Appendix F

Geotechnical Studies

Geotechnical Engineering

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GEOTECHNICAL ENGINEERING SERVICES
DESERT SUNLIGHT SOLAR FARM
550 MW PHOTOVOLTAIC SYSTEM
DESERT CENTER AREA OF
RIVERSIDE COUNTY, CALIFORIA

January 19, 2010
Revised June 16, 2010

File No.: 11666-01
Doc. No.: 10-01-733R

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January 19, 2010 File No.: 11666-01
Revised June 16, 2010 Doc. No.: 10-01-733R

First Solar Electric, LLC
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Attention: Mr. Peter Seidel
Project Manager

Project: **Desert Sunlight; 550 MW Photovoltaic Solar Farm**
County Route R2 at Power Line Road
Desert Center area of Riverside County, California

Subject: **Geotechnical Engineering Services**

We take pleasure in presenting this revised geotechnical engineering report prepared for the proposed 550-MW-AC Solar Photovoltaic System to be located on the west side of County Route R2 at Power Line Road in the Desert Center area of Riverside County, California.

This report presents our findings and recommendations for site grading and foundation design criteria, incorporating the information provided to our office. The site appears to be suitable for the proposed development, provided the recommendations in this report are followed in design and construction. This report should stand as a whole and no part of the report should be excerpted or used to the exclusion of any other part.

This report completes our scope of services in accordance with First Solar Purchase Order No. 650001. Other services that may be required, such as plan review and grading observation, are additional services and will be billed according to our Fee Schedule in effect at the time services are provided. Unless requested in writing, the client is responsible for distributing this report to the appropriate governing agency or other members of the design team.

We appreciate the opportunity to provide our professional services. Please contact our office if there are any questions or comments concerning this report or its recommendations.

Respectfully submitted,
EARTH SYSTEMS SOUTHWEST

Craig S. Hill
CE 38234

SER/csh/ajm

Distribution: 6/First Solar Electric, LLC
2/BD File

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EXECUTIVE SUMMARY

Earth Systems Southwest has prepared this executive summary solely to provide a general overview of the report. The report itself should be relied upon for information about the findings, conclusions, recommendations, and other concerns.

The proposed Desert Sunlight PV Solar Farm is to be located approximately 7 miles north of I-10, on the east side of County Route R2, Desert Center area of Riverside County, California. The proposed project will have a gross area of approximately 4830 acres; approximately 3010 acres will be developed with a 550-MW-AC solar photovoltaic system. The proposed solar system will consist photovoltaic [PV] panels mounted on W6 x 7.2 W-section posts (piles), spaced about 10 feet apart. Typical pile embedment ranges from 4 to 6 feet; however this may be varied to conform to the subsurface conditions, anticipated depth of scour/erosion, design wind speeds, methodology of site development, or other factors.

Site development is mostly flat and generally less than 1% gradient from north to south and will require clearing of vegetation, some site leveling in approved areas during the construction of PV solar panels and ground support systems, underground connective conduit utility installation, access roads, and construction of several pad-mounted structures including inverter transformers and PV interconnection switch gear. A new transmission line will be constructed probably along County Route R2 to connect to the existing transmission line located south of I-10.

The proposed project may be constructed as planned, provided that the recommendations in this report are incorporated in the final design and construction. Based on the fairly uniform and medium stiff to stiff nature of the near surface soils, only minor remedial site grading is anticipated to support spread foundations for structures. Site soils are classified as having a very low expansion potential.

Laboratory testing of the site soils indicate low levels of sulfate, therefore normal concrete mixes may be used. Test results of resistivity testing indicates on-site, near surface, soils exhibit a range of low to very severe resistivity resulting in a potential for electrochemical corrosion potential for metal in contact with the soil. Underground utilities and metal pipes will require corrosion protection from the surrounding soil or added sacrificial thickness.

We consider the most significant geologic hazard to the project to be the potential for moderate to severe seismic shaking that is likely to occur during the design life of the proposed structures. Structures should be designed in accordance with the values and parameters given within the 2007 California Building Code [CBC] and ASCE 7-05. The seismic design parameters are presented in the following table and within the report.

The recommendations and conclusions provided herein were based on design wind speed of 85 mph. The following results for lateral resistance are relative to the existing grade and the possible deflection of the top of the pile is dependent upon the length of pile above finish grade. A total of 24 test locations (48 test piles) were driven to depths that ranged from 34 inches to 60 inches below existing grade.

Tension: The pile load tests indicate that in all areas tested that the tension capacity of the 48 W-section piles resisted at least twice the assumed maximum in uplift force of 664 lbs with all piles except PT-7A, which yielded ¼-inch deflection at 750 pounds (driven to a depth of 36 inches).

Lateral: The lateral capacity at ½-inch deflection or less for all piles ranged from a low of 100 pounds at a pile depth of 36 inches to the maximum imposed load of 3450 pounds. Approximately 20% of the lateral loads tests did not meet, or are borderline, to the maximum imposed load (including a factor of safety of 2.0).

SUMMARY OF RECOMMENDATIONS

Design Item	Recommended Parameter	Reference Section No.
Foundations		
Allowable Bearing Pressure	2,500 psf (Buildings and Equipment Supports)	5.3
Foundation Types	Continuous/Spread Footings (Buildings and Equipment Supports) W-section Piles (PV Panels)	5.3
Bearing Materials	Compacted subgrade (Buildings and Equipment Supports)	5.3
Allowable Passive Pressure	250 psf	5.3
Allowable Coefficient of Friction	0.35	5.3
Soil Expansion	Very Low (non-expansive)	3.3.3
Geologic and Seismic Hazards		
Liquefaction Potential	Very Low to Nil	3.3.2
Significant Fault and Magnitude	San Andreas, 7.2M	3.3.1
Fault Distance	37 miles	3.3.1
Seismic Design Category	D	5.6
Site Class	D	5.6
Maximum Considered Earthquake [MCE]		
Short Period Spectral Response, S_s	0.77 g	5.6
Second Spectral Response, S_1	0.33 g	5.6
Site Coefficient, F_a	1.19	5.6
Site Coefficient, F_v	1.75	5.6
Slabs		
Building Floor Slabs	On engineered fill	5.4
Modulus of Subgrade Reaction	150 pci	5.4
Existing Site Conditions		
Soil Corrosivity	Low sulfates Low chlorides Resistivity (Low to Very Severe)	5.6
Groundwater Depth	Believed to be deeper than 50 feet (from public water well data)	3.2

The recommendations contained within this report are subject to the limitations presented in Section 6 of this report. We recommend that all individuals using this report read the limitations.

GEOTECHNICAL ENGINEERING SERVICES
DESERT SUNLIGHT SOLAR FARM
550 MW PHOTOVOLTAIC SYSTEM
DESERT CENTER AREA OF
RIVERSIDE COUNTY, CALIFORIA

Section 1
INTRODUCTION

1.1 Project Description

This revised geotechnical engineering report has been prepared for the Desert Sunlight PV Solar Plant to be located approximately 7 miles north of I-10 (and the community of Desert Center), east of County Route R2, Riverside County, California. The proposed project will have a gross area of approximately 4830-acres; approximately 3010-acres will be developed with a 550-MW-AC solar photovoltaic system. Site development will include clearing of vegetation, site grading in approved areas, construction of PV solar panels and ground support systems, underground connective conduit utility installation, access roads, and construction of several pad-mounted structures including inverter transformers and PV interconnection switch gear. A new transmission line will be constructed probably along County Route R2 to connect to the existing transmission line located south of the I-10 Freeway. On-site roads will likely be improved to a minor degree to provide all-weather access. No improvements to the off-site roads surrounding the site are planned. Following clearing and/or mowing of vegetation, changes to grade, if any, are expected to be a maximum of 1-foot from the existing topography, except within existing drainages approved for infill. The maximum burial depth for underground utility conduits is expected to be about 2 feet.

The proposed solar system will consist of photovoltaic [PV] panels mounted on driven W6 x 7.2 steel W-section posts (piles), spaced about 10 feet apart. The typical pile embedment ranges from 4 to 6 feet; however this may be varied to conform to the subsurface conditions encountered. Ultimate uplift pile loads of 664 pounds for Case A north row and 582 pounds for Case A south row, and ultimate lateral pile loads of 382 pounds for Case A north row and 345 pounds for Case A south row, were assumed as a basis for our recommendations for the driven W-section posts.

Conventional continuous and spread (pad) foundations, with concrete slabs-on-grade, are anticipated for support of the proposed structures, and for the transformers and other equipment associated with the switching station. Structural loading of support equipment is assumed to be less than 1500 psf although the native soils are capable of supporting more. All loading is assumed to be dead plus live load. If actual structural loading exceeds these assumed values, it will be necessary to reevaluate the recommendations contained in this report.

1.2 Site Description

The project site is an irregular-shaped piece within the jurisdiction the Bureau of Land Management. The site is east of County Route R2, and mostly south of an unimproved east/west dirt road that provides access to one of the Eagle Mountain Mine well sites. The approximate site location is shown on Figure 1 in Appendix A.

The topography of the site is flat exhibiting generally less than 1% gradient in a northwest (high) to southeast (low) direction. The site consists of open desert with numerous drainages oriented in a northwest to southeast direction. Elevations range from a high of about 840 feet mean sea level [msl] in the northwest corner of Section 9 to a low of about 617 feet msl in the southeast corner of the Section 24.

The history of past use and previous development of the property was not investigated as part of our scope of services. Buried remnants, such as old foundations, slabs, utilities, septic systems, leach lines, and irrigation systems may exist on the site.

1.3 Purpose and Scope of Services

The purpose for our services was to evaluate the site soil conditions and to provide professional opinions and recommendations regarding the proposed development of the site. The scope of work for this report included the following:

- A general reconnaissance of the site
- Subsurface exploration consisting of excavating and sampling of 5 exploratory backhoe pits to a maximum of 10 feet below existing grade.
- Pile driving and extraction observations of the test piles.
- Tension and lateral load tests on 48 test piles at 24 locations.
- Laboratory testing of selected soil samples obtained from the exploratory borings.
- Engineering analysis and evaluation of the acquired data from the exploration and testing programs.
- A summary of our findings and recommendations in this written report.

This report contains the following:

- Discussions on subsurface soil and groundwater conditions.
- Discussions on regional and local geologic conditions.
- Discussions on geologic and seismic hazards.
- Graphic and tabulated results of laboratory tests and field studies.
- Recommendations regarding:
  - Site development and grading criteria.
  - Excavation conditions and buried utility installations.
  - Solar panel pile supports.
  - Allowable bearing capacities for shallow foundations for support structures.
  - Concrete slabs-on-grade.
  - Lateral earth pressures and coefficients for foundations.
  - Preliminary evaluation of the potential adverse effects of site soils to concrete and buried metal objects.
  - Seismic design parameters.

Not Within the Scope of This Report: Although available through Earth Systems Southwest, the current scope of our services does not include:

- An environmental assessment.
- An investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

Section 2
METHODS OF INVESTIGATION

2.1 Field Exploration

On December 10, 2009, a total of 5 exploratory backhoe pits were excavated on the site to a maximum of 10 feet below the existing ground surface [BEG]. The backhoe pits were excavated with a John Deere 310, equipped with a 24-inch wide bucket. The approximate locations of the backhoe pits are shown on the Site Exploration Map (Figure 2) in Appendix A. The locations shown are approximate, and were established in the field by handheld GPS coordinates (accurate to within 10 to 15 feet) and by sighting from prominent features.

Subsurface conditions encountered in the borings were categorized and logged in general accordance with the Unified Soil Classification System and ASTM D 2488-06. Bulk samples were obtained from the spoil piles.

Logs of the test pits are presented in Appendix A, along with a Log Legend. The logs represent our interpretation of the contents of the field logs and the results of laboratory testing performed on the samples obtained during the subsurface exploration. The stratification lines represent the approximate boundaries between soil types, although the transitions may be gradational. In reviewing the boring logs and legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the soil characteristics as observed during drilling/excavating. These include, but are not limited to, the presence of cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting soil characteristics, possibly resulting in soil descriptions that vary somewhat from the legend.

2.2 Laboratory Testing

Samples were reviewed along with field logs to select those that would be analyzed further. Test results are presented in graphic and tabular form in Appendix C of this report. The tests were conducted in general accordance with the procedures of the American Society for Testing and Materials [ASTM] or other standardized methods as referenced below. Our testing program consisted of the following:

- Particle Size Analysis to classify and evaluate soil composition. The gradation characteristics of selected samples were made by hydrometer and sieve analysis procedures.

- Chemical Analyses (Soluble Sulfates and Chlorides, pH, and Electrical Resistivity) to evaluate the potential adverse effects of the soil on concrete and steel.

2.3 Pile Load Testing

Driven W6 x 7.2 W-sections were used for the test piles to support the proposed PV panels and resist the anticipated vertical and lateral loads. On December 14 through December 18, 2009, representatives of ESSW conducted load tests on the driven piles at 24 locations across the project site. The locations of the tests are shown on the 2 Site Exploration Map (Figure 2) in

Appendix A. The W-sections were driven 34 to 60 inches into the ground by representatives of Highway Technologies Construction of Las Vegas, Nevada.

The tests were conducted in general accordance with ASTM D 3689 and D 3966, but were modified for the small piles and field conditions. Initially, tension loading was applied by a hydraulic 12-ton capacity jack against a 12-foot long reaction beam frame with a 10,000 lb. capacity. Dial gauges accurate to 0.001-in were used to measure deflections due to loading with respect to reference beams.

After tension testing was completed, lateral loads were applied using a John Deere 310 backhoe as a reaction mass. The proposed W6 x 7.2 W-section has a cross section of approximately 4 inches by 6 inches; the lateral loads were applied to the 6-inch side of the beam. As the amount of movement associated with the uplift test is generally small, in our opinion, the potential for an adverse effect on the lateral load test is relatively small.

The loading sequence was performed with increments of 15 to 30 seconds between load applications. This is a significant departure from ASTM D 3689 and D 3966; the "quick" test (Procedure A) of these methods requires 4 to 15 minutes between load increments. In our opinion, the rapid loading sequence is unlikely to alter significantly the findings of the load tests. In addition, the rapid loading sequence more closely approximates field conditions due to short duration wind gust or seismic loading. However, a 5-minute hold on the vertical test was performed at the ultimate load for each pile. The threshold for this test is 0.04". Four piles (PT-1B, PT-5A, PT-16A, and PT-18B) exceeded the 0.04" threshold. It is our opinion that densifying the soil near the surface will improve the performance of these piles below the threshold.

The testing was performed in increments of 200 pounds per in^2 (pressure reading from the Enerpac dial gauge) with a test load range of 1800 to 3450 lbs for lateral and 850 to 5000 lbs for tension. The calibrated relationship between the pressure and the applied force in pounds is linear but not a 1:1 relationship. Therefore, the change in the axial load between readings increases as the pressure increases. The "Summary of Pile Load Test Results" presents the results as a deflection at the maximum applied load, and as pounds necessary to move the pile the established threshold.

Section 3
DISCUSSION

3.1 Soil Conditions

The units encountered consist of undifferentiated younger alluvium, younger alluvium with interspersed areas of weak desert pavement, and older alluvium with moderate to strong desert pavement. The older alluvium was moist and in a medium dense to dense condition while the younger alluvium were generally soft and dry. The soils encountered were dry to slightly moist with considerable variance in density.

3.2 Groundwater

Water was not encountered to the depths explored. The depth to groundwater in the area is believed to be in excess of 50 feet based on well data obtained from 2 sources within 2 miles of the site. However, there is uncertainty in the accuracy of short-term water level measurements whereby water may become trapped on less permeable layers. Groundwater levels may fluctuate with precipitation, irrigation, and drainage. Groundwater should not be a factor in design or construction at this site.

3.3 Geologic Setting

Regional Geology: The site lies within Chuckwalla Valley, a part of the Mojave Desert geomorphic province which is a vast area where broad desert valleys are separated by isolated mountain ranges. The Chuckwalla Valley is bounded on the west by the Eagle Mountains, on the east by the Palen Mountains, and to the north by the Coxcomb Mountains. The Chuckwalla Mountains are to the south. The Chuckwalla Valley contains a thick sequence of Quaternary sedimentary deposits including Pleistocene fan deposits and Holocene alluvium. The bordering mountains expose primarily Precambrian metamorphic and Mesozoic granitic rocks. The Blue Cut and Pinto Mountain fault zones, located north-northwest of the site are the nearest significant faults. The San Andreas fault is located approximately 37 miles southwest of the site.

Local Geology: The project site is located in the northwestern reaches of Chuckwalla Valley. Predominant geologic units include Pleistocene older alluvium and Holocene alluvium. Older alluvium (Qoa), characterized as uplifted Pleistocene fan surfaces with well –developed desert pavement and incised drainage courses, is located primarily in the western portion of the property. Holocene alluvium (Qal) is represented by the more recent braided stream channel deposits within the multitude of intermittent drainage channels that cross the property (see Figure 3). No active faults are currently mapped in the site vicinity. One un-named fault has been mapped by the California Geologic Survey trending in an east-west direction through the southern portion of the property. This fault is shown as buried, is poorly defined, and is not considered active or a significant source of seismic activity.

Geologic Hazards: Geologic hazards that may affect the region include seismic hazards (ground shaking, surface fault rupture, soil liquefaction, and other secondary earthquake-related hazards), slope instability, flooding, ground subsidence, and erosion. A discussion follows on the specific hazards to this site.

3.3.1 Primary Seismic Hazards

Seismic Sources: Several active faults or seismic zones lie within 62 miles (100 kilometers) of the project site as shown on Table 1 in Appendix A. The primary seismic hazard to the site is strong ground shaking from earthquakes along the Pinto Mountain fault, San Andreas fault, and the multitude of faults within the Eastern California shear zone. The Mean Magnitude Earthquake listed is from published geologic information available for each fault (CGS, 2008).

Surface Fault Rupture: The project site does not lie within a currently delineated State of California, *Alquist-Priolo* Earthquake Fault Zone (Hart, 1997). Well-delineated fault lines cross through this region as shown on California Geological Survey [CGS] maps (Jennings, 1994); however, no active faults are mapped in the immediate vicinity of the site. Therefore, active fault rupture is unlikely to occur at the project site. While fault rupture would most likely occur along previously established fault traces, future fault rupture could occur at other locations.

Historic Seismicity: Approximately 32 magnitude 5.5+ earthquakes have occurred within 70 miles of the site since 1800. These include the 1948 Desert Hot Springs earthquake (M6.0), the 1949 Pinto Mountains earthquake (M5.0), the 1981 Westmorland earthquake (M5.9), and the 1992 Joshua Tree earthquake (M6.1).

Seismic Risk: While accurate earthquake predictions are not possible, various agencies have conducted statistical risk analyses. In 2008, the California Geological Survey [CGS] and the United States Geological Survey [USGS] completed probabilistic seismic hazard maps. We have used these maps in our evaluation of the seismic risk at the site. The recent Working Group of California Earthquake Probabilities (WGCEP, 2008) estimated a 58% conditional probability that a magnitude 6.7 or greater earthquake may occur between 2008 and 2038 along the southern segment of the San Andreas fault.

