17:00	3,030	1,798	42.3	38.7	36.9	40.3	39.5	531
1 L - 7	1	13:20:00	3,500	2,075	49.4	46.3	43.1	47.7	46.6	626
1 L - 7	2	13:21:00	3,500	2,075	50.0	46.4	43.5	48.6	47.1	633
1 L - 7	4	13:23:00	3,500	2,075	50.8	46.4	44.0	48.0	47.3	635
1 L - 7	8	13:27:00	3,500	2,075	51.3	47.9	44.4	49.5	48.3	648
1 L - 8	1	13:29:30	4,030	2,387	60.8	55.2	51.5	58.0	56.4	757
1 L - 8	2	13:30:30	4,030	2,387	61.3	55.8	51.9	59.3	57.1	766
1 L - 8	4	13:32:30	4,030	2,387	62.0	56.7	52.5	58.9	57.5	772
1 L - 8	8	13:36:30	4,030	2,387	62.9	57.1	53.3	59.6	58.2	781
1 L - 9	1	13:39:30	4,520	2,676	71.5	65.3	59.8	68.5	66.3	890
1 L - 9	2	13:40:30	4,520	2,676	72.5	65.9	60.5	69.1	67.0	899
1 L - 9	4	13:42:30	4,520	2,676	73.2	66.4	61.0	70.0	67.7	908
1 L - 9	8	13:46:30	4,520	2,676	74.4	68.2	61.4	71.1	68.8	923
1 L - 10	1	13:49:30	5,010	2,965	84.1	76.3	68.5	79.6	77.1	1,035
1 L - 10	2	13:50:30	5,010	2,965	84.9	76.7	69.3	79.9	77.7	1,043
1 L - 10	4	13:52:30	5,010	2,965	85.9	78.2	70.0	80.7	78.7	1,056
1 L - 10	8	13:56:30	5,010	2,965	87.1	78.9	70.1	81.5	79.4	1,066
1 L - 11	1	13:59:30	5,500	3,253	97.4	88.2	77.5	90.6	88.4	1,187
1 L - 11	2	14:00:30	5,500	3,253	98.1	89.5	78.1	90.7	89.1	1,196
1 L - 11	4	14:02:30	5,500	3,253	99.2	89.9	78.2	91.4	89.7	1,204
1 L - 11	8	14:06:30	5,500	3,253	101.0	91.3	79.9	92.8	91.2	1,225
1 L - 12	1	14:09:00	6,060	3,583	112.6	101.4	87.7	103.2	101.2	1,358
1 L - 12	2	14:10:00	6,060	3,583	114.1	101.9	88.2	103.9	102.0	1,369
1 L - 12	4	14:12:00	6,060	3,583	115.1	103.5	88.6	104.6	103.0	1,382
1 L - 12	8	14:16:00	6,060	3,583	117.1	105.3	89.5	106.3	104.6	1,403
1 L - 13	1	14:19:00	6,540	3,866	128.2	114.4	96.7	115.2	113.6	1,525
1 L - 13	2	14:20:00	6,540	3,866	129.3	115.1	97.5	116.1	114.5	1,537
1 L - 13	4	14:22:00	6,540	3,866	130.8	116.7	98.0	117.2	115.7	1,553
1 L - 13	8	14:26:00	6,540	3,866	132.7	117.5	98.8	118.7	116.9	1,569
1 L - 14	1	14:28:30	7,020	4,148	142.3	126.7	105.7	127.9	125.6	1,687
1 L - 14	2	14:29:30	7,020	4,148	144.5	127.3	106.4	128.9	126.8	1,702
1 L - 14	4	14:31:30	7,020	4,148	146.3	129.1	107.3	130.3	128.2	1,721
1 L - 14	8	14:35:30	7,020	4,148	148.4	130.4	108.1	132.0	129.7	1,741
1 L - 15	1	14:38:00	7,500	4,431	159.7	140.8	115.7	141.6	139.4	1,872
1 L - 15	2	14:39:00	7,500	4,431	161.1	141.1	116.2	142.2	140.2	1,881
1 L - 15	4	14:41:00	7,500	4,431	163.2	142.8	117.0	143.9	141.7	1,902
1 L - 15	8	14:45:00	7,500	4,431	165.3	144.3	117.7	145.2	143.1	1,921
1 L - 16	1	14:48:00	8,000	4,725	183.8	159.6	129.5	160.3	158.3	2,125
1 L - 16	2	14:49:00	8,000	4,725	188.9	164.0	132.3	164.0	162.3	2,178
1 L - 16	4	14:51:00	8,000	4,725	194.2	168.6	135.1	166.8	166.2	2,231
1 L - 16	8	14:55:00	8,000	4,725	197.4	172.1	136.2	168.4	168.5	2,262
1 L - 17	1	14:58:00	8,500	5,020	210.2	187.1	147.7	180.3	181.3	2,434
1 L - 17	2	14:59:00	8,500	5,020	211.2	188.9	149.0	181.2	182.6	2,451
1 L - 17	4	15:01:00	8,500	5,020	211.4	190.9	150.8	181.9	183.7	2,466
1 L - 17	8	15:05:00	8,500	5,020	213.4	195.3	154.8	185.5	187.2	2,513
1 L - 18	1	15:11:30	8,870	5,238	227.7	216.3	177.4	207.2	207.1	2,781
1 L - 18	2	15:12:30	8,870	5,238	228.8	218.6	180.7	209.1	209.3	2,809
1 L - 18	4	15:14:30	8,870	5,238	230.2	221.8	186.4	213.4	212.9	2,858
1 L - 18	8	15:18:30	8,870	5,238	228.7	219.4	191.8	218.6	214.6	2,881

Strain Gage Readings and Loads at Level 2
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 2 2A-1416876 (με)	2B-1416877 (με)	2C-1416878 (με)	2D-1416879 (με)	Av. Strain (με)	Load (kips)
1 U - 1	1	15:24:30	6,730	3,977	197.2	184.3	161.8	189.4	183.2	2,459
1 U - 1	2	15:25:30	6,730	3,977	195.5	182.4	160.0	187.0	181.2	2,433
1 U - 1	4	15:27:30	6,730	3,977	192.9	179.7	156.4	183.5	178.1	2,391
1 U - 2	1	15:30:30	5,110	3,023	170.9	158.5	133.1	159.7	155.6	2,088
1 U - 2	2	15:31:30	5,110	3,023	170.7	158.0	132.8	159.0	155.1	2,082
1 U - 2	4	15:33:30	5,110	3,023	170.1	157.7	132.2	158.3	154.6	2,075
1 U - 3	1	15:36:30	3,550	2,105	146.9	133.5	107.7	132.5	130.1	1,747
1 U - 3	2	15:37:30	3,550	2,105	146.8	133.4	108.1	132.3	130.1	1,747
1 U - 3	4	15:39:30	3,550	2,105	147.1	134.6	107.8	132.3	130.4	1,751
1 U - 4	1	15:42:30	1,810	1,080	116.2	104.2	76.8	99.4	99.1	1,331
1 U - 4	2	15:43:30	1,810	1,080	117.0	104.2	77.3	100.2	99.7	1,338
1 U - 4	4	15:45:30	1,810	1,080	117.2	104.3	77.5	99.9	99.7	1,339
1 U - 5	1	15:50:30	0	0	79.5	66.8	42.3	62.1	62.7	841
1 U - 5	2	15:51:30	0	0	78.8	66.3	42.1	61.8	62.3	836
1 U - 5	4	15:53:30	0	0	78.9	65.8	41.8	61.4	62.0	832
1 U - 5	8	15:57:30	0	0	78.5	65.8	41.4	60.9	61.7	828

LOADTEST

Strain Gage Readings and Loads at Level 3
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 3: 3A-1416880 (με)	3B-1416881 (με)	3C-1416882 (με)	3D-1416883 (με)	Av. Strain (με)	Load (kips)
1 L - 0	-	11:59:00	0	0	0.0	0.0	0.0	0.0	0.0	0
1 L - 1	1	12:22:00	520	320	11.5	9.1	8.2	10.2	9.8	136
1 L - 1	2	12:23:00	520	320	11.4	9.3	8.3	10.5	9.9	138
1 L - 1	4	12:25:00	520	320	11.5	9.4	8.4	10.5	9.9	139
1 L - 1	8	12:29:00	520	320	11.5	9.6	8.2	10.3	9.9	138
1 L - 2	1	12:31:30	1,040	627	22.9	17.9	16.0	21.0	19.4	271
1 L - 2	2	12:32:30	1,040	627	23.1	18.2	16.2	21.6	19.8	276
1 L - 2	4	12:34:30	1,040	627	23.7	18.7	16.4	22.2	20.2	282
1 L - 2	8	12:38:30	1,040	627	24.2	19.5	16.9	22.7	20.9	291
1 L - 3	1	12:41:00	1,520	909	38.5	30.1	25.4	34.8	32.2	449
1 L - 3	2	12:42:00	1,520	909	38.6	29.9	25.0	35.0	32.1	448
1 L - 3	4	12:44:00	1,520	909	38.7	30.0	25.2	34.7	32.1	448
1 L - 3	8	12:48:00	1,520	909	39.9	30.9	26.0	36.3	33.3	464
1 L - 4	1	12:51:30	1,990	1,186	52.2	40.4	34.4	46.7	43.4	606
1 L - 4	2	12:52:30	1,990	1,186	52.5	40.6	34.2	47.3	43.6	609
1 L - 4	4	12:54:30	1,990	1,186	52.9	41.4	34.7	48.2	44.3	618
1 L - 4	8	12:58:30	1,990	1,186	54.1	42.4	35.8	49.1	45.4	633
1 L - 5	1	13:00:30	2,510	1,492	68.5	55.2	46.2	61.7	57.9	808
1 L - 5	2	13:01:30	2,510	1,492	68.4	54.9	46.2	61.6	57.8	806
1 L - 5	4	13:03:30	2,510	1,492	68.6	55.0	46.1	62.0	57.9	808
1 L - 5	8	13:07:30	2,510	1,492	69.6	56.0	46.6	62.8	58.7	820
1 L - 6	1	13:10:00	3,030	1,798	84.2	68.7	57.4	74.8	71.3	994
1 L - 6	2	13:11:00	3,030	1,798	84.8	69.7	58.1	75.5	72.0	1,005
1 L - 6	4	13:13:00	3,030	1,798	85.8	70.8	58.9	76.3	72.9	1,018
1 L - 6	8	13:17:00	3,030	1,798	87.1	71.6	59.7	77.0	73.8	1,030
1 L - 7	1	13:20:00	3,500	2,075	100.7	83.6	70.1	88.8	85.8	1,197
1 L - 7	2	13:21:00	3,500	2,075	101.3	84.3	70.2	89.6	86.3	1,205
1 L - 7	4	13:23:00	3,500	2,075	101.9	84.9	70.9	90.1	87.0	1,213
1 L - 7	8	13:27:00	3,500	2,075	102.4	85.3	71.4	90.8	87.5	1,220
1 L - 8	1	13:29:30	4,030	2,387	118.9	99.7	83.5	104.6	101.7	1,419
1 L - 8	2	13:30:30	4,030	2,387	119.5	100.0	83.9	105.4	102.2	1,426
1 L - 8	4	13:32:30	4,030	2,387	119.9	100.6	84.5	106.0	102.7	1,433
1 L - 8	8	13:36:30	4,030	2,387	121.3	101.5	85.3	106.8	103.7	1,447
1 L - 9	1	13:39:30	4,520	2,676	135.7	114.4	96.8	120.3	116.8	1,629
1 L - 9	2	13:40:30	4,520	2,676	136.4	115.1	97.3	120.6	117.4	1,637
1 L - 9	4	13:42:30	4,520	2,676	137.3	116.1	98.2	121.3	118.2	1,649
1 L - 9	8	13:46:30	4,520	2,676	138.0	116.6	98.9	122.2	118.9	1,659
1 L - 10	1	13:49:30	5,010	2,965	152.2	129.1	110.6	135.6	131.9	1,840
1 L - 10	2	13:50:30	5,010	2,965	153.7	130.3	111.2	136.6	133.0	1,855
1 L - 10	4	13:52:30	5,010	2,965	154.5	131.4	112.2	137.5	133.9	1,868
1 L - 10	8	13:56:30	5,010	2,965	154.4	130.9	111.9	137.2	133.6	1,864
1 L - 11	1	13:59:30	5,500	3,253	169.7	144.6	124.0	151.2	147.4	2,056
1 L - 11	2	14:00:30	5,500	3,253	170.1	144.6	124.1	151.3	147.5	2,058
1 L - 11	4	14:02:30	5,500	3,253	170.5	144.9	124.3	151.9	147.9	2,064
1 L - 11	8	14:06:30	5,500	3,253	172.5	146.9	126.1	154.3	149.9	2,092
1 L - 12	1	14:09:00	6,060	3,583	188.4	160.5	138.7	168.6	164.1	2,289
1 L - 12	2	14:10:00	6,060	3,583	189.0	161.0	139.3	169.5	164.7	2,298
1 L - 12	4	14:12:00	6,060	3,583	189.6	161.6	139.7	170.3	165.3	2,306
1 L - 12	8	14:16:00	6,060	3,583	191.2	162.9	141.0	171.8	166.7	2,326
1 L - 13	1	14:19:00	6,540	3,866	205.7	175.7	152.8	185.3	179.9	2,509
1 L - 13	2	14:20:00	6,540	3,866	206.2	176.3	153.6	186.0	180.5	2,518
1 L - 13	4	14:22:00	6,540	3,866	207.2	177.0	154.4	187.1	181.5	2,532
1 L - 13	8	14:26:00	6,540	3,866	208.7	178.2	155.5	188.5	182.8	2,550
1 L - 14	1	14:28:30	7,020	4,148	223.2	189.8	166.9	202.2	195.5	2,728
1 L - 14	2	14:29:30	7,020	4,148	224.9	191.3	168.5	203.9	197.2	2,751
1 L - 14	4	14:31:30	7,020	4,148	226.6	192.0	169.6	205.7	198.5	2,769
1 L - 14	8	14:35:30	7,020	4,148	228.2	192.9	170.9	207.4	199.9	2,788
1 L - 15	1	14:38:00	7,500	4,431	245.6	207.0	182.7	222.9	214.6	2,993
1 L - 15	2	14:39:00	7,500	4,431	246.9	208.1	183.2	224.2	215.6	3,008
1 L - 15	4	14:41:00	7,500	4,431	248.7	209.0	184.1	226.4	217.1	3,028
1 L - 15	8	14:45:00	7,500	4,431	250.8	210.0	185.1	229.0	218.7	3,052
1 L - 16	1	14:48:00	8,000	4,725	277.7	233.9	201.2	250.6	240.9	3,360
1 L - 16	2	14:49:00	8,000	4,725	280.0	236.6	207.3	254.7	244.6	3,413
1 L - 16	4	14:51:00	8,000	4,725	286.0	237.9	209.3	261.9	248.8	3,470
1 L - 16	8	14:55:00	8,000	4,725	287.9	238.7	210.0	263.9	250.1	3,489
1 L - 17	1	14:58:00	8,500	5,020	308.5	254.7	222.6	280.4	266.6	3,719
1 L - 17	2	14:59:00	8,500	5,020	310.9	256.0	222.4	281.6	267.7	3,735
1 L - 17	4	15:01:00	8,500	5,020	312.9	257.6	222.9	282.8	269.0	3,753
1 L - 17	8	15:05:00	8,500	5,020	318.5	260.5	222.1	284.0	271.3	3,784
1 L - 18	1	15:11:30	8,870	5,238	350.4	283.8	232.7	302.6	292.4	4,079
1 L - 18	2	15:12:30	8,870	5,238	353.2	287.8	233.6	302.5	294.3	4,106
1 L - 18	4	15:14:30	8,870	5,238	356.7	294.5	236.6	301.7	297.4	4,149
1 L - 18	8	15:18:30	8,870	5,238	358.3	295.7	236.2	301.0	297.8	4,154

Strain Gage Readings and Loads at Level 3
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 3 3A-1416880 (με)	3B-1416881 (με)	3C-1416882 (με)	3D-1416883 (με)	Av. Strain (με)	Load (kips)
1 U - 1	1	15:24:30	6,730	3,977	307.8	249.4	195.0	255.5	251.9	3,514
1 U - 1	2	15:25:30	6,730	3,977	306.5	248.3	194.2	254.3	250.8	3,499
1 U - 1	4	15:27:30	6,730	3,977	304.6	246.4	192.2	252.4	248.9	3,473
1 U - 2	1	15:30:30	5,110	3,023	261.8	209.4	160.5	213.5	211.3	2,947
1 U - 2	2	15:31:30	5,110	3,023	261.7	209.3	160.6	213.6	211.3	2,948
1 U - 2	4	15:33:30	5,110	3,023	261.4	209.2	160.6	213.5	211.2	2,946
1 U - 3	1	15:36:30	3,550	2,105	215.1	169.8	126.8	172.5	171.1	2,387
1 U - 3	2	15:37:30	3,550	2,105	215.3	170.1	127.1	172.7	171.3	2,390
1 U - 3	4	15:39:30	3,550	2,105	215.6	170.4	127.5	173.0	171.6	2,394
1 U - 4	1	15:42:30	1,810	1,080	157.6	121.2	86.8	122.0	121.9	1,701
1 U - 4	2	15:43:30	1,810	1,080	157.9	121.4	87.8	122.5	122.4	1,707
1 U - 4	4	15:45:30	1,810	1,080	158.4	122.1	88.1	122.9	122.9	1,714
1 U - 5	1	15:50:30	0	0	87.2	64.9	44.8	63.8	65.2	909
1 U - 5	2	15:51:30	0	0	86.4	64.6	44.9	63.3	64.8	904
1 U - 5	4	15:53:30	0	0	85.3	63.9	44.5	62.3	64.0	893
1 U - 5	8	15:57:30	0	0	84.9	63.3	44.2	61.8	63.5	886

Strain Gage Readings and Loads at Level 4
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 4 4A-1416884 (με)	4B-1416885 (με)	4C-1416886 (με)	4D-1416887 (με)	Av. Strain (με)	Load (kips)
1 L - 0	-	11:59:00	0	0	0.0	0.0	0.0	0.0	0.0	0
1 L - 1	1	12:22:00	520	320	7.3	8.1	8.4	7.4	7.8	105
1 L - 1	2	12:23:00	520	320	7.3	7.5	8.3	7.7	7.7	103
1 L - 1	4	12:25:00	520	320	7.3	7.5	8.7	7.5	7.8	104
1 L - 1	8	12:29:00	520	320	7.4	8.0	8.5	8.1	8.0	107
1 L - 2	1	12:31:30	1,040	627	13.6	14.2	15.4	14.7	14.5	195
1 L - 2	2	12:32:30	1,040	627	13.9	14.3	15.6	15.0	14.7	198
1 L - 2	4	12:34:30	1,040	627	14.6	14.5	16.5	15.0	15.1	203
1 L - 2	8	12:38:30	1,040	627	15.1	15.0	16.0	15.5	15.4	207
1 L - 3	1	12:41:00	1,520	909	23.2	22.9	23.6	23.3	23.2	312
1 L - 3	2	12:42:00	1,520	909	23.4	22.6	23.9	23.1	23.2	312
1 L - 3	4	12:44:00	1,520	909	23.8	22.7	23.7	23.6	23.4	314
1 L - 3	8	12:48:00	1,520	909	24.6	23.0	24.4	24.2	24.0	323
1 L - 4	1	12:51:30	1,990	1,186	32.1	31.0	32.0	32.2	31.8	427
1 L - 4	2	12:52:30	1,990	1,186	32.6	31.0	31.7	32.1	31.9	428
1 L - 4	4	12:54:30	1,990	1,186	33.1	31.4	32.2	32.5	32.3	434
1 L - 4	8	12:58:30	1,990	1,186	33.8	31.2	32.7	33.2	32.7	439
1 L - 5	1	13:00:30	2,510	1,492	43.8	40.9	41.7	42.5	42.2	566
1 L - 5	2	13:01:30	2,510	1,492	43.8	40.7	42.1	42.5	42.3	567
1 L - 5	4	13:03:30	2,510	1,492	44.2	40.7	41.8	42.6	42.4	569
1 L - 5	8	13:07:30	2,510	1,492	44.5	41.0	42.3	42.8	42.6	572
1 L - 6	1	13:10:00	3,030	1,798	54.0	50.1	51.1	52.6	51.9	697
1 L - 6	2	13:11:00	3,030	1,798	54.7	50.5	51.6	52.6	52.4	703
1 L - 6	4	13:13:00	3,030	1,798	55.1	50.6	52.0	53.5	52.8	709
1 L - 6	8	13:17:00	3,030	1,798	56.1	51.5	52.5	53.1	53.3	715
1 L - 7	1	13:20:00	3,500	2,075	65.5	61.0	61.7	63.3	62.9	844
1 L - 7	2	13:21:00	3,500	2,075	65.8	61.1	62.0	64.3	63.3	850
1 L - 7	4	13:23:00	3,500	2,075	66.3	61.8	62.2	64.2	63.6	854
1 L - 7	8	13:27:00	3,500	2,075	66.7	61.8	62.3	64.3	63.8	856
1 L - 8	1	13:29:30	4,030	2,387	78.0	72.8	72.9	74.1	74.4	999
1 L - 8	2	13:30:30	4,030	2,387	78.7	73.4	73.2	74.4	74.9	1,006
1 L - 8	4	13:32:30	4,030	2,387	79.3	73.5	73.4	75.1	75.3	1,011
1 L - 8	8	13:36:30	4,030	2,387	79.9	74.0	74.0	75.7	75.9	1,019
1 L - 9	1	13:39:30	4,520	2,676	90.0	83.7	84.0	85.7	85.8	1,152
1 L - 9	2	13:40:30	4,520	2,676	90.7	84.1	84.0	86.0	86.2	1,157
1 L - 9	4	13:42:30	4,520	2,676	91.5	84.4	84.5	86.9	86.8	1,165
1 L - 9	8	13:46:30	4,520	2,676	92.1	84.6	85.0	86.6	87.1	1,169
1 L - 10	1	13:49:30	5,010	2,965	102.1	95.2	95.1	96.5	97.2	1,305
1 L - 10	2	13:50:30	5,010	2,965	102.8	95.6	95.4	97.0	97.7	1,312
1 L - 10	4	13:52:30	5,010	2,965	103.6	96.5	96.3	97.6	98.5	1,322
1 L - 10	8	13:56:30	5,010	2,965	103.7	96.2	96.0	97.9	98.4	1,322
1 L - 11	1	13:59:30	5,500	3,253	114.7	107.3	106.1	108.3	109.1	1,464
1 L - 11	2	14:00:30	5,500	3,253	114.8	107.0	106.3	108.9	109.3	1,467
1 L - 11	4	14:02:30	5,500	3,253	115.0	106.8	106.2	109.6	109.4	1,468
1 L - 11	8	14:06:30	5,500	3,253	117.1	108.7	107.6	110.8	111.0	1,490
1 L - 12	1	14:09:00	6,060	3,583	128.9	119.1	119.0	121.9	122.2	1,641
1 L - 12	2	14:10:00	6,060	3,583	129.0	119.4	119.3	122.4	122.5	1,645
1 L - 12	4	14:12:00	6,060	3,583	129.8	119.6	119.4	122.8	122.9	1,650
1 L - 12	8	14:16:00	6,060	3,583	130.8	121.1	120.4	124.0	124.1	1,666
1 L - 13	1	14:19:00	6,540	3,866	141.9	130.9	130.2	133.9	134.2	1,802
1 L - 13	2	14:20:00	6,540	3,866	142.2	131.4	131.0	134.2	134.7	1,808
1 L - 13	4	14:22:00	6,540	3,866	143.0	131.5	131.3	134.9	135.2	1,814
1 L - 13	8	14:26:00	6,540	3,866	143.7	131.8	131.6	135.5	135.7	1,821
1 L - 14	1	14:28:30	7,020	4,148	153.5	142.0	141.0	144.9	145.4	1,951
1 L - 14	2	14:29:30	7,020	4,148	154.8	142.6	141.5	146.2	146.3	1,964
1 L - 14	4	14:31:30	7,020	4,148	155.5	143.1	141.8	146.7	146.8	1,970
1 L - 14	8	14:35:30	7,020	4,148	156.8	143.5	142.4	147.3	147.5	1,980
1 L - 15	1	14:38:00	7,500	4,431	174.9	159.2	152.3	158.3	161.2	2,164
1 L - 15	2	14:39:00	7,500	4,431	176.6	160.2	151.9	158.5	161.8	2,172
1 L - 15	4	14:41:00	7,500	4,431	178.1	161.0	152.3	158.9	162.6	2,182
1 L - 15	8	14:45:00	7,500	4,431	179.5	161.5	152.4	159.3	163.2	2,191
1 L - 16	1	14:48:00	8,000	4,725	200.1	179.8	165.3	173.1	179.6	2,410
1 L - 16	2	14:49:00	8,000	4,725	201.6	181.7	168.1	175.8	181.8	2,440
1 L - 16	4	14:51:00	8,000	4,725	206.4	182.1	169.8	180.8	184.8	2,480
1 L - 16	8	14:55:00	8,000	4,725	207.3	182.1	169.9	181.8	185.3	2,487
1 L - 17	1	14:58:00	8,500	5,020	220.9	192.1	179.1	193.3	196.4	2,636
1 L - 17	2	14:59:00	8,500	5,020	221.5	191.7	179.4	193.7	196.6	2,639
1 L - 17	4	15:01:00	8,500	5,020	221.5	191.1	178.7	193.8	196.3	2,634
1 L - 17	8	15:05:00	8,500	5,020	221.7	190.4	178.7	193.9	196.2	2,633
1 L - 18	1	15:11:30	8,870	5,238	232.5	198.0	187.2	204.6	205.6	2,760
1 L - 18	2	15:12:30	8,870	5,238	232.5	197.2	187.3	204.9	205.5	2,759
1 L - 18	4	15:14:30	8,870	5,238	232.5	196.7	187.1	205.7	205.5	2,759
1 L - 18	8	15:18:30	8,870	5,238	230.6	194.9	185.2	204.1	203.7	2,734

Strain Gage Readings and Loads at Level 4
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 4 4A-1416884 (με)	4B-1416885 (με)	4C-1416886 (με)	4D-1416887 (με)	Av. Strain (με)	Load (kips)
1 U - 1	1	15:24:30	6,730	3,977	200.2	170.6	159.1	172.6	175.6	2,357
1 U - 1	2	15:25:30	6,730	3,977	199.8	170.6	158.7	172.6	175.4	2,355
1 U - 1	4	15:27:30	6,730	3,977	199.2	169.6	158.3	171.8	174.7	2,345
1 U - 2	1	15:30:30	5,110	3,023	172.8	150.5	136.9	145.1	151.4	2,032
1 U - 2	2	15:31:30	5,110	3,023	172.8	150.7	137.1	145.1	151.4	2,033
1 U - 2	4	15:33:30	5,110	3,023	173.0	150.3	137.2	145.2	151.4	2,032
1 U - 3	1	15:36:30	3,550	2,105	144.8	131.1	115.5	117.4	127.2	1,707
1 U - 3	2	15:37:30	3,550	2,105	145.1	131.6	115.5	117.9	127.5	1,712
1 U - 3	4	15:39:30	3,550	2,105	145.2	131.2	116.0	117.6	127.5	1,712
1 U - 4	1	15:42:30	1,810	1,080	111.2	107.3	88.5	83.0	97.5	1,309
1 U - 4	2	15:43:30	1,810	1,080	111.7	108.1	88.6	83.4	98.0	1,315
1 U - 4	4	15:45:30	1,810	1,080	111.6	108.5	88.9	83.1	98.0	1,316
1 U - 5	1	15:50:30	0	0	69.4	65.9	49.9	45.7	57.7	774
1 U - 5	2	15:51:30	0	0	69.1	66.0	49.8	44.3	57.3	769
1 U - 5	4	15:53:30	0	0	68.5	65.8	49.4	44.5	57.1	766
1 U - 5	8	15:57:30	0	0	67.7	65.6	49.3	44.4	56.7	761

Strain Gage Readings and Loads at Level 5
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 5 5A-1416888 (με)	5B-1416889 (με)	5C-1416890 (με)	5D-1416891 (με)	Av. Strain (με)	Load (kips)
1 L - 0	-	11:59:00	0	0	0.0	0.0	0.0	0.0	0.0	0
1 L - 1	1	12:22:00	520	320	33.6	28.2	27.6	31.0	30.1	404
1 L - 1	2	12:23:00	520	320	33.8	28.5	27.6	31.2	30.3	406
1 L - 1	4	12:25:00	520	320	34.2	28.9	28.0	31.4	30.6	411
1 L - 1	8	12:29:00	520	320	34.4	29.2	28.2	31.5	30.9	414
1 L - 2	1	12:31:30	1,040	627	70.9	63.0	58.5	65.7	64.5	866
1 L - 2	2	12:32:30	1,040	627	73.0	64.3	59.6	67.6	66.1	888
1 L - 2	4	12:34:30	1,040	627	74.8	66.4	61.6	69.2	68.0	912
1 L - 2	8	12:38:30	1,040	627	77.6	68.8	64.5	71.4	70.6	947
1 L - 3	1	12:41:00	1,520	909	128.8	118.4	111.3	120.3	119.7	1,607
1 L - 3	2	12:42:00	1,520	909	129.7	119.1	112.4	120.9	120.5	1,618
1 L - 3	4	12:44:00	1,520	909	130.8	119.6	113.1	121.5	121.2	1,628
1 L - 3	8	12:48:00	1,520	909	136.0	125.9	118.3	126.8	126.7	1,701
1 L - 4	1	12:51:30	1,990	1,186	189.3	179.3	165.9	174.4	177.2	2,379
1 L - 4	2	12:52:30	1,990	1,186	190.0	180.6	167.3	175.2	178.3	2,393
1 L - 4	4	12:54:30	1,990	1,186	193.4	184.6	171.1	178.0	181.8	2,440
1 L - 4	8	12:58:30	1,990	1,186	198.6	189.4	176.1	183.7	186.9	2,509
1 L - 5	1	13:00:30	2,510	1,492	266.7	265.5	239.8	240.7	253.2	3,398
1 L - 5	2	13:01:30	2,510	1,492	267.3	266.0	240.6	241.7	253.9	3,408
1 L - 5	4	13:03:30	2,510	1,492	268.8	268.6	242.1	243.1	255.6	3,432
1 L - 5	8	13:07:30	2,510	1,492	272.3	272.6	245.2	246.2	259.1	3,478
1 L - 6	1	13:10:00	3,030	1,798	327.3	334.7	296.4	290.2	312.2	4,190
1 L - 6	2	13:11:00	3,030	1,798	330.0	337.9	298.2	292.9	314.8	4,225
1 L - 6	4	13:13:00	3,030	1,798	333.7	342.3	302.0	296.2	318.6	4,276
1 L - 6	8	13:17:00	3,030	1,798	337.2	345.4	305.9	299.2	321.9	4,322
1 L - 7	1	13:20:00	3,500	2,075	379.8	394.1	347.6	337.0	364.6	4,894
1 L - 7	2	13:21:00	3,500	2,075	382.1	397.5	349.3	339.0	367.0	4,926
1 L - 7	4	13:23:00	3,500	2,075	384.7	399.6	351.7	341.9	369.5	4,960
1 L - 7	8	13:27:00	3,500	2,075	387.4	402.9	353.9	343.5	371.9	4,993
1 L - 8	1	13:29:30	4,030	2,387	426.3	447.5	391.6	379.6	411.3	5,521
1 L - 8	2	13:30:30	4,030	2,387	428.6	450.8	394.2	381.2	413.7	5,553
1 L - 8	4	13:32:30	4,030	2,387	430.8	452.4	396.0	383.5	415.7	5,580
1 L - 8	8	13:36:30	4,030	2,387	433.8	456.2	399.2	386.3	418.9	5,622
1 L - 9	1	13:39:30	4,520	2,676	463.9	488.6	427.2	413.3	448.2	6,017
1 L - 9	2	13:40:30	4,520	2,676	465.6	490.4	430.0	414.6	450.1	6,042
1 L - 9	4	13:42:30	4,520	2,676	467.7	493.2	432.0	416.5	452.4	6,072
1 L - 9	8	13:46:30	4,520	2,676	470.1	496.0	434.4	419.2	454.9	6,106
1 L - 10	1	13:49:30	5,010	2,965	494.8	523.2	458.3	442.0	479.6	6,437
1 L - 10	2	13:50:30	5,010	2,965	496.3	525.1	460.5	443.8	481.4	6,462
1 L - 10	4	13:52:30	5,010	2,965	498.8	527.5	462.5	445.9	483.7	6,492
1 L - 10	8	13:56:30	5,010	2,965	500.1	529.2	463.9	446.8	485.0	6,510
1 L - 11	1	13:59:30	5,500	3,253	521.0	552.4	485.2	466.7	506.3	6,797
1 L - 11	2	14:00:30	5,500	3,253	521.9	553.5	486.1	467.3	507.2	6,809
1 L - 11	4	14:02:30	5,500	3,253	523.3	554.6	487.5	468.5	508.5	6,825
1 L - 11	8	14:06:30	5,500	3,253	526.1	557.9	489.6	471.0	511.2	6,862
1 L - 12	1	14:09:00	6,060	3,583	545.1	578.6	508.3	489.1	530.3	7,118
1 L - 12	2	14:10:00	6,060	3,583	546.6	580.2	509.9	490.1	531.7	7,137
1 L - 12	4	14:12:00	6,060	3,583	548.1	581.8	511.8	491.5	533.3	7,159
1 L - 12	8	14:16:00	6,060	3,583	550.0	584.1	513.2	492.9	535.0	7,182
1 L - 13	1	14:19:00	6,540	3,866	563.7	599.9	527.9	506.3	549.4	7,375
1 L - 13	2	14:20:00	6,540	3,866	564.8	601.3	529.0	507.3	550.6	7,391
1 L - 13	4	14:22:00	6,540	3,866	566.7	602.6	530.1	508.5	552.0	7,410
1 L - 13	8	14:26:00	6,540	3,866	568.3	604.2	531.7	510.1	553.6	7,431
1 L - 14	1	14:28:30	7,020	4,148	579.2	617.2	543.0	520.0	564.9	7,582
1 L - 14	2	14:29:30	7,020	4,148	581.2	619.3	544.6	521.9	566.7	7,608
1 L - 14	4	14:31:30	7,020	4,148	582.8	620.6	546.0	523.1	568.1	7,626
1 L - 14	8	14:35:30	7,020	4,148	584.8	622.5	547.7	524.2	569.8	7,648
1 L - 15	1	14:38:00	7,500	4,431	598.7	638.7	561.6	536.7	583.9	7,838
1 L - 15	2	14:39:00	7,500	4,431	600.8	641.1	563.7	538.1	585.9	7,865
1 L - 15	4	14:41:00	7,500	4,431	603.2	643.0	564.8	539.3	587.6	7,887
1 L - 15	8	14:45:00	7,500	4,431	604.7	645.2	565.7	540.5	589.0	7,906
1 L - 16	1	14:48:00	8,000	4,725	622.2	663.7	579.8	553.5	604.8	8,118
1 L - 16	2	14:49:00	8,000	4,725	625.5	667.5	582.6	554.8	607.6	8,156
1 L - 16	4	14:51:00	8,000	4,725	629.8	671.9	585.7	557.6	611.2	8,205
1 L - 16	8	14:55:00	8,000	4,725	631.7	674.1	586.0	558.0	612.5	8,221
1 L - 17	1	14:58:00	8,500	5,020	642.8	686.9	594.6	565.1	622.4	8,354
1 L - 17	2	14:59:00	8,500	5,020	643.8	687.6	594.6	565.2	622.8	8,360
1 L - 17	4	15:01:00	8,500	5,020	644.5	688.2	594.5	565.0	623.0	8,363
1 L - 17	8	15:05:00	8,500	5,020	645.3	689.2	594.4	564.7	623.4	8,368
1 L - 18	1	15:11:30	8,870	5,238	654.2	699.1	600.3	569.6	630.8	8,467
1 L - 18	2	15:12:30	8,870	5,238	654.5	699.2	600.1	569.8	630.9	8,469
1 L - 18	4	15:14:30	8,870	5,238	654.8	700.1	600.6	569.6	631.3	8,474
1 L - 18	8	15:18:30	8,870	5,238	654.3	699.5	599.0	568.4	630.3	8,461