The primary seismic risk at the site is a potential earthquake along the San Andreas fault that is about 37 miles from the site and is considered as fault Type A (CGS). Geologists believe that the San Andreas fault has characteristic earthquakes that result from rupture of each fault segment. The estimated characteristic earthquake is magnitude 7.7 for the Southern Segment of the fault (USGS, 2002). This segment has the longest elapsed time since rupture of any part of the San Andreas fault. The last rupture occurred about 1680 AD, based on dating by the USGS near Indio (WGCEP, 2008). This segment has also ruptured on about 1020, 1300, and 1450 AD, with an average recurrence interval of about 220 years. The San Andreas fault may rupture in multiple segments, producing a higher magnitude earthquake. Recent paleoseismic studies suggest that the San Bernardino Mountain Segment to the north and the Coachella Segment may have ruptured together in 1450 and 1690 AD (WGCEP, 1995).

3.3.2 Secondary Hazards

Secondary seismic hazards related to ground shaking include soil liquefaction, ground subsidence, tsunamis, and seiches. The site is far inland, so the hazard from tsunamis is non-existent. At the present time, no water storage reservoirs are located in the immediate vicinity of the site. Therefore, hazards from seiches are considered negligible at this time.

Soil Liquefaction: Liquefaction is the loss of soil strength from sudden shock (usually earthquake shaking), causing the soil to become a fluid mass. In general, for the effects of liquefaction to be manifested at the surface, groundwater levels must be within 50 feet of the ground surface and the soils within the saturated zone must also be susceptible to liquefaction.

The potential for liquefaction to occur at this site is considered negligible because the depth of groundwater beneath the site is thought to exceed 50 feet. No free groundwater was encountered in our test pits. However, the project lies in a zone designated by Riverside County for susceptible sediments, but undocumented depths to groundwater resulting in assumed moderate liquefaction potential. Water level data from a well located approximately two miles southwest of the site suggests static water levels in excess of 100 feet with historic shallow water levels greater than 60 feet.

Ground Subsidence: The site is within a Riverside County designated "susceptible" subsidence zone. Dry sands tend to settle and densify when subjected to strong earthquake shaking. The amount of subsidence is dependent on relative density of the soil, ground motion, and earthquake duration. Uncompacted fill areas may be susceptible to seismically induced settlement.

Slope Instability: The site has relatively gentle topography, such that the potential for large-scale landslides is considered negligible. The occurrence of local surficial failures and debris flows within and along incised drainage channels is considered likely

Flooding: The project site is in an area where sheet flooding and erosion could occur with localized flooding within the defined drainage channels during seasonal precipitation and flash flood events. Appropriate project design, construction, and maintenance can minimize the site flooding potential.

Tsunamis and Seiches: The site is far inland, and there are no water storage reservoirs on or near the site, so the hazards from tsunamis and seiches are nil.

3.3.3 Other Geologic Hazards

Slope Instability: The site is relatively level to gently sloping, and there are no significant slopes on or adjacent to the site. Therefore, the potential for slope instability, landslides or debris flows to affect the site is considered to be nil.

Erosion

The site is relatively flat and with the previous farming operation site drainage paths are poorly defined to non-existent with drainage by sheet flow in a north-northwest direction. There are "blue line" drainage areas, predominately in the southwest portion of the site and generally out of the influence of the proposed development.

Site Acceleration: The potential intensity of ground motion may be estimated by the horizontal peak ground acceleration (PGA), measured in "g" forces. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone. Accelerations are also dependent upon attenuation by rock and soil deposits, direction of rupture, and type of fault. For these reasons, ground motions may vary considerably in the same general area. This variability can be expressed statistically by a standard deviation about a mean relationship. Important factors influencing the structural performance are the duration and frequency of strong ground motion, local subsurface conditions, soil-structure interaction, and structural details.

The following table provides the probabilistic estimate of the PGA taken from the 2002 CGS/USGS seismic hazard maps/data.

Estimate of PGA from 2002 CGS/USGS Probabilistic Seismic Hazard Maps/Data

Risk	Equivalent Return Period (years)	PGA (g) [1]
10% exceedance in 50 years	475	≈ 0.24

Notes:
[1] Based on Site Class B/C and soil amplification factor of 1.0 for Site Class D.

2007 CBC Seismic Coefficients: The California Building Code [CBC] seismic design parameters criteria are based on a Design Earthquake that has an earthquake ground motion $^2/_3$ of the lesser of 2% probability of occurrence in 50 years or 150% of mean deterministic limit. The PGA estimate given above is provided for information on the seismic risk inherent in the CBC design.

Seismic Hazard Zones: The site lies in a moderate liquefaction potential zone designated by Riverside County because of high susceptibility sediments. This portion of Riverside County has not been mapped by the California Seismic Hazard Mapping Act (Ca. PRC 2690 to 2699).

3.4 Seismic Design Criteria

This site is subject to strong ground shaking due to potential fault movements along regional faults including the San Andreas, Pinto Mountain, and Blue Cut faults. Engineered design and earthquake-resistant construction increase safety and allow development of seismic areas. The *minimum* seismic design should comply with the 2007 edition of the California Building Code and ASCE 7-05 using the seismic coefficients given in the table below.

2007 CBC (ASCE 7-05) Seismic Parameters

		Reference
Seismic Category:	D	Table 1613.5.6
Site Class:	D	Table 1613.5.2
Maximum Considered Earthquake [MCE] Ground Motion		
Short Period Spectral Response S_s:	0.77 g	Figure 1613.5
1 second Spectral Response, S_1:	0.33 g	Figure 1613.5
Site Coefficient, F_a:	1.19	Table 1613.5.3(1)
Site Coefficient, F_v:	1.75	Table 1613.5.3(2)
Design Earthquake Ground Motion		
Short Period Spectral Response, S_{DS}	0.61 g	
1 second Spectral Response, S_{D1}	0.34 g	

The intent of the CBC lateral force requirements is to provide a structural design that will resist collapse to provide reasonable life safety from a major earthquake, but may experience some structural and nonstructural damage. A fundamental tenet of seismic design is that inelastic yielding is allowed to adapt to the seismic demand on the structure. In other words, *damage is allowed*. The CBC lateral force requirements should be considered a *minimum* design. The owner and the designer may evaluate the level of risk and performance that is acceptable.

Performance based criteria could be set in the design. The design engineer should exercise special care so that all components of the design are fully met with attention to providing a continuous load path. An adequate quality assurance and control program is urged during project construction to verify that the design plans and good construction practices are followed. This is especially important for sites lying close to the major seismic sources.

Estimated peak horizontal site accelerations based upon a probabilistic analysis (10% probability of occurrence in 50 years) is approximately 0.24 g for a stiff soil site. Actual accelerations may be more or less than estimated. Vertical accelerations are typically ⅓ to ⅔ of the horizontal accelerations, but can equal or exceed the horizontal accelerations, depending upon the local site effects and amplification.

3.5 Pile Load Test Results

Table 2 within Appendix C provides a summary of the tension and lateral load tests on the test piles conducted on the site. The full pile load test results are also provided in Appendix C.

The test results provided herein were based on assumed wind speed of 85 mph. The following results for lateral resistance are relative to the existing grade and the possible deflection of the top of the pile is dependent upon the length of pile above finish grade. A total of 48 piles were driven to depths that ranged from 34 to 60 inches below existing grade.

Tension: The pile load tests indicate that in all areas tested that the tension capacity of the 48 W-section piles resisted at least twice the assumed maximum in uplift force of 664 lbs with all piles except PT-7A, which yielded ¼-inch deflection at 750 pounds at a depth of 36 inches.

Lateral: The lateral capacity at ½-inch deflection or less for all piles ranged from a low of 150 pounds at a pile depth of 36 inches to the maximum imposed load of 3450 pounds. Approximately 20% of the lateral loads tests did not meet, or are borderline, the maximum imposed load including a factor of safety of 2.0. However, a 5-minute hold on the vertical test was performed at the ultimate load for each pile. The threshold for this test is 0.04". Four piles (PT-1B, PT-5A, PT-16A, and PT-18B) exceeded the 0.04" threshold. It is our opinion that densifying the soil near the surface will improve the performance of these piles below the threshold.

Equivalent Lateral Load: The test piles may be evaluated on the basis of an equivalent lateral load using the Brom's method. In general, equivalent test load:

$$Tt = [(e + Le)T + Ma]/(e\text{-}test + Le)$$

where "e" is point of application above grade, T = lateral load, Ma =unbalanced moment, e-test = point of application from test load, and Le = effective length of pile.

The Brom's Method assumes effective length equal total length, L with lateral soil reaction and point of rotation at tip of pile Actual point of rotation if rigid is at about 0.6 to 0.7 L where lateral reactions counterbalance each other; pile flexibility decreases this effective length even more. If actual point of rotation is considered this would increase the equivalent lateral test load from the Brom's method.

Section 4
CONCLUSIONS

The following is a summary of our conclusions and professional opinions based on the data obtained from a review of selected technical literature and the site evaluation.

General:

- From a geotechnical perspective, the site is suitable for the proposed development, provided the recommendations in this report are followed in the design and construction of this project.

Geotechnical Constraints and Mitigation:

- The primary geologic hazard is moderate ground shaking from earthquakes originating on regional faults. Engineered design and earthquake-resistant construction increase safety and allow development of seismic areas.

- The underlying geologic condition for seismic design is Site Class D. A qualified professional should design any permanent structure constructed on the site. The *minimum* seismic design should comply with the 2007 California Building Code.

- Other geologic hazards, including fault rupture, liquefaction, seismically-induced subsidence, tsunamis, seiches and slope instability are considered generally low to nil on this site.

- The site soils are considered to be non-expansive. Conventional foundations for shallow foundation used for the support of equipment should meet at least code minimums or as specified by the project structural engineer, whichever is more stringent. Slabs-on-grade for these structures should be provided with a cushion of nonexpansive soils.

- A site should be addressed by the project civil engineer for potential flooding. Preventative measures to reduce the effects of seasonal flooding and erosion should be incorporated into site grading plans.

- The near surface soils are non-uniform and highly effected by the presence of rodent and reptile borrows and by the geologic deposition of the soils. Areas to receive permanent structures will require over excavation and recompaction to support proposed structures. Areas to receive pile used to support the arrays would benefit from some surficial compaction to enhance the lateral stability and support of the W-section piles.

- Tension: The pile load tests indicate that in all areas tested that the tension capacity of the 48 W-section piles resisted at least twice the assumed maximum in uplift force of 664 lbs with all piles except PT-7A, which yielded ¼-inch deflection at 750 pounds at a depth of 36 inches. Uplift should yield a factor safety of at least 2.0 by being driven to a depth of at least 48 inches. Compacting the upper soils in the immediate vicinity of the pile will increase the vertical resistance to uplift allowing a shallower pile to support the modules.

However, a 5-minute hold on the vertical test was performed at the ultimate load for each pile. The threshold for this test is 0.04". Four piles (PT-1B, PT-5A, PT-16A, and PT-18B) exceeded the 0.04" threshold. It is our opinion that densifying the soil near the surface will improve the performance of these piles below the threshold.

- Lateral: The lateral capacity at ½-inch deflection or less for all piles ranged from a low of 100 pounds at a pile depth of 36 inches to the maximum imposed load of 3450 pounds. Approximately 20% of the lateral loads tests did not meet, or are borderline, the maximum imposed load including a factor of safety of 2.0. Due to the variability of the upper soils and since some of the pile exhibited excessive lateral movement even when driven to a depth of 60 inches, the options would be to drive the piles deeper, go to a pile that has a higher stiffness modulus, densify the upper soils in the vicinity of the W-sections, or a combination of these.

- In general, groundwater levels may fluctuate with precipitation, irrigation, drainage, regional pumping from wells, and site grading. Groundwater should not be a factor in design or construction at this site.

Section 5
RECOMMENDATIONS

SITE DEVELOPMENT AND GRADING

5.1 Site Development – Grading

A representative of ESSW should observe site clearing, grading, and the bottoms of excavations before placing fill. Local variations in soil conditions may warrant increasing the depth of recompaction and over-excavation.

Clearing and Grubbing: At the start of site grading, existing vegetation, trees, large roots, pavement, foundations, non-engineered fill, construction debris, trash, and abandoned underground utilities should be removed from the proposed building, structural, and pavement areas. The surface should be stripped of organic growth and removed from the construction area. Areas disturbed during demolition and clearing should be properly backfilled and compacted as described below.

Building Area Preparation: The existing soils within the building areas should be over-excavated to depth of 3 feet below the bottom of the footings or 4 feet below existing grade, whichever is deeper. The resulting surface should be moisture conditioned and compacted to at least 90% relative compaction. Previously removed soils may be placed in thin (6" to 8") lifts and compacted as stated above.

Access Road or Pavement Area Preparation: In access road areas or areas to receive pavement, the subgrade should be scarified, moisture conditioned, and compacted to at least 95% relative compaction (ASTM D 1557) for a depth of two feet below subgrade. Compaction should be verified by testing.

Fill or Flatwork Area Preparation: In areas to receive fill or flatwork, the subgrade should be scarified, moisture conditioned, and compacted to at least 90% relative compaction (ASTM D 1557) for a depth of 1-foot below subgrade. Compaction should be verified by testing.

Engineered Fill Soils: The native soil is suitable for use as engineered fill and utility trench backfill *within* areas to receive foundations and slabs-on-grade, to 18 inches below bottom of slab elevation, provided it is free of significant organic or deleterious matter. The native soil is suitable for use as engineered fill and utility trench backfill *beyond* areas to receive foundations and slabs-on-grade to pavement subgrade or finish grade. Within areas to receive foundations and slabs-on-grade, the final 18 inches of fill should be nonexpansive. Nonexpansive materials are defined as being classified in the GW, GP, GM, GC, SP, SW, SC, or SM categories per ASTM D 2487, and that have an expansion index of 10 or less (ASTM D 4829). The 4 to 6-inch sand or gravel cushion that is typically placed below slabs-on-grade is considered to be part of the recommended 18 inches of nonexpansive materials, not in addition to it.

Nonexpansive soils may be imported to the site, or they may be derived from selective grading of the site soils. Proposed nonexpansive soils should be observed by a representative of ESSW and tested for expansion potential before being used.

All fill should be placed in maximum 8-inch lifts (loose thickness) and compacted to at least 90% relative compaction (ASTM D 1557). The upper foot of subgrade, and all aggregate base, in access road areas should be compacted to a minimum of 95 percent of maximum dry density. Compaction should be verified by testing. In general, rocks larger than 6 inches in greatest dimension should be removed from fill or backfill material. Rocks larger than 3 inches in greatest dimension should be removed from fill or backfill material in the upper 3 feet below finish grade in areas to receive structures or utility lines.

All soils should be moisture conditioned prior to application of compactive effort. Moisture conditioning of soils refers to adjusting the soil moisture to or just above optimum moisture content. If the soils are overly moist so that instability occurs, or if the minimum recommended compaction cannot be readily achieved, it may be necessary to aerate or to use other methods to dry the soil to optimum moisture content as follows:

Site Drainage: Positive drainage should be maintained away from the structures (5% for 5 feet minimum) to prevent ponding and subsequent saturation of the foundation soils. Gutters and downspouts should be considered as a means to convey water away from foundations if adequate drainage is not provided. Drainage should be maintained for paved areas. Water should not pond on or near paved areas.

5.2 Excavations and Utility Trenches

Excavations: All excavations should be made in accordance with OSHA requirements. Using the OSHA standards and general soil information obtained from the field exploration, classification of the near surface on-site soils will likely be characterized as Type B and C. Actual classification of site specific soil type per OSHA specifications as they pertain to trench safety should be based on real-time observations and determinations of exposed soils by the Competent Person during grading and trenching operations.

Our site exploration and knowledge of the general area indicates there is a potential for caving of site excavations (utilities, footings, etc.). Excavations within sandy soil should be kept moist, but not saturated, to reduce the potential of caving or sloughing. Where excavations over 4 feet deep are planned, lateral bracing or cut slopes of 1.5:1 (horizontal to vertical) or flatter should be provided. No surcharge loads from stockpiled soils or construction materials should be allowed within a horizontal distance measured from the top of the excavation slope and equal to the depth of the excavation.

Utility Trenches: Backfill of utilities within roads or public right-of-ways should be placed in conformance with the requirements of the governing agency (water district, public works department, etc.). Utility trench backfill within private property should be placed in conformance with the provisions of this report. In general, service lines extending inside of property may be backfilled with native soils compacted to a minimum of 90% relative compaction. A minimum of 95% relative compaction, however, should be obtained where trench backfill comprises the upper 12 inches of subgrade beneath access roads. A minimum of 85% relative compaction should be attained in areas where minor settlement of the trench backfill will not be detrimental. Backfill operations should be observed and tested to monitor compliance with these recommendations.

STRUCTURES

In our professional opinion, foundations for the Substation/Switching Station equipment can be supported on shallow foundations bearing in properly prepared and compacted soils placed as recommended in Section 5.1. The recommendations that follow are based on very low expansion category soils in the upper 4 feet of subgrade.

5.3 Foundations

Foundation design is the responsibility of the Structural Engineer, considering the structural loading and the geotechnical parameters given in this report. A representative of ESSW should observe foundation excavations before placement of reinforcing steel or concrete. Loose soil or construction debris should be removed from footing excavations before placement of concrete.

Bearing Capacity - Conventional Foundations: A minimum footing depth of 21 inches below lowest adjacent grade should be maintained. Allowable soil bearing pressures are given below for foundations bearing on recompacted soils as described in Section 5.1. Allowable bearing pressures are net (weight of footing and soil surcharge may be neglected).

- Continuous wall foundations, 12-inch minimum width and 21 inches minimum below grade:
  2000 psf for dead plus design live loads
  Allowable increases of 300 psf per each foot of additional footing width and 300 psf for each additional 0.5 foot of footing depth may be used up to a maximum value of 3500 psf.

- Isolated pad foundations, 2 x 2 foot minimum in plan and 21 inches minimum below grade:
  2500 psf for dead plus design live loads
  Allowable increases of 300 psf per each foot of additional footing width and 300 psf for each additional 0.5 foot of footing depth may be used up to a maximum value of 3500 psf.

Frictional and Lateral Coefficients: Lateral loads may be resisted by soil friction on the base of foundations and by passive resistance of the soils acting on foundation walls. An allowable coefficient of friction of 0.35 of dead load may be used. An allowable passive equivalent fluid pressure of 250 pcf may also be used. *These values include a factor of safety of 1.5.* Passive resistance and frictional resistance may be used in combination if the friction coefficient is reduced by one-third. Lateral passive resistance is based on the assumption that backfill next to foundations is properly compacted.

Bearing Capacity and Passive Pressure – Wind and Seismic Forces: A one-third (⅓) increase in the bearing and passive pressures may be used when calculating resistance to wind or seismic loads. The allowable bearing values indicated are based on the anticipated maximum loads stated in Section 1.1 of this report. If the anticipated loads exceed these values, the geotechnical engineer must reevaluate the allowable bearing values and the grading requirements.

Minimum Foundation Reinforcement: Minimum reinforcement for continuous footings should be two No. 4 steel reinforcing bars, one placed near the top and one placed near the bottom of the footing. This reinforcing is not intended to supersede any structural requirements provided by the structural engineer.

Expected Settlement: Estimated total static settlement should be less than ¾-inch, based on footings founded on firm soils as recommended. Differential settlement between exterior and interior bearing members should be less than ½-inch, expressed in a post-construction angular distortion ratio of 1:480 or less.

Driven W-sections (W6 X 7.2) Piles for Support of Solar Panels: Driven steel W6 x 7.2 can be used to support the proposed vertical and lateral loads. The proposed W-section is approximately 4 inches by 6 inches, whereby the lateral load will be applied to the 6-inch side of the support. We understand the maximum axial tension is 664 lbs for Case A north row, and the maximum lateral load is 382 lbs for Case A north row, and maximum moment at the base of the pile is 1,902 ft-lbs for Case B north row.

5.4 Slabs-on-Grade

Subgrade: Concrete slabs-on-grade and flatwork should be supported by compacted soil placed in accordance with Section 5.1 of this report.

Vapor Retarder: In areas of moisture sensitive floor coverings, an appropriate vapor retarder should be installed to reduce moisture transmission from the subgrade soil to the slab. For these areas, a vapor retarder (minimum 10-mil thickness) should underlie the floor slabs. If a Class A vapor retarder (ASTM E 1745) is specified, the retarder can be placed directly on the nonexpansive soil. The retarder should be covered with a minimum 2 inches of *clean* sand. If a less durable vapor retarder is specified (i.e. ASTM E 1745, Class B or C), a minimum of 4 inches of clean sand should be provided, and the retarder should be placed in the center of the clean sand layer. Clean sand is defined as a well or poorly graded sand (ASTM D 2488) of which less than 3 percent passes the No. 200 sieve. The site soils do not fulfill the criteria to be considered clean sand. Clean sand, if utilized, is considered to be part of the minimum 18-inch thickness of nonexpansive materials recommended in Section 5.1 of this report to be placed below slabs-on-grade, not in addition to it. The sand should be lightly moistened just prior to placing the concrete. Low-slump concrete should be used to help reduce the potential for concrete shrinkage. The effectiveness of the membrane is dependent upon its quality, the method of overlapping, its protection during construction, and the successful sealing of the membrane around utility lines.

The following minimum slab recommendations are intended to address geotechnical concerns such as potential variations of the subgrade and are not to be construed as superseding any structural design. The design engineer and/or project architect should ensure compliance with SB800 with regards to moisture and moisture vapor.

Slab Thickness and Reinforcement: Slab thickness and reinforcement of slabs-on-grade are contingent on the recommendations of the structural engineer or architect and the expansion index of the supporting soil. Based upon our findings, a modulus of subgrade reaction of approximately 200 pci (psi/inch) can be used in concrete slab design.

Conventional capacity concrete slabs and flatwork should be a minimum of 4 inches thick; heavy duty slabs should be a minimum of 5 inches thick. These recommended minimum thicknesses are actual dimensions, not nominal values. Concrete slabs should be reinforced with a minimum

of No. 3 rebars at 18-inches on center each way, placed at slab mid-height, to reduce the potential for cracking. Concrete floor slabs may either be monolithically placed with the foundations or doweled after footing placement, as per the requirements of the structural engineer. The thickness and reinforcing given are not intended to supersede any structural requirements provided by the structural engineer.

Control Joints: Control joints should be provided in all concrete slabs-on-grade at a maximum spacing of 36 times the slab thickness (12 feet maximum on-center, each way) as recommended by the American Concrete Institute (ACI, 2004). All joints should form approximately square patterns to reduce the potential for randomly oriented shrinkage cracks. Construction joints in the slabs should be tooled at the time of the concrete placement or saw cut (¼ of slab depth) as soon as practical but not more than 8 hours from concrete placement. Construction (cold) joints should consist of thickened butt joints with ½-inch dowels at 18 inches on center or a thickened keyed-joint to resist vertical deflection at the joint. All construction joints in exterior flatwork should be sealed to reduce the potential of moisture or foreign material intrusion. These procedures will reduce the potential for randomly oriented cracks, but may not prevent them from occurring.

Curing and Quality Control: The contractor should take precautions to reduce the potential for curling of slabs by using proper batching, placement, and curing methods. Curing is highly affected by temperature, wind, and humidity. Quality control procedures that *may* be used include trial batch mix designs, batch plant inspection, and on-site special inspection and testing. However, depending on the concrete strength used by the structural engineer, many of these quality control procedures would not be required by the building code (CBC, 2007).

5.5 Soil Corrosivity

Selected chemical analyses for corrosivity were conducted on four soil samples from the project site as shown in Appendix B.

Sulfate and other salts can attack the cement within concrete causing weakening of the cement matrix and eventual deterioration by raveling. This attack can be in the form of a physical attack or chemical attack whereby there may be a chemical reaction between the sulfate and the cement used in the concrete. According to ACI 318 as referenced by the 2007 California Building Code, if sulfate concentrations exceed 1000 ppm there will be special requirements. For this project, the results of those samples tested suggest a low to moderate sulfate ion concentration (20 to 289 ppm. Normal concrete mixes may be used.

Electrical resistivity is a process whereby metal (ferrous) objects in direct contact with soil may be subject to attack by electrochemical corrosion. This typically pertains to buried metal pipes, valves, culverts, etc. made of ferrous metal. To avoid this type of corrosion or to slow the process, buried metal objects are generally protected with waterproof resistant barriers, i.e. epoxy corrosion inhibitors, asphalt coatings, cathodic protection, or encapsulating with densely consolidated concrete. Electrical resistivity testing of the soil suggests that the site soils range from low to very severe potential for metal loss from electrochemical corrosion processes.

Chloride ions can cause corrosion of reinforcing steel. For this project, the results of those samples tested suggest a moderate chloride ion concentration (32 to 1011 ppm). ACI 318 is referenced by the California Building Code, and provides commentary relative to the effects of chlorides present in the soil; from both internal and external sources. It is possible that long term saturation of foundations with chloride rich water could allow the chloride access to the reinforcing steel.

A minimum concrete cover of cast-in-place concrete should be in accordance with Section 7.7 of the 2007 edition of ACI 318. Additionally, the concrete should be thoroughly vibrated during placement.

The information provided above should be considered preliminary. These values can potentially change based on several factors, such as importing soil from another job site and the quality of construction water used during grading and subsequent landscape irrigation.

Earth Systems does not practice corrosion engineering. We recommend that a qualified corrosion engineer evaluate the corrosion potential on metal construction materials and concrete at the site to provide mitigation of corrosive effects, if further guidance is desired.

5.6 Seismic Design Criteria

This site is subject to moderate ground shaking due to potential fault movements along regional faults. Engineered design and earthquake-resistant construction increase safety and allow development of seismic areas. The *minimum* seismic design should comply with the 2007 California Building Code and ASCE 7-05 using the seismic coefficients given in the table below. Based on the size of the site, two sets of criteria are offered for your use. Based on the current proposed locations for the Topaz substation, PG&E switching station, maintenance facility, and visitor's center, specific seismic parameters have been calculated. The remainder of the site, north and east of these proposed improvements should be designed using the higher values.

2007 CBC (ASCE 7-05) Seismic Parameters

		Reference
Seismic Category:	D	Table 1613.5.6
Site Class:	D	Table 1613.5.2
Maximum Considered Earthquake [MCE] Ground Motion		
Short Period Spectral Response S_s:	0.77 g	Figure 1613.5
1 second Spectral Response, S_1:	0.33 g	Figure 1613.5
Site Coefficient, F_a:	1.19	Table 1613.5.3(1)
Site Coefficient, F_v:	1.75	Table 1613.5.3(2)
Design Earthquake Ground Motion		
Short Period Spectral Response, S_{DS}	0.61 g	
1 second Spectral Response, S_{D1}	0.34 g	

5.7 Access Roads, Driveways and Parking Areas

Based on our local knowledge of this area, the ability of access roads on the site to support construction traffic and maintenance vehicles in areas of low cohesive soils will be dependent on soil moisture contents. Construction traffic and maintenance vehicles should be able to traverse most portions of the site, either on- or off-road, during the dry months of the year. At a minimum, access roads should be improved with a surface of at least 6 inches of aggregate base (virgin or recycled), gravel or other locally available appropriate materials.

PRELIMINARY RECOMMENDED PAVEMENTS SECTIONS

R-Value Subgrade Soils - 50 (assumed) Design Method – CALTRANS

Traffic Index (Assumed)	Pavement Use	Flexible Pavements	
		Asphaltic Concrete Thickness (Inches)	Aggregate Base Thickness (Inches)
5.0	Autos and pickups	3.0	4.0
7.0	Heavier Trucks	4.0	4.5

Notes:
1. Asphaltic concrete should be Caltrans, Type B, ½-in. or ¾-in. maximum-medium grading and compacted to a minimum of 95% of the 75-blow Marshall density (ASTM D 1559) or equivalent.
2. Aggregate base should be Caltrans Class 2 (¾ in. maximum) and compacted to a minimum of 95% of ASTM D1557 maximum dry density near its optimum moisture.
3. All pavements should be placed on 12 inches of moisture-conditioned subgrade, compacted to a minimum of 90% of ASTM D 1557 maximum dry density near its optimum moisture.
4. Portland cement concrete should have a minimum of 3250 psi compressive strength at 28 days.
5. Equivalent Standard Specifications for Public Works Construction (Greenbook) may be used instead of Caltrans specifications for asphaltic concrete and aggregate base.

The subgrade should access road, driveways and pavement areas should be cleared of vegetation, moisture conditioned to or just above optimum moisture content, and compacted to at least 95% relative compaction (ASTM D1557) for a depth of one foot below subgrade. Compaction should be verified by testing.

Weak subgrade areas can be identified by proof rolling with heavy, rubber-tired equipment, such as a loaded water truck. Periodic moisture conditioning may be required to maintain the compaction of the subgrade. Daily moisture conditioning during construction may be necessary. Traffic speed should be restricted to 15 mph to reduce the potential for "wash boarding" and further restricted to 5 mph at turns to avoid rutting.

Unpaved access roads should be graded with a 2% crown. Positive drainage should be maintained away from the access roadways. Water should not pond on or near roadways areas. Periodic maintenance and regrading the surface should be anticipated.

Section 6
LIMITATIONS AND ADDITIONAL SERVICES

6.1 Uniformity of Conditions and Limitations

Our findings and recommendations in this report are based on selected points of field exploration, laboratory testing, and our understanding of the proposed project. Furthermore, our findings and recommendations are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil or groundwater conditions could exist between and beyond the exploration points. The nature and extent of these variations may not become evident until construction. Variations in soil or groundwater may require additional studies, consultation, and possible revisions to our recommendations.

Findings of this report are valid as of the issued date of the report. However, changes in conditions of a property can occur with passage of time, whether they are from natural processes or works of man, on this or adjoining properties. In addition, changes in applicable standards occur, whether they result from legislation or broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one year.

In the event that any changes in the nature, design, or location of structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified or verified in writing.

This report is issued with the understanding that the owner or the owner's representative has the responsibility to bring the information and recommendations contained herein to the attention of the architect and engineers for the project so that they are incorporated into the plans and specifications for the project. The owner or the owner's representative also has the responsibility to verify that the general contractor and all subcontractors follow such recommendations. It is further understood that the owner or the owner's representative is responsible for submittal of this report to the appropriate governing agencies.

As the Geotechnical Engineer of Record for this project, ESSW has striven to provide our services in accordance with generally accepted geotechnical engineering practices in this locality at this time. No warranty or guarantee is express or implied. This report was prepared for the exclusive use of the Client and the Client's authorized agents.

ESSW should be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications. If ESSW is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

Although available through ESSW, the current scope of our services does not include an environmental assessment or an investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

6.2 Additional Services

This report is based on the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to check compliance with these recommendations. Maintaining ESSW as the geotechnical consultant from beginning to end of the project will provide continuity of services. *The geotechnical engineering firm providing tests and observations shall assume the responsibility of Geotechnical Engineer of Record.*

Construction monitoring and testing would be additional services provided by our firm. The costs of these services are not included in our present fee arrangements, but can be obtained from our office. The recommended review, tests, and observations include, but are not necessarily limited to, the following:

- Consultation during the final design stages of the project.
- A review of the building and grading plans to observe that recommendations of our report have been properly implemented into the design.
- Observation and testing during site preparation, grading, and placement of engineered fill as required by CBC Sections 1704.7 and the local grading ordinances.
- Consultation as needed during construction.

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Appendices as cited are attached and complete this report.

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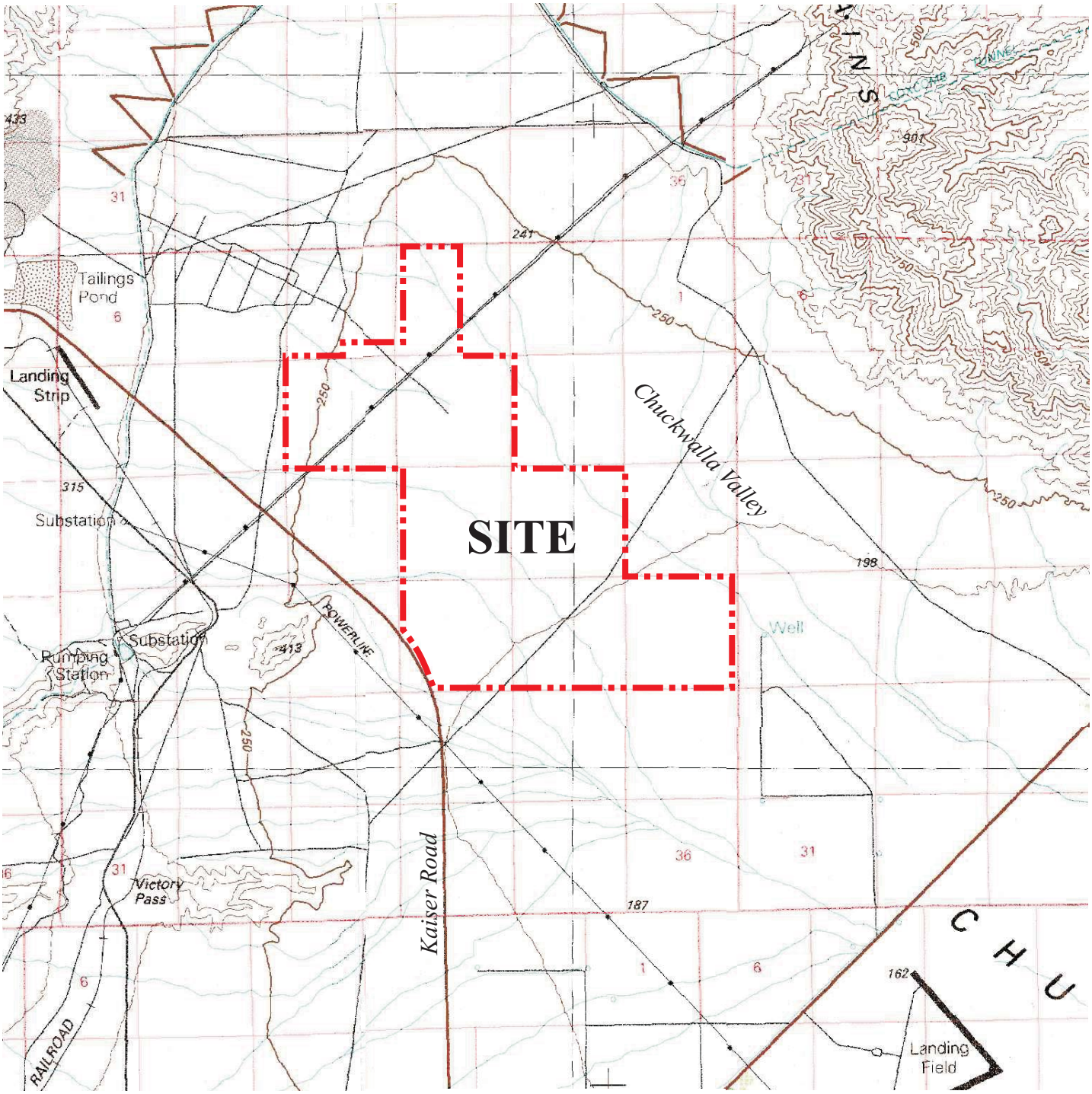
APPENDIX A

Figure 1 – Site Location Map
Figure 2 – Site Exploration Map
Figure 3 – Geologic Map
Fault Parameters
Test Pit Logs



Base Map: U.S.G.S. 30 x 60 Minute *Eagle Mountain, Calif., Quadrangle*, 1986
Eagle_Mountain_F33115E1.geo.pdf from usgs.gov

N

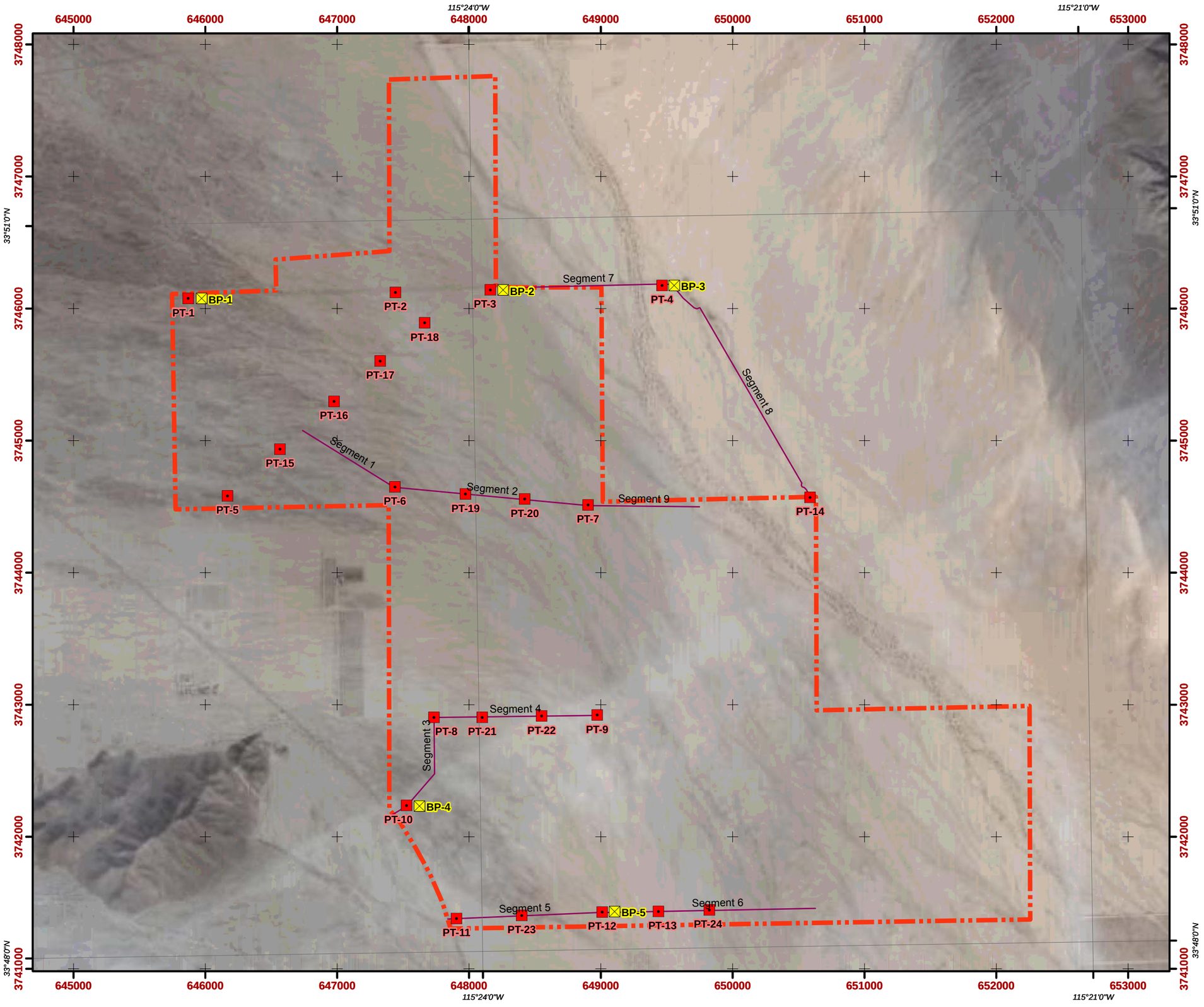
Scale in Miles
0 1 2

Figure 1
Site Location

Desert Sunlight Project
Proposed 550 MW Solar Farm
Desert Center, Riverside County, California