Strain Gage Readings and Loads at Level 5
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 5 5A-1416888 (με)	5B-1416889 (με)	5C-1416890 (με)	5D-1416891 (με)	Av. Strain (με)	Load (kips)
1 U - 1	1	15:24:30	6,730	3,977	635.5	681.9	583.7	552.4	613.4	8,234
1 U - 1	2	15:25:30	6,730	3,977	635.6	681.9	583.2	552.3	613.2	8,232
1 U - 1	4	15:27:30	6,730	3,977	634.8	681.7	582.9	551.8	612.8	8,226
1 U - 2	1	15:30:30	5,110	3,023	618.7	666.2	568.8	537.4	597.7	8,024
1 U - 2	2	15:31:30	5,110	3,023	618.6	666.1	568.9	537.5	597.8	8,024
1 U - 2	4	15:33:30	5,110	3,023	618.8	666.0	568.8	537.6	597.8	8,025
1 U - 3	1	15:36:30	3,550	2,105	600.3	647.4	551.2	521.0	579.9	7,785
1 U - 3	2	15:37:30	3,550	2,105	600.2	647.6	551.3	521.1	580.0	7,786
1 U - 3	4	15:39:30	3,550	2,105	600.5	647.6	551.4	521.0	580.1	7,787
1 U - 4	1	15:42:30	1,810	1,080	570.1	615.3	512.9	486.3	546.1	7,331
1 U - 4	2	15:43:30	1,810	1,080	570.0	615.7	512.8	486.4	546.2	7,332
1 U - 4	4	15:45:30	1,810	1,080	570.5	615.8	513.0	486.7	546.5	7,336
1 U - 5	1	15:50:30	0	0	484.3	524.1	408.4	379.0	449.0	6,026
1 U - 5	2	15:51:30	0	0	483.0	523.4	407.7	378.9	448.3	6,017
1 U - 5	4	15:53:30	0	0	482.4	522.9	407.4	378.6	447.8	6,012
1 U - 5	8	15:57:30	0	0	481.9	521.7	407.3	378.2	447.3	6,004

Strain Gage Readings and Loads at Level 6
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 6 6A-1416892 (με)	6B-1416893 (με)	6C-1416894 (με)	6D-1416895 (με)	Av. Strain (με)	Load (kips)
1 L - 0	-	11:59:00	0	0	0.0	0.0	0.0	0.0	0.0	0
1 L - 1	1	12:22:00	520	320	3.0	1.8	1.9	3.3	2.5	33
1 L - 1	2	12:23:00	520	320	3.0	2.1	1.4	3.0	2.4	32
1 L - 1	4	12:25:00	520	320	2.4	1.9	2.0	2.9	2.3	31
1 L - 1	8	12:29:00	520	320	3.2	2.0	2.0	4.1	2.8	38
1 L - 2	1	12:31:30	1,040	627	5.2	4.6	5.2	6.1	5.3	71
1 L - 2	2	12:32:30	1,040	627	5.3	4.7	5.0	6.9	5.5	74
1 L - 2	4	12:34:30	1,040	627	5.2	4.4	5.4	6.9	5.5	73
1 L - 2	8	12:38:30	1,040	627	5.6	5.0	5.7	7.1	5.8	78
1 L - 3	1	12:41:00	1,520	909	9.2	7.3	8.6	10.8	9.0	120
1 L - 3	2	12:42:00	1,520	909	9.0	7.5	8.8	10.8	9.0	121
1 L - 3	4	12:44:00	1,520	909	9.2	7.5	9.1	10.4	9.1	122
1 L - 3	8	12:48:00	1,520	909	9.5	8.0	9.3	11.4	9.6	129
1 L - 4	1	12:51:30	1,990	1,186	13.0	10.2	13.7	15.1	13.0	174
1 L - 4	2	12:52:30	1,990	1,186	13.4	10.3	13.1	15.8	13.2	177
1 L - 4	4	12:54:30	1,990	1,186	13.3	10.3	12.9	16.1	13.1	176
1 L - 4	8	12:58:30	1,990	1,186	13.4	11.3	14.2	16.1	13.7	184
1 L - 5	1	13:00:30	2,510	1,492	18.1	14.5	18.1	21.6	18.1	243
1 L - 5	2	13:01:30	2,510	1,492	18.2	14.9	18.2	22.3	18.4	247
1 L - 5	4	13:03:30	2,510	1,492	18.2	14.7	18.5	21.7	18.3	245
1 L - 5	8	13:07:30	2,510	1,492	18.4	15.0	18.9	22.1	18.6	250
1 L - 6	1	13:10:00	3,030	1,798	23.1	18.7	23.3	27.4	23.1	310
1 L - 6	2	13:11:00	3,030	1,798	23.6	18.9	24.0	28.1	23.7	318
1 L - 6	4	13:13:00	3,030	1,798	23.5	19.3	25.1	27.9	23.9	321
1 L - 6	8	13:17:00	3,030	1,798	24.3	19.4	24.2	28.4	24.1	324
1 L - 7	1	13:20:00	3,500	2,075	29.6	23.8	30.0	34.0	29.4	394
1 L - 7	2	13:21:00	3,500	2,075	30.0	24.2	30.7	34.9	29.9	402
1 L - 7	4	13:23:00	3,500	2,075	30.1	24.6	30.8	35.3	30.2	405
1 L - 7	8	13:27:00	3,500	2,075	30.4	24.6	31.2	35.5	30.4	408
1 L - 8	1	13:29:30	4,030	2,387	36.1	30.3	37.0	41.9	36.3	487
1 L - 8	2	13:30:30	4,030	2,387	37.0	30.2	37.3	42.1	36.6	492
1 L - 8	4	13:32:30	4,030	2,387	37.0	30.7	37.6	42.7	37.0	497
1 L - 8	8	13:36:30	4,030	2,387	37.5	31.3	38.4	43.0	37.5	504
1 L - 9	1	13:39:30	4,520	2,676	43.0	36.3	44.6	50.3	43.5	585
1 L - 9	2	13:40:30	4,520	2,676	43.7	36.8	45.3	49.5	43.8	588
1 L - 9	4	13:42:30	4,520	2,676	43.9	37.1	45.5	50.4	44.2	593
1 L - 9	8	13:46:30	4,520	2,676	44.6	37.9	46.2	51.4	45.0	605
1 L - 10	1	13:49:30	5,010	2,965	50.7	43.6	51.8	57.3	50.9	683
1 L - 10	2	13:50:30	5,010	2,965	51.4	44.2	52.8	57.9	51.6	692
1 L - 10	4	13:52:30	5,010	2,965	52.4	44.4	53.6	58.5	52.2	701
1 L - 10	8	13:56:30	5,010	2,965	52.2	44.9	53.7	59.9	52.7	707
1 L - 11	1	13:59:30	5,500	3,253	59.6	51.2	60.4	66.0	59.3	796
1 L - 11	2	14:00:30	5,500	3,253	59.8	51.3	60.8	66.4	59.6	800
1 L - 11	4	14:02:30	5,500	3,253	59.8	51.9	61.2	67.2	60.0	806
1 L - 11	8	14:06:30	5,500	3,253	61.4	53.0	62.1	68.2	61.2	821
1 L - 12	1	14:09:00	6,060	3,583	68.2	60.1	69.9	75.9	68.5	920
1 L - 12	2	14:10:00	6,060	3,583	69.5	60.6	71.2	76.7	69.5	933
1 L - 12	4	14:12:00	6,060	3,583	70.0	61.4	71.7	77.4	70.1	942
1 L - 12	8	14:16:00	6,060	3,583	70.9	62.1	72.2	78.4	70.9	952
1 L - 13	1	14:19:00	6,540	3,866	77.1	68.5	79.3	86.1	77.8	1,044
1 L - 13	2	14:20:00	6,540	3,866	78.2	69.1	80.3	86.3	78.5	1,054
1 L - 13	4	14:22:00	6,540	3,866	78.8	70.3	80.8	87.2	79.3	1,064
1 L - 13	8	14:26:00	6,540	3,866	79.7	71.0	81.8	87.3	79.9	1,073
1 L - 14	1	14:28:30	7,020	4,148	85.9	77.1	88.2	94.8	86.5	1,161
1 L - 14	2	14:29:30	7,020	4,148	86.6	78.0	89.5	95.5	87.4	1,173
1 L - 14	4	14:31:30	7,020	4,148	87.6	78.9	89.9	96.0	88.1	1,183
1 L - 14	8	14:35:30	7,020	4,148	88.6	79.7	90.8	97.0	89.0	1,195
1 L - 15	1	14:38:00	7,500	4,431	97.6	88.6	100.9	106.2	98.3	1,320
1 L - 15	2	14:39:00	7,500	4,431	98.5	89.5	102.3	107.8	99.5	1,336
1 L - 15	4	14:41:00	7,500	4,431	99.7	90.8	103.2	109.0	100.7	1,351
1 L - 15	8	14:45:00	7,500	4,431	100.5	91.7	103.8	109.2	101.3	1,360
1 L - 16	1	14:48:00	8,000	4,725	111.5	103.0	115.6	121.3	112.9	1,515
1 L - 16	2	14:49:00	8,000	4,725	113.7	105.5	117.1	121.9	114.5	1,537
1 L - 16	4	14:51:00	8,000	4,725	116.3	108.0	119.2	124.0	116.9	1,569
1 L - 16	8	14:55:00	8,000	4,725	117.6	109.1	120.4	124.1	117.8	1,581
1 L - 17	1	14:58:00	8,500	5,020	124.7	117.4	128.0	131.2	125.3	1,682
1 L - 17	2	14:59:00	8,500	5,020	125.3	118.1	128.4	131.3	125.8	1,688
1 L - 17	4	15:01:00	8,500	5,020	125.4	118.5	128.4	131.0	125.8	1,689
1 L - 17	8	15:05:00	8,500	5,020	125.7	118.6	128.3	130.8	125.9	1,690
1 L - 18	1	15:11:30	8,870	5,238	132.0	125.8	134.1	136.1	132.0	1,772
1 L - 18	2	15:12:30	8,870	5,238	132.0	126.1	134.6	135.8	132.1	1,774
1 L - 18	4	15:14:30	8,870	5,238	132.5	126.4	134.7	135.9	132.4	1,777
1 L - 18	8	15:18:30	8,870	5,238	131.7	125.9	134.6	135.0	131.8	1,769

Strain Gage Readings and Loads at Level 6
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 6 6A-1416892 (με)	6B-1416893 (με)	6C-1416894 (με)	6D-1416895 (με)	Av. Strain (με)	Load (kips)
1 U - 1	1	15:24:30	6,730	3,977	118.0	112.7	119.9	120.3	117.7	1,580
1 U - 1	2	15:25:30	6,730	3,977	117.3	112.6	119.6	120.1	117.4	1,576
1 U - 1	4	15:27:30	6,730	3,977	117.4	112.4	118.9	119.9	117.2	1,573
1 U - 2	1	15:30:30	5,110	3,023	105.3	100.5	107.4	107.6	105.2	1,412
1 U - 2	2	15:31:30	5,110	3,023	105.5	100.7	107.5	107.9	105.4	1,415
1 U - 2	4	15:33:30	5,110	3,023	105.2	100.7	107.5	107.6	105.3	1,413
1 U - 3	1	15:36:30	3,550	2,105	91.7	87.0	93.8	94.1	91.7	1,230
1 U - 3	2	15:37:30	3,550	2,105	91.8	87.1	94.0	93.9	91.7	1,231
1 U - 3	4	15:39:30	3,550	2,105	92.0	87.1	93.8	94.0	91.7	1,231
1 U - 4	1	15:42:30	1,810	1,080	74.1	68.4	74.9	75.5	73.2	983
1 U - 4	2	15:43:30	1,810	1,080	74.0	68.6	74.5	76.0	73.3	984
1 U - 4	4	15:45:30	1,810	1,080	74.3	68.6	74.8	75.8	73.4	985
1 U - 5	1	15:50:30	0	0	49.2	44.9	49.0	51.3	48.6	652
1 U - 5	2	15:51:30	0	0	48.9	44.6	48.1	51.0	48.2	646
1 U - 5	4	15:53:30	0	0	49.0	44.5	49.2	50.2	48.2	648
1 U - 5	8	15:57:30	0	0	48.6	44.6	49.0	50.1	48.1	645

LOADTEST

Strain Gage Readings and Loads at Level 7
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load	Hold		O-cell		Strain Gage Level 7					
Test Increment	Time (minutes)	Time (EST) (hh:mm:ss)	Pressure (psi)	Load (kips)	7A-1416896 (με)	7B-1416897 (με)	7C-1416898 (με)	7D-1416899 (με)	Av. Strain (με)	Load (kips)
1 L - 0	-	11:59:00	0	0	0.0	0.0	0.0	0.0	0.0	0
1 L - 1	1	12:22:00	520	320	2.3	1.2	1.7	2.7	2.0	27
1 L - 1	2	12:23:00	520	320	2.2	1.7	1.9	2.9	2.2	29
1 L - 1	4	12:25:00	520	320	2.7	1.4	2.1	2.9	2.2	30
1 L - 1	8	12:29:00	520	320	2.7	1.5	2.3	3.6	2.5	33
1 L - 2	1	12:31:30	1,040	627	4.8	3.3	4.3	6.1	4.6	62
1 L - 2	2	12:32:30	1,040	627	4.5	3.4	4.3	6.0	4.5	61
1 L - 2	4	12:34:30	1,040	627	4.9	3.4	4.5	6.1	4.7	64
1 L - 2	8	12:38:30	1,040	627	5.1	3.6	4.7	6.6	5.0	67
1 L - 3	1	12:41:00	1,520	909	7.9	5.6	7.3	9.4	7.5	101
1 L - 3	2	12:42:00	1,520	909	8.2	5.2	7.1	9.3	7.5	100
1 L - 3	4	12:44:00	1,520	909	8.1	5.4	6.7	9.7	7.5	100
1 L - 3	8	12:48:00	1,520	909	8.3	5.9	7.3	9.9	7.8	105
1 L - 4	1	12:51:30	1,990	1,186	11.4	7.8	10.6	13.4	10.8	145
1 L - 4	2	12:52:30	1,990	1,186	10.6	7.8	10.1	13.3	10.5	141
1 L - 4	4	12:54:30	1,990	1,186	11.6	7.9	10.7	14.1	11.1	149
1 L - 4	8	12:58:30	1,990	1,186	11.6	8.4	11.1	14.2	11.3	152
1 L - 5	1	13:00:30	2,510	1,492	14.9	11.2	14.4	19.0	14.9	199
1 L - 5	2	13:01:30	2,510	1,492	15.2	10.7	14.7	19.0	14.9	200
1 L - 5	4	13:03:30	2,510	1,492	14.7	10.8	14.8	19.7	15.0	201
1 L - 5	8	13:07:30	2,510	1,492	15.4	11.2	14.9	19.5	15.3	205
1 L - 6	1	13:10:00	3,030	1,798	19.3	14.1	18.4	24.4	19.1	256
1 L - 6	2	13:11:00	3,030	1,798	19.7	13.9	18.7	25.3	19.4	261
1 L - 6	4	13:13:00	3,030	1,798	19.5	14.4	18.8	25.3	19.5	262
1 L - 6	8	13:17:00	3,030	1,798	19.8	14.4	19.1	26.0	19.8	266
1 L - 7	1	13:20:00	3,500	2,075	24.0	17.8	22.9	30.8	23.9	321
1 L - 7	2	13:21:00	3,500	2,075	23.6	18.1	23.1	30.8	23.9	321
1 L - 7	4	13:23:00	3,500	2,075	24.3	17.9	23.1	31.0	24.1	323
1 L - 7	8	13:27:00	3,500	2,075	24.7	18.4	23.4	31.3	24.5	328
1 L - 8	1	13:29:30	4,030	2,387	30.2	22.2	27.6	36.8	29.2	392
1 L - 8	2	13:30:30	4,030	2,387	30.6	22.5	27.9	37.3	29.5	397
1 L - 8	4	13:32:30	4,030	2,387	30.5	22.7	28.2	37.2	29.6	398
1 L - 8	8	13:36:30	4,030	2,387	31.1	23.0	29.0	37.8	30.3	406
1 L - 9	1	13:39:30	4,520	2,676	35.6	27.1	32.9	43.7	34.8	467
1 L - 9	2	13:40:30	4,520	2,676	35.9	27.0	33.1	43.9	35.0	470
1 L - 9	4	13:42:30	4,520	2,676	36.2	27.5	33.2	44.4	35.3	474
1 L - 9	8	13:46:30	4,520	2,676	36.6	27.7	33.8	44.8	35.7	479
1 L - 10	1	13:49:30	5,010	2,965	41.3	31.6	38.8	50.9	40.7	546
1 L - 10	2	13:50:30	5,010	2,965	41.6	31.9	38.7	51.1	40.8	548
1 L - 10	4	13:52:30	5,010	2,965	42.4	32.2	39.6	52.3	41.6	559
1 L - 10	8	13:56:30	5,010	2,965	42.1	32.8	39.2	52.7	41.7	559
1 L - 11	1	13:59:30	5,500	3,253	47.3	36.9	45.1	58.0	46.9	629
1 L - 11	2	14:00:30	5,500	3,253	48.3	37.5	45.3	58.8	47.5	637
1 L - 11	4	14:02:30	5,500	3,253	48.0	37.3	45.8	59.0	47.5	638
1 L - 11	8	14:06:30	5,500	3,253	49.2	38.6	46.7	60.5	48.8	654
1 L - 12	1	14:09:00	6,060	3,583	55.3	43.6	52.0	67.5	54.6	733
1 L - 12	2	14:10:00	6,060	3,583	55.3	43.9	53.0	68.0	55.1	739
1 L - 12	4	14:12:00	6,060	3,583	56.0	44.2	53.6	68.8	55.6	747
1 L - 12	8	14:16:00	6,060	3,583	56.7	44.8	54.1	69.8	56.3	756
1 L - 13	1	14:19:00	6,540	3,866	62.7	49.3	59.3	75.9	61.8	830
1 L - 13	2	14:20:00	6,540	3,866	62.9	49.5	59.9	76.6	62.3	836
1 L - 13	4	14:22:00	6,540	3,866	63.4	50.2	60.3	77.4	62.8	843
1 L - 13	8	14:26:00	6,540	3,866	64.1	50.8	61.1	78.4	63.6	854
1 L - 14	1	14:28:30	7,020	4,148	69.1	55.1	66.3	84.2	68.7	922
1 L - 14	2	14:29:30	7,020	4,148	69.6	55.8	67.0	85.1	69.4	931
1 L - 14	4	14:31:30	7,020	4,148	70.3	56.5	67.7	85.6	70.0	940
1 L - 14	8	14:35:30	7,020	4,148	71.0	57.1	68.7	86.8	70.9	951
1 L - 15	1	14:38:00	7,500	4,431	78.1	63.1	76.7	96.2	78.5	1,054
1 L - 15	2	14:39:00	7,500	4,431	78.8	63.9	77.6	97.2	79.4	1,066
1 L - 15	4	14:41:00	7,500	4,431	79.4	64.6	78.4	98.0	80.1	1,075
1 L - 15	8	14:45:00	7,500	4,431	80.2	65.5	79.3	98.6	80.9	1,086
1 L - 16	1	14:48:00	8,000	4,725	88.6	73.4	89.2	110.1	90.3	1,213
1 L - 16	2	14:49:00	8,000	4,725	89.9	75.0	90.4	111.5	91.7	1,231
1 L - 16	4	14:51:00	8,000	4,725	91.8	77.0	92.8	112.9	93.6	1,257
1 L - 16	8	14:55:00	8,000	4,725	92.1	78.0	93.1	113.9	94.3	1,265
1 L - 17	1	14:58:00	8,500	5,020	97.8	84.2	99.9	120.2	100.5	1,350
1 L - 17	2	14:59:00	8,500	5,020	98.0	84.6	100.6	120.5	100.9	1,355
1 L - 17	4	15:01:00	8,500	5,020	98.2	84.8	100.5	120.3	101.0	1,355
1 L - 17	8	15:05:00	8,500	5,020	98.2	85.2	100.5	120.4	101.1	1,357
1 L - 18	1	15:11:30	8,870	5,238	102.8	90.6	106.1	124.6	106.0	1,423
1 L - 18	2	15:12:30	8,870	5,238	102.9	90.8	106.1	124.5	106.1	1,424
1 L - 18	4	15:14:30	8,870	5,238	103.1	91.0	106.2	124.6	106.2	1,426
1 L - 18	8	15:18:30	8,870	5,238	102.0	90.9	105.6	123.7	105.5	1,417

Strain Gage Readings and Loads at Level 7
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 7 7A-1416896 (με)	7B-1416897 (με)	7C-1416898 (με)	7D-1416899 (με)	Av. Strain (με)	Load (kips)
1 U - 1	1	15:24:30	6,730	3,977	89.6	80.8	94.4	109.8	93.7	1,257
1 U - 1	2	15:25:30	6,730	3,977	90.0	80.5	94.4	109.6	93.6	1,256
1 U - 1	4	15:27:30	6,730	3,977	89.5	80.6	93.8	108.9	93.2	1,251
1 U - 2	1	15:30:30	5,110	3,023	79.0	71.9	83.8	97.4	83.0	1,115
1 U - 2	2	15:31:30	5,110	3,023	79.0	71.9	84.1	97.2	83.0	1,115
1 U - 2	4	15:33:30	5,110	3,023	79.2	71.8	84.0	97.7	83.1	1,116
1 U - 3	1	15:36:30	3,550	2,105	68.9	62.7	73.5	84.6	72.4	972
1 U - 3	2	15:37:30	3,550	2,105	68.7	63.1	73.7	85.3	72.7	976
1 U - 3	4	15:39:30	3,550	2,105	68.9	62.5	73.7	85.3	72.6	974
1 U - 4	1	15:42:30	1,810	1,080	55.5	50.9	60.2	69.2	58.9	791
1 U - 4	2	15:43:30	1,810	1,080	55.2	51.2	59.8	69.7	59.0	792
1 U - 4	4	15:45:30	1,810	1,080	55.3	51.0	60.0	69.9	59.0	792
1 U - 5	1	15:50:30	0	0	36.9	34.8	41.3	47.7	40.2	539
1 U - 5	2	15:51:30	0	0	36.5	34.8	41.1	47.6	40.0	537
1 U - 5	4	15:53:30	0	0	36.7	34.6	41.1	47.5	40.0	537
1 U - 5	8	15:57:30	0	0	36.3	34.6	40.8	47.3	39.7	534

Strain Gage Readings and Loads at Level 8
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

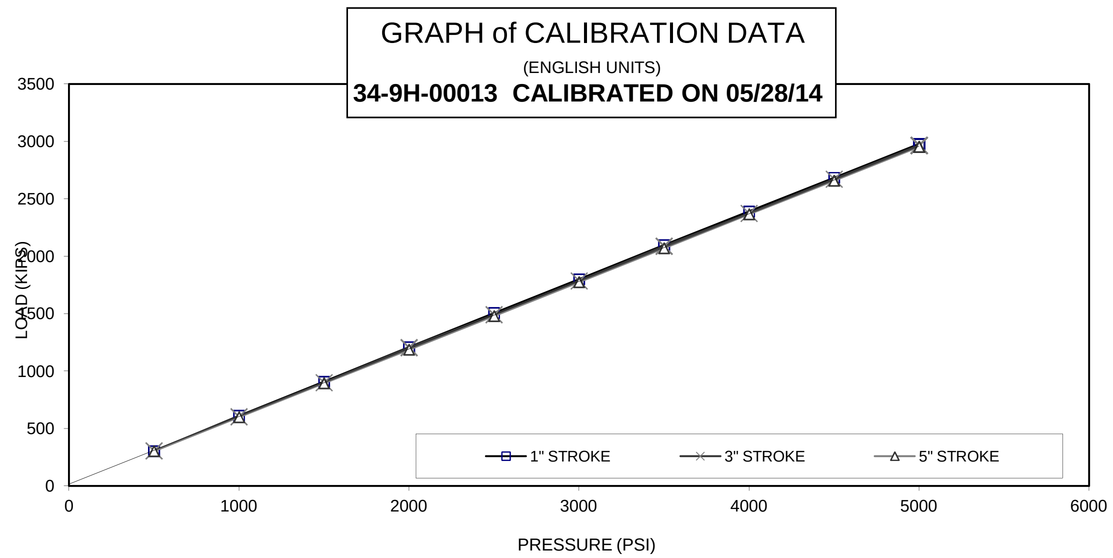
Load	Hold		O-cell		Strain Gage Level 8					
Test Increment	Time (minutes)	Time (EST) (hh:mm:ss)	Pressure (psi)	Load (kips)	8A-1416900 (με)	8B-1416901 (με)	8C-1416902 (με)	B-1416903 (με)	Av. Strain (με)	Load (kips)
1 L - 0	-	11:59:00	0	0	0.0	0.0	0.0	0.0	0.0	0
1 L - 1	1	12:22:00	520	320	1.6	1.0	0.4	1.0	1.0	14
1 L - 1	2	12:23:00	520	320	1.6	1.7	0.1	1.1	1.1	16
1 L - 1	4	12:25:00	520	320	2.2	0.9	0.5	1.0	1.2	17
1 L - 1	8	12:29:00	520	320	1.8	1.6	0.7	0.7	1.2	17
1 L - 2	1	12:31:30	1,040	627	2.7	2.5	1.2	2.3	2.2	31
1 L - 2	2	12:32:30	1,040	627	2.6	1.9	1.3	2.3	2.0	29
1 L - 2	4	12:34:30	1,040	627	2.2	2.1	1.4	1.9	1.9	27
1 L - 2	8	12:38:30	1,040	627	2.4	2.8	1.5	2.5	2.3	33
1 L - 3	1	12:41:00	1,520	909	3.1	3.6	3.0	4.1	3.5	50
1 L - 3	2	12:42:00	1,520	909	3.3	3.6	3.1	3.8	3.5	50
1 L - 3	4	12:44:00	1,520	909	3.5	3.7	3.1	4.0	3.6	51
1 L - 3	8	12:48:00	1,520	909	4.9	3.8	3.2	3.9	4.0	57
1 L - 4	1	12:51:30	1,990	1,186	4.5	4.7	4.4	5.2	4.7	68
1 L - 4	2	12:52:30	1,990	1,186	4.3	4.6	4.5	5.3	4.7	67
1 L - 4	4	12:54:30	1,990	1,186	5.1	5.0	4.8	5.5	5.1	73
1 L - 4	8	12:58:30	1,990	1,186	5.2	5.0	5.1	5.4	5.2	75
1 L - 5	1	13:00:30	2,510	1,492	7.0	6.0	6.4	7.6	6.7	96
1 L - 5	2	13:01:30	2,510	1,492	7.7	5.4	6.4	7.6	6.8	97
1 L - 5	4	13:03:30	2,510	1,492	7.0	6.1	6.4	7.7	6.8	98
1 L - 5	8	13:07:30	2,510	1,492	7.1	6.0	6.7	7.5	6.8	98
1 L - 6	1	13:10:00	3,030	1,798	9.1	7.1	8.2	10.0	8.6	124
1 L - 6	2	13:11:00	3,030	1,798	8.9	7.1	8.5	10.1	8.7	124
1 L - 6	4	13:13:00	3,030	1,798	9.5	7.6	8.7	10.2	9.0	129
1 L - 6	8	13:17:00	3,030	1,798	9.6	7.8	8.8	10.9	9.3	133
1 L - 7	1	13:20:00	3,500	2,075	10.3	8.8	10.7	12.7	10.6	153
1 L - 7	2	13:21:00	3,500	2,075	10.1	8.6	10.4	12.7	10.4	150
1 L - 7	4	13:23:00	3,500	2,075	10.3	8.7	10.4	13.0	10.6	152
1 L - 7	8	13:27:00	3,500	2,075	10.6	9.0	10.6	13.2	10.8	155
1 L - 8	1	13:29:30	4,030	2,387	12.3	9.6	12.9	15.6	12.6	181
1 L - 8	2	13:30:30	4,030	2,387	11.9	9.5	12.9	15.5	12.5	179
1 L - 8	4	13:32:30	4,030	2,387	12.0	9.9	13.2	15.9	12.8	183
1 L - 8	8	13:36:30	4,030	2,387	12.3	9.9	13.4	16.2	13.0	186
1 L - 9	1	13:39:30	4,520	2,676	13.6	10.6	15.2	18.7	14.5	209
1 L - 9	2	13:40:30	4,520	2,676	13.4	10.5	15.4	18.9	14.5	208
1 L - 9	4	13:42:30	4,520	2,676	14.2	10.5	15.5	19.4	14.9	214
1 L - 9	8	13:46:30	4,520	2,676	13.8	10.7	15.9	19.4	14.9	214
1 L - 10	1	13:49:30	5,010	2,965	14.7	10.5	17.6	21.9	16.2	233
1 L - 10	2	13:50:30	5,010	2,965	15.2	11.3	18.3	22.1	16.7	240
1 L - 10	4	13:52:30	5,010	2,965	14.2	11.0	18.2	22.3	16.5	236
1 L - 10	8	13:56:30	5,010	2,965	15.7	11.0	18.4	22.4	16.9	242
1 L - 11	1	13:59:30	5,500	3,253	16.0	11.7	20.5	25.0	18.3	262
1 L - 11	2	14:00:30	5,500	3,253	15.6	11.9	20.1	24.6	18.0	259
1 L - 11	4	14:02:30	5,500	3,253	16.3	11.7	20.8	24.7	18.4	264
1 L - 11	8	14:06:30	5,500	3,253	15.9	11.9	21.1	25.1	18.5	266
1 L - 12	1	14:09:00	6,060	3,583	18.1	12.9	23.2	28.2	20.6	296
1 L - 12	2	14:10:00	6,060	3,583	18.3	13.2	23.7	29.1	21.1	302
1 L - 12	4	14:12:00	6,060	3,583	18.0	13.3	23.9	29.1	21.1	302
1 L - 12	8	14:16:00	6,060	3,583	18.1	13.7	24.5	29.4	21.4	308
1 L - 13	1	14:19:00	6,540	3,866	19.6	14.9	26.9	32.0	23.3	335
1 L - 13	2	14:20:00	6,540	3,866	19.5	15.1	27.4	32.1	23.5	338
1 L - 13	4	14:22:00	6,540	3,866	20.2	15.2	28.0	32.5	24.0	344
1 L - 13	8	14:26:00	6,540	3,866	20.5	15.7	28.4	33.3	24.5	351
1 L - 14	1	14:28:30	7,020	4,148	21.4	17.1	31.0	36.1	26.4	379
1 L - 14	2	14:29:30	7,020	4,148	22.7	18.0	31.4	36.3	27.1	389
1 L - 14	4	14:31:30	7,020	4,148	23.0	18.5	32.0	36.8	27.6	396
1 L - 14	8	14:35:30	7,020	4,148	23.5	18.4	32.5	37.4	27.9	401
1 L - 15	1	14:38:00	7,500	4,431	25.9	21.9	36.6	41.1	31.4	450
1 L - 15	2	14:39:00	7,500	4,431	26.4	22.4	37.3	41.7	32.0	458
1 L - 15	4	14:41:00	7,500	4,431	27.1	23.1	38.1	42.9	32.8	470
1 L - 15	8	14:45:00	7,500	4,431	27.6	23.6	39.5	43.3	33.5	481
1 L - 16	1	14:48:00	8,000	4,725	30.6	27.2	45.0	49.1	38.0	545
1 L - 16	2	14:49:00	8,000	4,725	31.3	28.1	46.6	50.2	39.0	560
1 L - 16	4	14:51:00	8,000	4,725	32.1	29.1	48.7	52.4	40.6	582
1 L - 16	8	14:55:00	8,000	4,725	32.9	29.8	49.6	53.0	41.3	593
1 L - 17	1	14:58:00	8,500	5,020	35.5	32.4	54.3	57.7	45.0	645
1 L - 17	2	14:59:00	8,500	5,020	35.8	32.7	55.1	58.1	45.5	652
1 L - 17	4	15:01:00	8,500	5,020	35.2	33.1	55.3	58.5	45.5	653
1 L - 17	8	15:05:00	8,500	5,020	36.1	34.0	55.9	58.9	46.2	663
1 L - 18	1	15:11:30	8,870	5,238	38.1	35.8	60.2	62.9	49.3	707
1 L - 18	2	15:12:30	8,870	5,238	38.7	36.2	60.8	63.1	49.7	713
1 L - 18	4	15:14:30	8,870	5,238	38.7	36.1	61.2	63.3	49.8	715
1 L - 18	8	15:18:30	8,870	5,238	38.6	36.2	61.3	63.2	49.8	715

Strain Gage Readings and Loads at Level 8
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

Load Test Increment	Hold Time (minutes)	Time (EST) (hh:mm:ss)	O-cell Pressure (psi)	O-cell Load (kips)	Strain Gage Level 8 8A-1416900 (με)	8B-1416901 (με)	8C-1416902 (με)	B-1416903 (με)	Av. Strain (με)	Load (kips)
1 U - 1	1	15:24:30	6,730	3,977	33.9	32.6	57.0	58.3	45.4	652
1 U - 1	2	15:25:30	6,730	3,977	34.4	33.0	57.0	58.0	45.6	654
1 U - 1	4	15:27:30	6,730	3,977	33.6	32.2	56.3	57.9	45.0	646
1 U - 2	1	15:30:30	5,110	3,023	30.2	29.1	52.8	53.6	41.4	595
1 U - 2	2	15:31:30	5,110	3,023	29.9	29.0	52.7	53.5	41.3	592
1 U - 2	4	15:33:30	5,110	3,023	29.9	29.5	52.3	53.9	41.4	594
1 U - 3	1	15:36:30	3,550	2,105	27.1	26.6	48.7	48.8	37.8	543
1 U - 3	2	15:37:30	3,550	2,105	26.8	26.5	48.6	49.1	37.7	541
1 U - 3	4	15:39:30	3,550	2,105	28.0	26.1	48.6	48.9	37.9	544
1 U - 4	1	15:42:30	1,810	1,080	21.9	22.7	42.7	42.3	32.4	465
1 U - 4	2	15:43:30	1,810	1,080	21.6	22.0	42.9	42.0	32.1	461
1 U - 4	4	15:45:30	1,810	1,080	22.3	22.7	42.2	42.1	32.3	464
1 U - 5	1	15:50:30	0	0	16.8	17.8	33.4	32.7	25.2	361
1 U - 5	2	15:51:30	0	0	17.1	17.7	33.9	32.3	25.2	362
1 U - 5	4	15:53:30	0	0	16.5	17.6	33.5	32.6	25.1	360
1 U - 5	8	15:57:30	0	0	16.4	17.4	32.9	32.5	24.8	356

APPENDIX B

O-CELL AND INSTRUMENTATION CALIBRATION SHEETS



STROKE:	1 INCH	3 INCH	5 INCH
PRESSURE PSI	LOAD KIPS	LOAD KIPS	LOAD KIPS
0	0	0	0
500	303	305	303
1000	611	603	600
1500	908	900	894
2000	1208	1205	1186
2500	1505	1492	1479
3000	1799	1786	1774
3500	2097	2088	2070
4000	2389	2374	2366
4500	2684	2672	2658
5000	2979	2966	2954

34" O-CELL, SERIAL # 34-9H-00013

LOAD CONVERSION FORMULA

LOAD = PRESSURE * 0.5910 + (13.39)
{KIPS} {PSI}

Regression Output:

Constant	13.3936	kips
X Coefficient	0.5910	kip / psi
R Square	0.9999	
No. of Observations	30	
Degrees of Freedom	28	
Std Err of Y Est	9.65	
Std Err of X Coeff	0.0012	

CALIBRATION STANDARDS:

All data presented are derived from 6" dia. certified hydraulic pressure gauges and electronic load transducer, manufactured and calibrated by the University of Illinois at Champaign, Illinois. All calibrations and certifications are traceable through the Laboratory Master Deadweight Gauges directly to the National Institute of Standards and Technology. No specific guidelines exist for calibration of load test jacks and equipment but procedures comply with similar guidelines for calibration of gages, ANSI specifications B40.1.