Earth Systems Southwest

06/16/2010 | File No.: 11666-01



Legend

- Pile Test Location (24)
- Backhoe Pit Location (5)
- Routing Paths 10-01-09
- Project Boundary 01-19-10

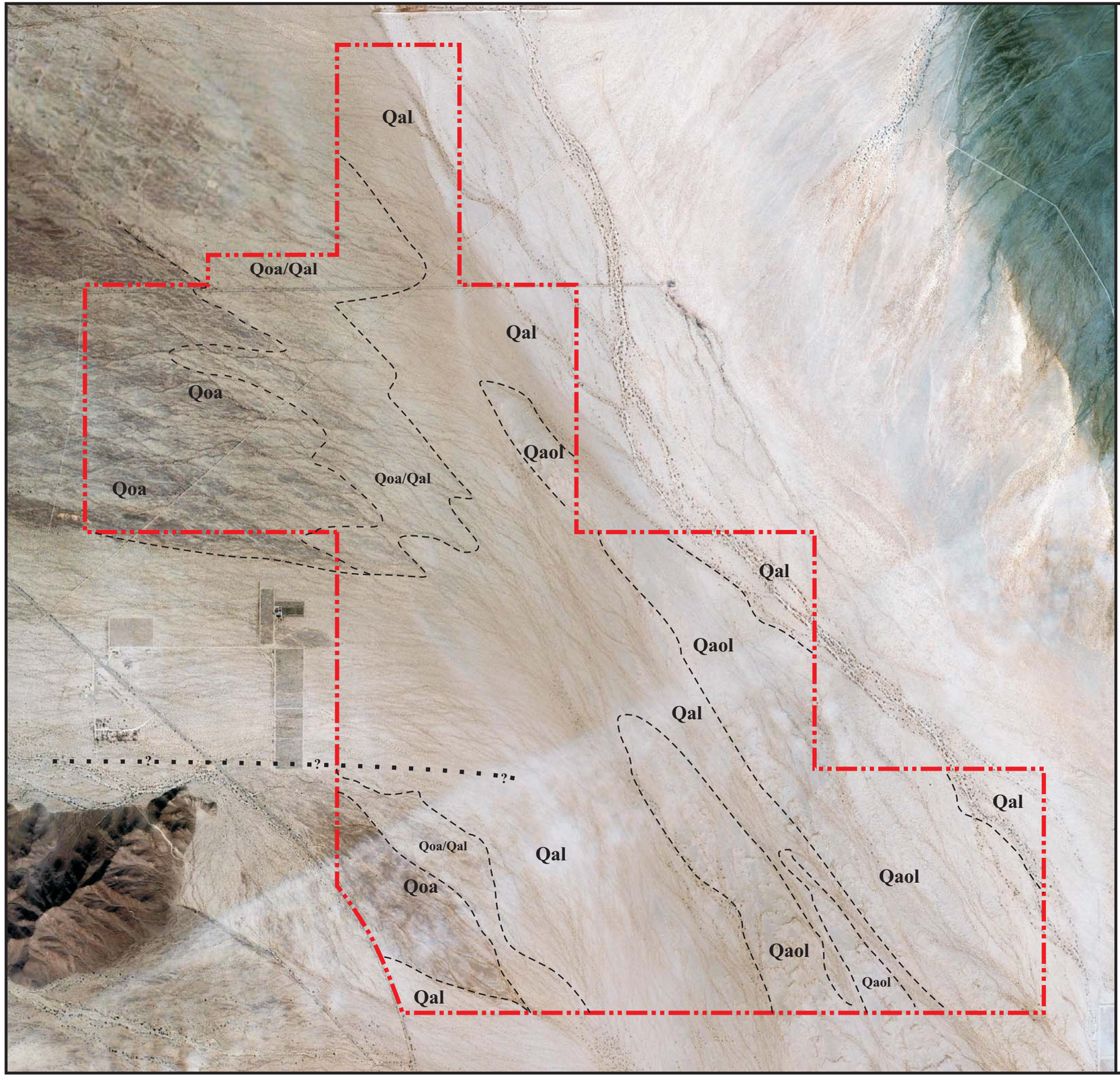
0 0.25 0.5 0.75 1 Miles

Figure 2
Test Locations

Desert Sunlight Project
Proposed 550 MW Solar Farm
Desert Center, Riverside County, California

Earth Systems Southwest

06/16/10 | File No.: 11666-01



LEGEND

- Property Boundary
- **Qal -** Quaternary Younger Alluvium, Undifferentiated
- **Qaol -** Quaternary Younger Alluvium with interspersed areas of weak desert pavement
- **Qoa -** Quaternary Older Alluvium typically with moderate to strong desert pavement.
- Fault: Dotted where concealed and conjectural.
- Contact: Dashed where approximate.

Note: Qoa/Qal denotes transition zone with interspersed areas of younger alluvium without significant desert pavement and areas with weak desert pavement.

Approximate Scale in Miles

0 0.5 1

Base Map: Desert Sunlight Aerial Photograph, 2009

N

Figure 3
Geologic Map-Revised

Desert Sunlight Project
Proposed 550 MW Solar Farm
Desert Center, Riverside County, California

Earth Systems Southwest

06/16/10 | File No.: 11666-01

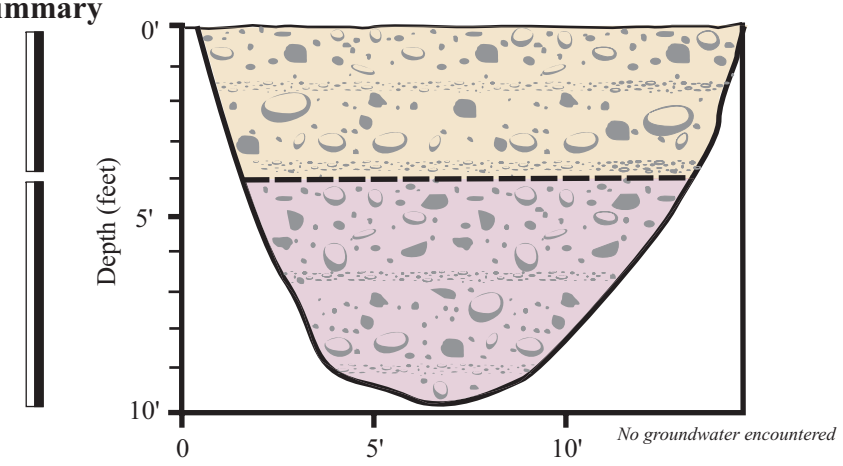
Fault Parameters

Fault Section Name	Distance (miles)	Distance (km)	Avg Dip Angle (deg.)	Avg Dip Direction (deg.)	Avg Rake (deg.)	Trace Length (km)	Fault Type	**Mean Mag**	Mean Return Interval (years)	Slip Rate (mm/yr)
Blue Cut	7.2	11.6	90	177	na	79	B'	**7.1**		
Pinto Mtn	35.9	57.8	90	175	0	74	B	**7.2**		2.5
Brawley (Seismic Zone), alt 1	36.8	59.2	90	250	na	60	B'	**7.0**		
San Andreas (Coachella) rev	36.8	59.2	90	224	180	69	A	**7.2**	69	20
Brawley (Seismic Zone), alt 2	38.0	61.2	90	250	na	61	B'	**7.0**		
Pisgah-Bullion Mtn-Mesquite Lk	40.0	64.4	90	60	180	88	B	**7.3**		0.8
Elmore Ranch	44.2	71.1	90	310	0	29	B	**6.6**		1
San Andreas (San Gorgonio Pass-Garnet Hill)	48.2	77.6	58	20	180	56	A	**7.6**	219	10
San Andreas, (North Branch, Mill Creek)	48.2	77.6	76	204	180	106	A	**7.5**	110	17
Calico-Hidalgo	48.6	78.2	90	52	180	117	B	**7.4**		1.8
So Emerson-Copper Mtn	49.5	79.6	90	51	180	54	B	**7.0**		0.6
Ludlow	49.6	79.8	90	239	na	70	B'	**7.0**		
Joshua Tree (Seismicity)	51.6	83.1	90	271	na	17	B'	**6.5**		
Eureka Peak	54.3	87.3	90	75	180	19	B	**6.6**		0.6
San Jacinto (Clark) rev	56.5	90.9	90	214	180	47	A	**7.6**	211	14
Burnt Mtn	56.8	91.4	67	265	180	21	B	**6.7**		0.6
Superstition Hills	61.6	99.1	90	220	180	36	A	**7.4**	199	4
Landers	62.4	100.4	90	60	180	95	B	**7.4**		0.6
San Jacinto (Borrego)	62.8	101.0	90	223	180	34	A	**7.0**	146	4
San Jacinto (Coyote Creek)	63.2	101.8	90	223	180	43	A	**7.3**	259	4
Imperial	63.5	102.1	82	55	180	46	A	**6.8**	89	20
Superstition Mountain	65.9	106.1	37	37	37	37	B	**7.0**		0.1
San Jacinto (Superstition Mtn)	66.0	106.3	90	210	180	26	B'	**6.6**		
Hector Mine	66.3	106.8	90	246	na	28	B'	**6.7**		
Mission Creek	67.7	109.0	65	5	180	31	B'	**6.9**		
San Jacinto (Anza) rev	67.9	109.3	90	216	180	46	A	**7.6**	151	18
Johnson Valley (No)	68.5	110.3	90	51	180	35	B	**6.8**		0.6
North Frontal (East)	71.8	115.6	41	187	90	27	B	**6.9**		0.5
Earthquake Valley (So Extension)	76.2	122.7	90	204	180	9	B'	**6.3**		
Earthquake Valley	78.4	126.1	90	217	180	20	B	**6.7**		2
San Gorgonio Pass	79.0	127.1	60	11	na	29	B'	**6.9**		
Lenwood-Lockhart-Old Woman Springs	79.1	127.2	90	43	180	145	B	**7.5**		0.9
Elsinore (Coyote Mountain)	79.7	128.3	82	35	180	39	A	**7.1**	322	3
Laguna Salada	81.4	131.0	90	41	180	99	A	**6.8**	89	3.5
San Andreas (San Bernardino S)	81.4	131.0	90	210	180	43	A	**7.6**	150	16
Earthquake Valley (No Extension)	81.6	131.3	90	221	180	33	B'	**6.9**		
Elsinore (Julian)	82.1	132.1	84	36	180	75	A	**7.6**	725	3
Cerro Prieto	82.7	133.1	90	221	na	84	B'	**7.2**		
San Jacinto (San Jacinto Valley, stepover)	86.0	138.4	90	224	180	24	A	**7.4**	199	9
San Jacinto (Anza, stepover)	86.8	139.6	90	224	180	25	A	**7.6**	151	9

Reference: USGS OFR 2007-1437 (CGS SP 203)

Mean Magnitude for Type A Faults based on 0.1 weight for unsegmented section, 0.9 weight for segmented model (weighted by probability of each scenario with section listed as given on Table 3 of Appendix G in OFR 2007-1437). Mean magntude is average of Ellworths-B and Hanks & Bakun moment area relationship.

Sampling Summary

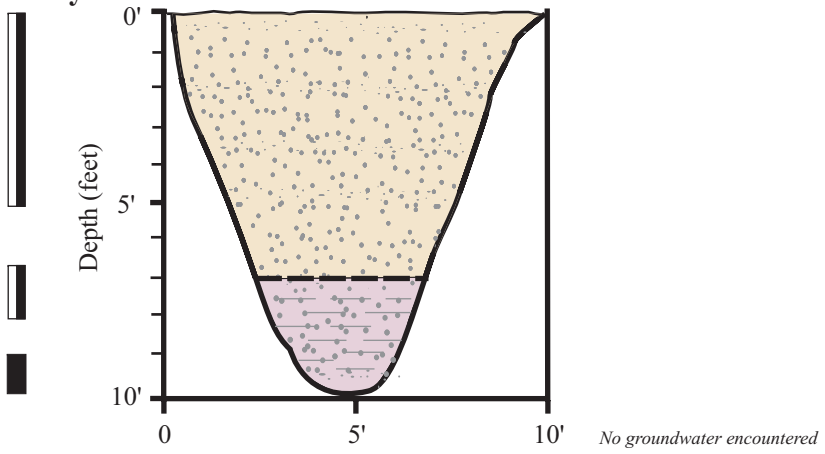


BP-1

Light brown, fine to medium grained **sand** with fine to coarse gravel **[SW-SM]**, thinly bedded (horizontal), uncemented, trace roots, with occasional silt layers to two inches thick, damp to approximately 8 inches. Calcified zone at 12 inches - 3 inches thick, alluvial deposition.

Reddish brown gravelly fine to coarse sand [SP-GP], iron oxide stain, very dense, damp, becomes yellowish brown at approximately 6', occasional silt layers (2-inch thick or less).

Sampling Summary



BP-2

Light brown fine to coarse sand [SW-SM], trace to some silt and fine to coarse gravel, uncemented, medium dense, damp to 1 foot, dry below, moderately to poorly bedded, apparent mix of alluvial deposition.

Reddish brown fine to coarse sand with silt and clay [SM], Ped development evident, calcified, iron oxide stained, very dense, dry, trace fine to coarse gravel and cobbles, older fan surface, apparent alluvial deposition.

LEGEND

- Bulk Sample
- Grab Sample

Horizontal and Vertical
Scale: 1" = 5'

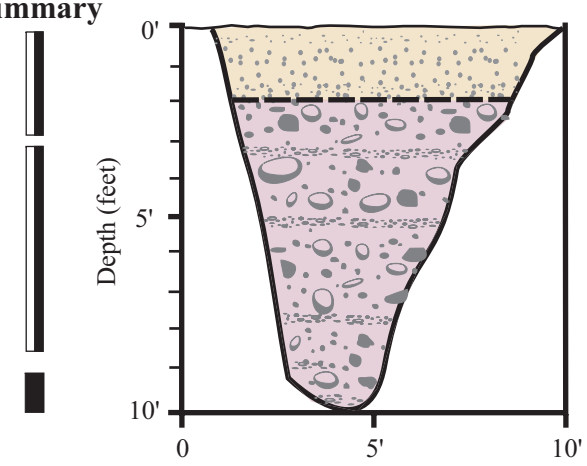
Backhoe Pit Logs

Desert Sunlight
Desert Center, Riverside County, California

Earth Systems Southwest

06/16/2010 | File No.: 11666-01

Sampling Summary



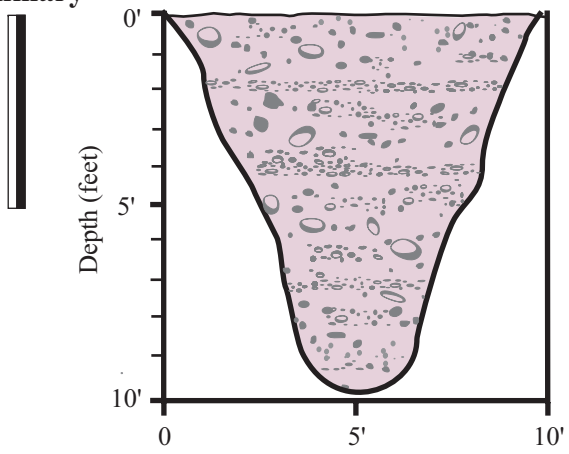
No groundwater encountered

BP-3

Light brown, fine to medium grained **sand** with fine to coarse gravel **[SP]**, thinly bedded (horizontal), uncemented, trace roots, with occasional silt layers to two inches thick, damp to approximately 8 inches. Calcified zone at 12 inches - 3 inches thick, alluvial deposition.

Reddish brown gravelly fine to coarse sand [SW-SM], iron oxide stain, very dense, damp, becomes yellowish brown at approximately 6', occasional silt layers (2-inch thick or less).

Sampling Summary



No groundwater encountered

BP-4

Light brown to reddish brown fine gravelly fine to coarse **sand [SW-SM]**, moderate to well bedded, occasional gravel layers with cobbles, dry very dense, apparent alluvial deposition, older fan surface, increasing cementation with depth beginning at 3-1/2 feet, ped development below 3 feet.

LEGEND

- Bulk Sample
- Grab Sample

Horizontal and Vertical
Scale: 1" = 5'

0 5' 10'

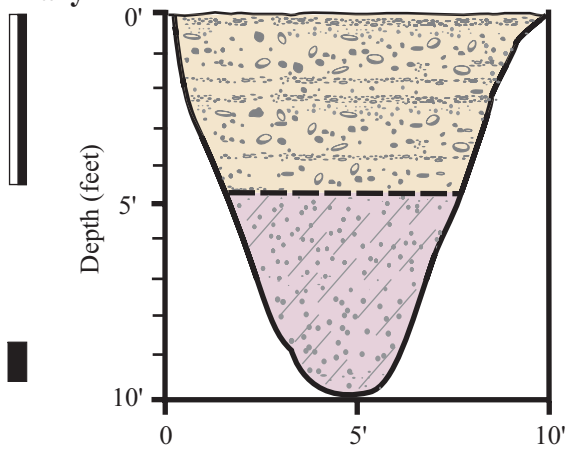
Backhoe Pit Logs

Desert Sunlight
Desert Center, Riverside County, California

Earth Systems Southwest

06/16/2010 | File No.: 11666-01

Sampling Summary



No groundwater encountered

BP-5

Light brown to reddish brown fine gravelly fine to coarse **sand and silt [SW-SM]**, damp to 8 inches, dry below, dense, medium to thickly bedded, lightly to moderately cemented, alluvial deposition.

Reddish brown clayey fine to coarse **sand** with silt **[SC]**, trace fine to coarse gravel, ped development evident, moderate to highly cemented, iron oxide stained, very dense, dry, older fan surface, apparent alluvial deposition.