* AE & FC CUSTOMER: LOADTEST	* CONTRACTOR.: AGGREGATE INDUSTRIES
* AE & FC JOB NO: SO12325	* JOB LOCATION: NORTH LAS VEGAS, NV
* CUSTOMER P.O. NO.: LT-1302-2	* DATED: 05/28/14

SERVICE ENGINEER: [signature] DATE: 5-28-14

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416872

Cable Length: 115 feet

Prestress: 35,000 psi

Regression Zero: 6964

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7017	7014	7016		
1500	7672	7671	7672	656	-0.09
3000	8378	8377	8378	706	-0.23
4500	9099	9098	9099	721	0.16
6000	9806	9803	9805	706	0.02
100	7014	7012	7013		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.354 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416873

Cable Length: 115 feet

Prestress: 35,000 psi

Regression Zero: 6996

Temperature: 23.3 °C

Technician: [signature]

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7045	7045	7045		
1500	7705	7705	7705	660	-0.10
3000	8419	8419	8419	714	-0.03
4500	9135	9136	9136	717	0.14
6000	9841	9842	9842	706	-0.07
100	7045	7044	7045		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.353 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416874

Cable Length: 115 feet

Prestress: 35,000 psi

Regression Zero: 6901

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	6960	6958	6959		
1500	7621	7619	7620	661	-0.24
3000	8344	8343	8344	724	-0.33
4500	9082	9084	9083	739	0.14
6000	9809	9808	9809	726	0.12
100	6958	6957	6958		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.348 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416875

Cable Length: 115 feet

Prestress: 35,000 psi

Regression Zero: 7045

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7103	7100	7102		
1500	7765	7765	7765	663	-0.27
3000	8497	8496	8497	732	-0.14
4500	9233	9230	9232	735	0.10
6000	9959	9958	9959	727	0.08
100	7100	7100	7100		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.348 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416876

Cable Length: 110 feet

Prestress: 35,000 psi

Regression Zero: 7004

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7058	7058	7058		
1500	7708	7708	7708	650	-0.21
3000	8415	8416	8416	708	-0.29
4500	9137	9140	9139	723	0.17
6000	9845	9844	9845	706	0.03
100	7058	7057	7058		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.354 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416877

Cable Length: 110 feet

Prestress: 35,000 psi

Regression Zero: 7126

Temperature: 23.3 °C

Technician: [signature]

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7177	7177	7177		
1500	7825	7822	7824	647	-0.16
3000	8528	8527	8528	704	-0.08
4500	9236	9235	9236	708	0.14
6000	9934	9933	9934	698	0.00
100	7176	7173	7175		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.357 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416878

Cable Length: 110 feet

Prestress: 35,000 psi

Regression Zero: 6967

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7014	7016	7015		
1500	7677	7678	7678	663	-0.03
3000	8390	8388	8389	711	-0.02
4500	9100	9099	9100	711	-0.05
6000	9814	9812	9813	713	0.03
100	7015	7015	7015		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.353 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416879

Cable Length: 110 feet

Prestress: 35,000 psi

Regression Zero: 7058

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7111	7105	7108		
1500	7786	7780	7783	675	-0.10
3000	8518	8512	8515	732	0.04
4500	9249	9242	9246	731	0.12
6000	9972	9964	9968	722	-0.06
100	7105	7100	7103		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.347 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416880

Cable Length: 95 feet

Prestress: 35,000 psi

Regression Zero: 6971

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7022	7020	7021		
1500	7669	7668	7669	648	-0.10
3000	8369	8371	8370	701	-0.07
4500	9076	9074	9075	705	0.10
6000	9775	9771	9773	698	0.01
100	7020	7019	7020		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.357 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416881

Cable Length: 95 feet

Prestress: 35,000 psi

Regression Zero: 6922

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	6975	6974	6975		
1500	7645	7644	7645	670	-0.15
3000	8375	8372	8374	729	-0.07
4500	9104	9105	9105	731	0.08
6000	9831	9828	9830	725	0.02
100	6974	6973	6974		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.348 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416882

Cable Length: 95 feet

Prestress: 35,000 psi

Regression Zero: 6994

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7051	7051	7051		
1500	7707	7708	7708	657	-0.23
3000	8428	8426	8427	719	-0.25
4500	9157	9156	9157	730	0.08
6000	9878	9879	9879	722	0.14
100	7051	7050	7051		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.350 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416883

Cable Length: 95 feet

Prestress: 35,000 psi

Regression Zero: 7098

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7144	7146	7145		
1500	7818	7817	7818	673	0.07
3000	8528	8528	8528	710	-0.17
4500	9254	9254	9254	726	0.13
6000	9969	9963	9966	712	-0.06
100	7146	7145	7146		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.351 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416884

Cable Length: 70 feet

Prestress: 35,000 psi

Regression Zero: 7002

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7051	7049	7050		
1500	7723	7720	7722	672	-0.05
3000	8447	8441	8444	722	0.00
4500	9167	9167	9167	723	0.06
6000	9888	9881	9885	718	-0.06
100	7049	7046	7048		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.350 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416885

Cable Length: 70 feet

Prestress: 35,000 psi

Regression Zero: 7068

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7113	7115	7114		
1500	7798	7794	7796	682	-0.07
3000	8532	8531	8532	736	0.12
4500	9262	9262	9262	730	0.14
6000	9983	9981	9982	720	-0.20
100	7115	7114	7115		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.347 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416886

Cable Length: 70 feet

Prestress: 35,000 psi

Regression Zero: 7000

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7051	7046	7049		
1500	7713	7709	7711	662	-0.04
3000	8425	8420	8423	712	-0.06
4500	9142	9139	9141	718	0.15
6000	9849	9844	9847	706	-0.06
100	7046	7042	7044		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.353 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416887

Cable Length: 70 feet

Prestress: 35,000 psi

Regression Zero: 7138

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7187	7186	7187		
1500	7846	7844	7845	658	-0.05
3000	8552	8552	8552	707	-0.11
4500	9266	9267	9267	715	0.10
6000	9973	9969	9971	704	-0.04
100	7186	7188	7187		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.354 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416888

Cable Length: 60 feet

Prestress: 35,000 psi

Regression Zero: 7176

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7225	7226	7226		
1500	7892	7893	7893	667	-0.06
3000	8613	8609	8611	718	-0.06
4500	9337	9335	9336	725	0.17
6000	10049	10046	10048	712	-0.07
100	7226	7224	7225		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.351 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416889

Cable Length: 60 feet

Prestress: 35,000 psi

Regression Zero: 6990

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7041	7040	7041		
1500	7712	7710	7711	670	-0.06
3000	8431	8430	8431	720	-0.17
4500	9161	9161	9161	730	0.10
6000	9882	9879	9881	720	0.00
100	7040	7036	7038		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.349 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416890

Cable Length: 60 feet

Prestress: 35,000 psi

Regression Zero: 7155

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7201	7201	7201		
1500	7877	7876	7877	676	0.11
3000	8588	8589	8589	712	-0.11
4500	9312	9311	9312	723	0.05
6000	10028	10027	10028	716	-0.03
100	7201	7199	7200		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.351 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416891

Cable Length: 60 feet

Prestress: 35,000 psi

Regression Zero: 6857

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	6905	6903	6904		
1500	7576	7574	7575	671	-0.09
3000	8300	8300	8300	725	0.07
4500	9025	9021	9023	723	0.16
6000	9735	9734	9735	712	-0.16
100	6903	6903	6903		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.350 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416892

Cable Length: 55 feet

Prestress: 35,000 psi

Regression Zero: 7002

Temperature: 23.3 °C

Technician: [signature]

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7053	7052	7053		
1500	7717	7717	7717	664	-0.05
3000	8431	8430	8431	714	-0.15
4500	9152	9150	9151	720	0.00
6000	9870	9869	9870	719	0.07
100	7052	7052	7052		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.352 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416893

Cable Length: 55 feet

Prestress: 35,000 psi

Regression Zero: 6882

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	6933	6926	6930		
1500	7593	7588	7591	661	-0.02
3000	8302	8297	8300	709	-0.03
4500	9012	9006	9009	709	-0.01
6000	9721	9716	9719	710	0.00
100	6926	6922	6924		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.354 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416894

Cable Length: 55 feet

Prestress: 35,000 psi

Regression Zero: 7048

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7098	7096	7097		
1500	7753	7752	7753	656	0.03
3000	8447	8447	8447	694	-0.29
4500	9164	9164	9164	717	0.19
6000	9862	9862	9862	698	-0.01
100	7096	7096	7096		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.356 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416895

Cable Length: 55 feet

Prestress: 35,000 psi

Regression Zero: 6923

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	6973	6973	6973		
1500	7639	7634	7637	664	-0.12
3000	8360	8355	8358	721	0.02
4500	9081	9078	9080	722	0.19
6000	9790	9787	9789	709	-0.08
100	6973	6968	6971		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.351 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416896

Cable Length: 50 feet

Prestress: 35,000 psi

Regression Zero: 7102

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7149	7147	7148		
1500	7809	7805	7807	659	0.06
3000	8511	8506	8509	702	0.00
4500	9214	9213	9214	705	0.07
6000	9916	9912	9914	700	-0.03
100	7147	7145	7146		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.356 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416897

Cable Length: 50 feet

Prestress: 35,000 psi

Regression Zero: 6934

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	6984	6984	6984		
1500	7644	7643	7644	660	-0.08
3000	8355	8353	8354	710	-0.13
4500	9077	9074	9076	722	0.21
6000	9779	9780	9780	704	-0.06
100	6985	6982	6984		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.353 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416898

Cable Length: 50 feet

Prestress: 35,000 psi

Regression Zero: 7138

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7180	7184	7182		
1500	7843	7849	7846	664	0.08
3000	8550	8555	8553	707	0.10
4500	9258	9259	9259	706	0.11
6000	9958	9958	9958	699	-0.12
100	7184	7185	7185		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.355 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416899

Cable Length: 50 feet

Prestress: 35,000 psi

Regression Zero: 7073

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7122	7119	7121		
1500	7796	7796	7796	675	0.00
3000	8519	8517	8518	722	-0.03
4500	9244	9245	9245	727	0.09
6000	9963	9963	9963	718	-0.07
100	7120	7119	7120		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.349 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416900

Cable Length: 35 feet

Prestress: 35,000 psi

Regression Zero: 7094

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7150	7147	7149		
1500	7789	7784	7787	638	-0.28
3000	8492	8489	8491	704	-0.16
4500	9200	9196	9198	707	0.09
6000	9900	9896	9898	700	0.08
100	7147	7146	7147		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.357 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416901

Cable Length: 35 feet

Prestress: 35,000 psi

Regression Zero: 7104

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7159	7154	7157		
1500	7823	7822	7823	666	-0.08
3000	8539	8536	8538	715	-0.28
4500	9274	9269	9272	734	0.18
6000	9989	9986	9988	716	0.02
100	7155	7155	7155		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.350 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416902

Cable Length: 35 feet

Prestress: 35,000 psi

Regression Zero: 7028

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	7078	7074	7076		
1500	7739	7737	7738	662	-0.04
3000	8449	8447	8448	710	-0.08
4500	9165	9161	9163	715	0.06
6000	9873	9870	9872	709	-0.03
100	7074	7071	7073		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.353 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON

48 Spencer St. Lebanon, NH 03766 USA

Sister Bar Calibration Report

Model Number: 4911-4

Date of Calibration: May 28, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1416903

Cable Length: 35 feet

Prestress: 35,000 psi

Regression Zero: 6827

Temperature: 23.3 °C

Technician:

Calibration Instruction: CI-VW Rebar

Applied Load (pounds)	Readings				Linearity % Max. Load
	Cycle #1	Cycle #2	Average	Change	
100	6883	6876	6880		
1500	7540	7536	7538	658	-0.15
3000	8257	8251	8254	716	-0.12
4500	8979	8973	8976	722	0.11
6000	9692	9686	9689	713	0.03
100	6876	6870	6873		

For conversion factor, load to strain, refer to table C-2 of the Installation Manual

Gage Factor: 0.352 microstrain/ digit (GK-401 Pos. "B")

Calculated Strain = Gage Factor(Current Reading - Zero Reading)

Note: The above calibration uses the linear regression method.

Users are advised to establish their own zero conditions.

Linearity: ((Calculated Load - Applied Load)/Max. Applied Load) X 100 percent

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Displacement Transducer Calibration Report

Range: 250 mm

Calibration Date: May 22, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1414359

Temperature: 23.3 °C

Calibration Instruction: CI-4400

Technician:

Cable Length: 80 feet

GK-401 Reading Position B

Actual Displacement (mm)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Displacement Linear	Error Linear (%FS)	Calculated Displacement Polynomial	Error Polynomial (%FS)
0.0	2361	2362	2362	-0.38	-0.15	-0.05	-0.02
50.0	3346	3346	3346	50.14	0.06	50.08	0.03
100.0	4325	4320	4323	100.26	0.10	100.00	0.00
150.0	5298	5295	5297	150.24	0.10	149.99	-0.01
200.0	6268	6264	6266	200.00	0.00	199.94	-0.02
250.0	7235	7234	7235	249.70	-0.12	250.04	0.02

(mm) Linear Gage Factor (G): 0.05132 (mm/ digit) **Regression Zero: 2369**

Polynomial Gage Factors: A: 1.0428E-07 B: 0.05032 C: ______

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

(inches) Linear Gage Factor (G): 0.002020 (inches/digit)

Polynomial Gage Factors: A: 4.1055E-09 B: 0.001981 C: ______

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

Calculated Displacement: **Linear, $D = G(R_1 - R_0)$**

Polynomial, $D = AR_1^2 + BR_1 + C$

Refer to manual for temperature correction information.

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Displacement Transducer Calibration Report

Range: 250 mm

Calibration Date: May 27, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1414870

Temperature: 22.8 °C

Calibration Instruction: CI-4400

Technician: [signature]

Cable Length: 80 feet

GK-401 Reading Position B

Actual Displacement (mm)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Displacement Linear	Error Linear (%FS)	Calculated Displacement Polynomial	Error Polynomial (%FS)
0.0	2233	2228	2231	-0.28	-0.11	-0.05	-0.02
50.0	3223	3224	3224	50.14	0.06	50.09	0.04
100.0	4207	4210	4209	100.15	0.06	99.96	-0.01
150.0	5196	5193	5195	150.21	0.09	150.03	0.01
200.0	6176	6173	6175	199.97	-0.01	199.93	-0.03
250.0	7157	7155	7156	249.81	-0.08	250.04	0.02

(mm) Linear Gage Factor (G): 0.05077 (mm/ digit)

Regression Zero: 2236

Polynomial Gage Factors: A: 7.2465E-08 B: 0.05009 C: ________

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

(inches) Linear Gage Factor (G): 0.001999 (inches/digit)

Polynomial Gage Factors: A: 2.8529E-09 B: 0.001972 C: ________

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

Calculated Displacement: **Linear, $D = G(R_1 - R_0)$**

Polynomial, $D = AR_1^2 + BR_1 + C$

Refer to manual for temperature correction information.

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Displacement Transducer Calibration Report

Range: 250 mm

Calibration Date: May 27, 2014

This calibration has been verified/validated as of 06/03/2014

Serial Number: 1414871

Temperature: 22.8 °C

Calibration Instruction: CI-4400

Technician: [signature]

Cable Length: 80 feet

GK-401 Reading Position B

Actual Displacement (mm)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Displacement Linear	Error Linear (%FS)	Calculated Displacement Polynomial	Error Polynomial (%FS)
0.0	2237	2232	2235	-0.74	-0.29	-0.14	-0.06
50.0	3242	3239	3241	50.37	0.15	50.23	0.09
100.0	4227	4230	4229	100.56	0.22	100.06	0.03
150.0	5207	5210	5209	150.35	0.14	149.86	-0.06
200.0	6185	6187	6186	200.01	0.00	199.88	-0.05
250.0	7159	7162	7161	249.51	-0.19	250.11	0.04

(mm) Linear Gage Factor (G): 0.05080 (mm/ digit)

Regression Zero: 2249

Polynomial Gage Factors: A: 1.8692E-07 B: 0.04905 C: ________

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

(inches) Linear Gage Factor (G): 0.002000 (inches/digit)

Polynomial Gage Factors: A: 7.359E-09 B: 0.001931 C: ________

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

Calculated Displacement: **Linear, $D = G(R_1 - R_0)$**

Polynomial, $D = AR_1^2 + BR_1 + C$

Refer to manual for temperature correction information.

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Displacement Transducer Calibration Report

Range: 250 mm

Serial Number: 1414872

Calibration Instruction: CI-4400

Cable Length: 80 feet

Calibration Date: May 27, 2014

This calibration has been verified/validated as of 06/03/2014

Temperature: 22.8 °C

Technician: [signature]

GK-401 Reading Position B

Actual Displacement (mm)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Displacement Linear	Error Linear (%FS)	Calculated Displacement Polynomial	Error Polynomial (%FS)
0.0	2293	2303	2298	-0.66	-0.26	-0.15	-0.06
50.0	3306	3305	3306	50.37	0.15	50.26	0.10
100.0	4295	4294	4295	100.46	0.18	100.05	0.02
150.0	5275	5276	5276	150.14	0.06	149.74	-0.10
200.0	6260	6265	6263	200.13	0.05	200.04	0.02
250.0	7240	7236	7238	249.54	-0.18	250.05	0.02

(mm) Linear Gage Factor (G): 0.05065 (mm/ digit) **Regression Zero: 2311**

Polynomial Gage Factors: A: 1.5603E-07 B: 0.04916 C: ____

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

(inches) Linear Gage Factor (G): 0.001994 (inches/digit)

Polynomial Gage Factors: A: 6.143E-09 B: 0.001935 C: ____

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

Calculated Displacement: **Linear, $D = G(R_1 - R_0)$**

Polynomial, $D = AR_1^2 + BR_1 + C$

Refer to manual for temperature correction information.

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Displacement Transducer Calibration Report

Range: 250 mm

Serial Number: 1414877

Calibration Instruction: CI-4400

Cable Length: 80 feet

Calibration Date: May 27, 2014

This calibration has been verified/validated as of 06/03/2014

Temperature: 22.8 °C

Technician: [signature]

GK-401 Reading Position B

Actual Displacement (mm)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Displacement Linear	Error Linear (%FS)	Calculated Displacement Polynomial	Error Polynomial (%FS)
0.0	2230	2230	2230	-0.75	-0.30	-0.13	-0.05
50.0	3247	3249	3248	50.39	0.16	50.24	0.10
100.0	4245	4244	4245	100.46	0.18	99.94	-0.03
150.0	5242	5240	5241	150.53	0.21	150.01	0.00
200.0	6227	6223	6225	199.96	-0.01	199.83	-0.07
250.0	7210	7211	7211	249.48	-0.21	250.10	0.04

(mm) Linear Gage Factor (G): 0.05024 (mm/ digit) **Regression Zero: 2245**

Polynomial Gage Factors: A: 1.9258E-07 B: 0.04842 C: ________

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

(inches) Linear Gage Factor (G): 0.001978 (inches/digit)

Polynomial Gage Factors: A: 7.5819E-09 B: 0.001906 C: ________

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

Calculated Displacement: **Linear, $D = G(R_1 - R_0)$**

Polynomial, $D = AR_1^2 + BR_1 + C$

Refer to manual for temperature correction information.

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Displacement Transducer Calibration Report

Range: 250 mm

Serial Number: 1414878

Calibration Instruction: CI-4400

Cable Length: 80 feet

Calibration Date: May 27, 2014

This calibration has been verified/validated as of 06/03/2014

Temperature: 22.8 °C

Technician: [signature]

GK-401 Reading Position B

Actual Displacement (mm)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Displacement Linear	Error Linear (%FS)	Calculated Displacement Polynomial	Error Polynomial (%FS)
0.0	2252	2250	2251	-0.76	-0.30	-0.17	-0.07
50.0	3263	3261	3262	50.39	0.16	50.25	0.10
100.0	4254	4255	4255	100.61	0.24	100.11	0.04
150.0	5238	5237	5238	150.34	0.14	149.85	-0.06
200.0	6218	6217	6218	199.93	-0.03	199.80	-0.08
250.0	7198	7199	7199	249.56	-0.18	250.15	0.06

(mm) Linear Gage Factor (G): 0.05060 (mm/ digit) **Regression Zero: 2266**

Polynomial Gage Factors: A: 1.8508E-07 B: 0.04885 C: ________

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

(inches) Linear Gage Factor (G): 0.001992 (inches/digit)

Polynomial Gage Factors: A: 7.2866E-09 B: 0.001923 C: ________

Calculate C by setting D = 0 and R_1 = initial field zero reading into the polynomial equation

Calculated Displacement: **Linear, $D = G(R_1 - R_0)$**

Polynomial, $D = AR_1^2 + BR_1 + C$

Refer to manual for temperature correction information.

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

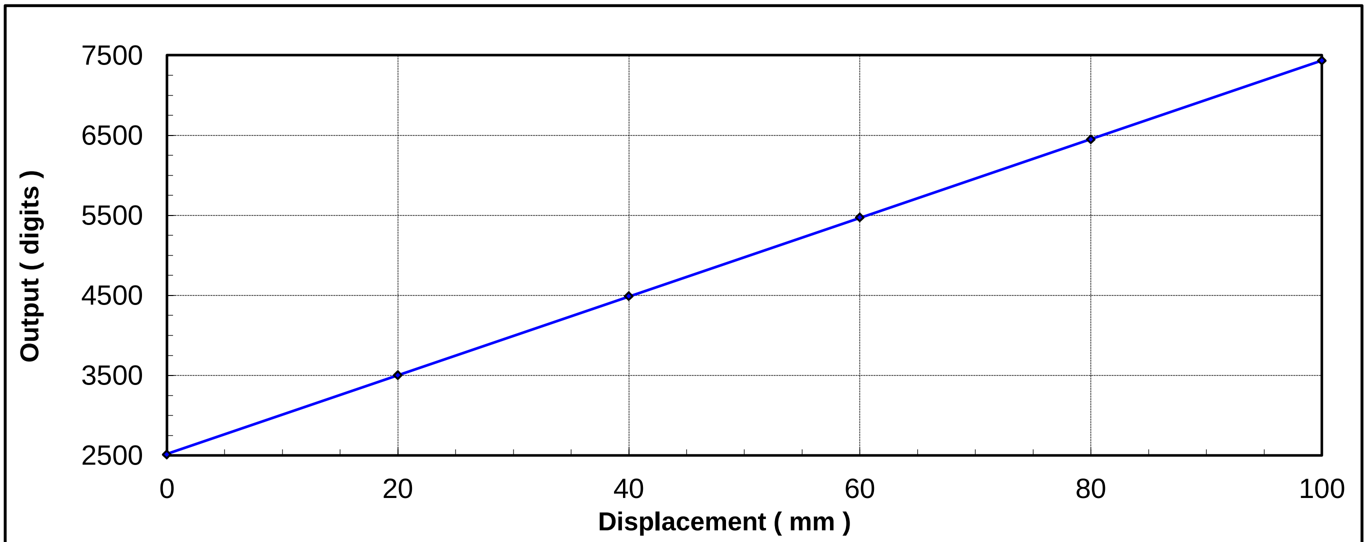
Certificate of Calibration

Instrument: Geokon LVWDT
Calibration Date: May 1, 2014

Model: 4450-3-100
Temperature: 24.0 °C

Serial Number: 1314998
Linear Range: 100 mm

Displacement (mm)	1st Cycle (digits)	2nd Cycle (digits)	Average (digits)	Linear Calculated (mm)	Linear Error (% FS)	Polynomial Calculated (mm)	Polynomial Error (% FS)
0	2516	2508	2512	0	-0.14	0	-0.02
20	3509	3501	3505	20	0.05	20	0.03
40	4497	4486	4491	40	0.12	40	0.02
60	5478	5468	5473	60	0.08	60	-0.01
80	6454	6447	6451	80	-0.02	80	-0.05
100	7431	7431	7431	100	-0.09	100	0.03



Linear Gauge Factor: 0.02034 **mm/dig** 0.0008008 **in/dig**

Polynomial Factor: 3.684E-08 **mm/dig² +** 1.998E-02 **mm/dig +** -50.437 **mm**

Reference Instrument: Fowler Blocks, Serial: A00778, Certificate No.: F-47-778-1

Logging Instrument: Datataker DT85G, Serial: 089546

LOADTEST certifies that the above named instrument has been calibrated by comparison with standards traceable to the NIST and was found to be in tolerance in all operating ranges. Relevant documentation and certificates are available on request.

Tested by: Michael Crumpton, B.S.C.E. Signed: M Z Crumpton

Approved by: David J. Jakstis, P.E. Signed:

Instrument Calibrated By LOADTEST, 2631-D NW 41 St, Gainesville, FL 32606

LOADTEST

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

Certificate of Calibration

Instrument: Geokon LVWDT

Calibration Date: May 1, 2014

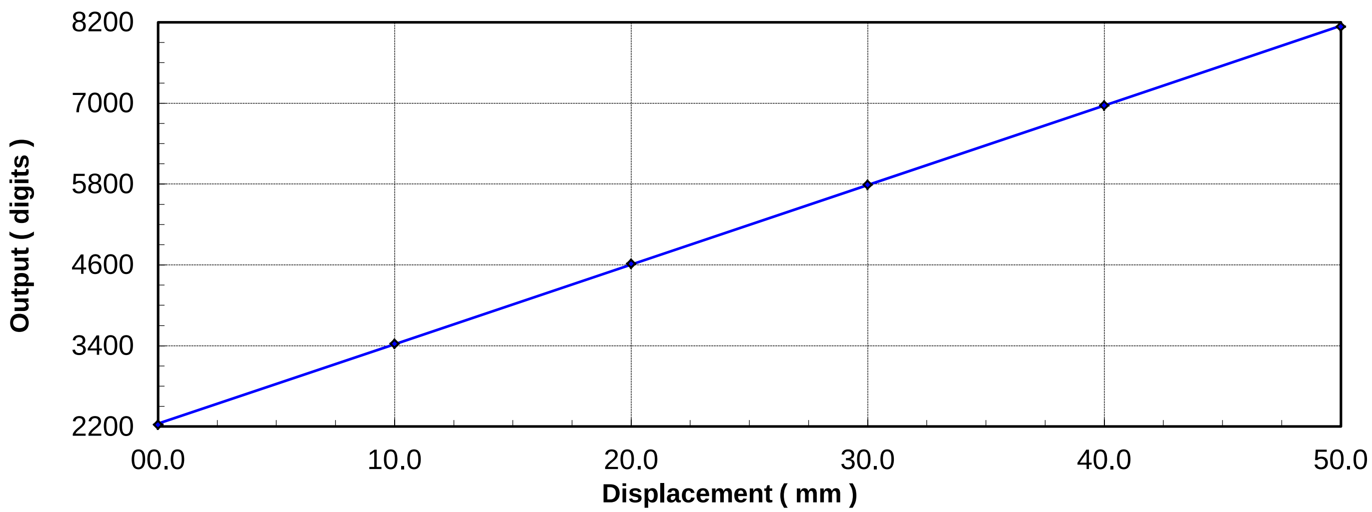
Model: 4450-3-2

Temperature: 25.2 °C

Serial Number: 22909

Linear Range: 50 mm

				Linear		Polynomial	
Displacement (mm)	1st Cycle (digits)	2nd Cycle (digits)	Average (digits)	Calculated (mm)	Error (% FS)	Calculated (mm)	Error (% FS)
00.0	2231	2227	2229	-00.1	-0.23	00.0	-0.03
10.0	3435	3423	3429	10.0	0.09	10.0	0.05
20.0	4623	4607	4615	20.1	0.18	20.0	0.02
30.0	5799	5787	5793	30.1	0.12	30.0	-0.04
40.0	6972	6963	6968	40.0	0.01	40.0	-0.03
50.0	8138	8140	8139	49.9	-0.17	50.0	0.03



Linear Gauge Factor: 0.00847 **mm/dig** 0.0003333 **in/dig**

Polynomial Factor: 2.072E-08 **mm/dig² +** 8.251E-03 **mm/dig +** -18.509 **mm**

Reference Instrument: Fowler Blocks, Serial: A00778, Certificate No.: F-47-778-1

Logging Instrument: Datataker DT85G, Serial: 089546

LOADTEST certifies that the above named instrument has been calibrated by comparison with standards traceable to the NIST and was found to be in tolerance in all operating ranges. Relevant documentation and certificates are available on request.

Tested by: Michael Crumpton, B.S.C.E. Signed: [signature]

Approved by: David J. Jakstis, P.E. Signed: [signature]

Instrument Calibrated By LOADTEST, 2631-D NW 41 St, Gainesville, FL 32606

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Certificate of Calibration

Instrument: Geokon LVWDT

Model: 4450-3-100

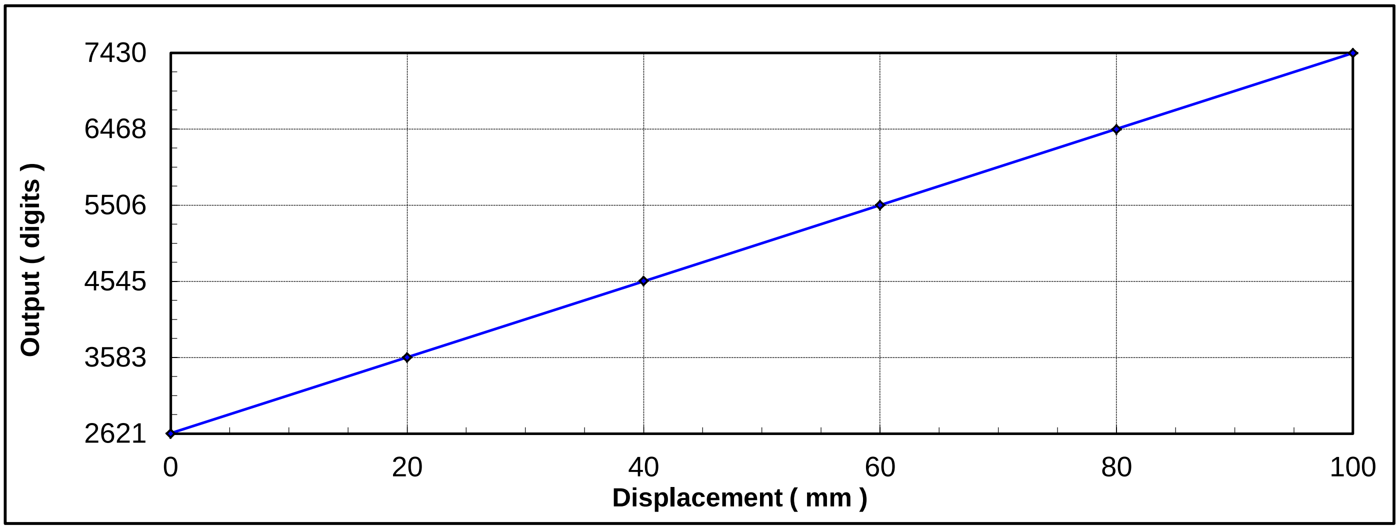
Serial Number: 08-23842

Calibration Date: May 23, 2014

Temperature: 25.5 °C

Linear Range: 100 mm

Reference Displacement		Gauge Readings		Linear Error		Polynomial Error	
1st Cycle (mm)	2nd Cycle (mm)	1st Cycle (digits)	2nd Cycle (digits)	1st Cycle (% FS)	2nd Cycle (% FS)	1st Cycle (% FS)	2nd Cycle (% FS)
0	0	2625	2621	0.00	-0.07	0.02	-0.05
20	20	3588	3583	0.06	-0.05	0.05	-0.05
40	40	4554	4545	0.17	-0.03	0.15	-0.05
60	60	5511	5502	0.08	-0.10	0.07	-0.12
80	80	6471	6462	0.06	-0.13	0.05	-0.13
100	100	7429	7430	0.00	0.02	0.02	0.04



Linear Gauge Factor: 0.02081 mm/dig 0.0008195 in/dig

Polynomial Factor: 6.538E-09 mm/dig² + 2.075E-02 mm/dig + -54.484 mm

Reference Instrument: Fowler Blocks, Serial: A00778
Certificate: F-47-778-1, Calibration Date: 2013-06-13

Logging Instrument: Datataker DT85G, Serial: 089546

LOADTEST certifies that the above named instrument has been calibrated by comparison with standards traceable to the NIST and was found to be in tolerance in all operating ranges. Relevant documentation and certificates are available on request.

Tested by: Michael Crumpton, B.S.C.E. Signed: [signature]

Approved by: David J. Jakstis, P.E. Signed: [signature]

Instrument Calibrated By LOADTEST, 2631-D NW 41 St, Gainesville, FL 32606

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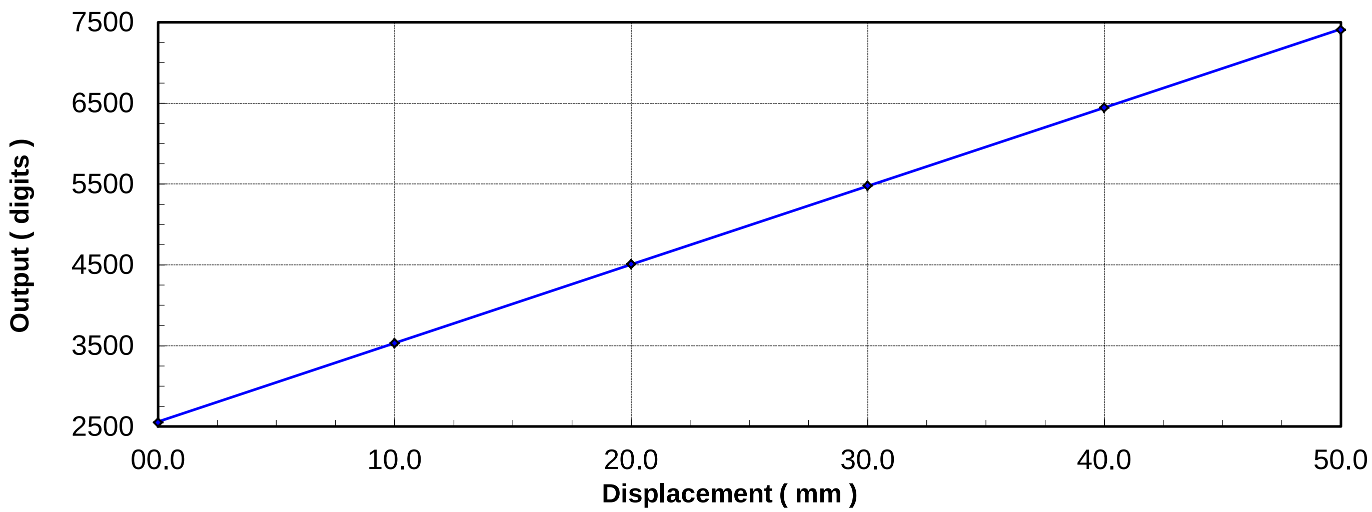
Certificate of Calibration

Instrument: Geokon LVWDT
Calibration Date: May 1, 2014

Model: 4450-3-50
Temperature: 25.3 °C

Serial Number: 04-12345
Linear Range: 50 mm

Displacement (mm)	1st Cycle (digits)	2nd Cycle (digits)	Average (digits)	Linear Calculated (mm)	Linear Error (% FS)	Polynomial Calculated (mm)	Polynomial Error (% FS)
00.0	2559	2547	2553	-00.1	-0.17	00.0	-0.01
10.0	3538	3529	3533	10.0	0.03	10.0	0.00
20.0	4516	4505	4510	20.1	0.15	20.0	0.02
30.0	5486	5475	5480	30.1	0.13	30.0	0.01
40.0	6447	6441	6444	40.0	-0.02	40.0	-0.05
50.0	7410	7409	7409	49.9	-0.14	50.0	0.02



Linear Gauge Factor: 0.01030 **mm/dig** 0.0004054 **in/dig**

Polynomial Factor: 2.542E-08 **mm/dig² +** 1.004E-02 **mm/dig +** -25.809 **mm**

Reference Instrument: Fowler Blocks, Serial: A00778, Certificate No.: F-47-778-1

Logging Instrument: Datataker DT85G, Serial: 089546

LOADTEST certifies that the above named instrument has been calibrated by comparison with standards traceable to the NIST and was found to be in tolerance in all operating ranges. Relevant documentation and certificates are available on request.

Tested by: Michael Crumpton, B.S.C.E. Signed: [signature]

Approved by: David J. Jakstis, P.E. Signed: [signature]

Instrument Calibrated By LOADTEST, 2631-D NW 41 St, Gainesville, FL 32606

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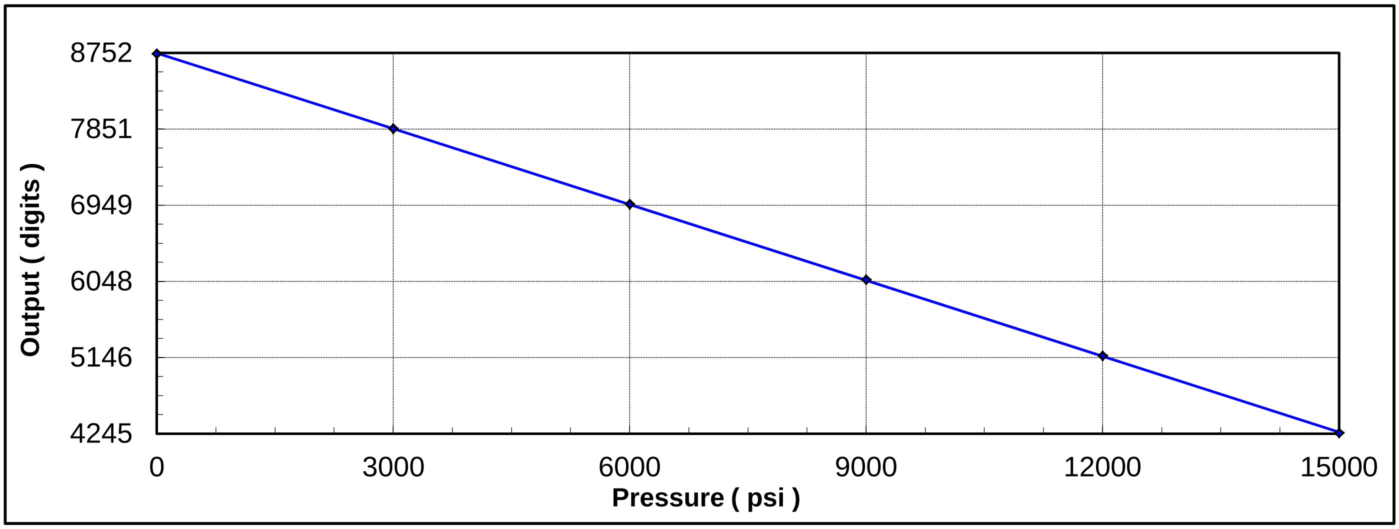
Certificate of Calibration

Instrument: Geokon VWPX | Calibration Date: May 23, 2014

Model: 4500HH-10000 | Temperature: 24.5 °C

Serial Number: 05-10341 | Linear Range: 15000 psi

Reference Pressure		Gauge Readings		Linear Error		Polynomial Error	
1st Cycle (psi)	2nd Cycle (psi)	1st Cycle (digits)	2nd Cycle (digits)	1st Cycle (% FS)	2nd Cycle (% FS)	1st Cycle (% FS)	2nd Cycle (% FS)
0	0	8741	8742	0.24	0.21	0.01	-0.03
3000	3000	7861	7852	-0.14	0.05	-0.10	0.10
6000	6000	6969	6957	-0.27	-0.01	-0.08	0.18
9000	9000	6074	6065	-0.33	-0.13	-0.13	0.06
12000	12000	5169	5161	-0.17	0.01	-0.11	0.06
15000	15000	4260	4245	0.09	0.42	-0.15	0.18



Linear Gauge Factor: -3.34257 **psi/dig** -0.0230462 **MPa/dig**

Polynomial Factor: -1.333E-05 **psi/dig² +** -3.169E+00 **psi/dig +** 28721.778 **psi**

Reference Instrument: SENSOTEC TJE/743-23TJA, Serial: 622335
Certificate: 1001395677, Calibration Date: 2014-04-15

Logging Instrument: Datataker DT85G, Serial: 089546

LOADTEST certifies that the above named instrument has been calibrated by comparison with standards traceable to the NIST and was found to be in tolerance in all operating ranges. Relevant documentation and certificates are available on request.

Tested by: Michael Crumpton, B.S.C.E. Signed: ______________

Approved by: David J. Jakstis, P.E. Signed: ______________

Instrument Calibrated By LOADTEST, 2631-D NW 41 St, Gainesville, FL 32606

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APPENDIX C

CONSTRUCTION OF THE EQUIVALENT TOP LOAD-DISPLACEMENT CURVE

CONSTRUCTION OF THE EQUIVALENT TOP-LOADED LOAD-SETTLEMENT CURVE FROM THE RESULTS OF AN O-CELL TEST (August, 2000)

Introduction: Some engineers find it useful to see the results of an O-cell load test in the form of a curve showing the load versus settlement of a top-loaded driven or bored pile (drilled shaft). We believe that an O-cell test can provide a good estimate of this curve when using the method described herein.

Assumptions: We make the following assumptions, which we consider both reasonable and usually conservative:

1. The end bearing load-movement curve in a top-loaded shaft has the same loads for a given movement as the net (subtract buoyant weight of pile above O-cell) end bearing load-movement curve developed by the bottom of the O-cell when placed at or near the bottom of the shaft.

2. The side shear load-movement curve in a top-loaded shaft has the same net shear, multiplied by an adjustment factor 'F', for a given downward movement as occurred in the O-cell test for that same movement at the top of the cell in the upward direction. The same applies to the upward movement in a top-loaded tension test. Unless noted otherwise, we use the following adjustment factors:
(a) F = 1.00 in all rock sockets and for primarily cohesive soils in compression
(b) F = 0.95 in primarily cohesionless soils
(c) F = 0.80 for all soils in top load tension tests.

3. We initially assume the pile behaves as a rigid body, but include the elastic compressions that are part of the movement data obtained from an O-cell test (OLT). Using this assumption, we construct an equivalent top-load test (TLT) movement curve by the method described below in Procedure Part I. We then use the following Procedure Part II to correct for the effects of the additional elastic compressions in a TLT.

4. Consider the case with the O-cell, or the bottom O-cell of more than one level of cells, placed some distance above the bottom of the shaft. We assume the part of the shaft below the cell, now top-loaded, has the same load-movement behavior as when top-loading the entire shaft. For this case the subsequent "end bearing movement curve" refers to the movement of the entire length of shaft below the cell.

Procedure Part I: Please refer to the attached Figure A showing O-cell test results and to Figure B, the constructed equivalent top loaded settlement curve. Note that each of the curves shown has points numbered from 1 to 12 such that the same point number on each curve has the same magnitude of movement. For example, point 4 has an upward and downward movement of 0.40 inches in Figure A and the same 0.40 inches downward in Figure B.

Note: This report shows the O-cell movement data in a Figure similar to Fig. A, but uses the gross loads as obtained in the field. Fig. A uses net loads to make it easier for the reader to convert Fig. A into Fig. B without the complication of first converting gross to net loads. For conservative reconstruction of the top loaded settlement curve we first convert both of the O-cell components to net load.

Using the above assumptions, construct the equivalent curve as follows: Select an arbitrary movement such as the 0.40 inches to give point 4 on the shaft side shear load movement curve in Figure A and record the 2,090 ton load in shear at that movement. Because we have initially assumed a rigid pile, the top of pile moves downward the same as the bottom. Therefore, find point 4 with 0.40 inches of upward movement on the end bearing load movement curve and record the corresponding load of 1,060 tons. Adding these two loads will give the total load of 3,150 tons due to side shear plus end bearing at the same movement and thus gives point 4 on the Figure B load settlement curve for an equivalent top-loaded test.

One can use the above procedure to obtain all the points in Figure B up to the component that moved the least at the end of the test, in this case point 5 in side shear. To take advantage of the fact that the test produced end bearing movement data up to point 12, we need to make an extrapolation of the side shear curve. We usually use a convenient and suitable hyperbolic curve fitting technique for this extrapolation. Deciding on the maximum number of data points to provide a good fit (a high r^2 correlation coefficient) requires some judgment. In this case we omitted point 1 to give an r^2 = 0.999 (including point 1 gave an r^2 = 0.966) with the result shown as points 6 to 12 on the dotted extension of the measured side shear curve. Using the same movement matching procedure described earlier we can then extend the equivalent curve to points 6 to 12. The results, shown in Figure B as a dashed line, signify that this part of the equivalent curve depends partly on extrapolated data.

Sometimes, if the data warrants, we will use extrapolations of both side shear and end bearing to extend the equivalent curve to a greater movement than the maximum measured (point 12). An appendix in this report gives the details of the extrapolation(s) used with the present O-cell test and shows the fit with the actual data.

Procedure Part II: The elastic compression in the equivalent top load test always exceeds that in the O-cell test. It not only produces more top movement, but also additional side shear movement, which then generates more side shear, which produces more compression, etc . . . An exact solution of this load transfer problem requires knowing the side shear vs. vertical movement (t-y) curves for a large number of pile length increments and solving the resulting set of simultaneous equations or using finite element or finite difference simulations to obtain an approximate solution for these equations. We usually do not have the data to obtain the many accurate t-y curves required. Fortunately, the approximate solution described below usually suffices.

The attached analysis p. 6 gives the equations for the elastic compressions that occur in the OLT with one or two levels of O-cells. Analysis p. 7 gives the equations for the elastic compressions that occur in the equivalent TLT. Both sets of equations do not include the elastic compression below the O-cell because the same compression takes place in both the OLT and the TLT. This is equivalent to taking $L_3 = 0$. Subtracting the OLT from the TLT compression gives the desired additional elastic compression at the top of the TLT. We then add the additional elastic compression to the 'rigid' equivalent curve obtained from Part I to obtain the final, corrected equivalent load-settlement curve for the TLT on the same pile as the actual OLT.

Note that the above pp. 6 and 7 give equations for each of three assumed patterns of developed side shear stress along the pile. The pattern shown in the center of the three applies to any approximately determined side shear distribution. Experience has shown the initial solution for the additional elastic compression, as described above, gives an adequate and slightly conservative (high) estimate of the additional compression versus more sophisticated load-transfer analyses as described in the first paragraph of this Part II.

The analysis p. 8 provides an example of calculated results in English units on a hypothetical 1-stage, single level OLT using the simplified method in Part II with the centroid of the side shear distribution 44.1% above the base of the O-cell. Figure C compares the corrected with the rigid curve of Figure B. Page 9 contains an example equivalent to that above in SI units.

The final analysis p. 10 provides an example of calculated results in English units on a hypothetical 3-stage, multi level OLT using the simplified method in Part II with the centroid of the combined upper and middle side shear distribution 44.1% above the base of the bottom O-cell. The individual centroids of the upper and middle side shear distributions lie 39.6% and 57.9% above and below the middle O-cell, respectively. Figure E compares the corrected with the rigid curve. Page 11 contains an example equivalent to that above in SI units.

Other Tests: The example illustrated in Figure A has the maximum component movement in end bearing. The procedures remain the same if the maximum test movement occurred in side shear. Then we would have extrapolated end bearing to produce the dashed-line part of the reconstructed top-load settlement curve.

The example illustrated also assumes a pile top-loaded in compression. For a pile top-loaded in tension we would, based on Assumptions 2. and 3., use the upward side shear load curve in Figure A, multiplied by the F = 0.80 noted in Assumption 2., for the equivalent top-loaded displacement curve.

Expected Accuracy: We know of only five series of tests that provide the data needed to make a direct comparison between actual, full scale, top-loaded pile movement behavior and the equivalent behavior obtained from an O-cell test by the method described herein. These involve three sites in Japan and one in Singapore, in a variety of soils, with three compression tests on bored piles (drilled shafts), one compression test on a driven pile and one tension test on a bored pile. The largest bored pile had a 1.2-m diameter and a 37-m length. The driven pile had a 1-m increment modular construction and a 9-m length. The largest top loading = 28 MN (3,150 tons).

The following references detail the aforementioned Japanese tests and the results therefrom:

Kishida H. et al., 1992, "Pile Loading Tests at Osaka Amenity Park Project," Paper by Mitsubishi Co., also briefly described in Schmertmann (1993, see bibliography). Compares one drilled shaft in tension and another in compression.

Ogura, H. et al., 1995, "Application of Pile Toe Load Test to Cast-in-place

Concrete Pile and Precast Pile," special volume 'Tsuchi-to-Kiso' on Pile Loading Test, Japanese Geotechnical Society, Vol. 3, No. 5, Ser. No. 448. Original in Japanese. Translated by M. B. Karkee, GEOTOP Corporation. Compares one drilled shaft and one driven pile, both in compression.

We compared the predicted equivalent and measured top load at three top movements in each of the above four Japanese comparisons. The top movements ranged from ¼ inch (6 mm) to 40 mm, depending on the data available. The (equiv./meas.) ratios of the top load averaged 1.03 in the 15 comparisons with a coefficient of variation of less than 10%. We believe that these available comparisons help support the practical validity of the equivalent top load method described herein.

L. S. Peng, A. M. Koon, R. Page and C. W. Lee report the results of a class-A prediction by others of the TLT curve from an Osterberg cell test on a 1.2 m diameter, 37.2 m long bored pile in Singapore, compared to an adjacent pile with the same dimensions actually top-loaded by kentledge. They report about a 4% difference in ultimate capacity and less than 8% difference in settlements over the 1.0 to 1.5 times working load range -- comparable to the accuracy noted above. Their paper has the title "OSTERBERG CELL TESTING OF PILES", and was published in March 1999 in the Proceedings of the International Conference on Rail Transit, held in Singapore and published by the Association of Consulting Engineers Singapore.

B. H. Fellenius has made several finite element method (FEM) studies of an OLT in which he adjusted the parameters to produce good load-deflection matches with the OLT up and down load-deflection curves. He then used the same parameters to predict the TLT deflection curve. We compared the FEM-predicted curve with the equivalent load-deflection predicted by the previously described Part I and II procedures, with the results again comparable to the accuracy noted above. The ASCE has published a paper by Fellenius et. al. titled "O-Cell Testing and FE Analysis of 28-m-Deep Barrette in Manila, Philippines" in the Journal of Geotechnical and Geoenvironmental Engineering, Vol. 125, No. 7, July 1999, p. 566. It details one of his comparison studies.

Limitations: The engineer using these results should judge the conservatism, or lack thereof, of the aforementioned assumptions and extrapolation(s) before utilizing the results for design purposes. For example, brittle failure behavior may produce movement curves with abrupt changes in curvature (not hyperbolic). However, we believe the hyperbolic fit method and our assumptions used usually produce reasonable equivalent top load settlement curves.

August, 2000

Example of the Construction of an Equivalent Top-Loaded Settlement Curve (Figure B) From Osterberg Cell Test Results (Figure A)

Figure A

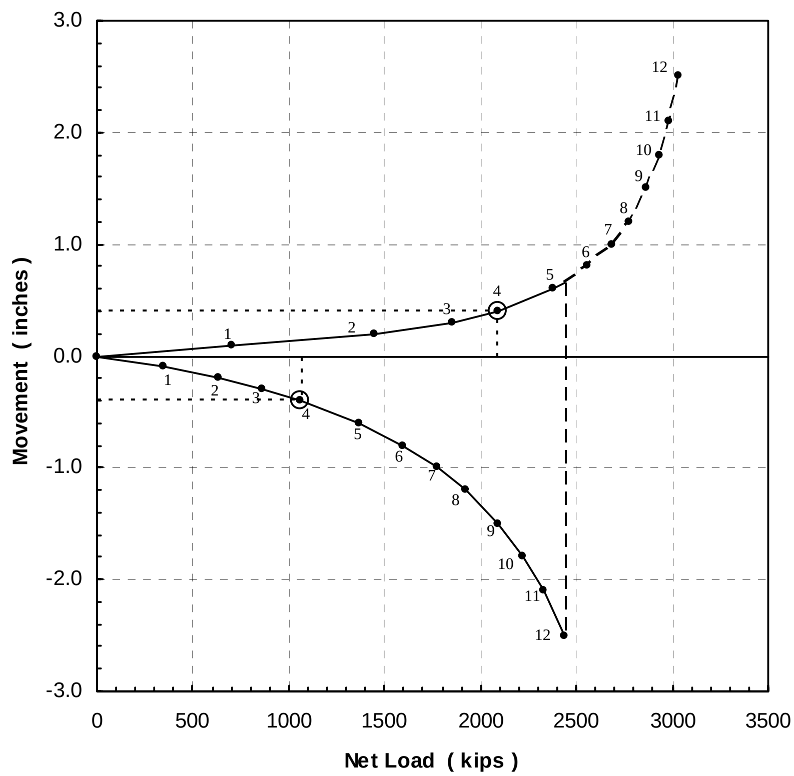
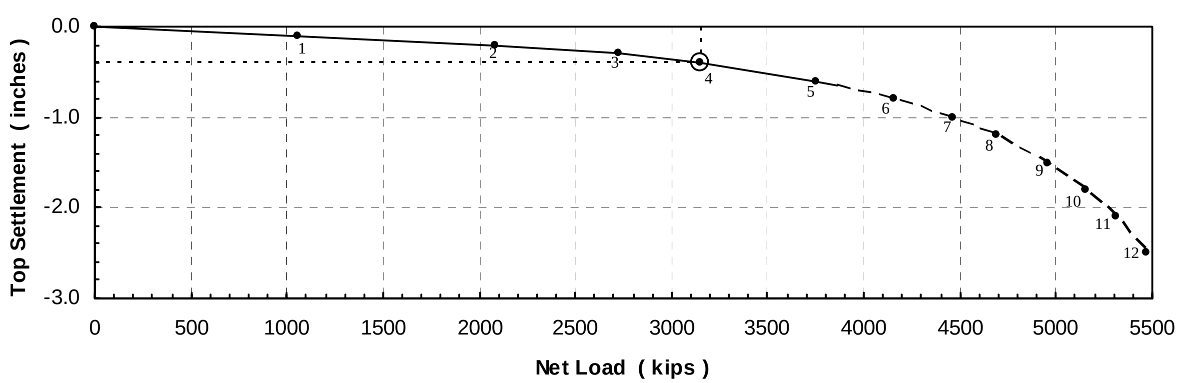
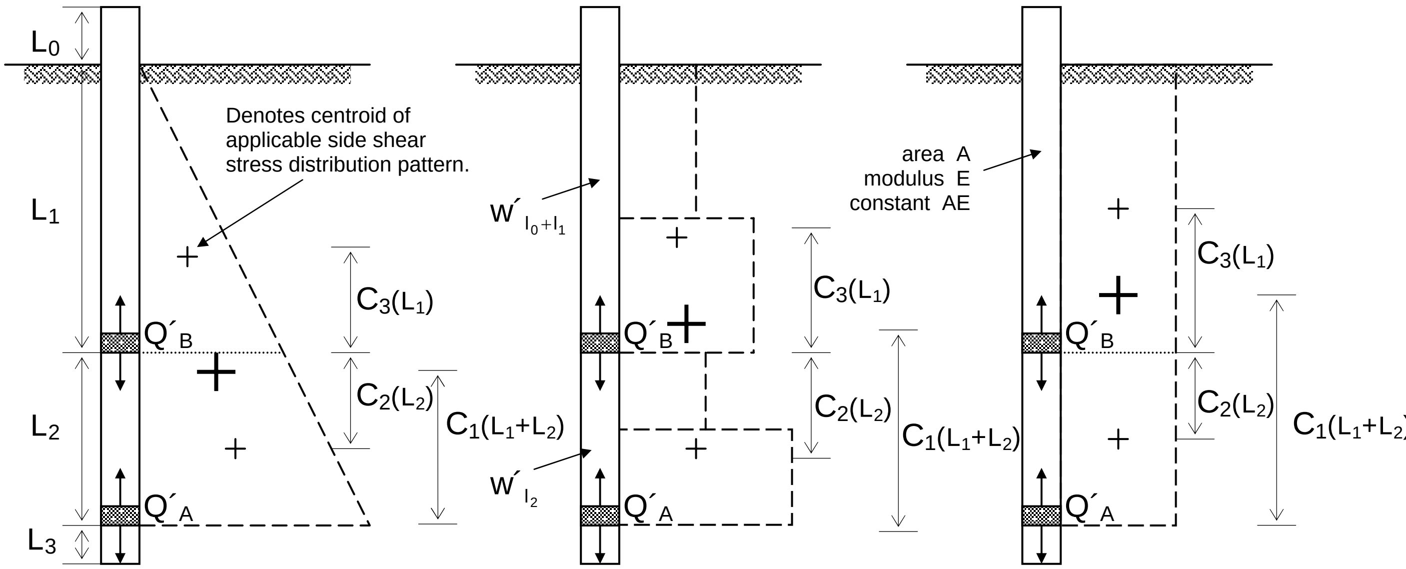


Figure B



Theoretical Elastic Compression in O-cell Test Based on Pattern of Developed Side Shear Stress



1-Stage Single Level Test (Q´A only):

$$\delta_{OLT} = \delta_{\uparrow(l_1+l_2)}$$

$C_1 = \frac{1}{3}$	$\text{Centroid Factor} = C_1$	$C_1 = \frac{1}{2}$
$\delta_{\uparrow(l_1+l_2)} = \frac{1}{3}\frac{Q'_{\uparrow A}(l_1+l_2)}{AE}$	$\delta_{\uparrow(l_1+l_2)} = C_1\frac{Q'_{\uparrow A}(l_1+l_2)}{AE}$	$\delta_{\uparrow(l_1+l_2)} = \frac{1}{2}\frac{Q'_{\uparrow A}(l_1+l_2)}{AE}$

3-Stage Multi Level Test (Q´A and Q´B): $\delta_{OLT} = \delta_{\uparrow l_1} + \delta_{\downarrow l_2}$

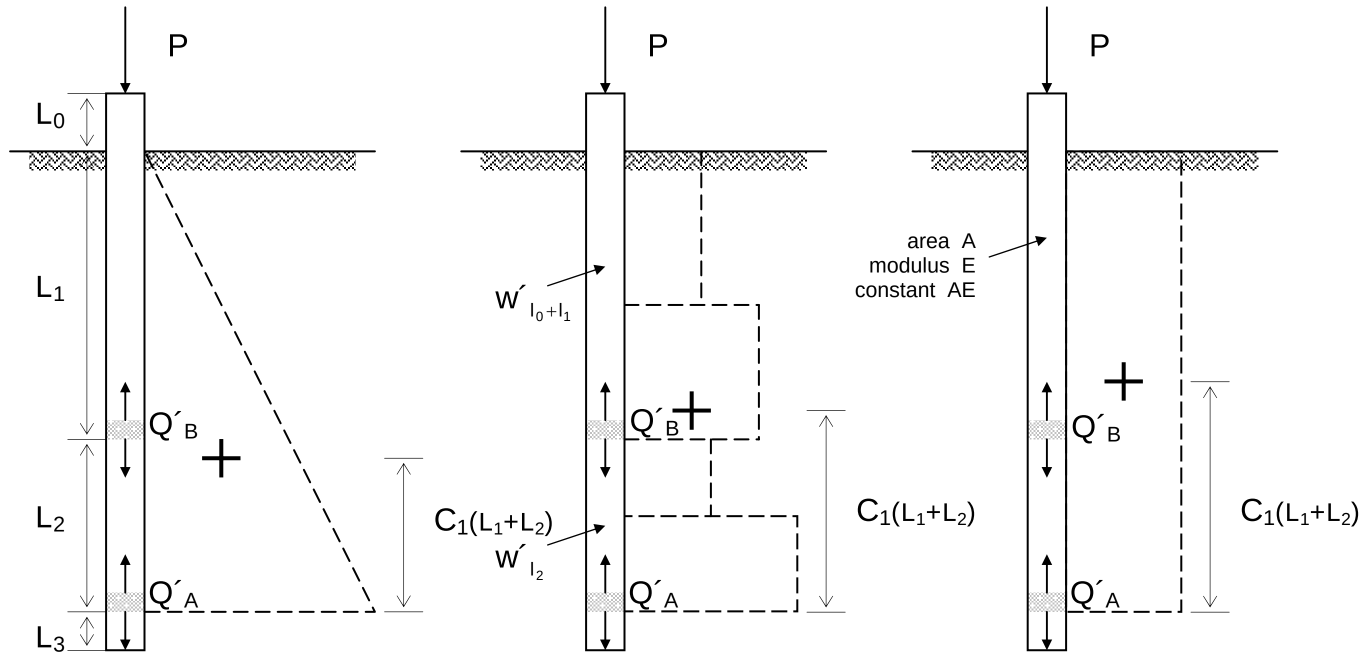
$C_3 = \frac{1}{3}$	$\text{Centroid Factor} = C_3$	$C_3 = \frac{1}{2}$
$\delta_{\uparrow l_1} = \frac{1}{3}\frac{Q'_{\uparrow B}\, l_1}{AE}$	$\delta_{\uparrow l_1} = C_3\frac{Q'_{\uparrow B}\, l_1}{AE}$	$\delta_{\uparrow l_1} = \frac{1}{3}\frac{Q'_{\uparrow B}\, l_1}{AE}$
$C_2 = \frac{1}{3}\left(\frac{3l_1+2l_2}{2l_1+l_2}\right)$	$\text{Centroid Factor} = C_2$	$C_2 = \frac{1}{2}$
$\delta_{\downarrow l_2} = \frac{1}{3}\left(\frac{3l_1+2l_2}{2l_1+l_2}\right)\frac{Q'_{\downarrow B}\, l_2}{AE}$	$\delta_{\downarrow l_2} = C_2\frac{Q'_{\downarrow B}\, l_2}{AE}$	$\delta_{\downarrow l_2} = \frac{1}{2}\frac{Q'_{\downarrow B}\, l_2}{AE}$

Net Loads:

$Q'_{\uparrow A} = Q_{\uparrow A} - W'_{l_0+l_1+l_2}$ $\quad Q'_{\uparrow B} = Q_{\uparrow B} - W'_{l_0+l_1}$ $\quad Q'_{\downarrow B} = Q'_{\downarrow B} + W'_{l_2}$

W' = pile weight, buoyant where below water table

Theoretical Elastic Compression in Top Loaded Test Based on Pattern of Developed Side Shear Stress



Top Loaded Test: $\delta_{TLT} = \delta_{\downarrow l_0} + \delta_{\downarrow l_1 + l_2}$

$\delta_{\downarrow l_0} = \dfrac{Pl_0}{AE}$	$\delta_{\downarrow l_0} = \dfrac{Pl_0}{AE}$	$\delta_{\downarrow l_0} = \dfrac{Pl_0}{AE}$
$C_1 = \dfrac{1}{3}$	$\text{Centroid Factor} = C_1$	$C_1 = \dfrac{1}{2}$
$\delta_{\downarrow l_1+l_2} = \dfrac{(Q'_{\downarrow A} + 2P)}{3} \dfrac{(l_2 + l_2)}{AE}$	$\delta_{\downarrow l_1+l_2} = \left[(C_1)Q'_{\downarrow A} + (1 - C_1)P\right] \dfrac{(l_1 + l_2)}{AE}$	$\delta_{\downarrow l_1+l_2} = \dfrac{(Q'_{\downarrow A} + P)}{2} \dfrac{(l_1 + l_2)}{AE}$

Net and Equivalent Loads:

$Q'_{\downarrow A} = Q_{\downarrow A} - w'_{l_0+l_1+l_2}$ $\quad$ $P_{single} = Q'_{\downarrow A} + Q'_{\uparrow A}$ $\quad$ $P_{multi} = Q'_{\downarrow A} + Q'_{\uparrow B} + Q'_{\downarrow B}$

Component loads Q selected at the same (±) Δ_{OLT}.

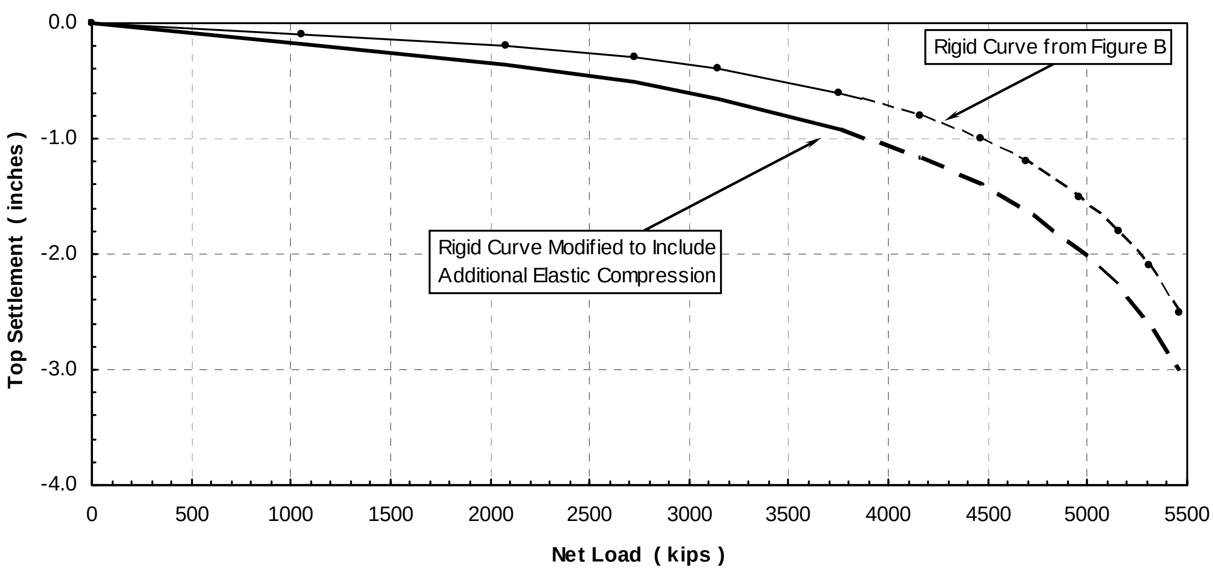
Example Calculation for the Additional Elastic Compression Correction For Single Level Test (English Units)

Given:

C_1	=	0.441	
AE	=	3,820,000	kips (assumed constant throughout test)
I_0	=	5.9	ft
I_1	=	30.0	ft (embedded length of shaft above O-cell)
I_2	=	0.00	ft
I_3	=	0.0	ft
Shear reduction factor	=	1.00	(cohesive soil)

Δ_{OLT} (in)	$Q'_{\downarrow A}$ (kips)	$Q'_{\uparrow A}$ (kips)	P (kips)	δ_{TLT} (in)	δ_{OLT} (in)	Δ_δ (in)	$\Delta_{OLT} + \Delta_\delta$ (in)
0.000	0	0	0	0.000	0.000	0.000	0.000
0.100	352	706	1058	0.133	0.047	0.086	0.186
0.200	635	1445	2080	0.257	0.096	0.160	0.360
0.300	867	1858	2725	0.339	0.124	0.215	0.515
0.400	1061	2088	3149	0.396	0.139	0.256	0.656
0.600	1367	2382	3749	0.478	0.159	0.319	0.919
0.800	1597	2563	4160	0.536	0.171	0.365	1.165
1.000	1777	2685	4462	0.579	0.179	0.400	1.400
1.200	1921	2773	4694	0.613	0.185	0.427	1.627
1.500	2091	2867	4958	0.651	0.191	0.460	1.960
1.800	2221	2933	5155	0.680	0.196	0.484	2.284
2.100	2325	2983	5308	0.703	0.199	0.504	2.604
2.500	2434	3032	5466	0.726	0.202	0.524	3.024

Figure C



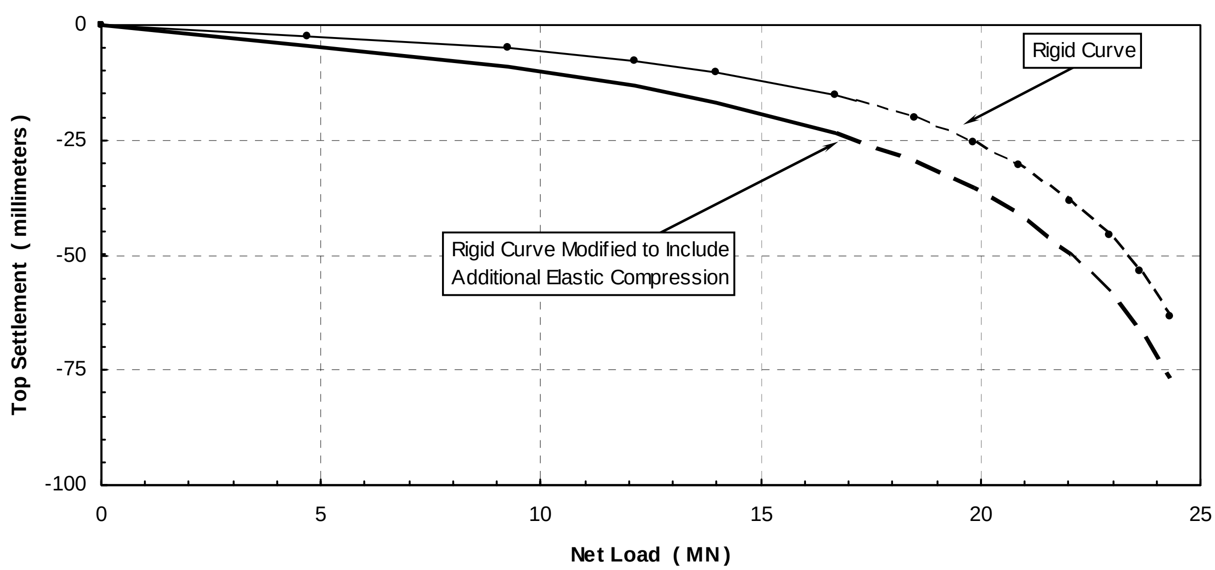
Example Calculation for the Additional Elastic Compression Correction For Single Level Test (SI Units)

Given:

C_1	=	0.441	
AE	=	17,000	MN (assumed constant throughout test)
I_0	=	1.80	m
I_1	=	14.69	m (embedded length of shaft above mid-cell)
I_2	=	0.00	m
I_3	=	0.0	m
Shear reduction factor	=	1.00	(cohesive soil)

Δ_{OLT} (mm)	$Q'_{\downarrow A}$ (MN)	$Q'_{\uparrow A}$ (mm)	P (MN)	δ_{TLT} (mm)	δ_{OLT} (mm)	Δ_{δ} (mm)	$\Delta_{OLT} + \Delta_{\delta}$ (mm)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.54	1.57	3.14	4.71	3.37	1.20	2.17	4.71
5.08	2.82	6.43	9.25	6.52	2.45	4.07	9.15
7.62	3.86	8.27	12.12	8.61	3.15	5.46	13.08
10.16	4.72	9.29	14.01	10.05	3.54	6.51	16.67
15.24	6.08	10.60	16.68	12.14	4.04	8.10	23.34
20.32	7.11	11.40	18.50	13.60	4.34	9.26	29.58
25.40	7.90	11.94	19.85	14.70	4.55	10.15	35.55
30.48	8.55	12.33	20.88	15.55	4.70	10.85	41.33
38.10	9.30	12.75	22.05	16.53	4.86	11.67	49.77
45.72	9.88	13.05	22.93	17.27	4.97	12.29	58.01
53.34	10.34	13.27	23.61	17.84	5.06	12.79	66.13
63.50	10.83	13.48	24.31	18.44	5.14	13.30	76.80

Figure D



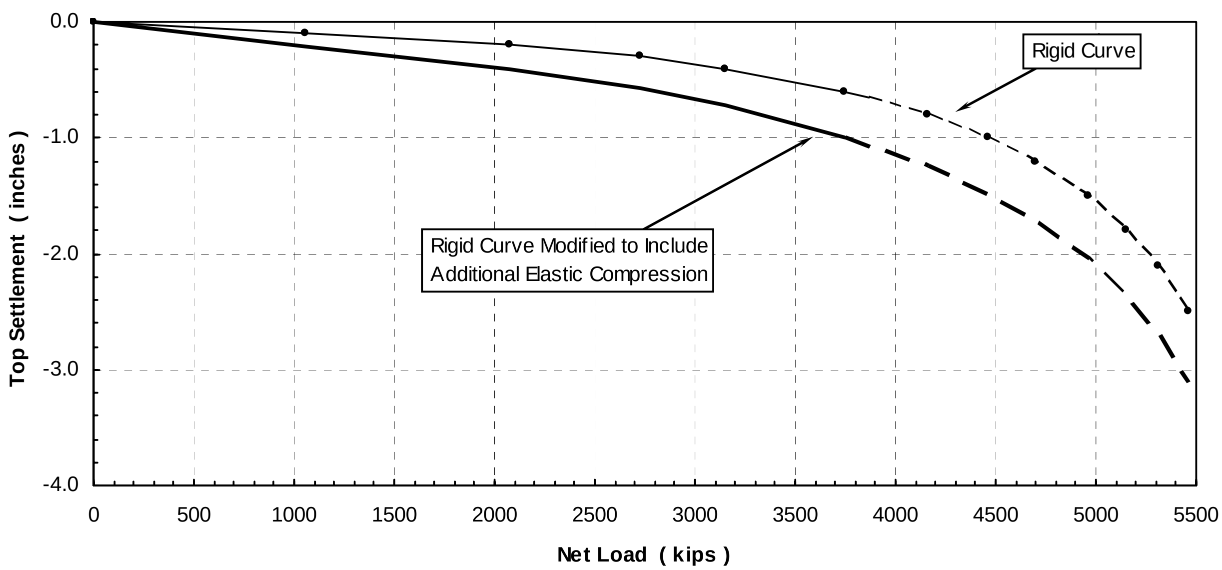
Example Calculation for the Additional Elastic Compression Correction For Multi Level Test (English Units)

Given:

C_1	=	0.441	
C_2	=	0.579	
C_3	=	0.396	
AE	=	3,820,000	kips (assumed constant throughout test)
I_0	=	5.9	ft
I_1	=	30.0	ft (embedded length of shaft above mid-cell)
I_2	=	18.2	ft (embedded length of shaft between O-cells)
I_3	=	0.0	ft
Shear reduction factor	=	1.00	(cohesive soil)

Δ_{OLT} (in)	$Q'_{\downarrow A}$ (kips)	$Q'_{\downarrow B}$ (kips)	$Q'_{\uparrow A}$ (kips)	P (kips)	δ_{TLT} (in)	δ_{OLT} (in)	Δ_{δ} (in)	$\Delta_{OLT} + \Delta_{\delta}$ (in)
0.000	0	0	0	0	0.000	0.000	0.000	0.000
0.100	352	247	459	1058	0.133	0.025	0.107	0.207
0.200	635	506	939	2080	0.257	0.052	0.205	0.405
0.300	867	650	1208	2725	0.339	0.067	0.272	0.572
0.400	1061	731	1357	3149	0.396	0.075	0.321	0.721
0.600	1367	834	1548	3749	0.478	0.085	0.393	0.993
0.800	1597	897	1666	4160	0.536	0.092	0.444	1.244
1.000	1777	940	1745	4462	0.579	0.096	0.483	1.483
1.200	1921	971	1802	4694	0.613	0.099	0.513	1.713
1.500	2091	1003	1864	4958	0.651	0.103	0.548	2.048
1.800	2221	1027	1907	5155	0.680	0.105	0.575	2.375
2.100	2325	1044	1939	5308	0.703	0.107	0.596	2.696
2.500	2434	1061	1971	5466	0.726	0.109	0.618	3.118

Figure E



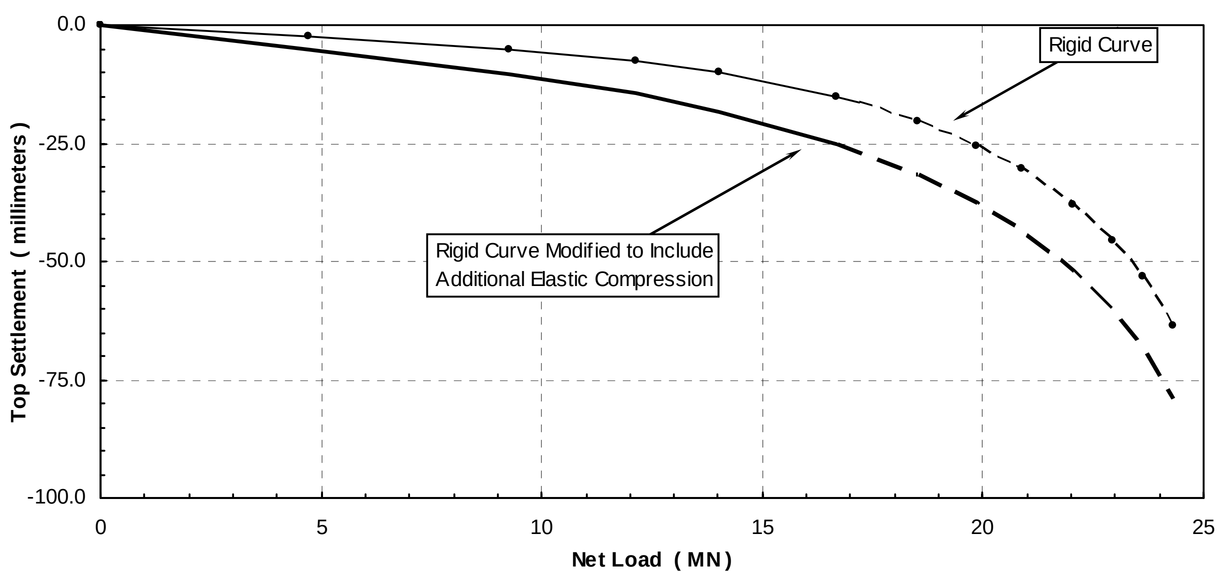
Example Calculation for the Additional Elastic Compression Correction For Multi Level Test (SI Units)

Given:

C_1	=	0.441	
C_2	=	0.579	
C_3	=	0.396	
AE	=	17,000	MN (assumed constant throughout test)
I_0	=	1.80	m
I_1	=	9.14	m (embedded length of shaft above mid-cell)
I_2	=	5.55	m (embedded length of shaft between O-cells)
I_3	=	0.00	m
Shear reduction factor	=	1.00	(cohesive soil)

Δ_{OLT} (mm)	$Q'_{\downarrow A}$ (MN)	$Q'_{\downarrow B}$ (MN)	$Q'_{\uparrow B}$ (mm)	P (MN)	δ_{TLT} (mm)	δ_{OLT} (mm)	Δ_{δ} (mm)	$\Delta_{OLT} + \Delta_{\delta}$ (mm)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.54	1.57	1.10	2.04	4.71	3.37	0.64	2.73	5.27
5.08	2.82	2.25	4.18	9.25	6.52	1.31	5.21	10.29
7.62	3.86	2.89	5.37	12.12	8.61	1.69	6.92	14.54
10.16	4.72	3.25	6.04	14.01	10.05	1.90	8.15	18.31
15.24	6.08	3.71	6.89	16.68	12.14	2.17	9.97	25.21
20.32	7.11	3.99	7.41	18.50	13.60	2.33	11.27	31.59
25.40	7.90	4.18	7.76	19.85	14.70	2.44	12.26	37.66
30.48	8.55	4.32	8.02	20.88	15.55	2.52	13.03	43.51
38.10	9.30	4.46	8.29	22.05	16.53	2.61	13.92	52.02
45.72	9.88	4.57	8.48	22.93	17.27	2.67	14.60	60.32
53.34	10.34	4.64	8.62	23.61	17.84	2.71	15.13	68.47
63.50	10.83	4.72	8.76	24.31	18.44	2.76	15.68	79.18

Figure F



APPENDIX D

O-CELL METHOD FOR DETERMINING CREEP LIMIT LOADING

O-CELL METHOD FOR DETERMINING A CREEP LIMIT LOADING ON THE EQUIVALENT TOP-LOADED SHAFT (September, 2000)

Background: O-cell testing provides a sometimes useful method for evaluating that load beyond which a top-loaded drilled shaft might experience significant unwanted creep behavior. We refer to this load as the "creep limit," also sometimes known as the "yield limit" or "yield load".

To our knowledge, Housel (1959) first proposed the method described below for determining the creep limit. Stoll (1961), Bourges and Levillian (1988), and Fellenius (1996) provide additional references. This method also follows from long experience with the pressuremeter test (PMT). Figure 8 and section 9.4 from ASTM D4719-94, reproduced below, show and describe the creep curve routinely determined from the PMT. The creep curve shows how the movement or strain obtained over a fixed time interval, 30 to 60 seconds, changes versus the applied pressure. One can often detect a distinct break in the curve at the pressure P_e in Figure 8. Plastic deformations may become significant beyond this break loading and progressively more severe creep can occur.

Definition: Similarly with O-cell testing using the ASTM Quick Method, one can conveniently measure the additional movement occurring over the final time interval at each constant load step, typically 4 to 8 minutes. A break in the curve of load vs. movement (as at P_e with the PMT) indicates the creep limit.

We usually indicate such a creep limit in the O-cell test for either one, or both, of the side shear and end bearing components, and herein designate the corresponding movements as M_{CL1} and M_{CL2}. We then combine the creep limit data to predict a creep limit load for the equivalent top loaded shaft.

Procedure if both M_{CL1} and M_{CL2} available: Creep cannot begin until the shaft movement exceeds the M_{CL} values. A conservative approach would assume that creep begins when movements exceed the lesser of the M_{CL} values. However, creep can occur freely only when the shaft has moved the greater of the two M_{CL} values. Although less conservative, we believe the latter to match behavior better and therefore set the creep limit as that load on the equivalent top-loaded movement curve that matches the greater M_{CL}.

Procedure if only M_{CL1} available: If we cannot determine a creep limit in the second component before it reaches its maximum movement M_x, we treat M_x as M_{CL2}. From the above method one can say that the creep limit load exceeds, by some unknown amount, that obtained when using $M_{CL2} = M_x$.

Procedure if no creep limit observed: Then, according to the above, the creep limit for the equivalent top-loaded shaft will exceed, again by some unknown amount, that load on the equivalent curve that matches the movement of the component with the maximum movement.

Limitations: The accuracy in estimating creep limits depends, in part, on the scatter of the data in the creep limit plots. The more scatter, the more difficult to define a limit. The user should make his or her own interpretation if he or she intends to make important use of the creep limit interpretations. Sometimes we obtain excessive scatter of the data and do not attempt an interpretation for a creep limit and will indicate this in the report.

Excerpts from ASTM D4719
"Standard Test Method for Pressuremeter Testing in Soils"

9.4 For Procedure A, plot the volume increase readings (V_{60}) between the 30 s and 60 s reading on a separate graph. Generally, a part of the same graph is used, see Fig. 8. For Procedure B, plot the pressure decrease reading between the 30 s and 60 s reading on a separate graph. The test curve shows an almost straight line section within the range of either low volume increase readings (V_{60}) for Procedure A or low pressure decrease for Procedure B. In this range, a constant soil deformation modulus can be measured. Past the so-called creep pressure, plastic deformations become prevalent.

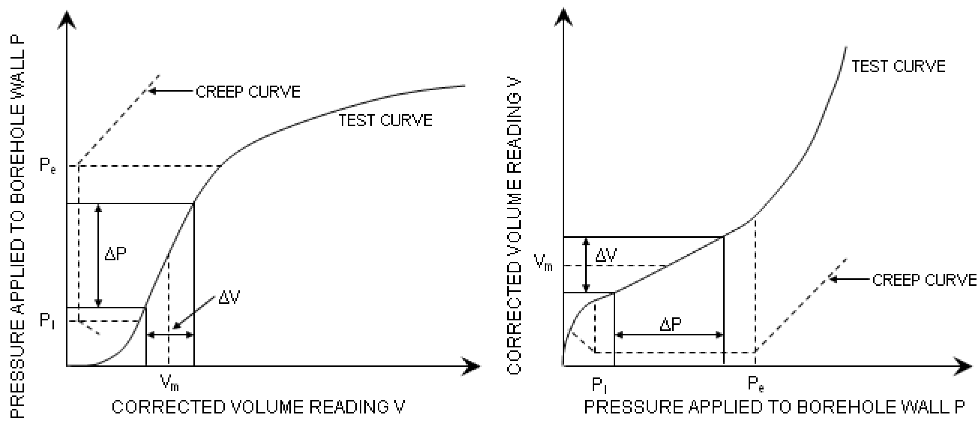


FIG. 8 Pressuremeter Test Curves for Procedure A

References

Housel, W.S. (1959), "Dynamic & Static Resistance of Cohesive Soils", ASTM STP 254, pp. 22-23.

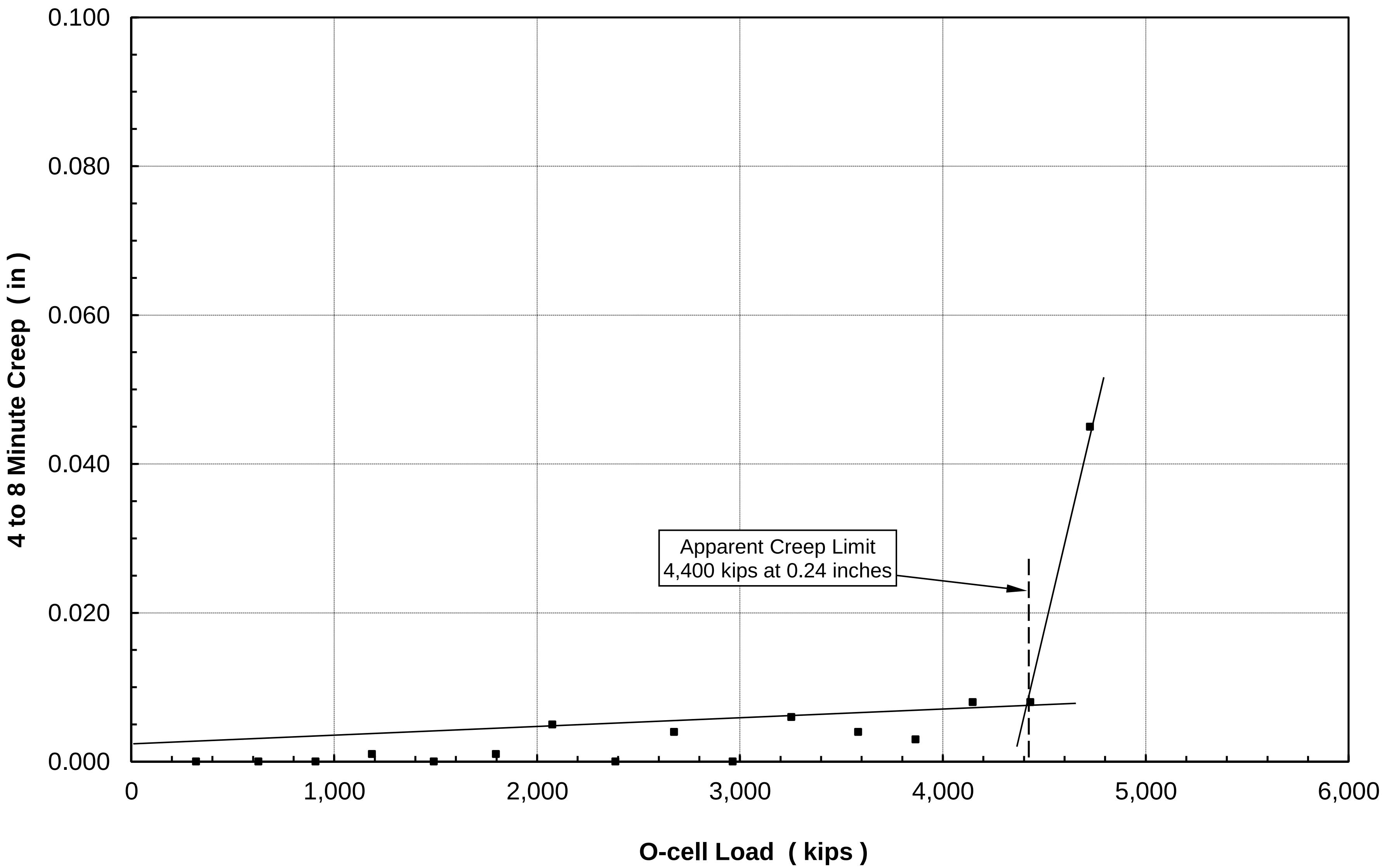
Stoll, M.U.W. (1961, Discussion, Proc. 5th ICSMFE, Paris, Vol. III, pp. 279-281.

Bourges, F. and Levillian, J-P (1988), "force portante des rideaux plans metalliques charges verticalmement," Bull. No. 158, Nov.-Dec., des laboratoires des ponts et chaussees, p. 24.

Fellenius, Bengt H. (1996), Basics of Foundation Design, BiTech Publishers Ltd., p.79.

Combined End Bearing and Lower Side Shear Creep Limit

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

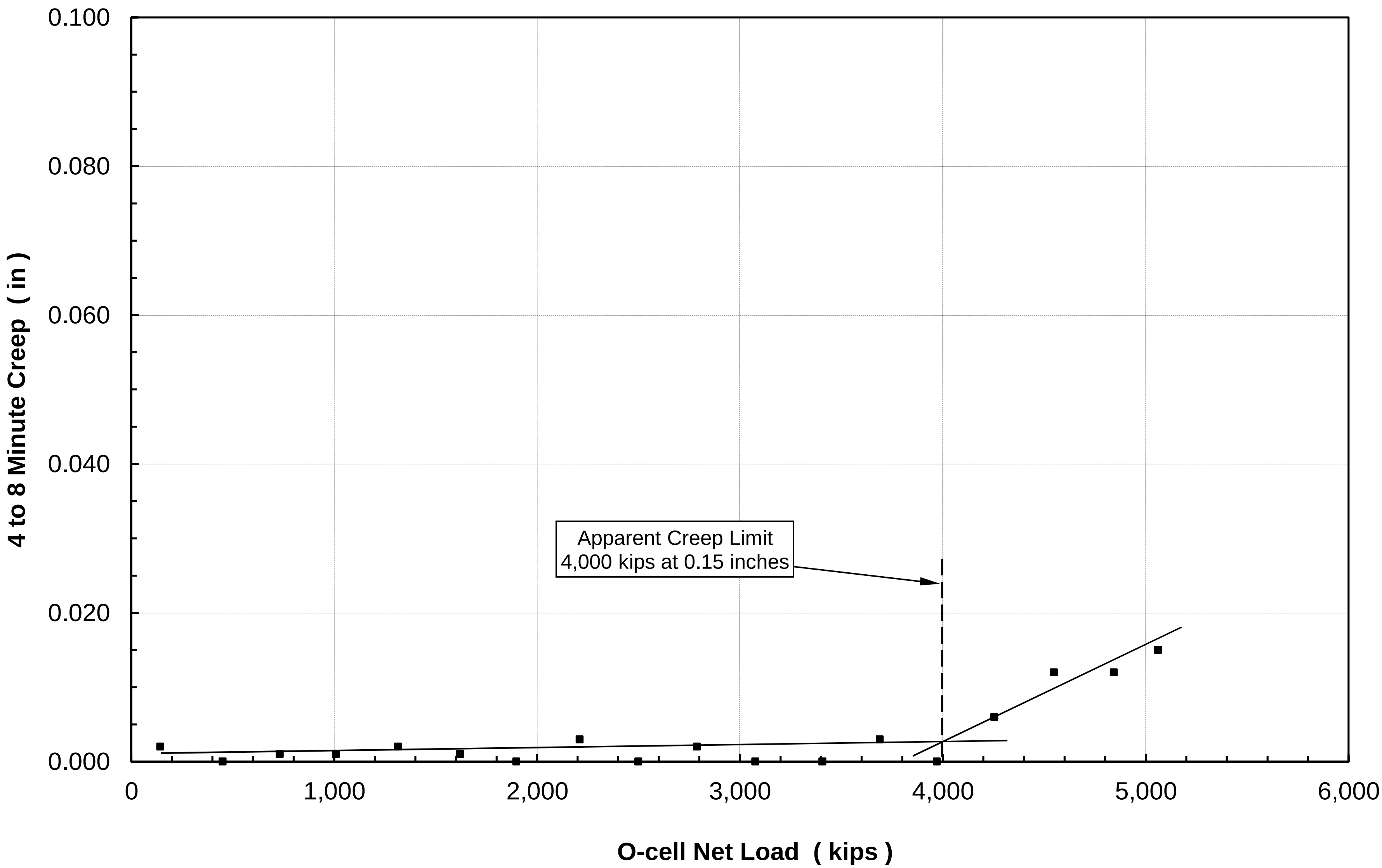


Loadtest USA Project No. LT-1302-2

Figure D-1

Upper Side Shear Creep Limit

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV



Loadtest USA Project No. LT-1302-2

Figure D-2

APPENDIX E

SOIL BORING LOG

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE	9/9/13	STATION	"XP" 189+88
END DATE	9/10/13	OFFSET	313' Right
JOB DESCRIPTION	US95 / CC-215 System-to-System Interchange	ENGINEER	Boomhower/Lawrence
LOCATION	Northwest Las Vegas - Clark County	EQUIPMENT	Diedrich D-120 (Unit 1627)
BORING	TS-1-2	OPERATOR	Beus/Pypkowski
E.A. #	73518	DRILLING METHOD	6" H.S.A.
GROUND ELEV.	2406.10 (ft)	BACKFILLED	
HAMMER DROP SYSTEM	Automatic	DATE	

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
10/10/13	62.00	2344.1

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group		MATERIAL DESCRIPTION	REMARKS
	3.00									Asphaltic Concrete	
	4.50	A	CMS	12 12 12	24	100		CL ML	4.50	**SILTY CLAY** Dry, medium dense, very pale brown (10 YR 7/4)	
2401.1	5 6.00	B	SPT	6 5 14	19	85		CL		**LEAN CLAY with SAND** Dry, medium dense, very pale brown to white (10 YR 7/4 to 10 YR 8/1)	
	6.50										
	8.00	C	CMS	11 15 22	37	95				**LEAN CLAY** Dry, very stiff, light gray to white (10 YR 7/2 to 10 YR 8/1)	
	9.50	D	SPT	11 11 17	28	85				**LEAN CLAY with SAND** Dry, very stiff, light gray to white (10 YR 7/2 to 10 YR 8/1)	
2396.1	10 11.00	E	CMS	18 15 16	31	85				**LEAN CLAY with SAND** Dry, very stiff, light gray to white (10 YR 7/2 to 10 YR 8/1)	
	12.50	F	SPT	8 10 13	23	85				**SANDY LEAN CLAY** Dry, very stiff, light gray to white (10 YR 7/2 to 10 YR 8/1)	
	14.00	G	CMS	11 16 22	38	95			14.00	**SANDY LEAN CLAY** Dry, very stiff, light gray (2.5 Y 7/2)	
2391.1	15 15.50	H	SPT	12 15 21	36	85		SC		**CLAYEY SAND** Dry, very stiff, light gray (2.5 Y 7/2)	
	16.60	I	CMS	20 35	15/0.1'	80			16.80	**CLAYEY SAND with GRAVEL** Dry, very hard, light gray (10 YR 7/2)	(I) Last 10 blows; no progress.
	17.00			15/0.1'							
	18.40	J	CMS	31 38 50/0.4'	50/0.4'	95		GM	19.00	**SILTY GRAVEL with SAND** Dry, very dense, light gray (10 YR 7/2)	
2386.1	20 20.00							SC			
	21.50	K	CMS	20 33 41	74	95			21.50	**CLAYEY SAND with GRAVEL** Dry, very dense, light gray (10 YR 7/2)	
	23.00	L	SPT	15 21 28	49	80		GC	23.80	**CLAYEY GRAVEL with SAND** Dry, dense, yellow to very pale brown (10 YR 7/6 to 10 YR 8/2)	
	24.50	M	CMS	25 23 31	54	95		CH	24.50	**FAT CLAY with SAND** Dry, dense, yellowish brown to very pale brown (10 YR 5/6 to 10 YR 7/3)	
2381.1	25 26.00	N	CMS	1 6 26	32	55		SC	26.00	**CLAYEY SAND with GRAVEL** Dry, dense, yellowish brown to very pale brown (10 YR 5/6 to 10 YR 7/3)	(N) Loose sample recovered.
	27.50	O	SPT	14 16 19	35	80		CH	27.50	**SANDY FAT CLAY** Dry, hard, very pale brown to white (10 YR 7/3 to 10 YR 8/1)	End day 1 drilling @ 27.5'.
	29.00	P	SPT	25 35 53	88	95		SC		**CLAYEY SAND with GRAVEL** Dry, very dense, white (7.5 YR 8/1)	
	30.00								30.00		

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE 9/9/13
END DATE 9/10/13
JOB DESCRIPTION US95 / CC-215 System-to-System Interchange
LOCATION Northwest Las Vegas - Clark County
BORING TS-1-2
E.A. # 73518
GROUND ELEV. 2406.10 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
10/10/13	62.00	2344.1

STATION "XP" 189+88
OFFSET 313' Right
ENGINEER Boomhower/Lawrence
EQUIPMENT Diedrich D-120 (Unit 1627)
OPERATOR Beus/Pypkowski
DRILLING METHOD 6" H.S.A.
BACKFILLED ________ DATE ________

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group		MATERIAL DESCRIPTION	REMARKS
	31.50	Q	CMS	19 26 55	81	100		CL		**GRAVELLY LEAN CLAY with SAND** Dry, hard, light gray (10 YR 7/2) with white (10 YR 8/1) nodules	(Q) Nodules lightly to strongly cemented.
	32.80 33.00	R	SPT	18 30 50/0.3'	50/0.3'	100				**LEAN CLAY** Dry to moist, very hard, white (10 YR 8/1)	
	34.50	S	CMS	27 17 21	38	95				**SANDY LEAN CLAY** Dry to moist, medium dense to dense, white to very pale brown (10 YR 8/1 to 10 YR 7/4)	
2371.1	35 / 36.00	T	SPT	10 9 11	20	75				**SANDY LEAN CLAY** Moist, very stiff, very pale brown to brown (10 YR 8/2 to 7.5 YR 5/4)	
	37.50								37.00		
	39.00	U	CMS	10 15 30	45	95		CH	39.00	**FAT CLAY with SAND** Moist, very stiff, pale brown to brown (10 YR 6/3 to 7.5 YR 5/4)	
2366.1	40 / 40.50	V	SPT	11 13 18	31	60		GC	40.50	**CLAYEY GRAVEL with SAND** Moist, hard, pale brown (10 YR 6/3) with white (10 YR 8/1) nodules	(V) Nodules lightly to strongly cemented.
	42.00	W	CMS	11 23 30	53	100		CL	42.00	**SANDY LEAN CLAY with GRAVEL** Moist, hard, pale brown (10 YR 6/3) with white (10 YR 8/1) nodules	(W) Nodules lightly to strongly cemented.
	43.50	X	SPT	9 13 32	45	95		ML	43.50	**SANDY SILT with GRAVEL** Moist, hard, pale brown (10 YR 6/3) with white (10 YR 8/1) nodules	
	45.00	Y	CMS	13 14 22	36	85		CL		**LEAN CLAY with SAND** Moist, hard, pale brown (10 YR 6/3) with white (10 YR 8/1) nodules	
2361.1	45 / 46.50	Z	SPT	7 12 21	33	85				**LEAN CLAY** Dry to moist, hard, light brown (7.5 YR 6/4)	
	48.00	AA	CMS	18 18 24	42	95			48.00	**SANDY LEAN CLAY with GRAVEL** Moist, dense, light gray to light yellowish brown (2.5 Y 7/2 to 10 YR 6/4)	
	49.50	BB	SPT	2 7 24	31	65		GC	49.50	**CLAYEY GRAVEL with SAND** Moist, stiff to very stiff, light yellowish brown (10 YR 6/4)	(BB) Sample strongly cemented in sampler shoe.
2356.1	50 / 51.00	CC	CMS	11 24 20	44	95		CH	51.00	**SANDY FAT CLAY** Moist, very stiff, mottled light gray to brown (10 YR 7/2 to 7.5 YR 5/4)	(CC) Nodules lightly to strongly cemented.
	52.50	DD	SPT	7 9 11	20	65		GC		**CLAYEY GRAVEL with SAND** Moist, medium dense, brown (7.5 YR 5/4)	
	54.00	EE	CMS	11 11 34	45	85				**CLAYEY GRAVEL with SAND** Moist, very stiff, mottled light gray to brown (10 YR 7/2 to 7.5 YR 5/4)	
2351.1	55 / 55.50	FF	SPT	9 14 50/0.3'	50/0.3'	60				**CLAYEY GRAVEL with SAND** Moist, very hard, very pale brown (10 YR 8/3)	
	56.30	GG	CMS	41 50/0.3'	50/0.3'	90			57.00	**CLAYEY GRAVEL with SAND** Dry to moist, very hard, very pale brown to light gray (10 YR 8/2 to 10 YR 7/2)	(GG) Sample strongly cemented lenses. Very hard drilling from 56.5' to 60.0'. Progress 3.5'/30 minutes @ 250
	60.00 60.10										

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE	9/9/13	STATION	"XP" 189+88
END DATE	9/10/13	OFFSET	313' Right
JOB DESCRIPTION	US95 / CC-215 System-to-System Interchange	ENGINEER	Boomhower/Lawrence
LOCATION	Northwest Las Vegas - Clark County	EQUIPMENT	Diedrich D-120 (Unit 1627)
BORING	TS-1-2	OPERATOR	Beus/Pypkowski
E.A. #	73518	DRILLING METHOD	6" H.S.A.
GROUND ELEV.	2406.10 (ft)	BACKFILLED	DATE
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL

DATE	DEPTH ft	ELEV. ft
10/10/13	62.00	2344.1

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		HH	SPT	15/0.1'	15/0.1'	0			**Hard Drilling - Moderate to Strongly Cemented Materials - "Caliche"** 62.00	psi down pressure. (HH) Last 10 blows; no progress. No sample recovered. Very hard drilling from 60.1' to 60.3'. Progress 0.2'/25 minutes @ 300 psi down pressure. Very hard drilling from 60.3' to 60.6'. Progress 0.3'/30 minutes @ 300 psi down pressure. Drilling with clean water (D2) SPT full, poor sample
	64.50							CL		
2341.1	65 / 66.00	A2	CMS	6 10 25	35	100		CL	**LEAN CLAY** Moist, very stiff to hard, very pale brown (10 YR 7/3) 66.00	
	67.50	B2	SPT	8 7 6	13	100			**LEAN CLAY with SAND** Moist, stiff, very pale brown (10 YR 6/3)	
	69.50								69.00	
2336.1	70 / 70.50	C2	CMS	7 50/ 0.45'	50/ 0.45'	0		CL	**C-CMS-NO RECOVERY**	
	71.00	D2	SPT	50/ 0.45'	50/ 0.45'	100		CL	**LEAN CLAY** Moist, hard, very pale brown (10 YR 6/3) 72.00	
	74.50									
2331.1	75 / 76.00	E2	CMS	18 14 12	26	105		CL		
	77.50	F2	SPT	4 7 12	19	95		CL	**LEAN CLAY with SAND** Moist ,very stiff ,very pale brown (10 YR 6/4) mottled 10% brownish yellow (10 YR 6/6)	
	79.50									
2326.1	80 / 81.00	G2	CMS	8 9 54	63	100		CL	81.00	
	81.80	H2	SPT	34 50/0.30'	50/0.30'	100		CL	**GRAVELLY LEAN CLAY with SAND** Moist, very hard , very pale brown (10 YR 7/4) 83.50	
	84.50							CL	**SANDY LEAN CLAY** Moist, very hard, brown (7.5 YR 5/4)	
2321.1	85 / 85.70	I2	CMS	14 51 50/0.15'	50/ 0.15'	75		CL	85.70	
	86.50	J2	SPT	28 50/ 0.30'	50/ 0.30'	100			**SANDY LEAN CLAY with GRAVEL** Moist, very hard, very pale brown (10 YR 7/4) 88.00	
	89.50								**GRAVELLY LEAN CLAY** Moist, hard, very pale brown (10 YR 7/4)	
				20						

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE	9/9/13	STATION	"XP" 189+88
END DATE	9/10/13	OFFSET	313' Right
JOB DESCRIPTION	US95 / CC-215 System-to-System Interchange	ENGINEER	Boomhower/Lawrence
LOCATION	Northwest Las Vegas - Clark County	EQUIPMENT	Diedrich D-120 (Unit 1627)
BORING	TS-1-2	OPERATOR	Beus/Pypkowski
E.A. #	73518	DRILLING METHOD	6" H.S.A.
GROUND ELEV.	2406.10 (ft)	BACKFILLED	
HAMMER DROP SYSTEM	Automatic	DATE	