LEGEND

- Bulk Sample
- Grab Sample

Horizontal and Vertical
Scale: 1" = 5’

0 5’ 10’

Backhoe Pit Logs

Desert Sunlight
Desert Center, Riverside County, California

Earth Systems Southwest

06/16/2010 | File No.: 11666-01

APPENDIX B

Laboratory Test Results

File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

PARTICLE SIZE ANALYSIS

ASTM D-422-63 Reapproved 2007

Job Name: Desert Sunlite Project, Desert Center, CA

Sample ID: **BP-1 @ 0-4 feet**

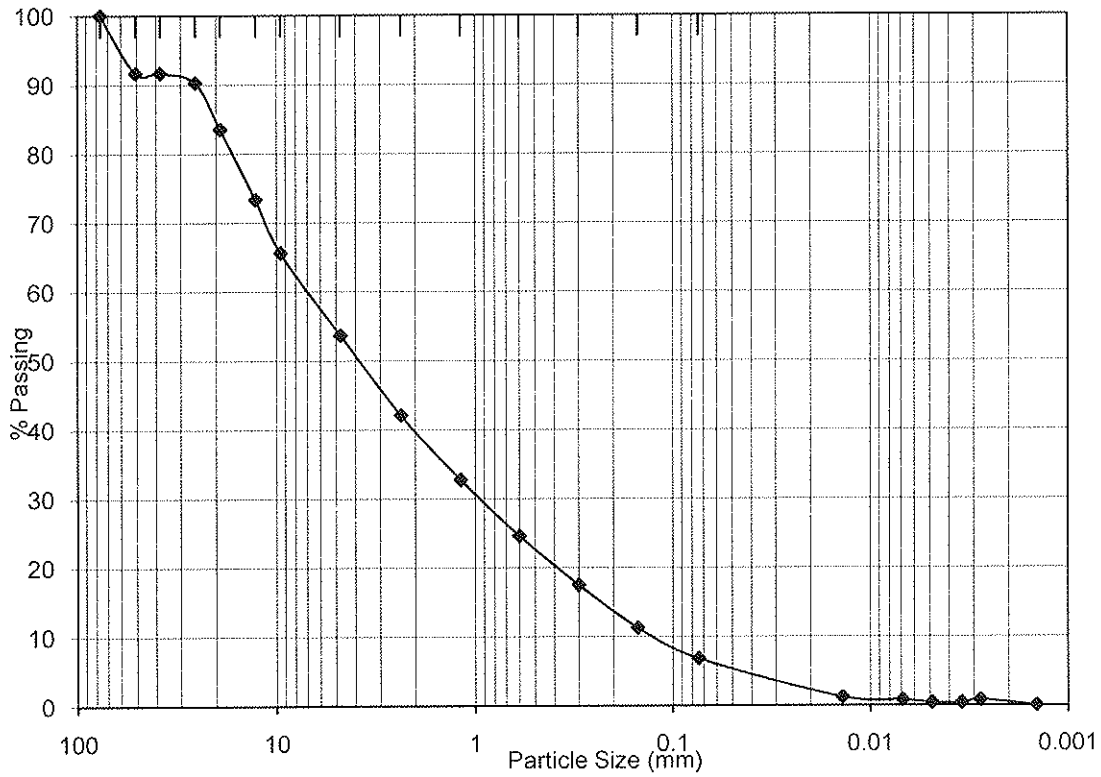
Description: **Brown Gravelly Fine to Coarse Sand w/Silt (SW-SM)**

Sieve Size	% Passing
3"	100
2"	92
1-1/2"	92
1"	90
3/4"	84
1/2"	73
3/8"	66
#4	54
#8	42
#16	33
#30	25
#50	17
#100	11
#200	7

By Hydrometer Method:

Particle Size	% Passing
63 Micron	4
24 Micron	2
14 Micron	1
7 Micron	1
5 Micron	0
3.4 Micron	0
2.8 Micron	1
1.4 Micron	0

% Gravel:	**46**
% Sand:	**47**
% Silt:	**6**
% Clay (3 micron):	**1**



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

PARTICLE SIZE ANALYSIS

ASTM D-422-63 Reapproved 2007

Job Name: Desert Sunlite Project, Desert Center, CA

Sample ID: **BP-2 @ 0-5 feet**

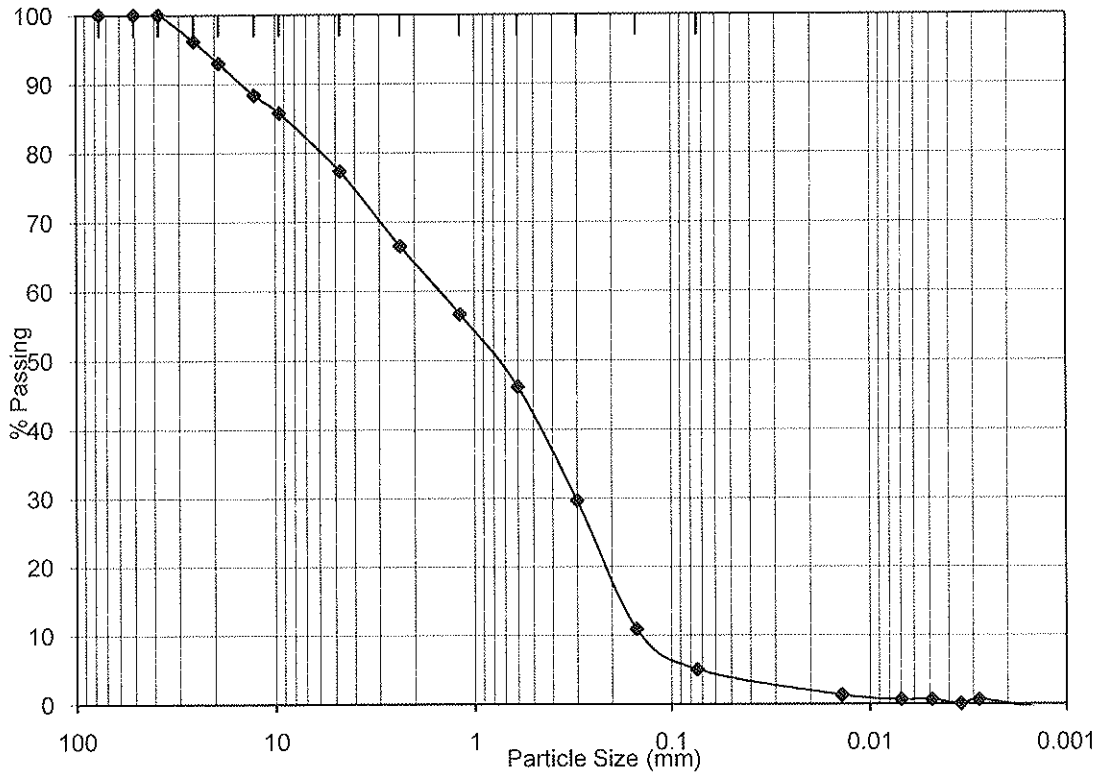
Description: **Brown Gravelly Fine to Coarse Sand w/Silt (SW-SM)**

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	96
3/4"	93
1/2"	88
3/8"	86
#4	77
#8	66
#16	57
#30	46
#50	30
#100	11
#200	5

By Hydrometer Method:

Particle Size	% Passing
65 Micron	2
24 Micron	1
14 Micron	1
7 Micron	1
5 Micron	1
3.5 Micron	0
2.8 Micron	1
1.5 Micron	-1

% Gravel:	**23**
% Sand:	**72**
% Silt:	**4**
% Clay (3 micron):	**1**



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

PARTICLE SIZE ANALYSIS

ASTM D-422-63 Reapproved 2007

Job Name: Desert Sunlite Project, Desert Center, CA

Sample ID: **BP-3 @ 0-1 1/2 feet**

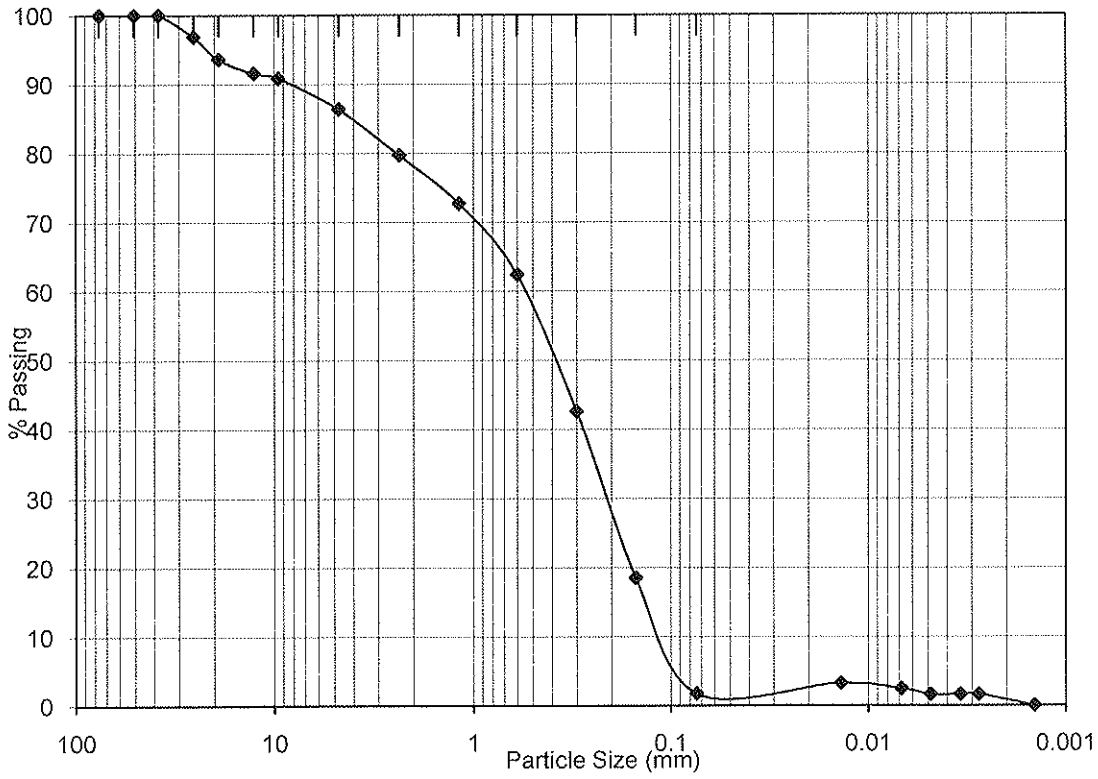
Description: **Brown Fine to Coarse Sand w/Gravel (SP)**

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	97
3/4"	94
1/2"	92
3/8"	91
#4	86
#8	80
#16	73
#30	62
#50	43
#100	19
#200	2

By Hydrometer Method:

Particle Size	% Passing
63 Micron	9
24 Micron	5
14 Micron	3
7 Micron	2
5 Micron	2
3.4 Micron	2
2.8 Micron	2
1.4 Micron	0

% Gravel:	**14**
% Sand:	**85**
% Silt:	**0**
% Clay (3 micron):	**2**



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

PARTICLE SIZE ANALYSIS

ASTM D-422-63 Reapproved 2007

Job Name: Desert Sunlite Project, Desert Center, CA

Sample ID: **BP-3 @ 1 1/2-10 feet**

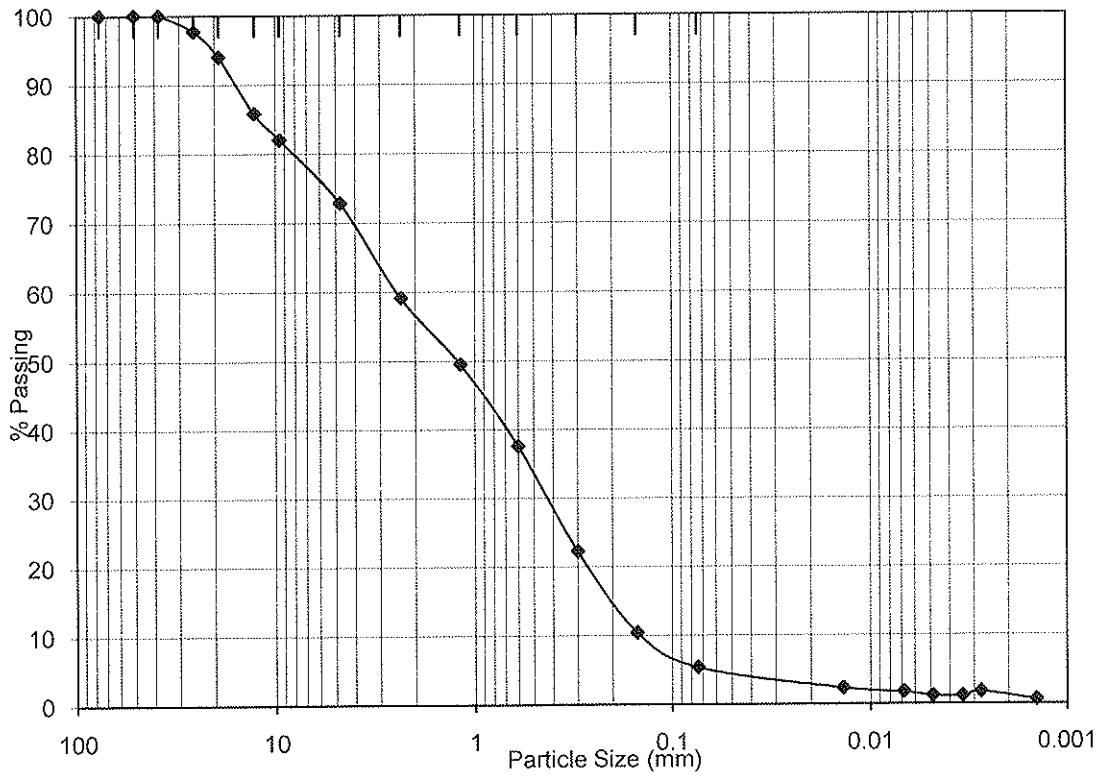
Description: **Reddish Brown Gravelly Fine to Coarse Sand w/Silt (SW-SM)**

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	98
3/4"	94
1/2"	86
3/8"	82
#4	73
#8	59
#16	49
#30	38
#50	22
#100	10
#200	5

By Hydrometer Method:

Particle Size	% Passing
64 Micron	4
24 Micron	2
14 Micron	2
7 Micron	2
5 Micron	1
3.4 Micron	1
2.8 Micron	2
1.4 Micron	1

% Gravel:	**27**
% Sand:	**68**
% Silt:	**3**
% Clay (3 micron):	**2**



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

PARTICLE SIZE ANALYSIS

ASTM D-422-63 Reapproved 2007

Job Name: Desert Sunlite Project, Desert Center, CA

Sample ID: **BP-4 @ 0-5 feet**

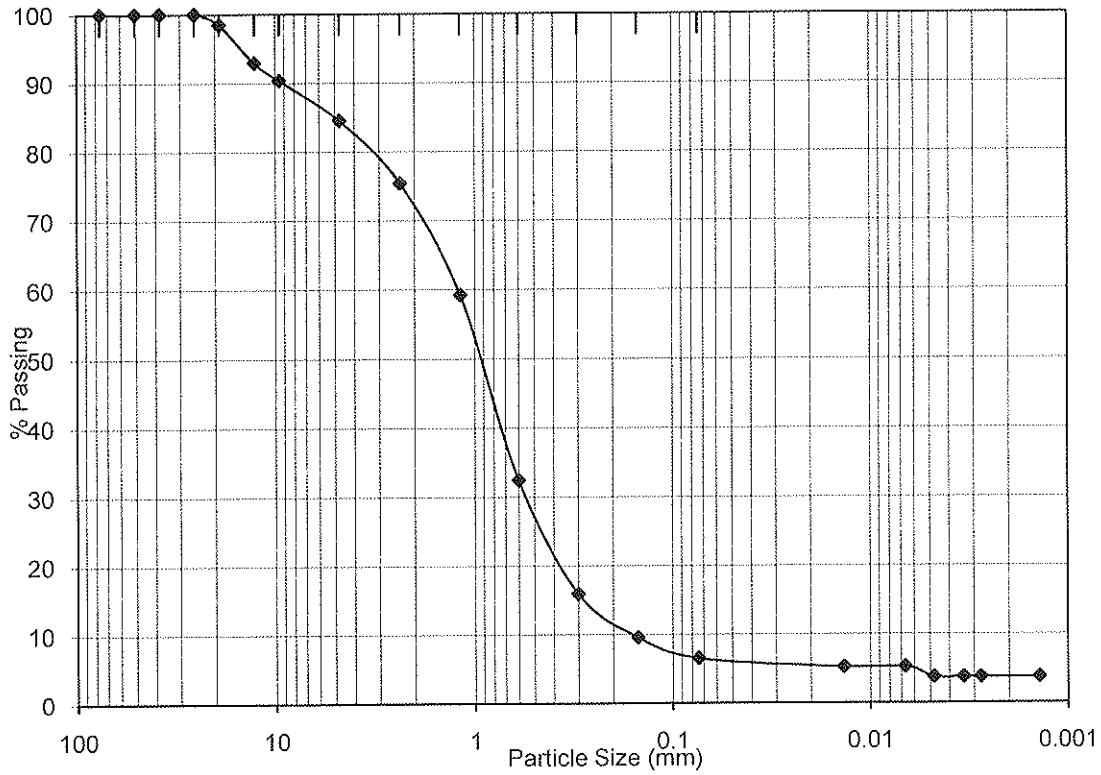
Description: **Brown Well Graded Sand w/Silt (SW-SM)**

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	98
1/2"	93
3/8"	90
#4	85
#8	75
#16	59
#30	32
#50	16
#100	10
#200	6

By Hydrometer Method:

Particle Size	% Passing
65 Micron	5
24 Micron	5
14 Micron	5
7 Micron	5
5 Micron	4
3.4 Micron	4
2.8 Micron	4
1.4 Micron	4

% Gravel:	**15**
% Sand:	**78**
% Silt:	**2**
% Clay (3 micron):	**4**



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

PARTICLE SIZE ANALYSIS

ASTM D-422-63 Reapproved 2007

Job Name: Desert Sunlite Project, Desert Center, CA

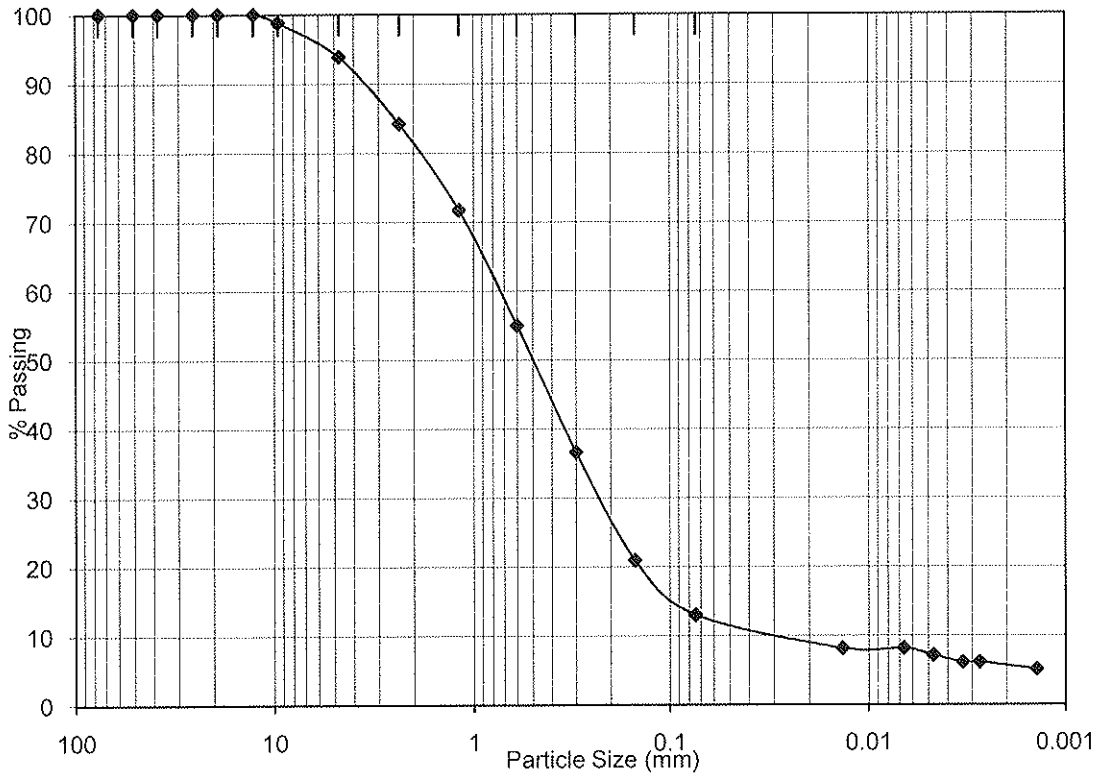
Sample ID: **BP-5 @ 0-4 1/2 feet**

Description: **Brown Well Graded Sand w/Silt (SW-SM)**

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	99
#4	94
#8	84
#16	72
#30	55
#50	37
#100	21
#200	13