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
10/10/13	62.00	2344.1

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	91.00	K2	CMS	30 30	60	0			**K-CMS-NO RECOVERY**	
	92.50	L2	SPT	5 9 27	36	55		CL	**GRAVELLY LEAN CLAY** Moist, hard, very pale brown (10 YR 7/4)	(L2) 2' + in SPT, CMS sample?
	93.00									
	94.50									
2311.1	95 96.00	M2	CMS	12 20 45	65	115		CL	**LEAN CLAY** Moist, hard, very pale brown (10 YR 7/4)	
	96.00									
	97.50	N2	SPT	26 30 55	85	100		CL ML	**SANDY SILTY CLAY** Moist, hard, very pale brown (10 YR 7/4)	
	98.00									
	99.50									
2306.1	100 100.90	O2	CMS	12 19 50/ .40'	50/ .40'	120		CL	**LEAN CLAY with SAND** Moist, very hard, light yellowish brown (10 YR 6/4) mottled 10% brownish yellow (10 YR 6/6)	(O2) CMS full, not draining pressure
	102.40	P2	SPT	28 25 20	45	75			**LEAN CLAY with SAND** Moist, hard, very pale brown (10 YR 6/4)	
	103.00									
	104.50									
	104.80 104.80	Q2	CMS	50/ .30'	50/ .30'	0			**Q-CMS- NO RECOVERY**	(Q2) 1.3' cuttings in CMS sample, No recovery
2301.1	105 106.30	R2	SPT	30 17 19	36	120		CL	**LEAN CLAY** Moist, hard, light yellowish brown (10 YR 6/4)	
	108.00									
	109.50									
2296.1	110 111.00	S2	CMS	33 31 60	91	100		CL ML	**SILTY CLAY** Very hard, moist, light yellowish brown (10 YR 6/4)	
	112.50	T2	SPT	18 26 45	71	100				
	113.00									
	114.50									
2291.1	115 116.00	U2	CMS	18 28 40	68	100		ML	**SILT** Hard, moist, light yellowish brown (10 YR 6/4)	
	116.00									
	117.50	V2	SPT	11 14 26	40	115		CL ML	**SILTY CLAY** Hard, moist, light yellowish brown (10 YR 6/4)	
	118.00									
	119.50			38					**LEAN CLAY** Moist, very stiff, light yellowish brown (10 YR 6/4)	

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE 9/9/13
END DATE 9/10/13
JOB DESCRIPTION US95 / CC-215 System-to-System Interchange
LOCATION Northwest Las Vegas - Clark County
BORING TS-1-2
E.A. # 73518
GROUND ELEV. 2406.10 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
10/10/13	62.00	2344.1

STATION "XP" 189+88
OFFSET 313' Right
ENGINEER Boomhower/Lawrence
EQUIPMENT Diedrich D-120 (Unit 1627)
OPERATOR Beus/Pypkowski
DRILLING METHOD 6" H.S.A.
BACKFILLED ______ DATE ______

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	121.00	W2	CMS	22 20	42	115		CL	**LEAN CLAY** Moist, very stiff, light yellowish brown (10 YR 6/4) 121.00	
	122.50	X2	SPT	5 19 30	49	105		CL	**LEAN CLAY WITH SAND** Moist, hard, light yellowish brown (10 YR 6/4)	
	124.50									
2281.1	125 125.90	Y2	CMS	32 40 50/.40'	50/.40'	100			**LEAN CLAY WITH SAND** Moist, very stiff, light yellowish brown (10 YR 6/4)	
	127.40	Z2	SPT	24 24 28	52	85			**LEAN CLAY WITH SAND** Moist, hard, light yellowish brown (10 YR 6/4) to very pale brown (10 YR 8/2) 127.40	
									END TS-2 @ 127.4'	
2276.1	130									
2271.1	135									
2266.1	140									
2261.1	145									

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE	10/9/13
END DATE	10/21/13
JOB DESCRIPTION	US95 / CC-215 System-to-System Interchange
LOCATION	Northwest Las Vegas - Clark County
BORING	TS-3A
E.A. #	73518
GROUND ELEV.	2425.30 (ft)
HAMMER DROP SYSTEM	Automatic
STATION	"X" 65+30
OFFSET	227' Right
ENGINEER	Boomhower/ Lawrence
EQUIPMENT	Diedrich D-120(Unit 1627)
OPERATOR	Pypkowski
DRILLING METHOD	6" H.S.A. /4" Rotary
BACKFILLED	Wash
DATE	

GROUNDWATER LEVEL

DATE	DEPTH ft	ELEV. ft
10/21/13	63.00	2362.3

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									SANDY GRAVEL, tan, dry	
2420.3	5 / 5.00							GC		
	6.40	A	CMS	15 30 50/0.4'	50/0.4'	100			**CLAYEY GRAVEL with SAND** Dry, very dense, very pale brown (10 YR 7/4)	
	6.50	B	SPT	20/0.1'	20/0.1'	0			7.00	(B) Last 10 blows; no progress. No sample recovered.
	7.50									
	7.80	C	CMS	50/0.3'	50/0.3'	0				(C) Last 10 blows; no progress; No sample recovered.
	8.00									
	9.40	D	CMS	37 60 50/0.4'	50/0.4'	85		GW GC	**WELL-GRADED GRAVEL with SILTY CLAY and SAND** Dry, very dense, very pale brown (10 YR 7/4) 9.70	
2415.3	10 / 10.00									
	11.50	E	CMS	9 45 63	108	95		SW SM	**WELL-GRADED SAND with SILT and GRAVEL** Dry, very dense, very pale brown (10 YR 7/4) 11.50	
	12.20	F	SPT	50 35/0.2'	35/0.2'	100		SC	**CLAYEY SAND with GRAVEL** Dry, very dense, very pale brown (10 YR 7/4)	(F) Last 10 blows; no progress.
	13.00									
	14.50	G	CMS	20 32 71	103	80			13.80	
2410.3	15 / 16.00	H	SPT	39 30 41	71	80		GC	**CLAYEY GRAVEL with SAND** Dry, very dense, very pale brown (10 YR 7/4)	
	17.50								17.50	
	17.70	I	CMS	30/0.2'	30/0.2'	0				(I) Last 10 blows; no progress.
	19.00									
2405.3	20 / 20.50	J	CMS	16 22 27	49	100		CL	**LEAN CLAY with SAND** Dry, very stiff, very pale brown (10 YR 7/3)	
	22.00	K	SPT	15 17 15	32	80			**SANDY LEAN CLAY** Dry, hard, mottled light yellowish brown to very pale brown (10 YR 6/4 to 10 YR 8/2)	
	23.50	L	CMS	12 14 29	43	95			**LEAN CLAY with SAND** Dry, hard, mottled light yellowish brown to very pale brown (10 YR 6/4 to 10 YR 8/2)	
	25.00	M	SPT	16 10 11	21	85			**SANDY LEAN CLAY** Dry, very stiff, light brown (7.5 YR 6/4) 25.00	
2400.3	25 / 26.50	N	CMS	13 26 30	56	95		SC	**CLAYEY SAND with GRAVEL** Dry to moist, dense, mottled pale brown to white (10 YR 6/3 to 10 YR 8/1)	
	28.00	O	SPT	9 12 14	26	80			**CLAYEY SAND with GRAVEL** Dry to moist, dense, mottled pale brown to white (10 YR 6/3 to 10 YR 8/1)	
	30.00								30.00	

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE 10/9/13
END DATE 10/21/13
JOB DESCRIPTION US95 / CC-215 System-to-System Interchange
LOCATION Northwest Las Vegas - Clark County
BORING TS-3A
E.A. # 73518
GROUND ELEV. 2425.30 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
10/21/13	63.00	2362.3

STATION "X" 65+30
OFFSET 227' Right
ENGINEER Boomhower/ Lawrence
EQUIPMENT Diedrich D-120(Unit 1627)
OPERATOR Pypkowski
DRILLING METHOD 6" H.S.A. /4" Rotary
BACKFILLED Wash DATE

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	31.50	P	CMS	12 30 47	77	100		GC GM	**SILTY CLAYEY GRAVEL with SAND** Dry to moist, dense, mottled pale brown to white (10 YR 6/3 to 10 YR 8/1) (31.50)	
	33.00	Q	SPT	9 8 13	21	85		CH	**FAT CLAY with SAND** Dry to moist, very stiff, mottled light brown to pale yellow (7.5 YR 6/3 to 2.5 Y 8/3) (34.00)	
2390.3	35 / 35.00									
	36.50	R	CMS	22 26 32	58	100		GC	**CLAYEY GRAVEL with SAND** Dry to moist, dense, mottled pale brown to white (10 YR 6/3 to 10 YR 8/1)	
	38.00	S	SPT	16 16 24	40	75		GC	**CLAYEY GRAVEL with SAND** Dry to moist, dense, mottled pale brown to white (10 YR 6/3 to 10 YR 8/1)	
	39.50	T	CMS	17 21 36	57	100		GC	**CLAYEY GRAVEL with SAND** Dry to moist, dense, mottled pale brown to white (10 YR 6/3 to 10 YR 8/1) (39.50)	
2385.3	40 / 41.00	U	SPT	11 20 17	37	75		MH	**GRAVELLY ELASTIC SILT with SAND** Dry to moist, dense, mottled pale brown to white (10 YR 6/3 to 10 YR 8/1) (41.50)	
	42.00									
	42.40	V	CMS	50/0.4'	50/0.4'	100		GM	(42.70) **SILTY GRAVEL with SAND** Dry to moist, dense, mottled pale brown to white (10 YR 6/3 to 10 YR 8/1)	
	43.00									
	44.40	W	SPT	16 24 50/0.4'	50/0.4'	70		SC	**CLAYEY SAND with GRAVEL** Dry, very dense, light brown to pinkish white (7.5 YR 6/3 to 7.5 YR 8/2) (44.70)	
2380.3	45 / 45.00									
	45.40	X	CMS	50/0.4'	50/0.4'	100		GC	**CLAYEY GRAVEL with SAND** Dry to moist, very dense, light brown (7.5 YR 6/3)	
	47.00									
	48.50	Y	CMS	28 15 25	40	100		GC	**CLAYEY GRAVEL with SAND** Dry to moist, medium dense to dense, light brown to reddish yellow (7.5 YR 6/4 to 7.5 YR 6/6)	
2375.3	50 / 50.00	Z	SPT	17 23 40	63	85		GC	**CLAYEY GRAVEL with SAND** Dry to moist, very dense, multicolored	
	51.50	AA	CMS	45 32 28	60	100		GC	**CLAYEY GRAVEL with SAND** Dry to moist, very dense, multicolored	
	53.00	BB	SPT	17 10 12	22	75		GC	**CLAYEY GRAVEL with SAND** Moist, very stiff, light brown (7.5 YR 6/4)	End day 1 drilling @ 53.0'.
2370.3	55 / 55.00									
	56.20	CC	CMS	25 23 25/0.2'	25/0.2'	90		GC	**CLAYEY GRAVEL with SAND** Moist, very dense, yellowish brown (10 YR 5/6)	(CC) Last 10 blows; no progress.
	56.60	DD	SPT	25/0.2'	25/0.2'	0				(DD) Last 10 blows; no progress. No sample recovered.
	60.00								(60.00)	Hard drilling at 57.5' to 60.0'.

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 10/9/13
END DATE 10/21/13
JOB DESCRIPTION US95 / CC-215 System-to-System Interchange
LOCATION Northwest Las Vegas - Clark County
BORING TS-3A
E.A. # 73518
GROUND ELEV. 2425.30 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
10/21/13	63.00	2362.3

STATION "X" 65+30
OFFSET 227' Right
ENGINEER Boomhower/ Lawrence
EQUIPMENT Diedrich D-120(Unit 1627)
OPERATOR Pypkowski
DRILLING METHOD 6" H.S.A. /4" Rotary
BACKFILLED Wash DATE

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	60.20	EE	SPT	35/0.2'	35/0.2'	0			*Continue TS-3 down same hole, use 4" Mud rotary End Hard Drilling @ 62.8' 62.80	Progress 3.5'/30 minutes @ 250 psi down pressure. (EE) Last 10 blows; no progress. No sample recovered. Very hard drilling at 62.0'. Progress 0.3'/20 minutes @ 350 psi down pressure. Very hard drilling at 62.5'. Progress 0.1'/20 minutes @ 350 psi down pressure.
2360.3	65									
	69.50									
2355.3	70 / 71.00	FF	CMS	56 30 28	58	100		CL ML	**SILTY CLAY with SAND** Hard ,moist, light yellowish brown (10 YR 6/4)	
	72.50	GG	SPT	21 43 33	76	100		CL ML	**SILTY CLAY with SAND** Very hard ,moist, light yellowish brown (10 YR 6/4) 73.00	
	74.50									
2350.3	75 / 76.00	HH	CMS	8 11 16	27	100		CL	**LEAN CLAY** Very stiff ,moist, light yellowish brown (10 YR 6/4)	
	77.50	II	SPT	6 8 13	21	100		CL	**LEAN CLAY** Very stiff ,moist, light yellowish brown to brownish yellow (10 YR 6/4 to 10 YR 6/6) mottled black 1%-5% 78.00	
	79.50									
2345.3	80 / 81.00	JJ	CMS	19 31 26	57	100		CL	**GRAVELLY LEAN CLAY** Hard ,moist, light yellowish brown (10 YR 6/4)	
	82.50	KK	SPT	9 15 27	42	100		CL	**LEAN CLAY with GRAVEL** Hard ,moist, light yellowish brown (10 YR 6/4)	
	84.50									
2340.3	85 / 85.40	LL	CMS	56 50-.40'	50-.40'	0		CL		CMS(LL)- No Recovery; gouge in side of sampler-Hung up on rock?, no progress last 20 blows
	86.90	MM	SPT	12 24 30	54	100		CL	**GRAVELLY LEAN CLAY** Hard, moist, light yellowish brown (10 YR 6/4), angular gravel 87.30	
	89.50 / 89.67	NN	CMS	50-.17'	50-.17'	0			**MODERATELY CEMENTED MATERIALS**	CMS(NN)- No recovery;No progress last 40 blows

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE	10/9/13	STATION	"X" 65+30
END DATE	10/21/13	OFFSET	227' Right
JOB DESCRIPTION	US95 / CC-215 System-to-System Interchange	ENGINEER	Boomhower/ Lawrence
LOCATION	Northwest Las Vegas - Clark County	EQUIPMENT	Diedrich D-120(Unit 1627)
BORING	TS-3A	OPERATOR	Pypkowski
E.A. #	73518	DRILLING METHOD	6" H.S.A. /4" Rotary
GROUND ELEV.	2425.30 (ft)	BACKFILLED	Wash DATE
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL

DATE	DEPTH ft	ELEV. ft
10/21/13	63.00	2362.3

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									MODERATELY CEMENTED MATERIALS 92.00	
	94.50									
2330.3	95 / 95.30	OO	CMS	37 50-.28'	50-.28'	100		CL ML	**GRAVELLY SILTY CLAY** Very hard, moist, very pale brown (10 YR 7/3)	
	96.80	PP	SPT	35 39 53	92	100		CL ML	**GRAVELLY SILTY CLAY** Very hard, moist, very pale brown (10 YR 7/3)	
									98.00	
	99.50									CMS(QQ)-No recovery; sampler ball valve, not relieving pressure during sampling? no negtive pressure to retain sample, to many cuttings?
2325.3	100 / 101.00	QQ	CMS	16 9 32	41	0		CL	**LEAN CLAY with GRAVEL** Very hard, moist, brownish yellow (10 YR 6/6) to very pale brown (10 YR 7/3)	
	102.50	RR	SPT	3 6 50-.42'	50-.42'	150		CL	***INTERBEDDED HARD GRAVELLY CLAY? AND WEAKLY CEMENTED MATERIALS FROM 102.5' to 106.0'**	
	104.50									
2320.3	105 / 105.00	SS	CMS	50-.5'	50-.5'	40		CL	**GRAVELLY LEAN CLAY with SAND** Very hard, moist, brownish yellow (10 YR 6/6) to very pale brown (10 YR 7/3)	CMS(SS)- add brass leaf catcher, .2' recovery in shoe, sampler full of mud/cuttings, no tests
	105.40	TT	SPT	50-.35'	50-.35'	100		CL	106.00	SPT(TT)- angular cemented materials in sampler, broken up by driving?
									WEAKLY TO STRONGLY CEMENTED MATERIALS	
	109.50 / 109.65	UU	SPT	50-.15'	50-.15'	0				SPT(UU)-No recovery
2315.3	110								110.50	Depth 106.0'-110.5' .08ft/min to .15 ft/min drilling rate 250psi down
	114.50									
2310.3	115 / 115.80	VV	CMS	31 56 50-.3'	50-.3'	95		CL ML	**SILTY CLAY** Hard, moist, light yellowish brown (10 YR 6/4)	
	117.10	WW	SPT	19 32 50	82	95		CL ML	**SILTY CLAY** Hard, moist, light yellowish brown (10 YR 6/4)	
									118.00	
	119.50			22					**LEAN CLAY** Hard, moist, reddish yellow (7.5 YR 6/6)	

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE	10/9/13	STATION	"X" 65+30
END DATE	10/21/13	OFFSET	227' Right
JOB DESCRIPTION	US95 / CC-215 System-to-System Interchange	ENGINEER	Boomhower/ Lawrence
LOCATION	Northwest Las Vegas - Clark County	EQUIPMENT	Diedrich D-120(Unit 1627)
BORING	TS-3A	OPERATOR	Pypkowski
E.A. #	73518	DRILLING METHOD	6" H.S.A. /4" Rotary
GROUND ELEV.	2425.30 (ft)	BACKFILLED	Wash
HAMMER DROP SYSTEM	Automatic	DATE	

GROUNDWATER LEVEL

DATE	DEPTH ft	ELEV. ft
10/21/13	63.00	2362.3

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	121.00	XX	CMS	26 45	71	75		CL	**LEAN CLAY** Hard, moist, reddish yellow (7.5 YR 6/6)	
	122.50	YY	SPT	6 10 32	42	115		CL	**LEAN CLAY** Hard, moist, reddish yellow (7.5 YR 6/6)	
	124.50							CL		
2300.3	125 126.00	ZZ	CMS	14 22 39	61	80		CL	**LEAN CLAY** Hard, moist, reddish yellow (7.5 YR 6/6)	
	127.50	AB	SPT	13 20 34	54	140		CL	**LEAN CLAY with GRAVEL** Hard, moist, reddish yellow (7.5 YR 6/6) 127.50	
									END TS3A @ 127.5'	
2295.3	130									
2290.3	135									
2285.3	140									
2280.3	145									

APPENDIX F

SONICALIPER PROFILE

Calipered and Nominal Shaft Dimensions
TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

I.D.	Depth (ft)	Calipered Diameter (in)	Elevation From (ft)	Elevation To (ft)	Perimeter (in)	Cross Section (ft²)	Cumulative Shear (ft²)	Cumulative Volume (yd³)
Ground	0.00	60.0	2425.30	2423.30	188.5	19.60	31.4	1.5
Caliper 1	2.00	60.0	2423.30	2421.30	188.5	19.60	62.8	2.9
Caliper 2	4.00	60.3	2421.30	2419.30	189.6	19.90	94.3	4.4
Caliper 3	6.00	60.8	2419.30	2417.30	191.0	20.20	125.9	5.9
Caliper 4	8.00	61.4	2417.30	2415.30	192.9	20.60	157.7	7.4
Caliper 5	10.00	62.5	2415.30	2413.30	196.4	21.30	189.8	9.0
Caliper 6	12.00	62.7	2413.30	2411.30	196.9	21.40	222.6	10.6
Caliper 7	14.00	61.0	2411.30	2409.30	191.7	20.30	255.4	12.1
Caliper 8	16.00	62.0	2409.30	2407.30	194.8	21.00	287.3	13.6
Caliper 9	18.00	60.3	2407.30	2405.30	189.3	19.80	319.8	15.1
Caliper 10	20.00	60.0	2405.30	2403.30	188.5	19.60	351.4	16.5
Caliper 11	22.00	60.0	2403.30	2401.30	188.5	19.60	382.8	18.0
Caliper 12	24.00	60.0	2401.30	2399.30	188.5	19.60	414.2	19.4
Caliper 13	26.00	60.0	2399.30	2397.30	188.5	19.60	445.6	20.9
Caliper 14	28.00	60.0	2397.30	2395.30	188.5	19.60	477.0	22.3
Caliper 15	30.00	60.0	2395.30	2393.30	188.5	19.60	508.4	23.8
Caliper 16	32.00	60.0	2393.30	2391.30	188.5	19.60	539.9	25.3
Caliper 17	34.00	60.0	2391.30	2389.30	188.5	19.60	571.3	26.7
Caliper 18	36.00	60.0	2389.30	2387.30	188.5	19.60	602.7	28.2
Caliper 19	38.00	60.0	2387.30	2385.30	188.5	19.60	634.1	29.6
Caliper 20	40.00	60.0	2385.30	2383.30	188.5	19.60	665.5	31.1
Caliper 21	42.00	60.0	2383.30	2381.30	188.5	19.60	696.9	32.5
Caliper 22	44.00	60.0	2381.30	2379.30	188.5	19.60	728.4	34.0
Caliper 23	46.00	60.0	2379.30	2377.30	188.5	19.60	759.8	35.4
Caliper 24	48.00	60.0	2377.30	2375.30	188.5	19.60	791.2	36.9
Caliper 25	50.00	60.0	2375.30	2373.30	188.5	19.60	822.6	38.3
Caliper 26	52.00	60.0	2373.30	2371.30	188.5	19.60	854.0	39.8
Caliper 27	54.00	60.0	2371.30	2369.30	188.5	19.60	885.4	41.2
Caliper 28	56.00	60.0	2369.30	2367.30	188.5	19.60	916.9	42.7
Caliper 29	58.00	60.0	2367.30	2365.30	188.5	19.60	948.3	44.1
Caliper 30	60.00	60.0	2365.30	2363.30	188.5	19.60	979.7	45.6
Caliper 31	62.00	60.0	2363.30	2361.30	188.5	19.60	1011.1	47.0
Caliper 32	64.00	60.0	2361.30	2359.30	188.5	19.60	1042.5	48.5
Caliper 33	66.00	60.0	2359.30	2359.20	188.5	19.60	1044.1	48.6
Caliper 34	66.10	60.0	2359.20	2357.30	188.5	19.60	1073.9	49.9
Caliper 35	68.00	60.4	2357.30	2355.30	189.9	19.90	1105.4	51.4
Caliper 36	70.00	61.0	2355.30	2353.30	191.7	20.30	1137.0	52.9
Caliper 37	72.00	61.1	2353.30	2351.30	191.9	20.40	1169.0	54.4
Caliper 38	74.00	61.1	2351.30	2349.30	192.0	20.40	1200.9	55.9
Caliper 39	76.00	60.8	2349.30	2347.30	191.0	20.20	1232.9	57.4
Caliper 40	78.00	60.4	2347.30	2345.30	189.6	19.90	1264.8	58.9
Caliper 41	80.00	61.1	2345.30	2343.30	191.8	20.30	1296.4	60.4
Caliper 42	82.00	60.9	2343.30	2341.30	191.2	20.20	1328.3	61.9
Caliper 43	84.00	60.3	2341.30	2339.30	189.5	19.80	1360.2	63.4
Caliper 44	86.00	60.0	2339.30	2337.30	188.5	19.60	1391.8	64.8
Caliper 45	88.00	60.0	2337.30	2335.30	188.5	19.60	1423.2	66.3
Caliper 46	90.00	60.2	2335.30	2333.30	189.0	19.80	1454.6	67.7
Caliper 47	92.00	60.6	2333.30	2331.30	190.4	20.00	1486.1	69.2
Caliper 48	94.00	60.1	2331.30	2329.30	188.8	19.70	1517.9	70.7
Caliper 49	96.00	60.2	2329.30	2327.30	189.2	19.80	1549.3	72.1
Caliper 50	98.00	60.0	2327.30	2325.47	188.5	19.60	1578.2	73.5
Shaft base	99.83		2325.47					

Note: Cumulative shear and volume calculated by method of cylinders in descending order of depth.

I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014

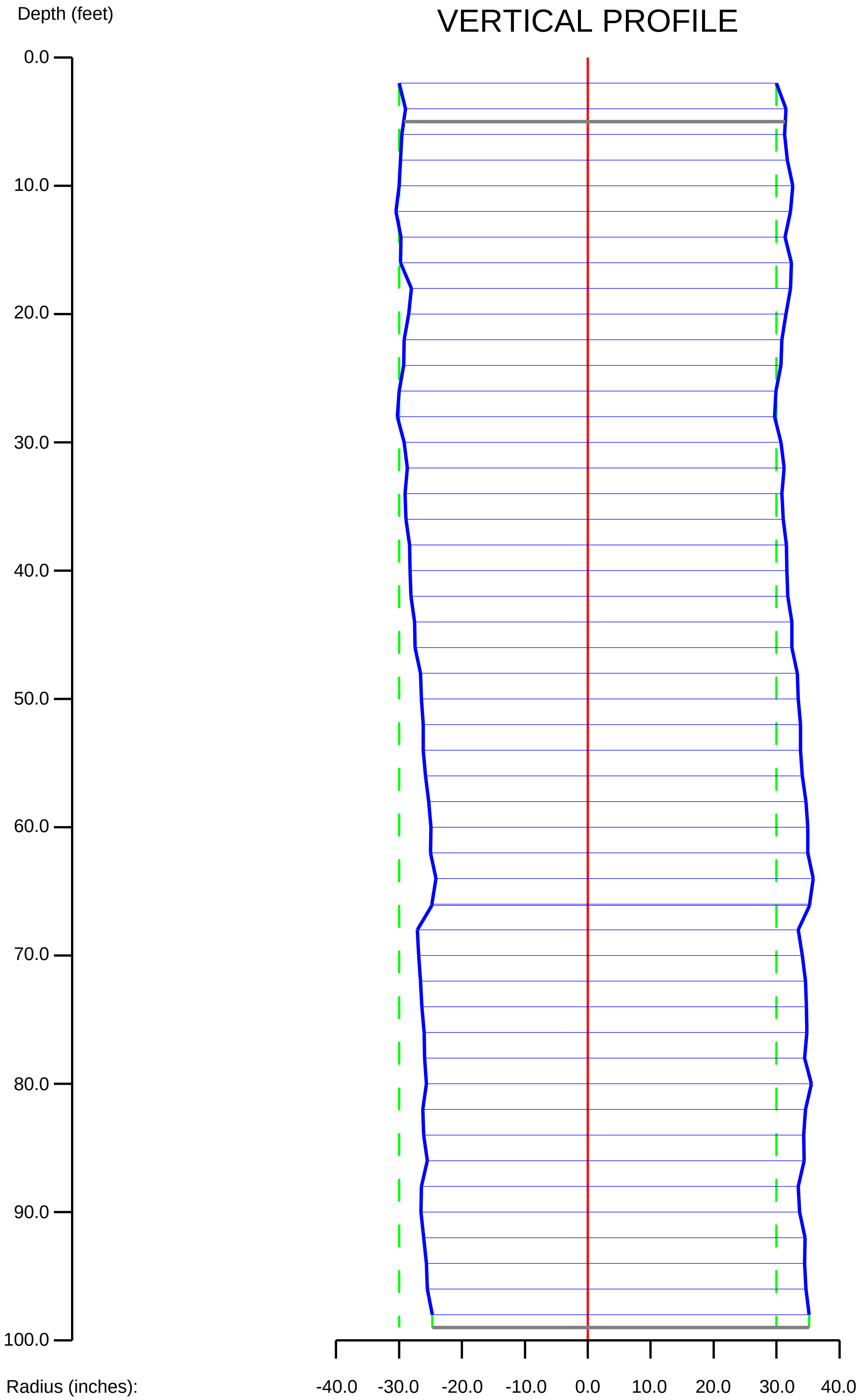
The enclosed report contains the data and analysis summary for the SoniCaliper shaft caliper, performed at I-215 US 95 (Test Pile), Las Vegas, NV on Tuesday, June 17, 2014 by Loadtest USA. The shaft was calipered from a reference depth of 2.0 feet to a depth of 98.0 feet. The shaft excavation was supported by a permanent, 1.0 feet deep, 60.0 inches I.D., 1.0 inches thick steel casing. The thickness of the casing itself, if temporary, was added to the total volume calculation.

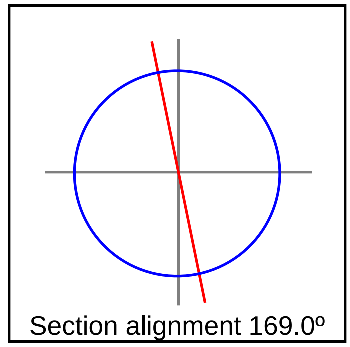
The minimum concrete volume is calculated to be 69.3 yd^3, based on the area of the calipered cross-sections and a Top of Concrete depth of 5.0 feet. (Note that this includes theoretical volume based on a nominal shaft cross-sectional area between depths of 98.0 feet and 99.0 feet, which was not calipered.)

I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014

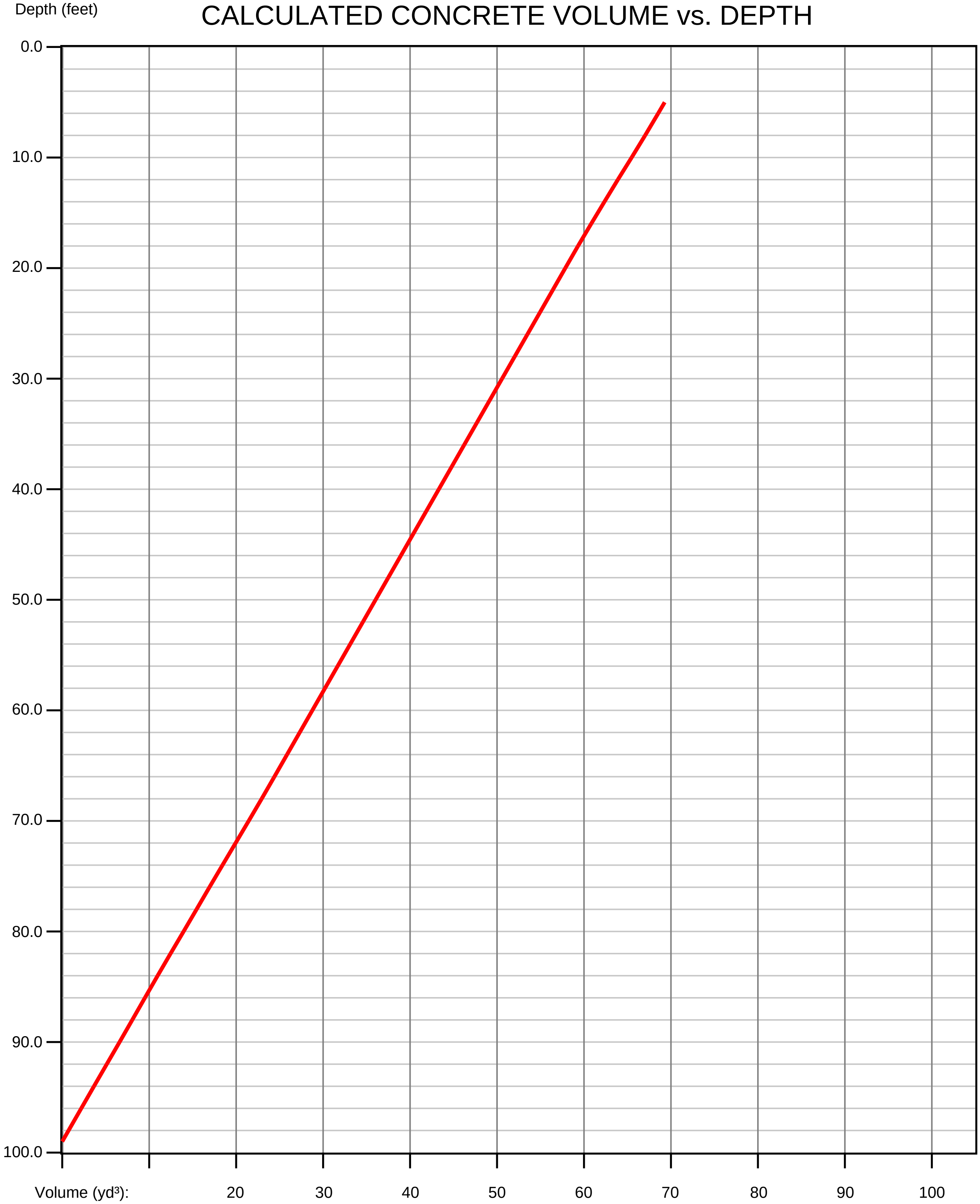
VERTICAL PROFILE





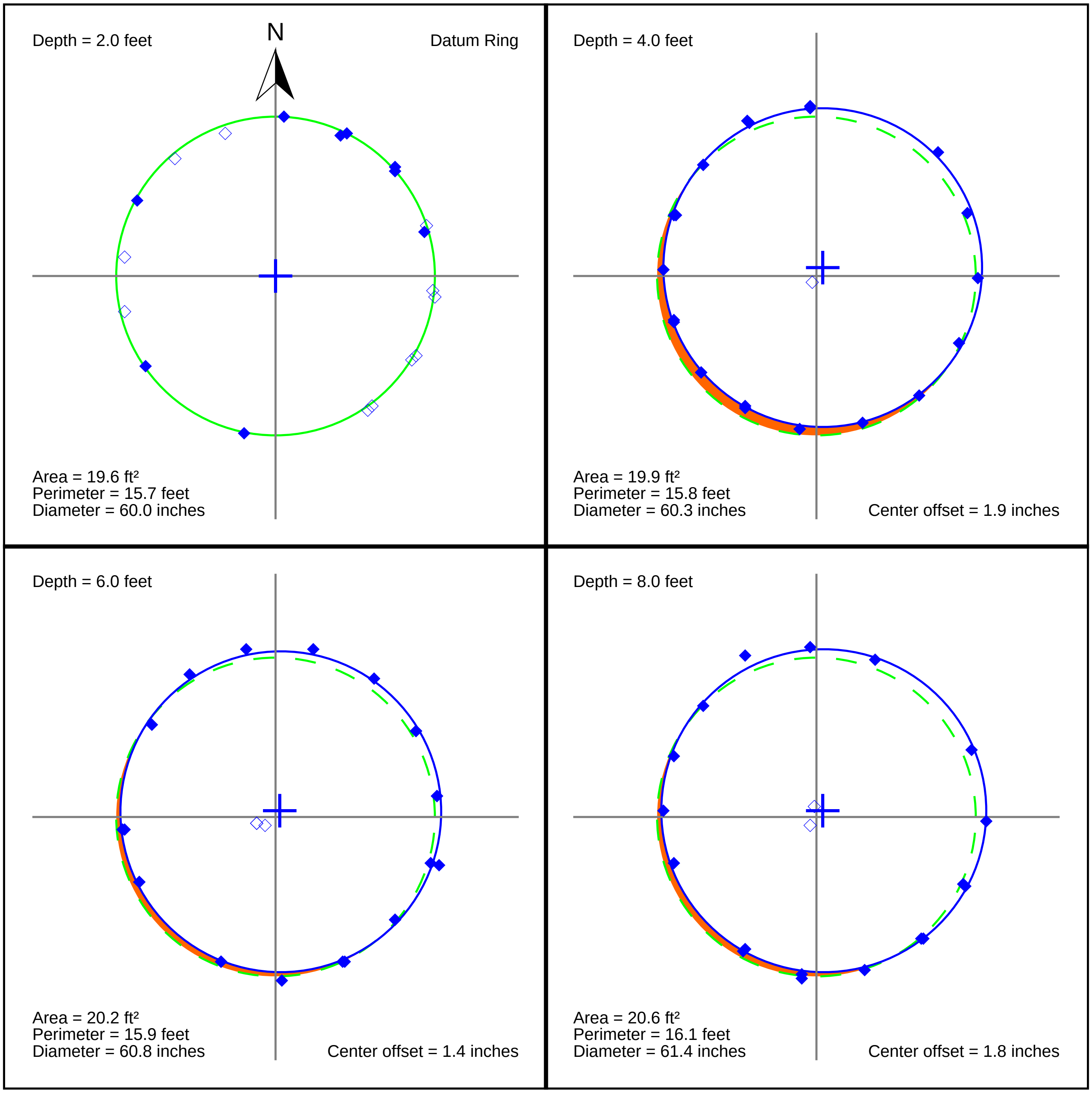
I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014