By Hydrometer Method:

Particle Size	% Passing
63 Micron	11
23 Micron	9
14 Micron	8
7 Micron	8
5 Micron	7
3.4 Micron	6
2.7 Micron	6
1.4 Micron	5
% Gravel:	**6**
% Sand:	**81**
% Silt:	**7**
% Clay (3 micron):	**6**



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

MAXIMUM DENSITY / OPTIMUM MOISTURE

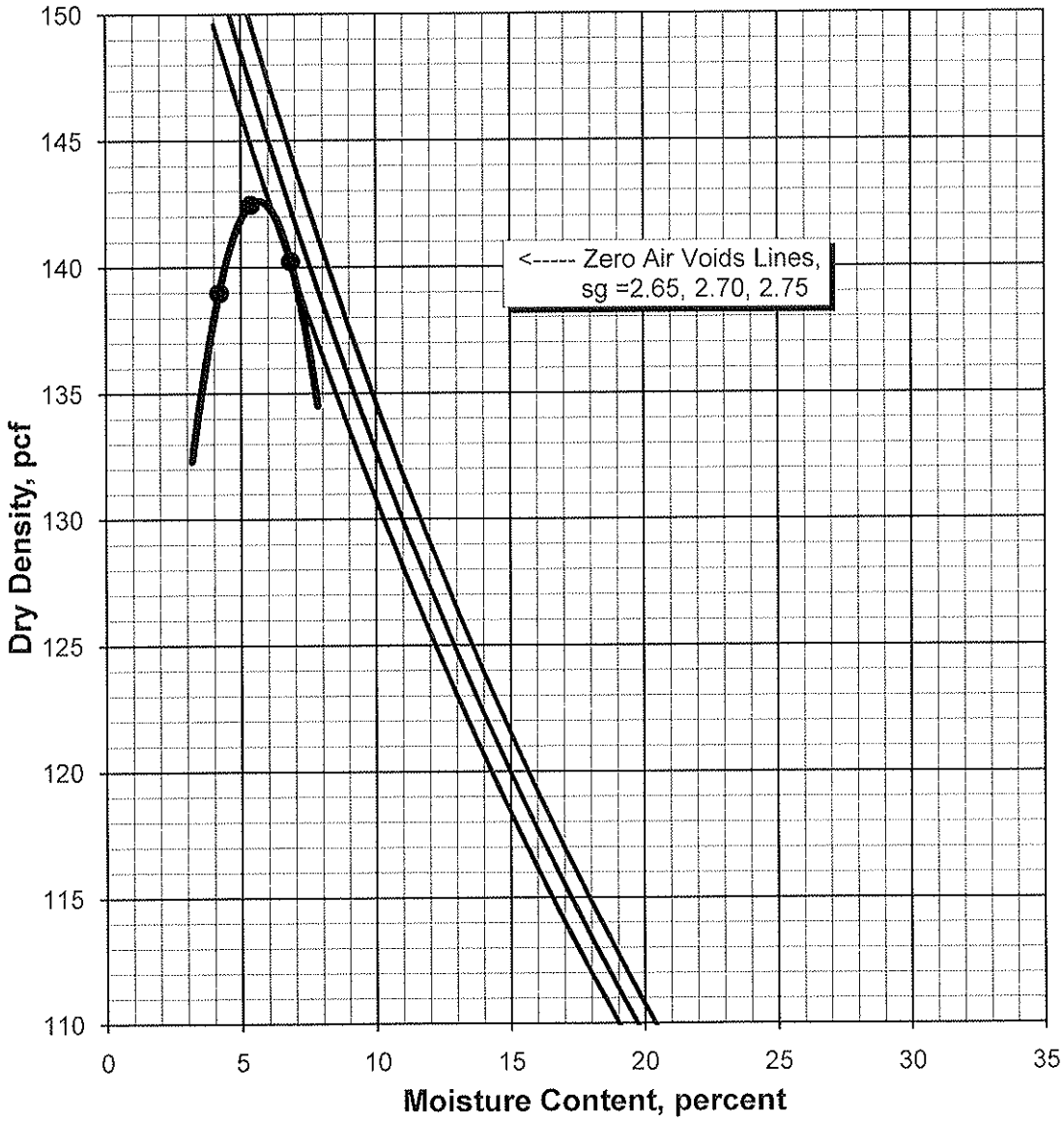
ASTM D 1557-07 (Modified)

Job Name: Desert Sunlite Project, Desert Center, CA
Sample ID: 1
Location: BP-1 @ 0-4 feet
Description: Brown Gravelly Fine to Coarse Sand w/Silt (SW-SM)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 09-0292

Maximum Density: 142.5 pcf
Optimum Moisture: 6%
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	20.3
3/8"	31.8
#4	41.9



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

MAXIMUM DENSITY / OPTIMUM MOISTURE

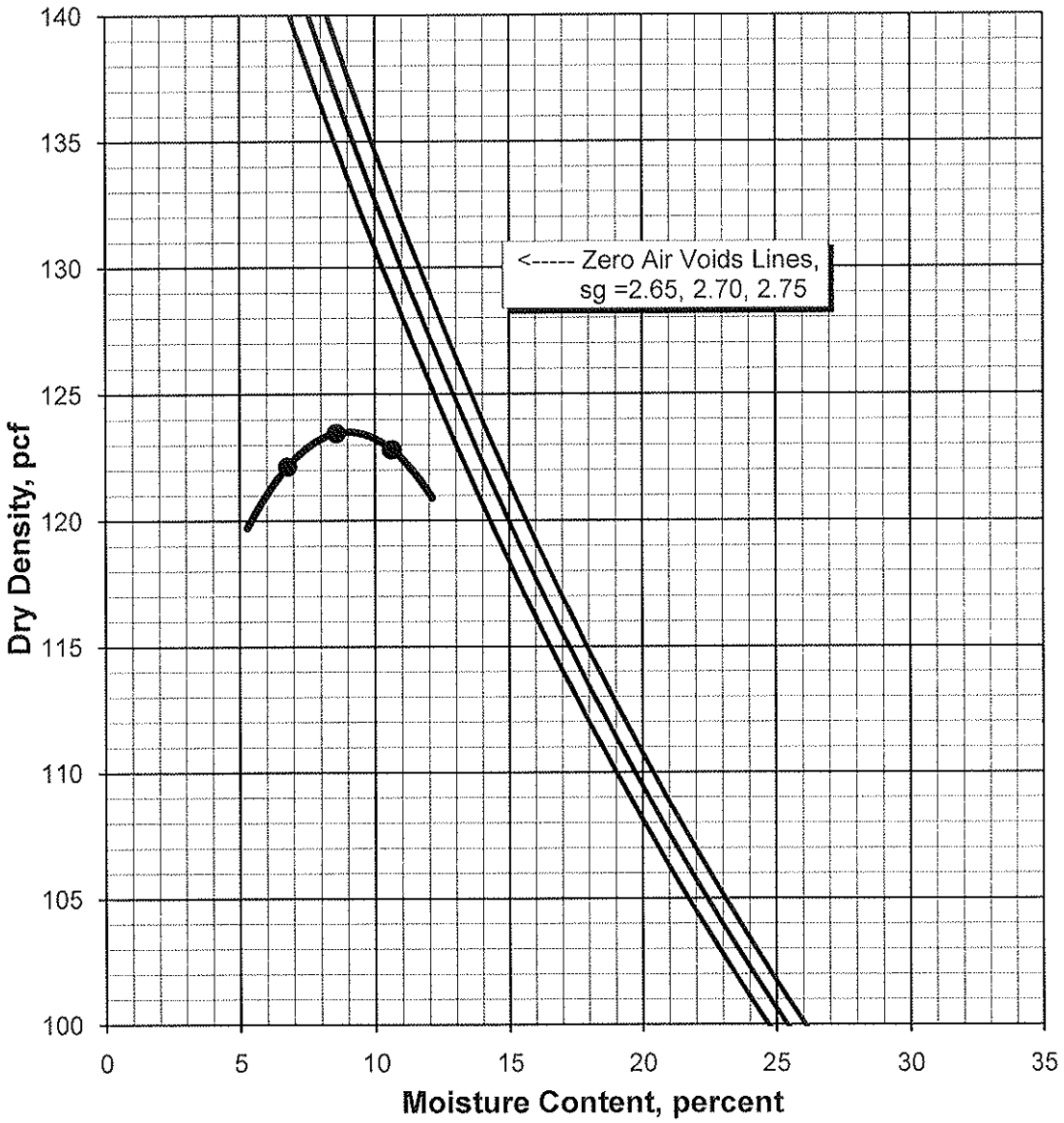
ASTM D 1557-07 (Modified)

Job Name: Desert Sunlite Project, Desert Center, CA
Sample ID: 2
Location: BP-2 @ 0-5 feet
Description: Brown Gravelly Fine to Coarse Sand w/Silt (SW-SM)

Procedure Used: B
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 09-0292

Maximum Density: **123.5 pcf**
Optimum Moisture: **9%**

Sieve Size	% Retained
3/4"	6.9
3/8"	12.0
#4	19.4



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

MAXIMUM DENSITY / OPTIMUM MOISTURE

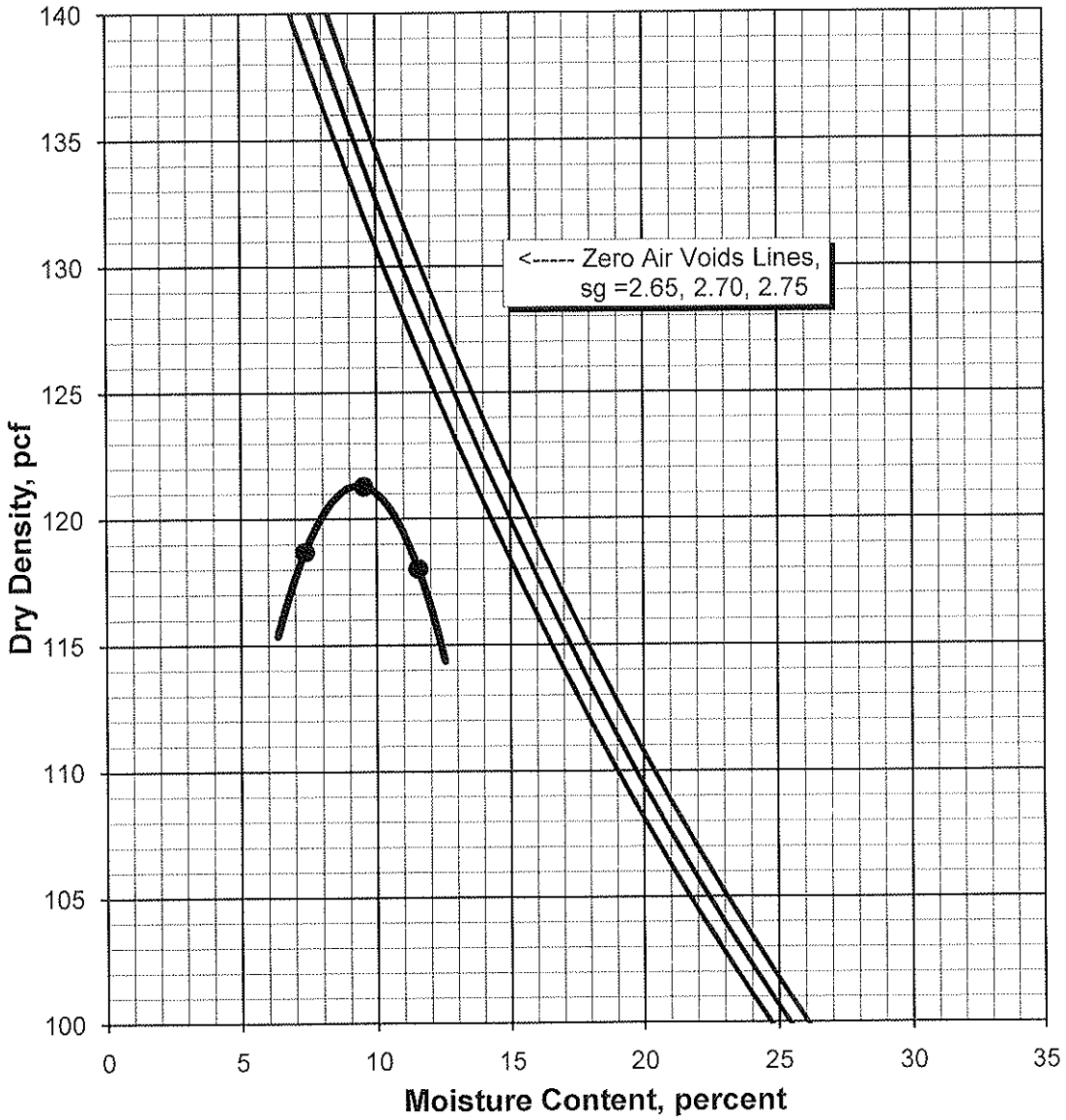
ASTM D 1557-07 (Modified)

Job Name: Desert Sunlite Project, Desert Center, CA
Sample ID: 3
Location: BPB-3 @ 0-1 1/2 feet
Description: Brown Fine to Coarse Sand w/Gravel (SP)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 09-0292

Maximum Density: **121.5 pcf**
Optimum Moisture: **9.5%**

Sieve Size	% Retained
3/4"	5.0
3/8"	7.8
#4	10.8



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

MAXIMUM DENSITY / OPTIMUM MOISTURE

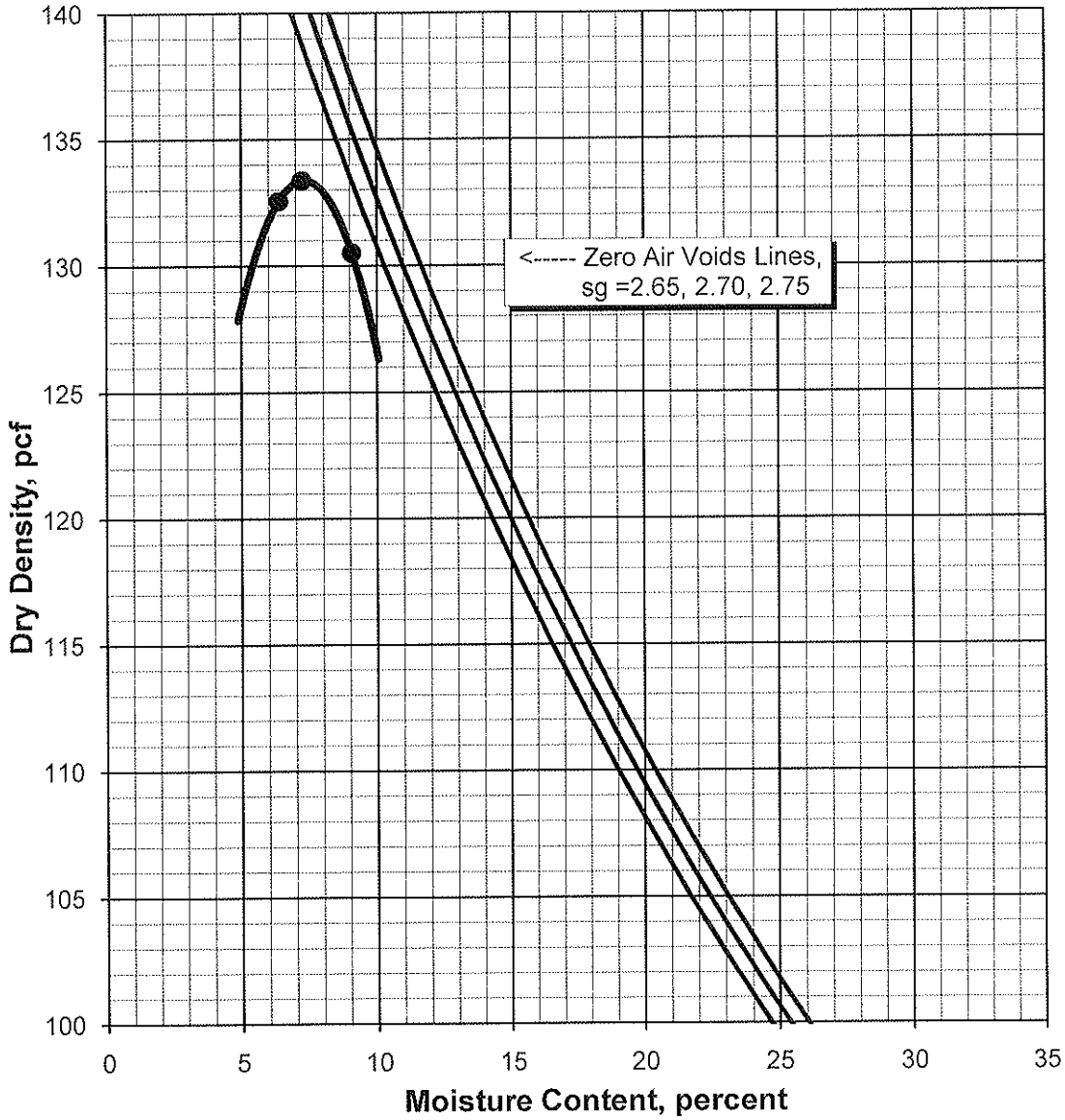
ASTM D 1557-07 (Modified)

Job Name: Desert Sunlite Project, Desert Center, CA
Sample ID: 4
Location: BP-3 @ 1 1/2-10 feet
Description: Reddish Brown Gravelly Fine to Coarse Sand w/Silt (SW-SM)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 09-0292

Maximum Density: **133.5 pcf**
Optimum Moisture: **7.5%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	16.5
3/8"	19.7
#4	27.5