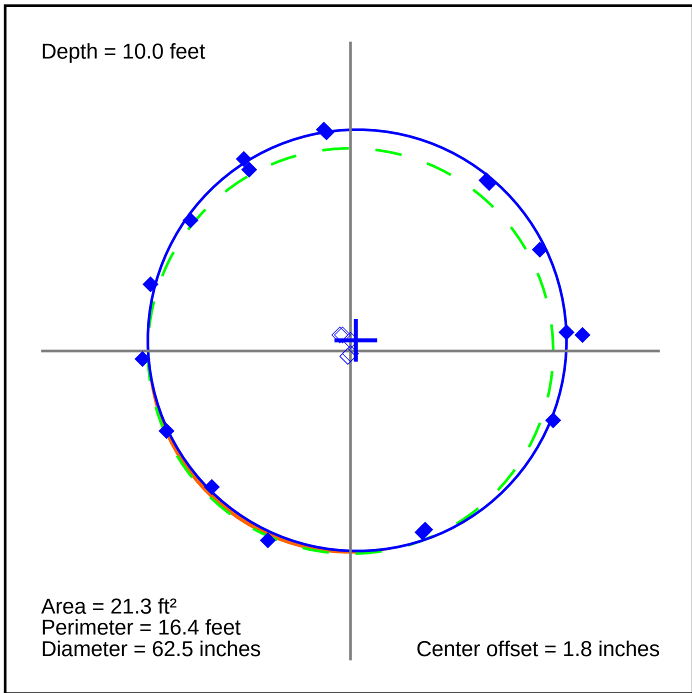
I-215 US 95 - Test Pile

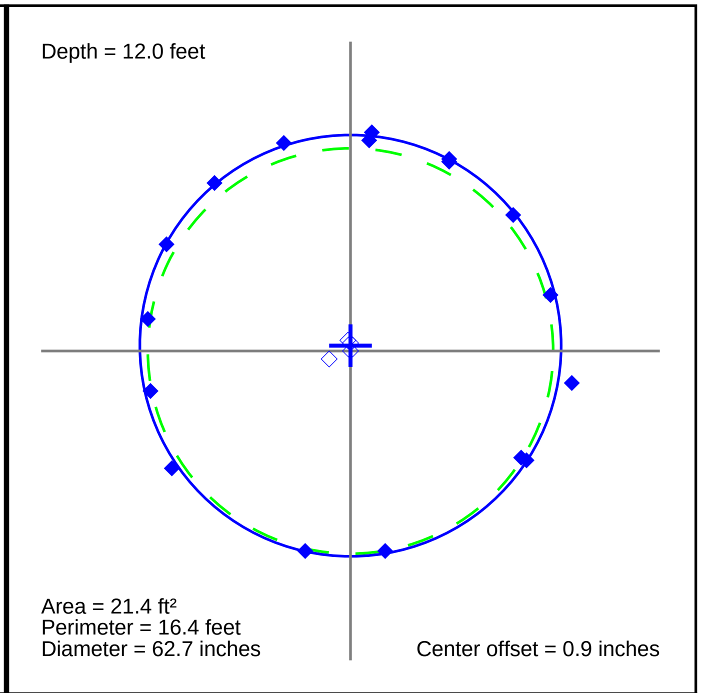
Las Vegas, NV, 6/17/2014

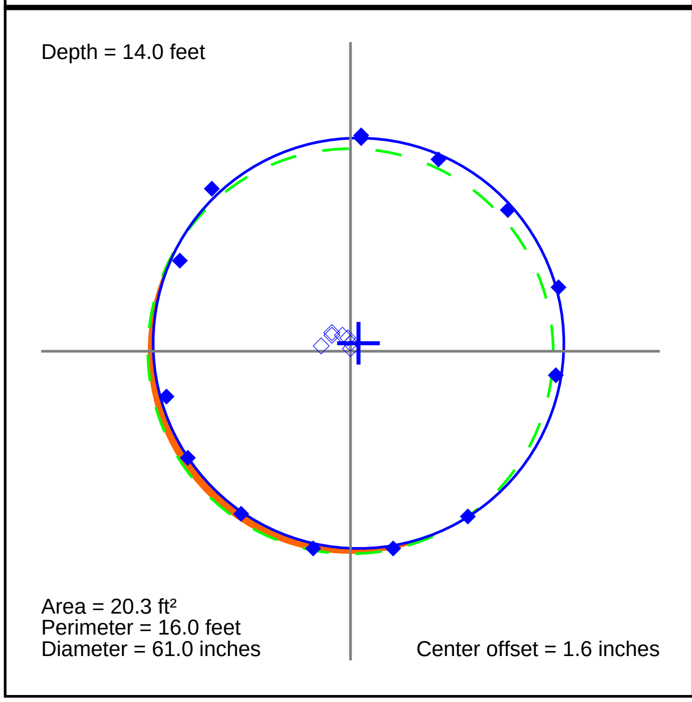


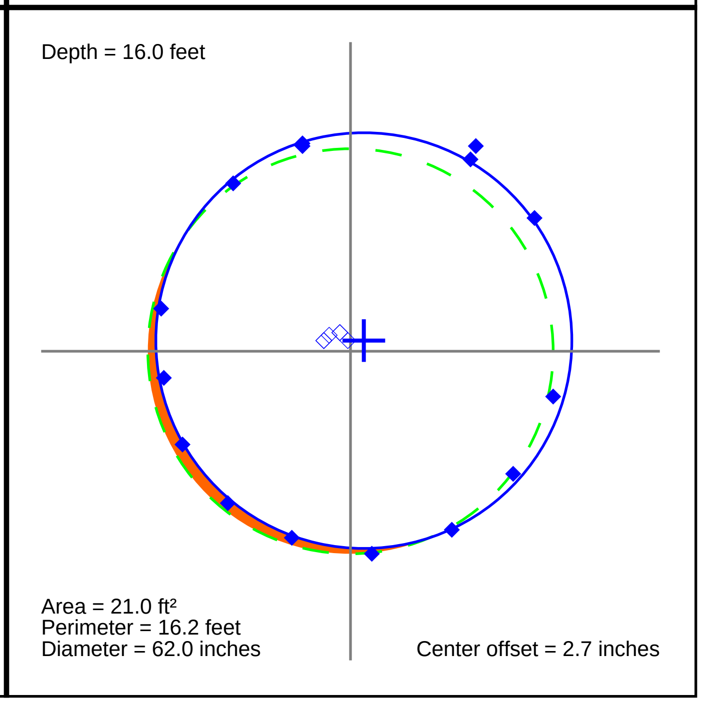
I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014



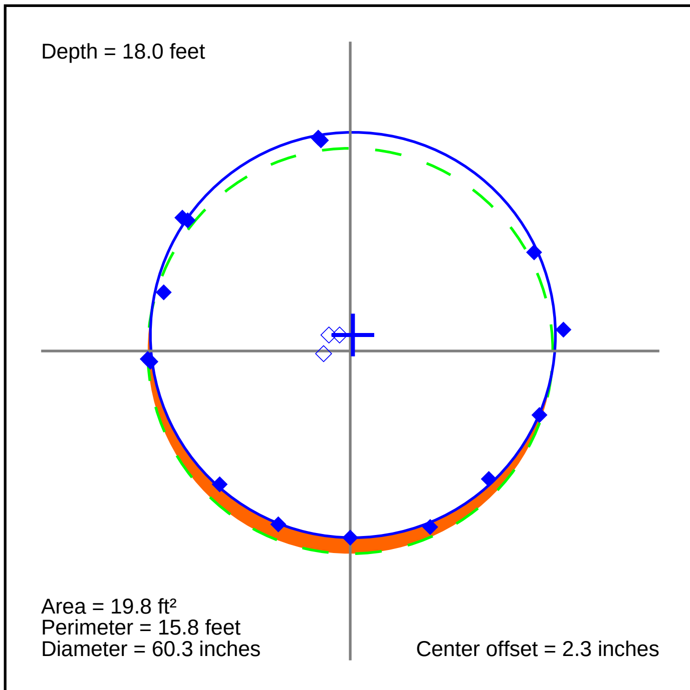


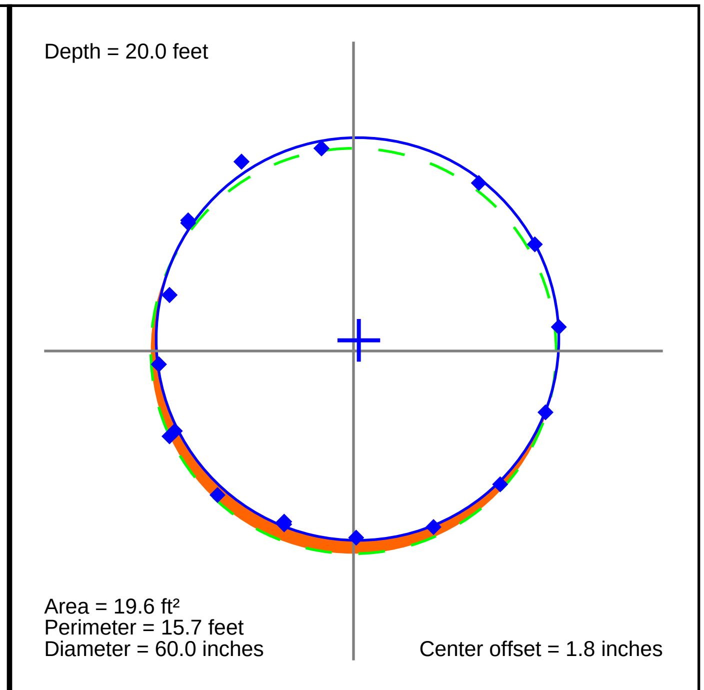


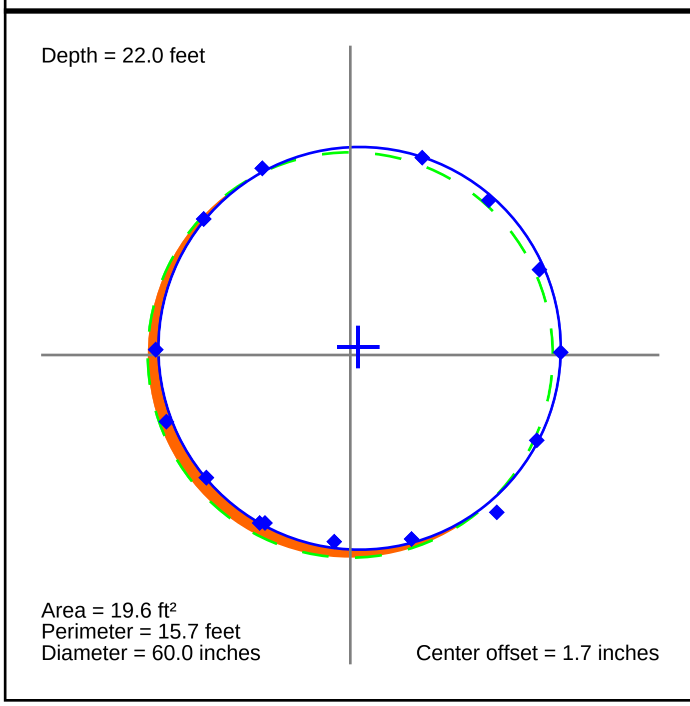


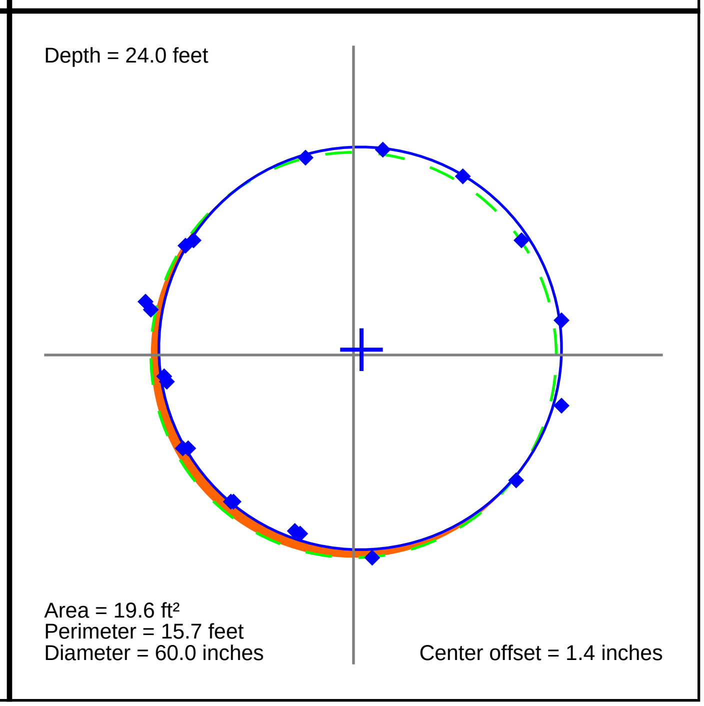
I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014



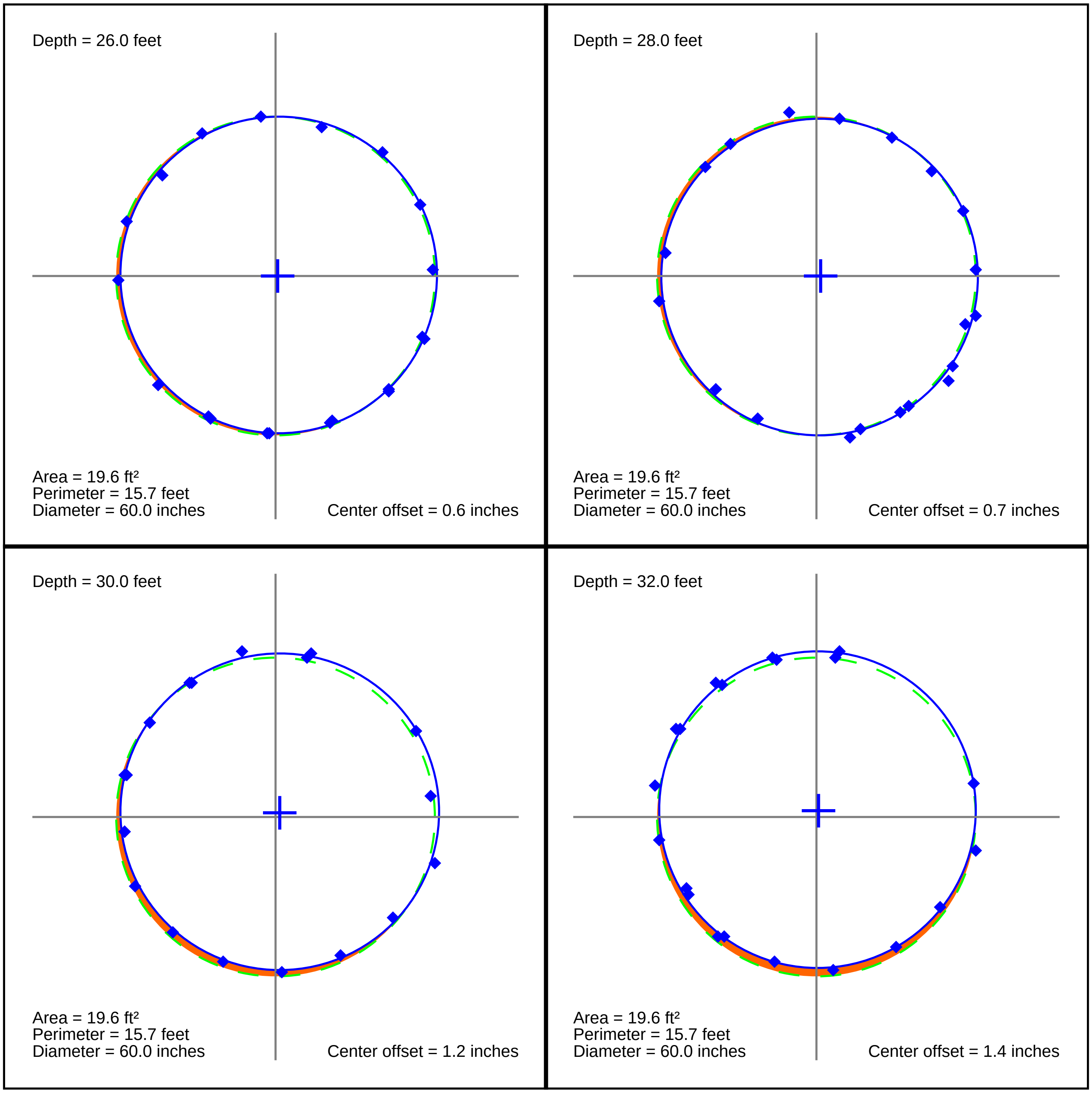






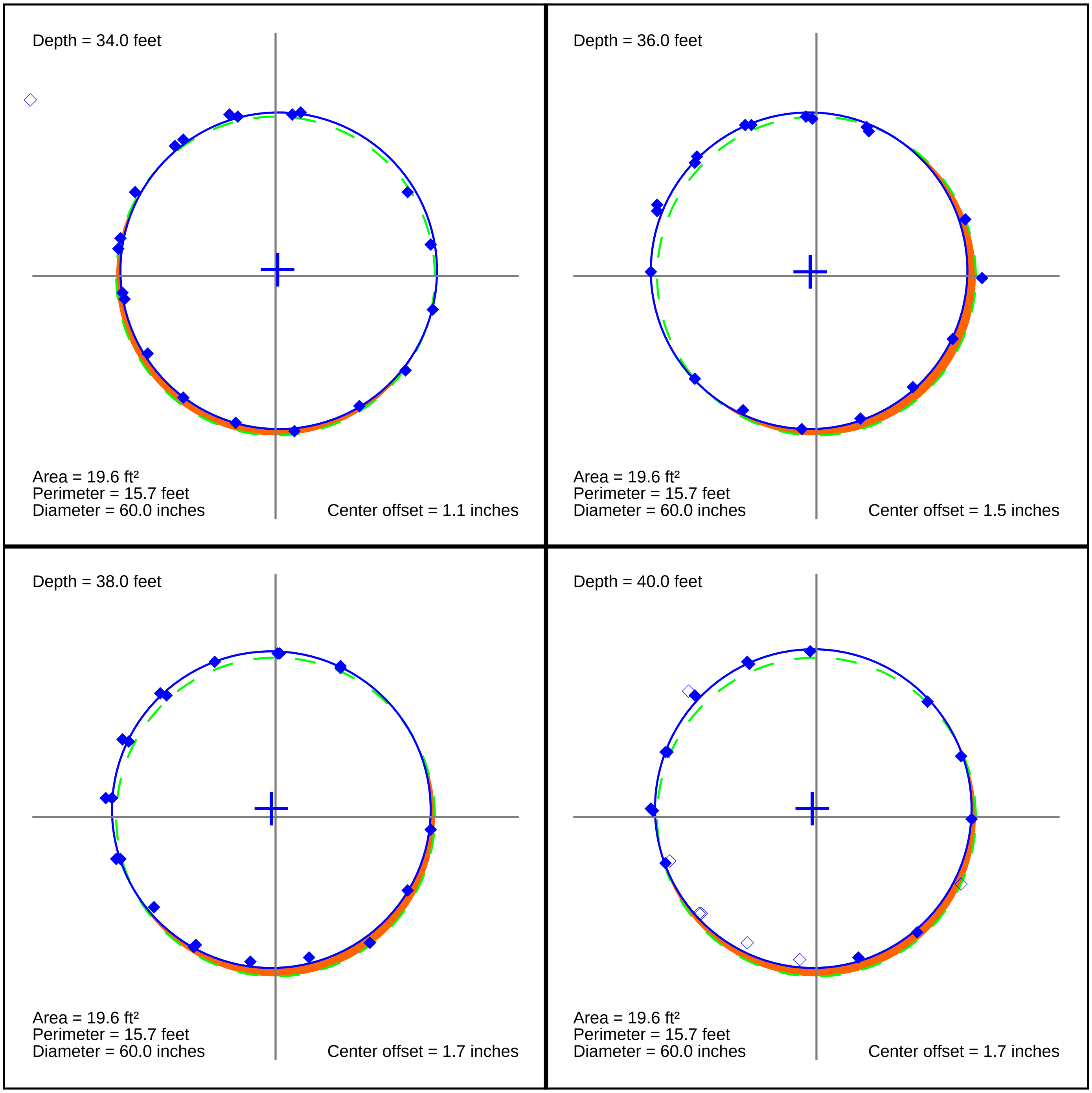
I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014



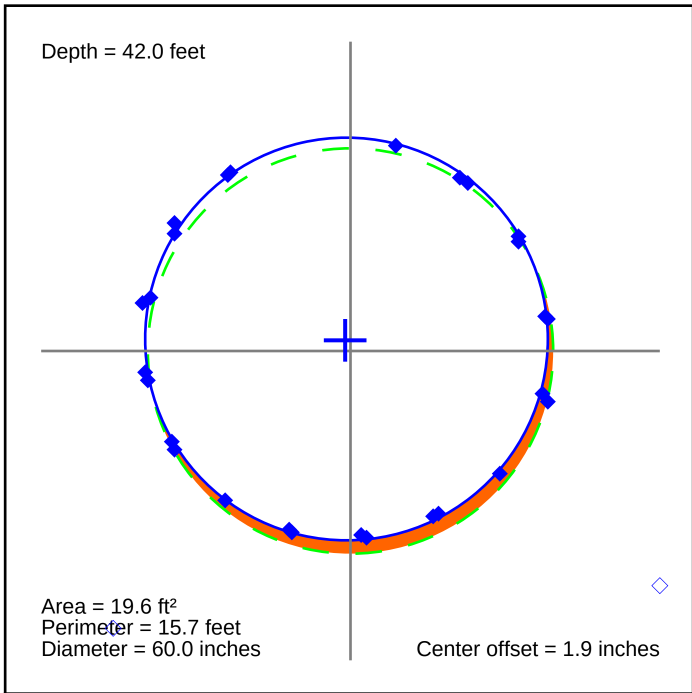
I-215 US 95 - Test Pile

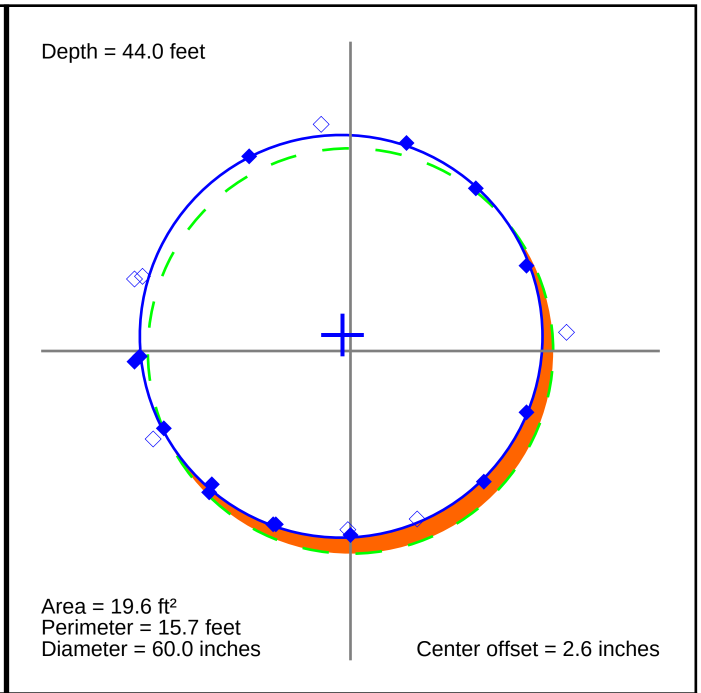
Las Vegas, NV, 6/17/2014

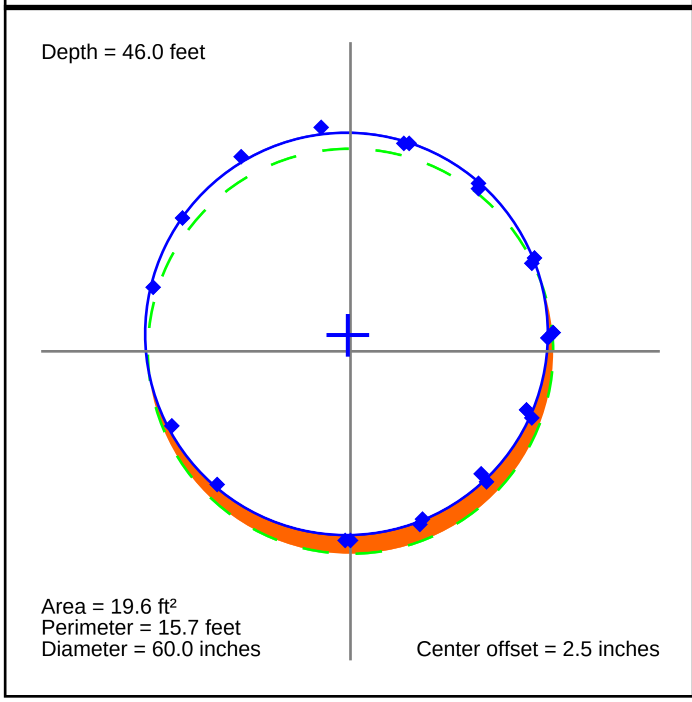


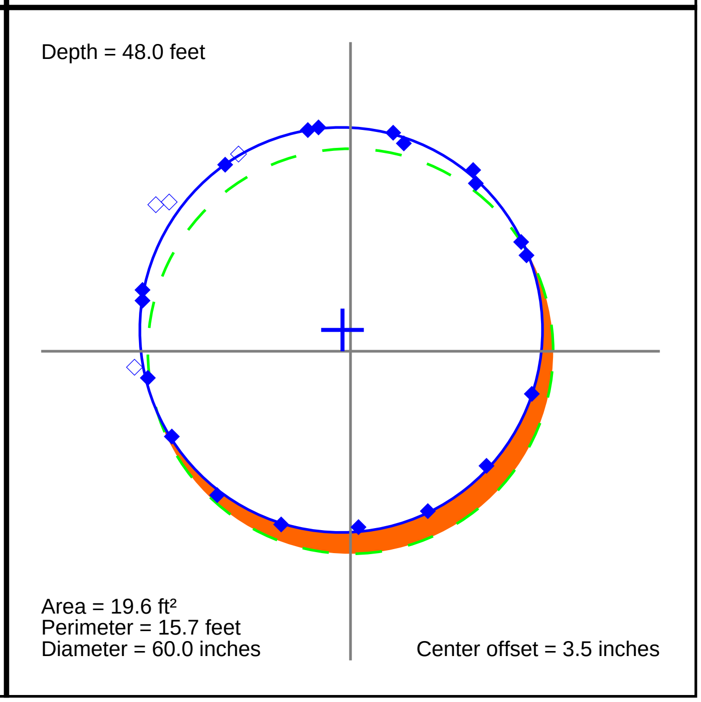
I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014



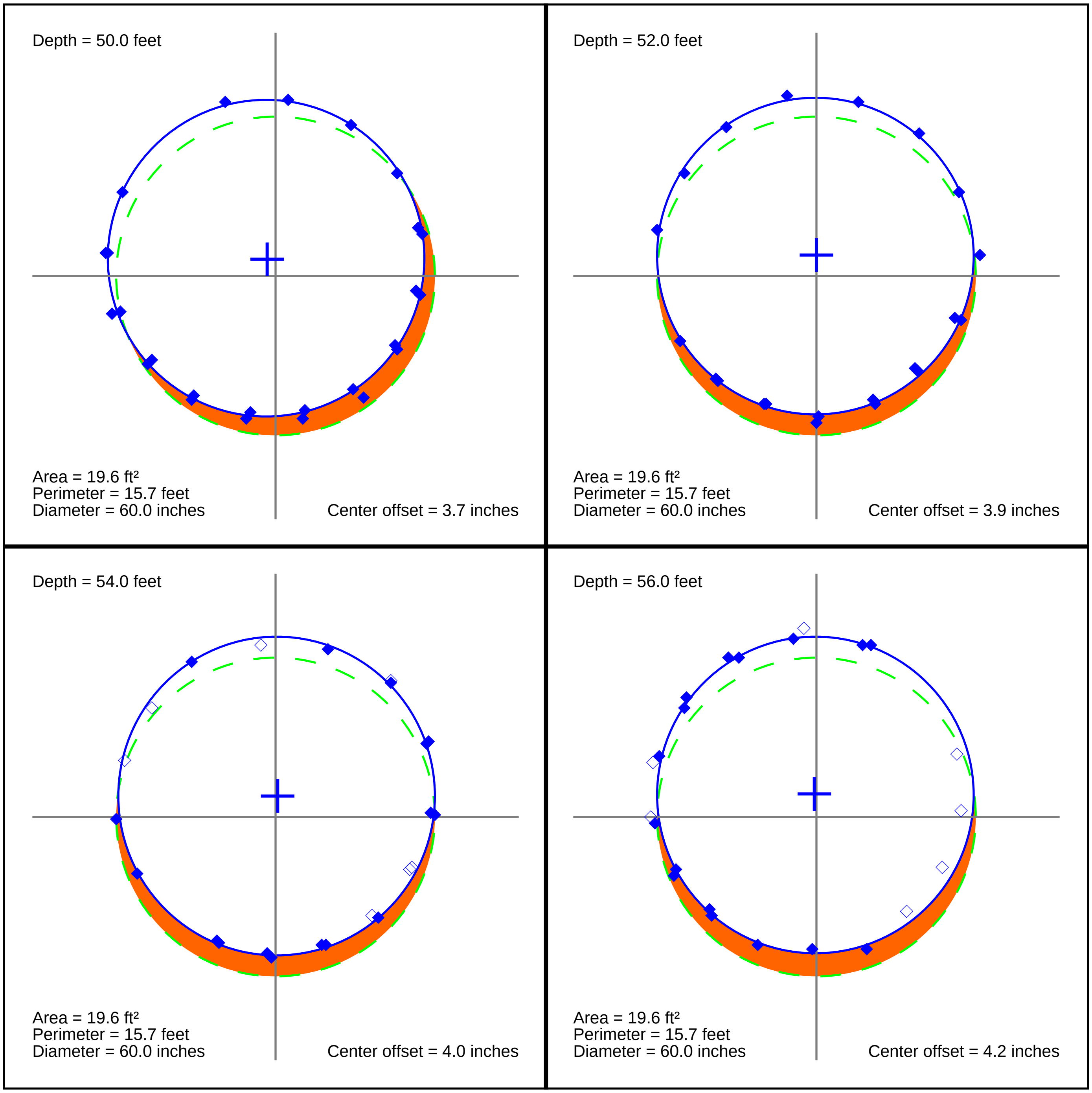






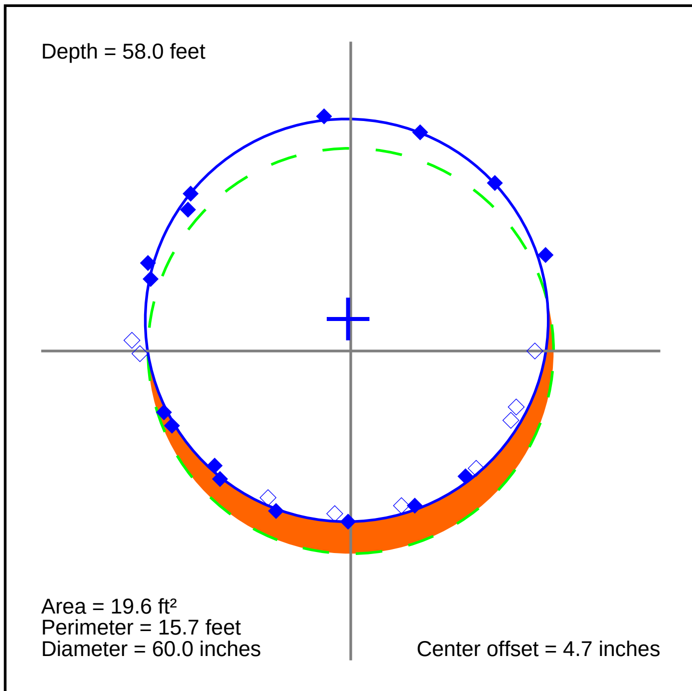
I-215 US 95 - Test Pile

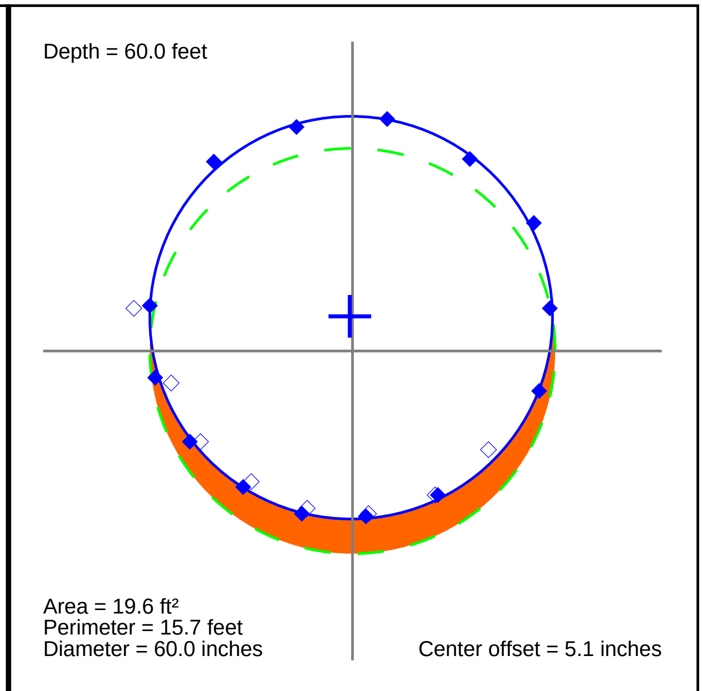
Las Vegas, NV, 6/17/2014

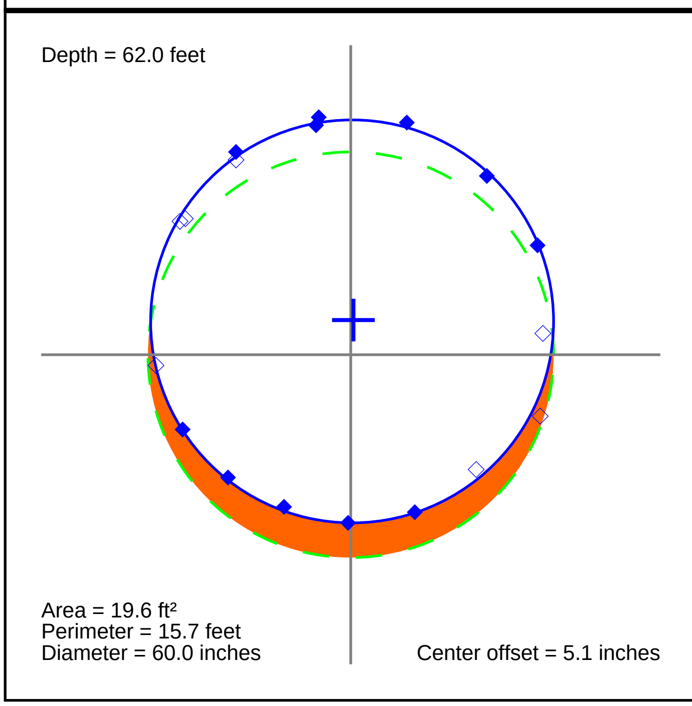


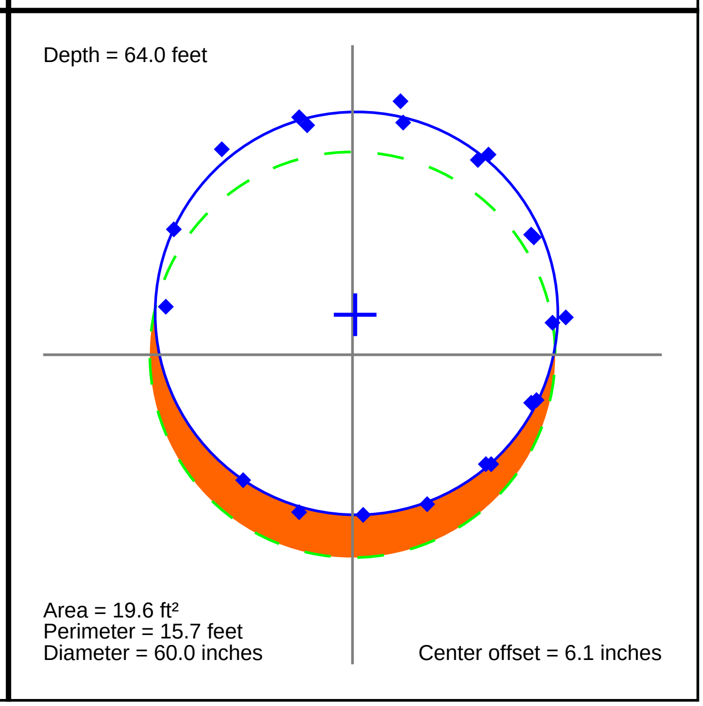
I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014