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

MAXIMUM DENSITY / OPTIMUM MOISTURE

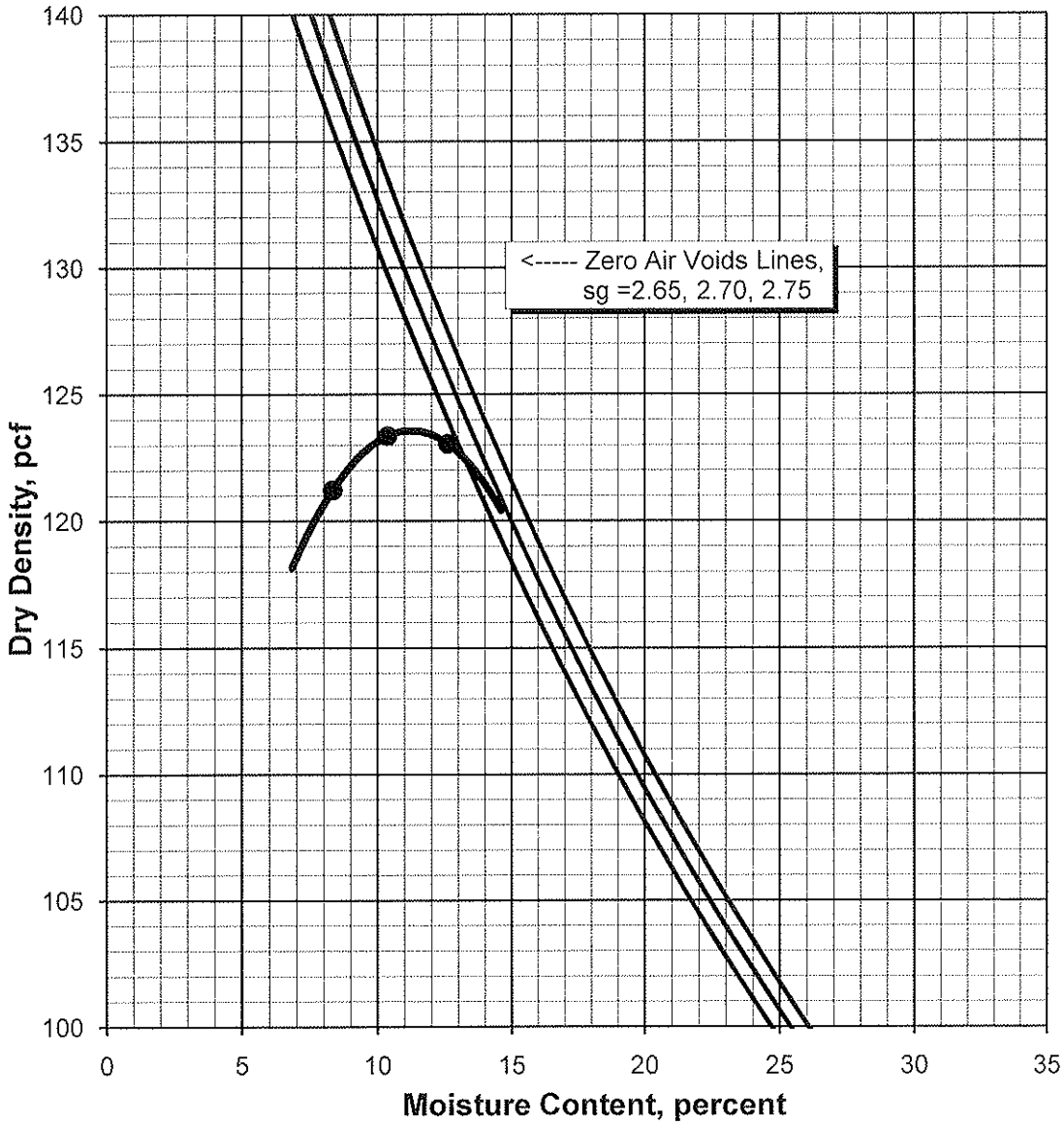
ASTM D 1557-07 (Modified)

Job Name: Desert Sunlite Project, Desert Center, CA
Sample ID: 5
Location: BP-4 @ 0-5 feet
Description: Brown, Silty F to C Sand (SM)

Procedure Used: B
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 09-0292

Maximum Density: **123.5 pcf**
Optimum Moisture: **11.5%**

Sieve Size	% Retained
3/4"	8.2
3/8"	14.3
#4	20.3



File No.: 11666-01 January 19, 2010

Lab No.: 09-0292

MAXIMUM DENSITY / OPTIMUM MOISTURE

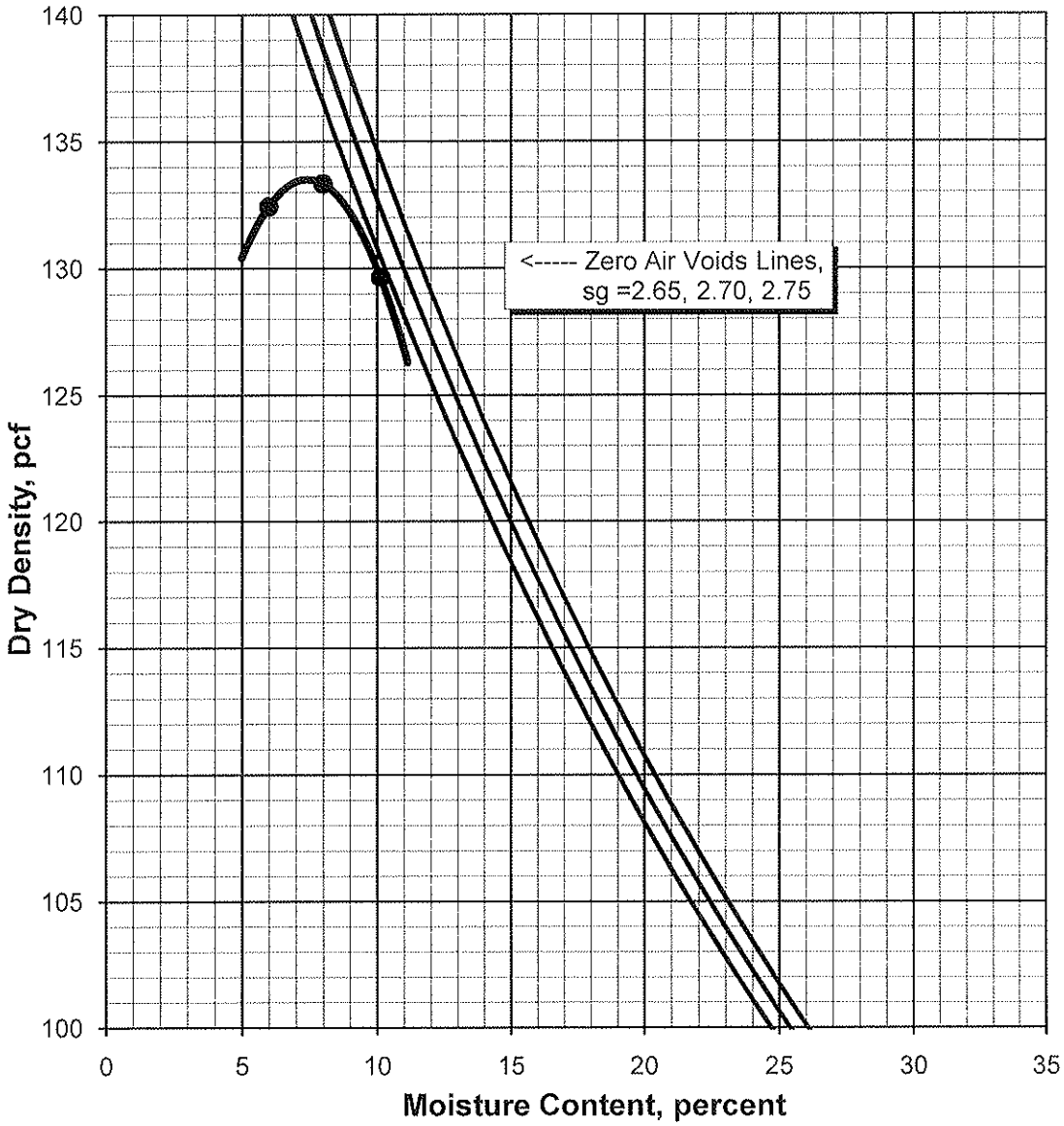
ASTM D 1557-07 (Modified)

Job Name: Desert Sunlite Project, Desert Center, CA
Sample ID: 6
Location: BP-5 @ 0-4 1/2 feet
Description: Brown, Silty F to C Sand (SM)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 09-0292

Maximum Density: **133.5 pcf**
Optimum Moisture: **7.5%**

Sieve Size	% Retained
3/4"	1.1
3/8"	4.3
#4	10.5



File No.: 11666-01
Lab No.: 09-0292

January 19, 2010

SOIL CHEMICAL ANALYSES

Job Name: Desert Sunlite Project, Desert Center, CA
Job No.: 11666-01

Sample ID:	BP-1	BP-2	BP-3		
Sample Depth, feet:	0-4	-05	0-1.5	DF	RL
Sulfate, mg/Kg (ppm):	**86**	**19**	**24**	1	0.50
Chloride, mg/Kg (ppm):	**285**	**70**	**32**	1	0.20
pH, (pH Units):	**7.27**	**7.50**	**7.54**	1	0.41
Resistivity, (ohm-cm):	**2,481**	**14,184**	**8,945**	N/A	N/A
Conductivity, (µmhos-cm):				1	2.00

Note: Tests performed by Subcontract Laboratory:
Surabian AG Laboratory
105 Tesori Drive
Palm Desert, California 92211 Tel: (760) 200-4498

DF: Dilution Factor
RL: Reporting Limit
N.D.: Not Detectable

General Guidelines for Soil Corrosivity		
Chemical Agent	Amount in Soil	Degree of Corrosivity
Soluble Sulfates	0 -1000 mg/Kg (ppm) [0-.1%]	Low
	1000 - 2000 mg/Kg (ppm) [0.1-0.2%]	Moderate
	2000 - 20,000 mg/Kg (ppm) [0.2-2.0%]	Severe
	> 20,000 mg/Kg (ppm) [>2.0%]	Very Severe
Resistivity	1-1000 ohm-cm	Very Severe
	1000-2000 ohm-cm	Severe
	2000-10,000 ohm-cm	Moderate
	10,000+ ohm-cm	Low

File No.: 11666-01
Lab No.: 09-0292

January 19, 2010

SOIL CHEMICAL ANALYSES

Job Name: Desert Sunlite Project, Desert Center, CA
Job No.: 11666-01

Sample ID:	BP-3	BP-4	BP-5		
Sample Depth, feet:	1.5-10	0-5	0-4.5	DF	RL
Sulfate, mg/Kg (ppm):	**20**	**289**	**58**	1	0.50
Chloride, mg/Kg (ppm):	**101**	**1,011**	**354**	1	0.20
pH, (pH Units):	**7.72**	**7.50**	**7.87**	1	0.41
Resistivity, (ohm-cm):	**7,309**	**1,748**	**882**	N/A	N/A
Conductivity, (µmhos-cm):				1	2.00

Note: Tests performed by Subcontract Laboratory:
Surabian AG Laboratory
105 Tesori Drive
Palm Desert, California 92211 Tel: (760) 200-4498

DF: Dilution Factor
RL: Reporting Limit
N.D.: Not Detectable

General Guidelines for Soil Corrosivity

Chemical Agent	Amount in Soil	Degree of Corrosivity
Soluble Sulfates	0 -1000 mg/Kg (ppm) [0-.1%]	Low
	1000 - 2000 mg/Kg (ppm) [0.1-0.2%]	Moderate
	2000 - 20,000 mg/Kg (ppm) [0.2-2.0%]	Severe
	> 20,000 mg/Kg (ppm) [>2.0%]	Very Severe
Resistivity	1-1000 ohm-cm	Very Severe
	1000-2000 ohm-cm	Severe
	2000-10,000 ohm-cm	Moderate
	10,000+ ohm-cm	Low

APPENDIX C

Table 1 – Physical Drive Time Characteristics
Table 2 – Pile Load Test Results

Desert Sunlight Solar Farm
Desert Center, Riverside County, California
Table 1
Physical Drive Time Characteristics

Location	Date	Total Drive Time (seconds)	Final Depth (inches)	Comments (Feet - Seconds)
TP-1A	12/10/09	23	48	1' - 3 sec; 2' - 8 sec; 3' - 15 sec; 4' - 23 sec
TP-1B	12/10/09	45	60	1' - 4 sec; 2' - 8 sec; 3' - 17 sec; 4' - 24 sec; 5' - 45 sec
TP-2A	12/10/09	41	48	1' - 1 sec; 2' - 7 sec; 3' - 22 sec; 4' - 41 sec
TP-2B	12/10/09	27	36	1' - 0.5 sec; 2' - 7 sec; 3' - 27 sec
TP-3A	12/10/09	23	48	1' - 0 sec; 2' - 4 sec; 3' - 12 sec; 4' - 23 sec
TP-3B	12/10/09	26	58	1' - 0 sec; 2' - 3 sec; 3' - 11 sec; 4' - 17 sec; 4.8' - 26 sec
TP-4A	12/10/09	26	47	1' - 2 sec; 2' - 4 sec; 3' - 15 sec; 4' - 26 sec
TP-4B	12/10/09	21	40	1' - 0 sec; 2' - 4 sec; 3' - 21 sec
TP-5A	12/10/09	26	48	1' - 5 sec; 2' - 10 sec; 3' - 15 sec; 4' - 26 sec
TP-5B	12/10/09	15	36	1' - 4 sec; 2' - 8 sec; 3' - 15 sec
TP-6A	12/11/09	20	48	1' - 1 sec; 2' - 3 sec; 3' - 5 sec; 4' - 20 sec
TP-6B	12/11/09	10	37	1' - 2 sec; 2' - 5 sec; 3' - 10 sec
TP-7A	12/11/09	18	48	1' - 0.5 sec; 2' - 1 sec; 3' - 10 sec; 4' - 18 sec
TP-7B	12/11/09	9	36	1' - 0.5 sec; 2' - 2 sec; 3' - 9 sec
TP-8A	12/10/09	32	48	1' - 1 sec; 2' - 8 sec; 3' - 14 sec; 4' - 32 sec
TP-8B	12/10/09	14	35	1' - 1 sec; 2' - 5 sec; 3' - 14 sec
TP-9A	12/10/09	13	48	1' - 1 sec; 2' - 4 sec; 3' - 9 sec; 4' - 13 sec
TP-9B	12/10/09	32	56	1' - 0.5 sec; 2' - 3 sec; 3' - 8 sec; 4' - 16 sec; 4.6' - 32 sec
TP-10A	12/10/09	25	45	1' - 1 sec; 2' - 3 sec; 3' - 10 sec; 4' - 25 sec
TP-10B	12/10/09	29	59	1' - 2 sec; 2' - 5 sec; 3' - 6 sec; 4' - 16 sec; 4.9' - 29 sec
TP-11A	12/11/09	9	48	1' - 0 sec; 2' - 1 sec; 3' - 3 sec; 4' - 9 sec
TP-11B	12/11/09	19	60	1' - 0.5 sec; 2' - 3 sec; 3' - 6 sec; 4' - 10 sec; 5' - 19 sec
TP-12A	12/11/09	12	48	1' - 0.5 sec; 2' - 2 sec; 3' - 4 sec; 4' - 12 sec
TP-12B	12/11/09	32	58	1' - 0 sec; 2' - 1 sec; 3' - 3 sec; 4' - 12 sec; 4.8' - 32 sec
TP-13A	12/11/09	25	48	1' - 1 sec; 2' - 4 sec; 3' - 10 sec; 4' - 25 sec
TP-13B	12/11/09	10	34	1' - 0.5 sec; 2' - 1 sec; 3' - 10 sec
TP-14A	12/10/09	33	48	1' - 5 sec; 2' - 13 sec; 3' - 22 sec; 4' - 33 sec
TP-14B	12/10/09	17	36	1' - 5 sec; 2' - 9 sec; 3' - 17 sec
TP-15A	12/10/09	8	48	1' - 1 sec; 2' - 2 sec; 3' - 4 sec; 4' - 8 sec
TP-15B	12/10/09	26	60	1' - 2 sec; 2' - 5 sec; 3' - 11 sec; 4' - 15 sec; 5' - 26 sec
TP-16A	12/11/09	12	48	1' - 1 sec; 2' - 3 sec; 3' - 7 sec; 4' - 12 sec
TP-16B	12/11/09	27	60	1' - 1 sec; 2' - 5 sec; 3' - 8 sec; 4' - 13 sec; 5' - 27 sec
TP-17A	12/11/09	9	48	1' - 0 sec; 2' - 2 sec; 3' - 4 sec; 4' - 9 sec
TP-17B	12/11/09	35	60	1' - 3 sec; 2' - 5 sec; 3' - 10 sec; 4' - 19 sec; 5' - 35 sec
TP-18A	12/11/09	22	48	1' - 1 sec; 2' - 5 sec; 3' - 10 sec; 4' - 22 sec
TP-18B	12/11/09	11	36	1' - 1 sec; 2' - 3 sec; 3' - 11 sec
TP-19A	12/11/09	13	48	1' - 1 sec; 2' - 2 sec; 3' - 4 sec; 4' - 13 sec
TP-19B	12/11/09	18	60	1' - 0 sec; 2' - 1 sec; 3' - 4 sec; 4' - 9 sec; 5' - 18 sec
TP-20A	12/11/09	15	48	1' - 0.5 sec; 2' - 2 sec; 3' - 6 sec; 4' - 15 sec
TP-20B	12/11/09	19	60	1' - 0 sec; 2' - 2 sec; 3' - 5 sec; 4' - 10 sec; 5' - 19 sec
TP-21A	12/10/09	9	48	1' - 1 sec; 2' - 3 sec; 3' - 5 sec; 4' - 9 sec
TP-21B	12/10/09	12	56	1' - 0.5 sec; 2' - 1 sec; 3' - 5 sec; 4' - 7 sec; 4.7' - 12 sec
TP-22A	12/10/09	20	48	1' - 1 sec; 2' - 4 sec; 3' - 9 sec; 4' - 20 sec
TP-22B	12/10/09	23	58	1' - 0 sec; 2' - 4 sec; 3' - 7 sec; 4' - 12 sec; 4.8' - 23 sec
TP-23A	12/11/09	21	48	1' - 0.5 sec; 2' - 3 sec; 3' - 11 sec; 4' - 21 sec
TP-23B	12/11/09	13	36	1' - 0.5 sec; 2' - 2 sec; 3' - 13 sec
TP-24A	12/11/09	20	48	1' - 1 sec; 2' - 4 sec; 3' - 9 sec; 4' - 20 sec
TP-24B	12/11/09	6	36	1' - 1 sec; 2' - 2 sec; 3' - 6 sec

** Speed of driver with depth*

Desert Sunlight Solar Farm, Desert Center, California

Table 2

Summary of Pile Load Test Results

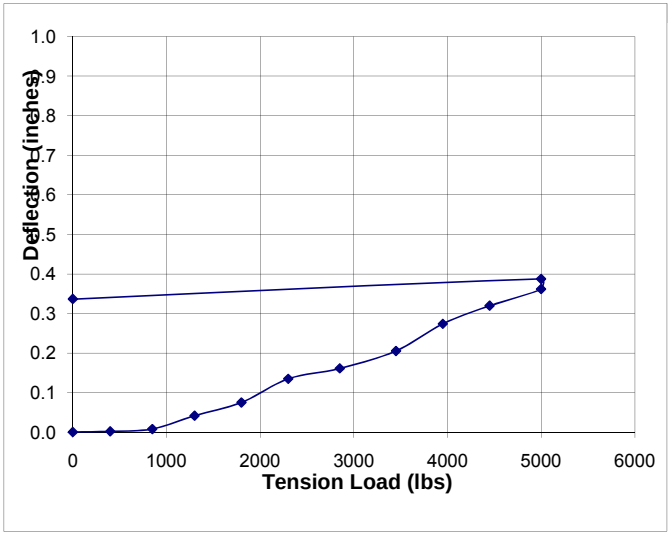
Pile Test No.	Pile Driven Depth (inches)	Max Test Uplift Load (lbs)	Deflection at Max Load (inches)	Load at 0.25 Movement (inches)	Max Test Latera Load (lbs)	Deflection at Max Load (inches)	Load at 0.50 Deflection (inches)
PT-1A	48	5000	0.39	3800	3450	0.51	3350
PT-1B	60	5000	0.54	4150	Not tested due to Eagle Mt. GM		
PT-2A	48	5000	0.20	5000	3450	0.77	1900
PT-2B	36	5000	0.44	3400	2300	0.91	200
PT-3A	48	5000	0.33	4000	3450	0.40	3450
PT-3B	58	5000	0.31	4350	3450	0.93	1400
PT-4A	47	5000	0.14	5000	3450	0.42	3450
PT-4B	40	5000	0.03	5000	2850	0.71	2000
PT-5A	48	5000	0.60	3650	2850	0.97	600
PT-5B	36	4450	0.96	2200	3450	0.61	2150
PT-6A	48	5000	0.60	4250	2300	0.90	450
PT-6B	37	4450	0.71	2900	3450	0.74	2350
PT-7A	48	2850	0.50	1700	3450	0.76	2200
PT-7B	36	850	0.37	750	3450	0.88	1050
PT-8A	48	5000	0.19	5000	3450	0.53	3200
PT-8B	35	3450	0.40	2750	1800	1.01	750
PT-9A	48	5000	0.37	3500	2850	0.90	1850
PT-9B	56	5000	0.02	5000	3450	0.32	3450
PT-10A	45	3450	0.57	2650	2300	1.04	100
PT-10B	60	5000	0.71	1950	2300	0.95	250
PT-11A	48	5000	0.14	5000	3000	0.86	1700
PT-11B	60	5000	0.04	5000	3000	0.42	3000
PT-12A	48	5000	0.08	5000	3000	0.37	3000
PT-12B	58	5000	0.01	5000	3000	0.41	3000
PT-13A	48	5000	0.01	5000	3450	0.24	3450
PT-13B	34	5000	0.11	4300	3450	0.58	3000
PT-14A	48	5000	0.04	5000	3450	0.63	2550
PT-14B	36	5000	0.48	3450	3450	0.75	1800
PT-15A	48	3950	1.02	1200	2850	0.92	1200
PT-15B	60	5000	0.29	4800	3450	0.79	1900
PT-16A	48	5000	0.72	3050	2300	0.86	750
PT-16B	60	5000	0.19	5000	2850	1.07	750
PT-17A	48	2300	0.89	900	2300	0.97	300
PT-17B	60	5000	0.07	5000	2850	0.98	850
PT-18A	48	5000	0.32	4400	1800	0.63	1000
PT-18B	36	5000	0.68	2700	2300	0.87	200
PT-19A	48	5000	0.15	5000	3450	0.70	2300
PT-19B	60	5000	0.06	5000	2850	0.84	1250
PT-20A	48	5000	0.17	5000	3450	0.55	3150
PT-20B	60	5000	0.07	5000	3450	0.56	3100
PT-21A	48	5000	0.44	3700	3450	0.79	2500
PT-21B	56	5000	0.45	4250	3450	0.85	2200
PT-22A	48	5000	0.11	5000	3450	0.49	3450
PT-22B	58	5000	0.02	5000	3450	0.79	2150
PT-23A	48	5000	0.13	5000	3000	0.44	3000
PT-23B	36	5000	0.32	4350	3000	0.64	2300
PT-24A	48	5000	0.04	5000	3450	0.27	3450
PT-24B	36	3450	0.45	2350	2300	0.86	150

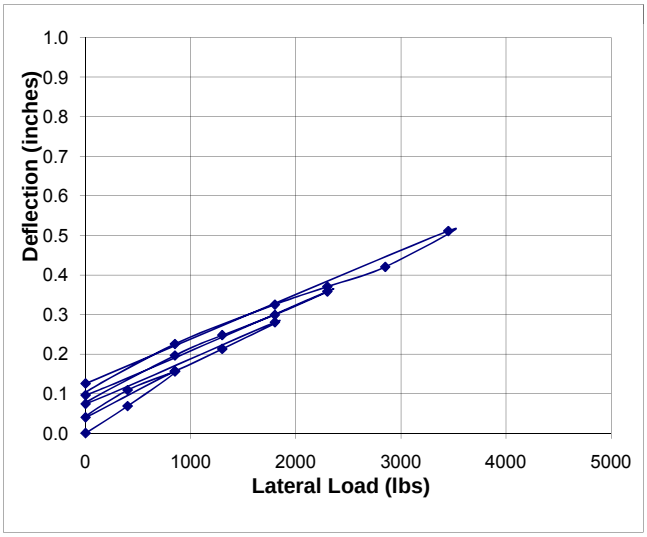
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-1A
Date:	12/14/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
3:26	0	0	0.000	0.000	0.000		3:42	0	0	0.000	0.000	
	200	400	0.004	0.001	0.002			200	400	0.069	0.069	
	400	850	0.011	0.005	0.008			400	850	0.156	0.156	
	600	1300	0.046	0.037	0.042			0	0	0.040	0.040	
	800	1800	0.081	0.069	0.075			200	400	0.109	0.109	
	1000	2300	0.144	0.126	0.135			400	850	0.157	0.157	
	1200	2850	0.171	0.152	0.161			600	1300	0.213	0.213	
	1400	3450	0.215	0.196	0.205			800	1800	0.281	0.281	
	1600	3950	0.287	0.261	0.274			0	0	0.074	0.074	
	1800	4450	0.337	0.303	0.320			400	850	0.197	0.197	
3:30	2000	5000	0.380	0.343	0.362			600	1300	0.248	0.248	
3:35	2000	5000	0.407	0.368	0.387			800	1800	0.299	0.299	
	0	0	0.346	0.328	0.337			1000	2300	0.359	0.359	
								0	0	0.096	0.096	
								400	850	0.226	0.226	
								800	1800	0.325	0.325	
								1000	2300	0.371	0.371	
								1200	2850	0.421	0.421	
								1400	3450	0.512	0.512	
							3:41	0	0	0.126	0.126	

Notes:





EARTH SYSTEMS SOUTHWEST

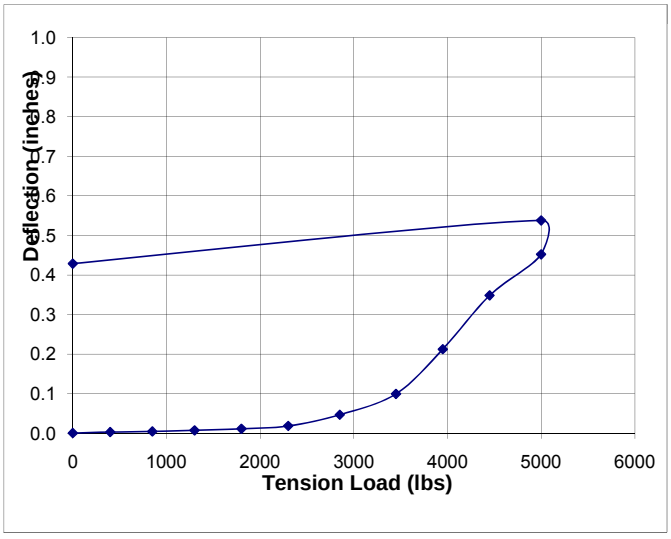
* - Gages reading positive with vertical displacement

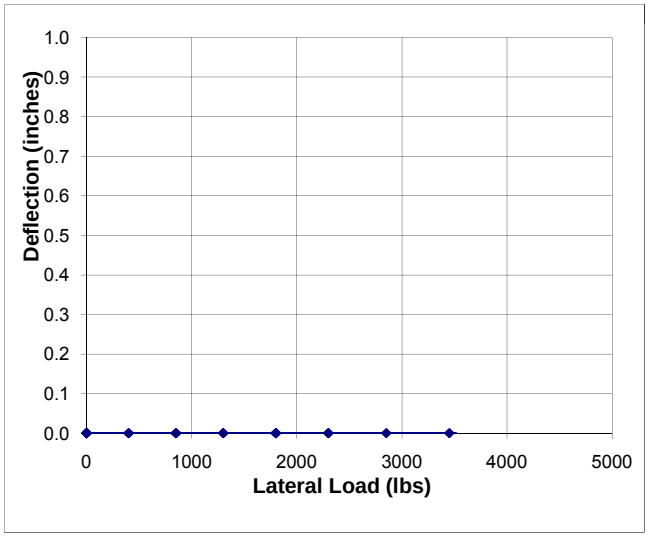
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-1B
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**60**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
7:30	0	0	0.000	0.000	0.000			0	0		0.000	
	200	400	-0.002	0.007	0.003			200	400		0.000	
	400	850	-0.003	0.012	0.004			400	850		0.000	
	600	1300	-0.004	0.018	0.007			0	0		0.000	
	800	1800	-0.005	0.027	0.011			200	400		0.000	
	1000	2300	-0.005	0.041	0.018			400	850		0.000	
	1200	2850	0.018	0.076	0.047			600	1300		0.000	
	1400	3450	0.061	0.138	0.099			800	1800		0.000	
	1600	3950	0.157	0.268	0.212			0	0		0.000	
	1800	4450	0.241	0.456	0.348			400	850		0.000	
7:35	2000	5000	0.283	0.622	0.452			600	1300		0.000	
7:40	2000	5000	0.445	0.632	0.538			800	1800		0.000	
	0	0	0.397	0.461	0.429			1000	2300		0.000	
								0	0		0.000	
								400	850		0.000	
								800	1800		0.000	
								1000	2300		0.000	
								1200	2850		0.000	
								1400	3450		0.000	
								0	0		0.000	

Notes: Cobbles& Boulders





EARTH SYSTEMS SOUTHWEST

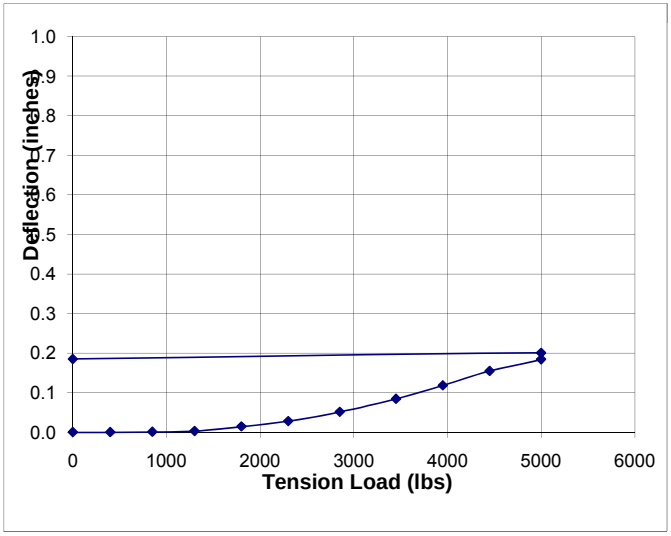
* - Gages reading positive with vertical displacement

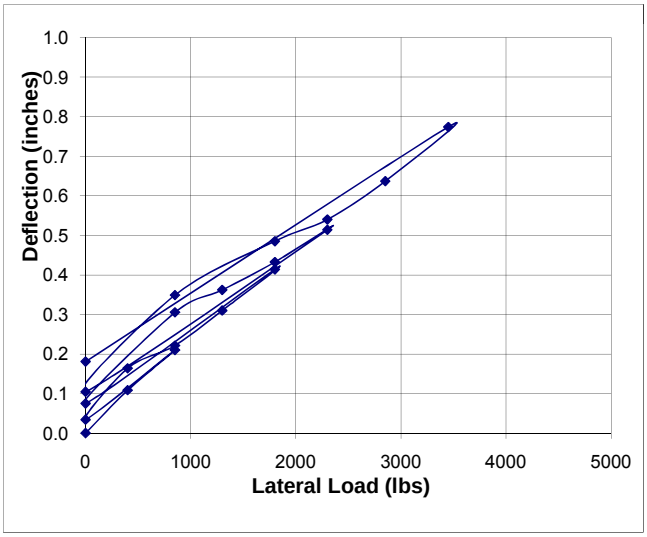
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-2A
Date:	12/14/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
1:49	0	0	0.000	0.000	0.000		2:07	0	0	0.000	0.000	
	200	400	0.000	0.000	0.000			200	400	0.109	0.109	
	400	850	0.002	0.000	0.001			400	850	0.210	0.210	
	600	1300	0.006	0.000	0.003			0	0	0.034	0.034	
	800	1800	0.014	0.016	0.015			200	400	0.164	0.164	
	1000	2300	0.028	0.028	0.028			400	850	0.222	0.222	
	1200	2850	0.055	0.049	0.052			600	1300	0.310	0.310	
	1400	3450	0.090	0.079	0.084			800	1800	0.414	0.414	
	1600	3950	0.126	0.111	0.118			0	0	0.075	0.075	
	1800	4450	0.165	0.145	0.155			400	850	0.306	0.306	
1:54	2000	5000	0.196	0.173	0.184			600	1300	0.362	0.362	
1:59	2000	5000	0.212	0.190	0.201			800	1800	0.433	0.433	
	0	0	0.183	0.187	0.185			1000	2300	0.514	0.514	
								0	0	0.105	0.105	
								400	850	0.349	0.349	
								800	1800	0.485	0.485	
								1000	2300	0.540	0.540	
								1200	2850	0.637	0.637	
								1400	3450	0.774	0.774	
							2:18	0	0	0.181	0.181	

Notes:





EARTH SYSTEMS SOUTHWEST

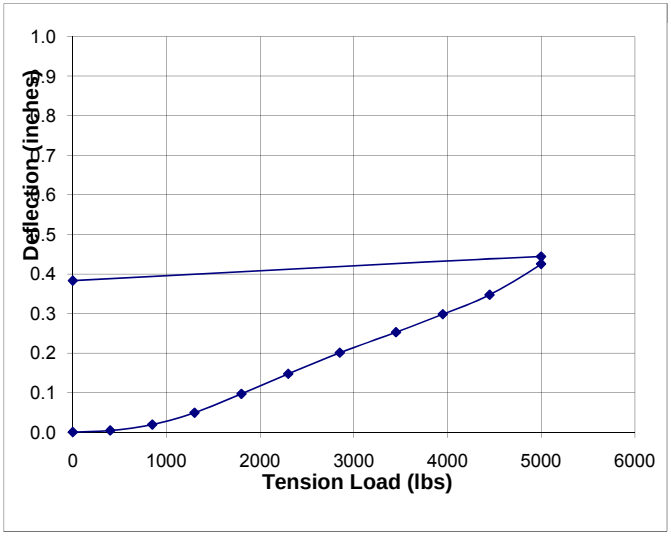
* - Gages reading positive with vertical displacement

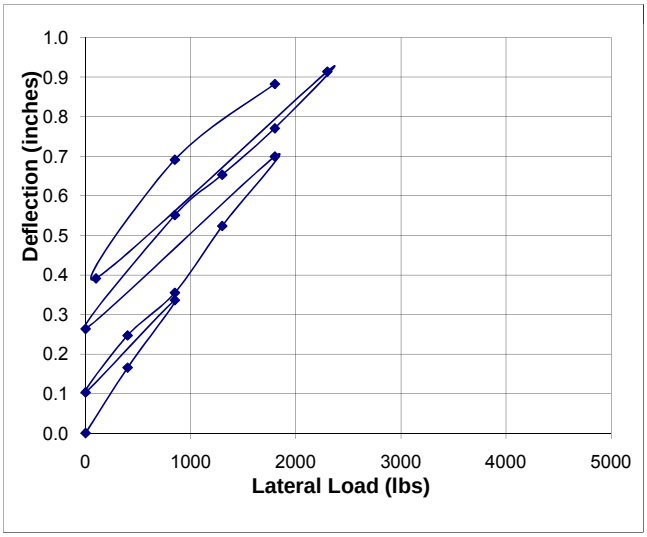
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-2B
Date:	12/14/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**36**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
2:22	0	0	0.001	-0.002	0.000		2:41	0	0	0.000	0.000	
	200	400	0.009	-0.002	0.004			200	400	0.166	0.166	
	400	850	0.030	0.008	0.019			400	850	0.336	0.336	
	600	1300	0.067	0.031	0.049			0	0	0.103	0.103	
	800	1800	0.123	0.070	0.097			200	400	0.247	0.247	
	1000	2300	0.179	0.115	0.147			400	850	0.355	0.355	
	1200	2850	0.239	0.162	0.201			600	1300	0.524	0.524	
	1400	3450	0.296	0.208	0.253			800	1800	0.699	0.699	
	1600	3950	0.348	0.248	0.298			0	0	0.264	0.264	
	1800	4450	0.404	0.290	0.347			400	850	0.551	0.551	
2:27	2000	5000	0.490	0.360	0.425			600	1300	0.653	0.653	
2:32	2000	5000	0.509	0.378	0.444			800	1800	0.771	0.771	
	0	0	0.410	0.356	0.383			1000	2300	0.914	0.914	
								0	0	0.391	0.391	
								400	850	0.691	0.691	
								800	1800	0.883	0.883	
							2:49	0	0	0.439	0.439	

Notes:





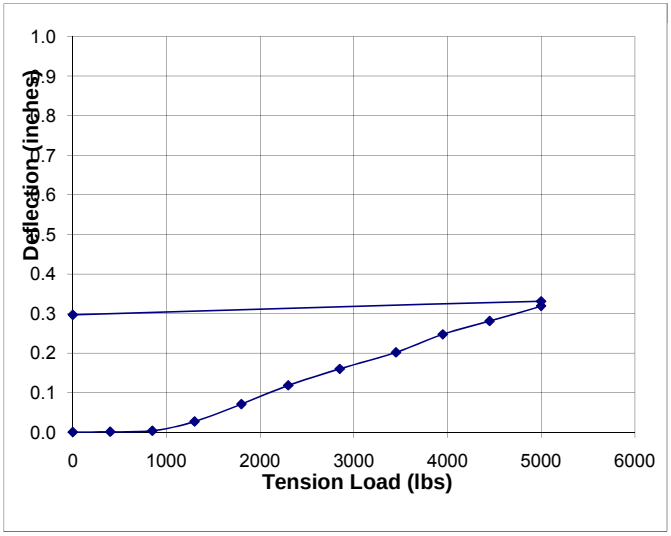
* - Gages reading positive with vertical displacement