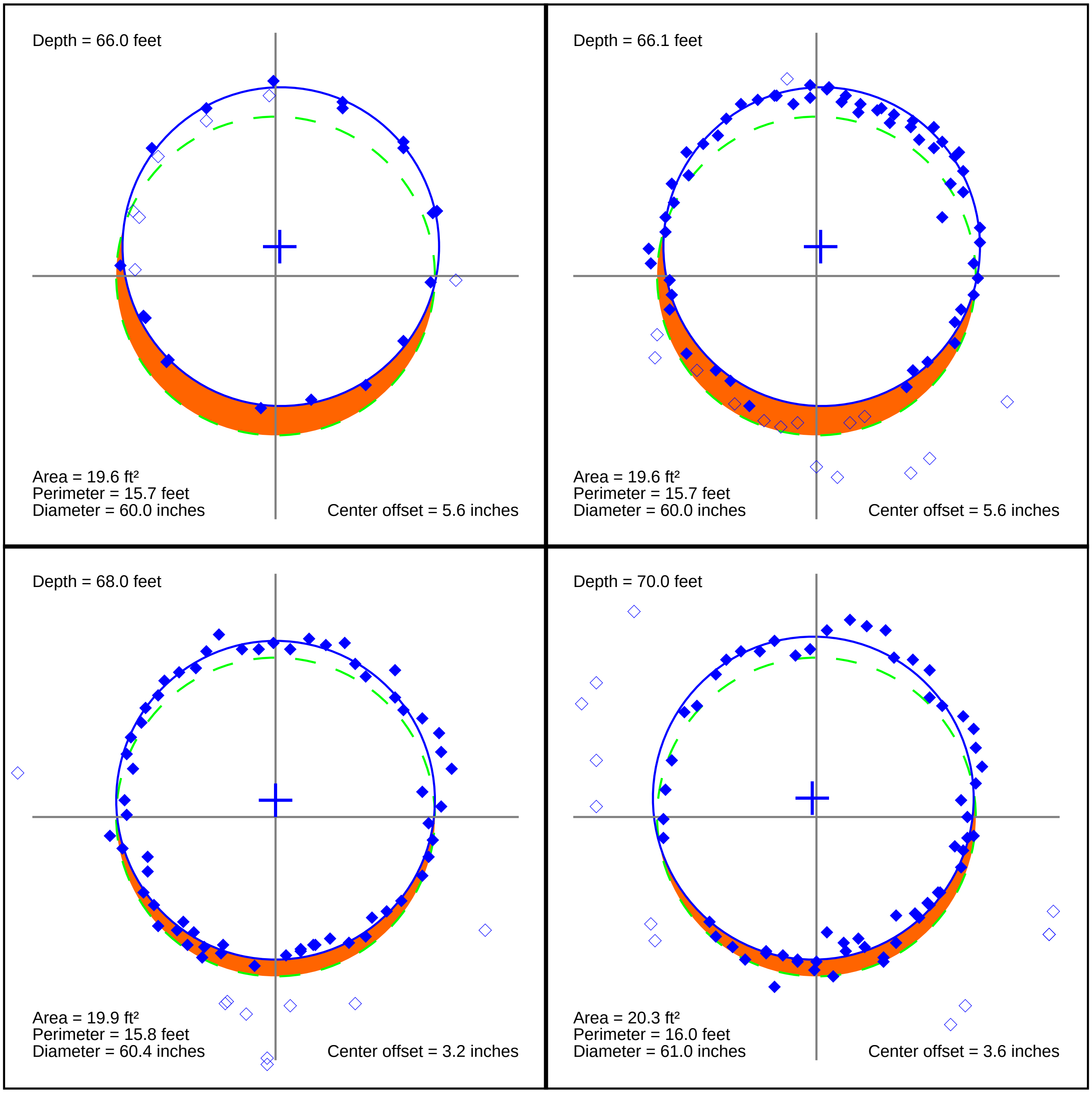






I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014



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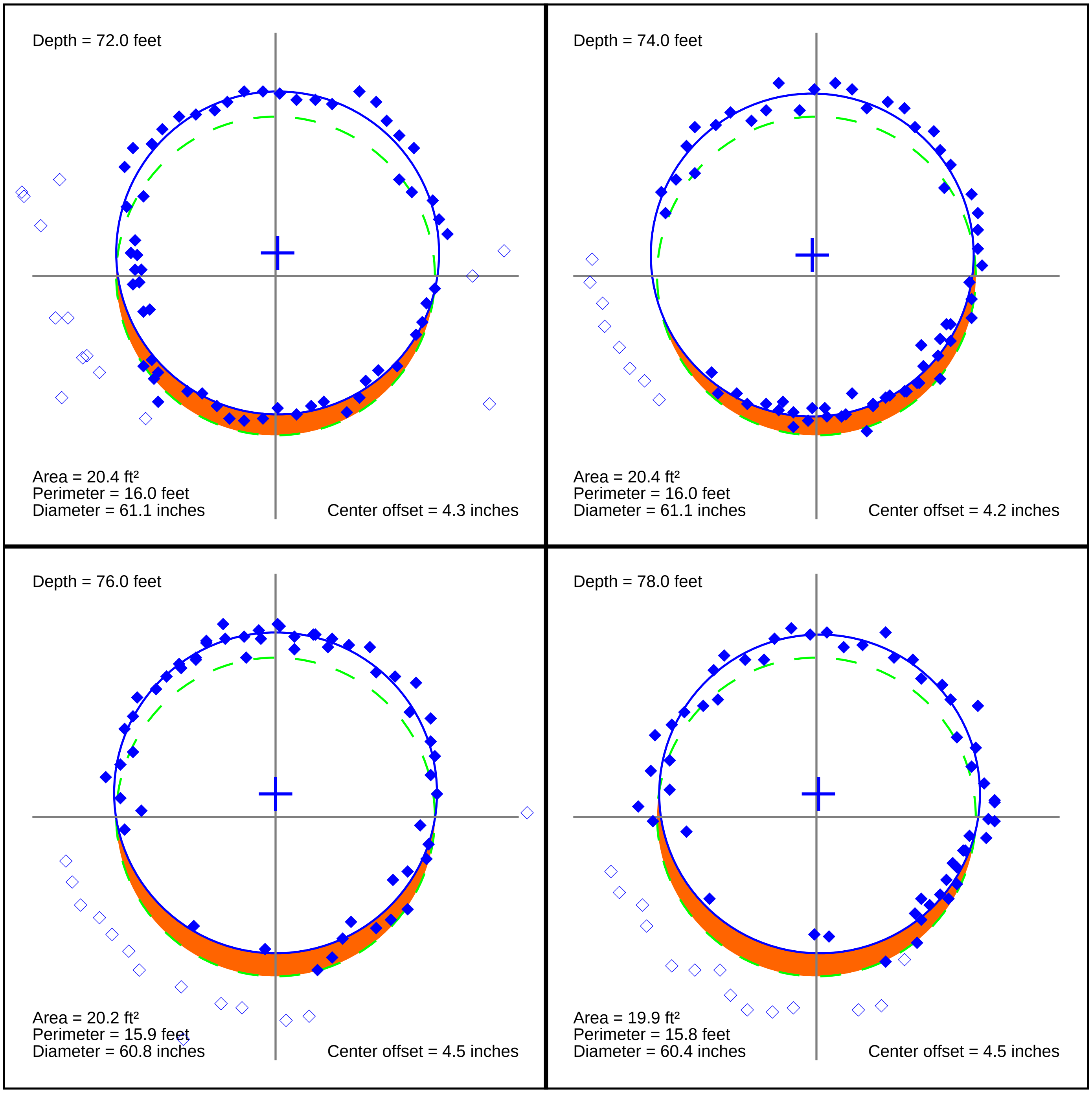
Las Vegas, NV, 6/17/2014



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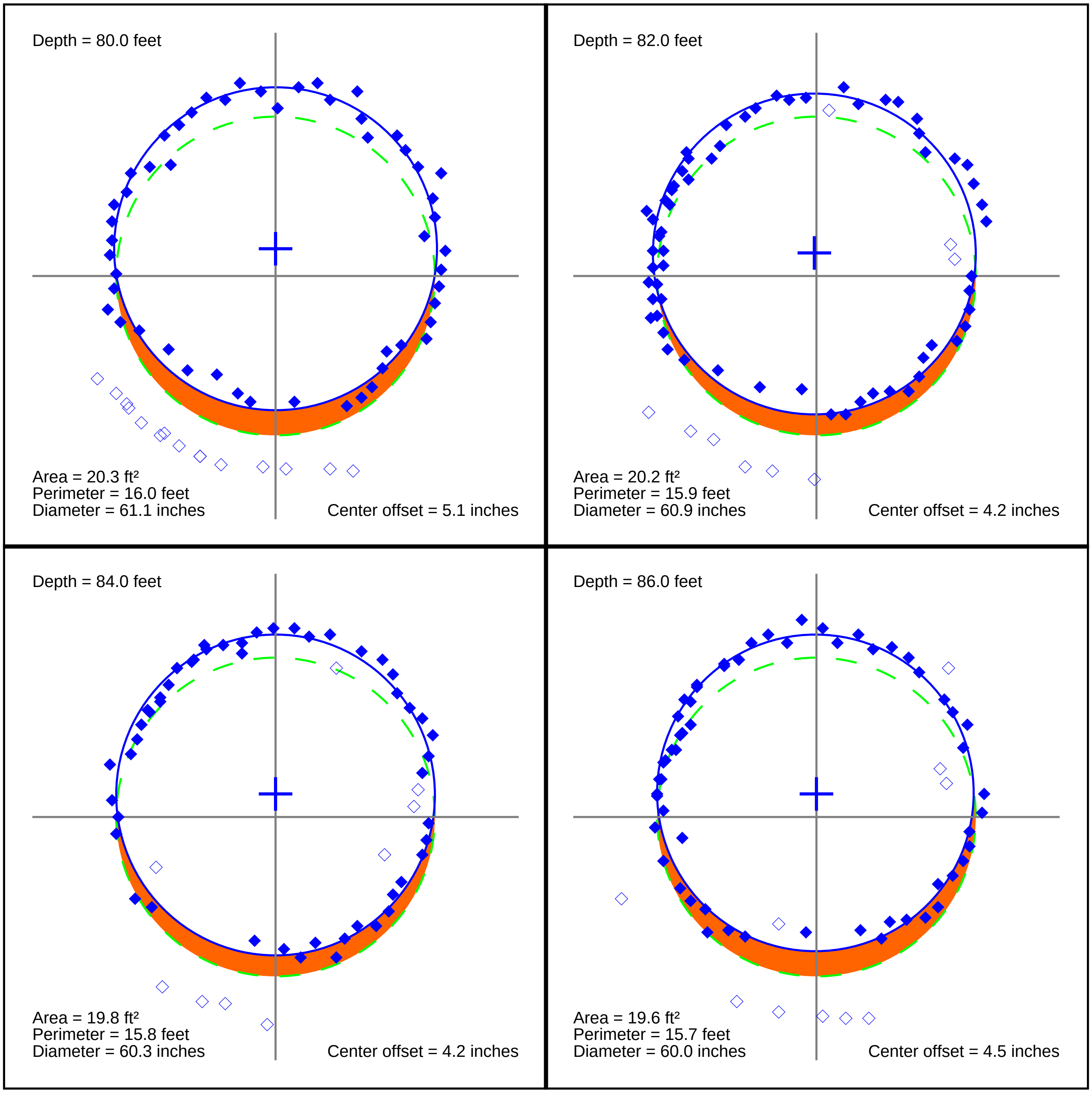

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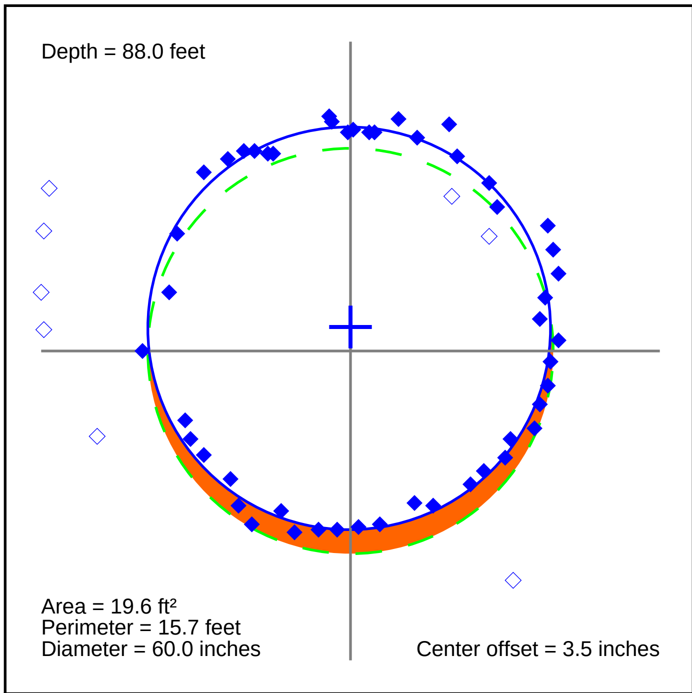
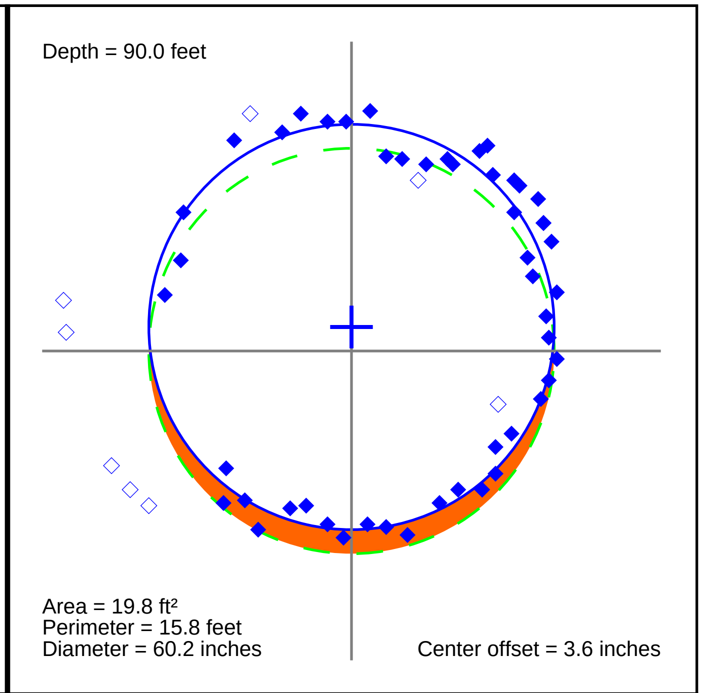
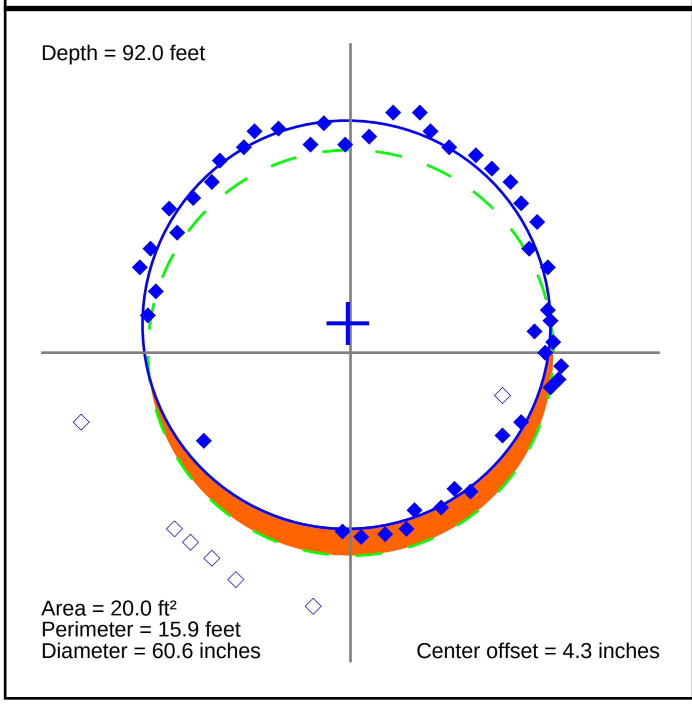
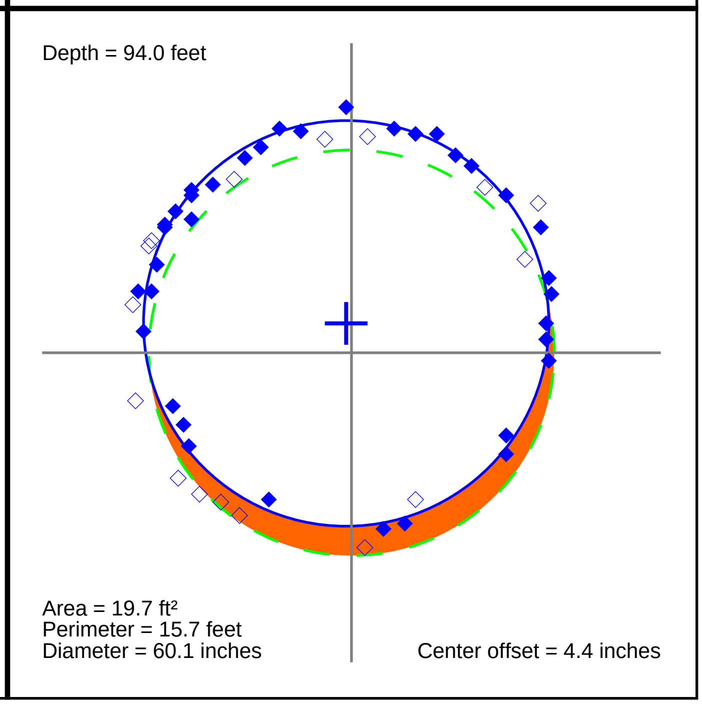


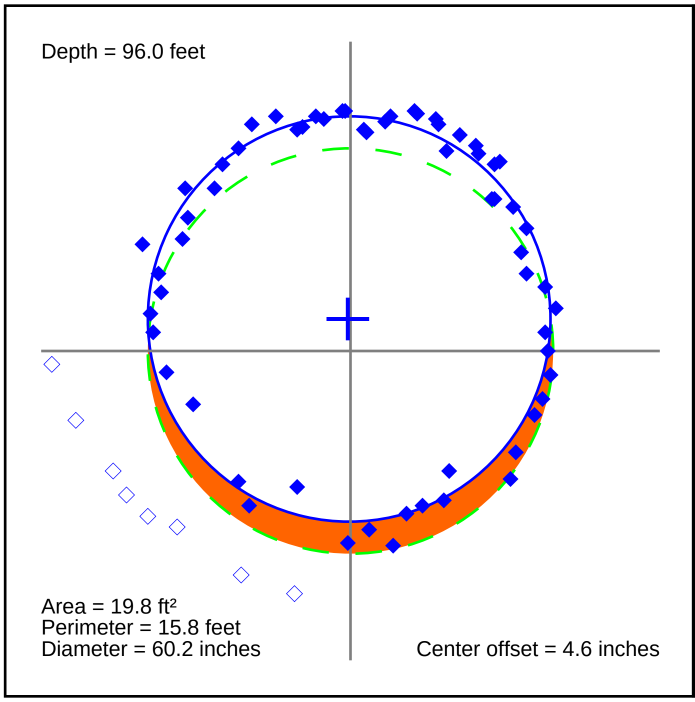


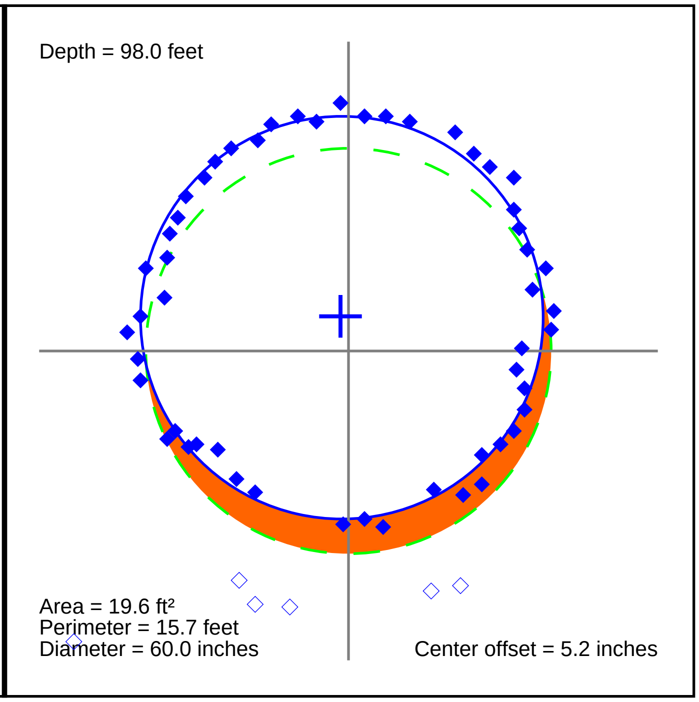




I-215 US 95 - Test Pile

Las Vegas, NV, 6/17/2014





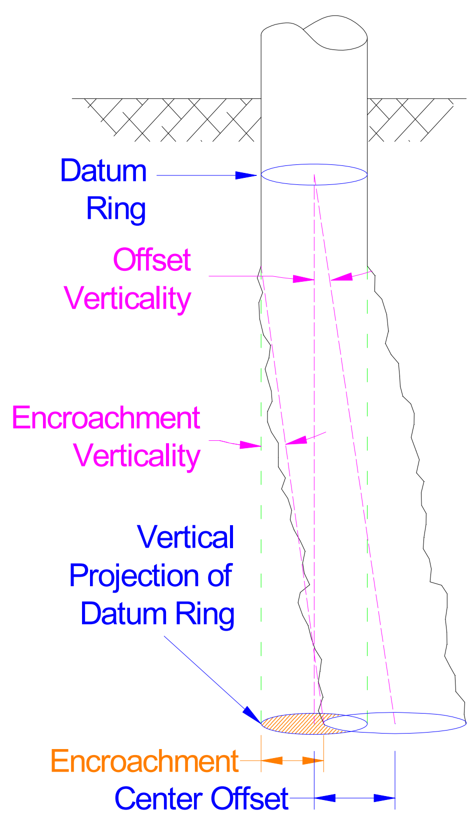
INTERPRETATION OF SONICALIPER FIELD DATA REPORT

General: The SoniCaliper is a profiling sonar device, specially adapted to function in drilling fluids. Each 360° pass generated with the SoniCaliper device produces up to one hundred twenty individual echo returns (profile data points). In the preceding figures (profile ring plots), the diamond points represent individual profile data points. A geometric shape is fitted to the data points using the non-linear least-squares technique (see Gander et al) to approximate the cross-sectional profile of the shaft for verticality, perimeter area and volume calculations. Hollow diamonds designate rejected points which are not used in the data fitting.

Deployment: The device is lowered into the shaft excavation in incremental depths. At each depth, a 360° sweep of the shaft wall is performed. The device is assumed to hang vertically in the shaft (any deviation from verticality can be noted using onboard pitch and roll sensors). Any twist in the device relative to its initial orientation is compensated by onboard compass and/or gyroscope sensors.

Calibration: Because the properties of drilling fluids vary widely, a calibration must be performed for each shaft to determine fluid wavespeed. This is done by selecting a profile ring of known diameter (drilled shaft) or length & width (panel / barrette) as the "calibration ring". The data analysis then back-calculates the fluid wavespeed based on the known dimensions of this ring. The fluid wavespeed is assumed to be constant over the entire column of fluid depth.

Shaft Verticality: To determine shaft verticality, a profile ring (usually, but not always the calibration ring) is selected as the "datum ring". The geometric centers of the datum ring and all other profile rings are compared. The "center offset" listed on the figures indicates the divergence of each profile ring center point from the datum ring center point. "Encroachment" is presented graphically as the shaded area representing the portion of the shaft wall which would encroach into the perfectly vertical projection of the datum ring to the depth in question. For circular shafts, the maximum encroachment value for each profile ring is also given numerically. The user may also choose to display computed values for the vertical inclination of the shaft between each ring and the datum ring, for both encroachment and center offset. Verticality is computed as the maximum encroachment or center offset (the "deviation") divided by change in depth, and may be expressed as an angle, a percentage or as a deviation:depth ratio.



Calipered Volume: The cross sectional area of each profile ring is determined and a cumulative volume for the calipered portion of the shaft is calculated. Note that this volume is a minimum.

APPENDIX G

ESTIMATED CONCRETE STRENGTH

Concrete Strength vs. Age (logarithmic approximation)

TS-2 - US95 / CC-215 Interchange - Las Vegas, NV

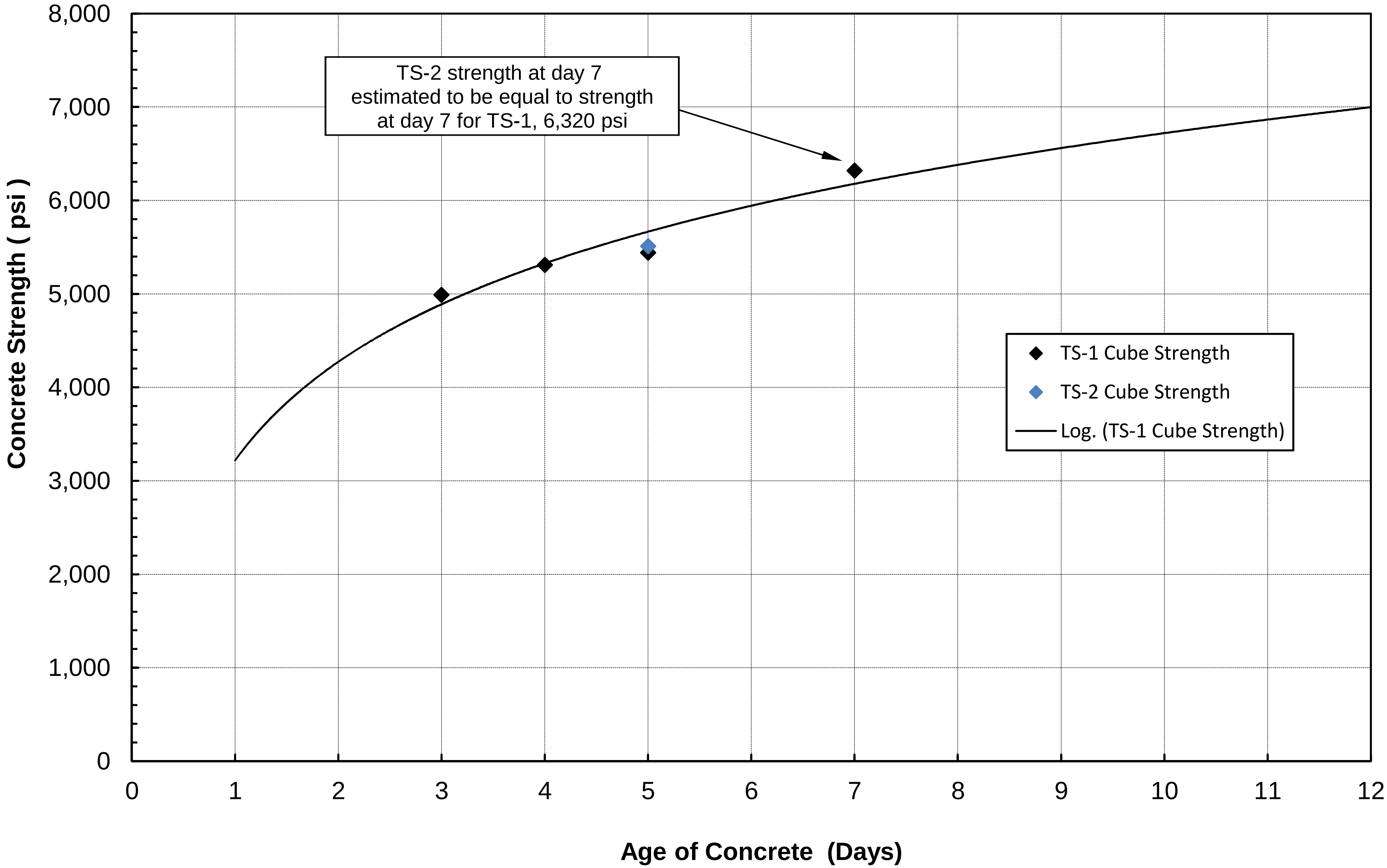


Figure G-1

Refer Correspondence to:

Calls to: (702) 671-6605

Date Reported: 7/1/2014

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
123 E. Washington Ave., Las Vegas, NV 89101

Distribution:
_1_ District Engineer
_1_ Resident Engineer
_1_ Laboratory
_1_ Supplier @ 28 Days
___ Construction
___ Bridge

TRANSMITTAL FOR CONCRETE SAMPLES AND REPORT OF TESTS OF CONCRETE CYLINDERS
Test Method ASTM C39

Contract 806-14 **Resident Engineer:** Don Christiansen **Contractor** **Report** LV-14-1781 **Mix Design** 2607702

County CL **Date Placed** 06/18/2014 **Date Received** 06/20/2014 **Time Placed** 9:10 am **Sample Location**

Class of Concrete: SCC
Mix Design Strength: 4000 **PSI** 27.58 **MPa**
Cylinder Number(s): 2
Brand of Cement: TXI Oro Grande
Type of Cement: V
Source of Water: Domestic
Source of Fine Aggregate: Sloan Pit
Source of Coarse Aggregate: Sloan Pit
Source of Fly Ash: Navajo AZ
Concrete Temperature: 23.9 C 75 F

Cement as Batched: 554 **lbs/cyd** 328.6 **kg/cum**
Fly Ash as Batched: 210 **lbs/cyd** 124.3 **kg/cum**
Fine Aggregate as Batched: 1,518 **lbs/cyd** 901 **kg/cum**
Coarse Aggregate as Batched: 1,462 **lbs/cyd** 867 **kg/cum**
Mixing Water: **gal** **L**
Slump: **in** **mm Nev.T438**
% Air: **Nev.T431**
Slump After Addition of Super Plasticizer: **in** **mm**
Unit Weight: 147.2 **PCF** 2,358 **kg/cum Nev. T435**
Water Cement Ratio: 0.400

Brand of Air Entraining Agent Used
Brand of Water Reducer Used:
Brand of Super Plasticizer:
Amount of Super Plasticizer: **oz/cyd** **L/cu**
Other Additives Used:
Sampled By: Funcion/Valentin
Concrete Supplied By: Aggregate Industries
Remarks:

Laboratory Sample Number	Date of Test	Age Days	Age Hours	Diameter (in)	Area (Sq In)	Total Load (lbs)	lbs/sq in	Avg 28 Day lbs/sq in	Diameter (mm)	Area (sq cm)	Total Load (newtons)	MPa	Avg 28 day MPa	Fracture Type	Operator
LV-14-1781	06/23/2014	5		4.00	12.57	69220	5510		101.60	81.07	307900	37.99		1	jc
LV-14-1782	07/02/2014	14													
LV-14-1783	07/16/2014	28													
LV-14-1784	07/16/2014	28													
LV-14-1785	07/16/2014	28													

Remarks:

NDOT 020-050 Rev 03/01

Refer Correspondence to:

Calls to: (702) 671-6605

Date Reported: 7/1/2014

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
123 E. Washington Ave., Las Vegas, NV 89101

Distribution:
_1_ District Engineer
_1_ Resident Engineer
_1_ Laboratory
_1_ Supplier @ 28 Days
___ Construction
___ Bridge

TRANSMITTAL FOR CONCRETE SAMPLES AND REPORT OF TESTS OF CONCRETE CYLINDERS
Test Method ASTM C39

Contract 806-14 **Resident Engineer:** Don Christiansen **Contractor** **Report** LV-14-1737 **Mix Design** 2607702

County CL **Date Placed** 06/13/2014 **Date Received** 06/16/2014 **Time Placed** 9:57 am **Sample Location** D-Cell Test, East Side

Class of Concrete: SCC

Mix Design Strength: 4000 **PSI** 27.58 **MPa**

Cylinder Number(s): 1

Brand of Cement: TXI Oro Grande

Type of Cement: V

Source of Water: City

Source of Fine Aggregate: Sloan Pit

Source of Coarse Aggregate: Sloan Pit

Source of Fly Ash: Navajo AZ

Concrete Temperature: 27.8 C 82 F

Cement as Batched: 592 **lbs/cyd** 351.2 **kg/cum**

Fly Ash as Batched: 207 **lbs/cyd** 122.8 **kg/cum**

Fine Aggregate as Batched: 1,515 **lbs/cyd** 899 **kg/cum**

Coarse Aggregate as Batched: 1,495 **lbs/cyd** 887 **kg/cum**

Mixing Water: 38.4 **gal** 190.1 **L**

Slump: 6.00 **in** 152 **mm Nev.T438**

% Air: **Nev.T431**

Slump After Addition of Super Plasticizer: 4.00 **in** 102 **mm**

Unit Weight: 144.6 **PCF** 2,316 **kg/cum Nev. T435**

Water Cement Ratio: 0.400

Brand of Air Entraining Agent Used

Brand of Water Reducer Used: VMA - SIKA

Brand of Super Plasticizer: SIKA 161, SIKA Plastiment

Amount of Super Plasticizer: **oz/cyd** **L/cu**

Other Additives Used: SIKA 2100

Sampled By: J. Carsto

Concrete Supplied By: Aggregate Industries

Remarks: Flow=21", J-Ring=19", VIS=0, Passability=2

Laboratory Sample Number	Date of Test	Age Days	Age Hours	Diameter (in)	Area (Sq In)	Total Load (lbs)	lbs/sq in	Avg 28 Day lbs/sq in	Diameter (mm)	Area (sq cm)	Total Load (newtons)	MPa	Avg 28 day MPa	Fracture Type	Operator
LV-14-1737	06/16/2014	3		4.00	12.57	62736	4990		101.60	81.07	279100	34.40		1	jc
LV-14-1738	06/17/2014	4		4.02	12.69	67352	5310		102.10	81.89	299600	36.61		1	ks
LV-14-1739	06/18/2014	5		4.01	12.63	68655	5440		101.90	81.48	305400	37.51		1	jc
LV-14-1740	06/20/2014	7		4.01	12.63	79840	6320		101.90	81.48	355100	43.57		1	jc
LV-14-1741	06/27/2014	14													
LV-14-1742	07/11/2014	28													
LV-14-1743	07/11/2014	28													
LV-14-1744	07/11/2014	28													

Remarks: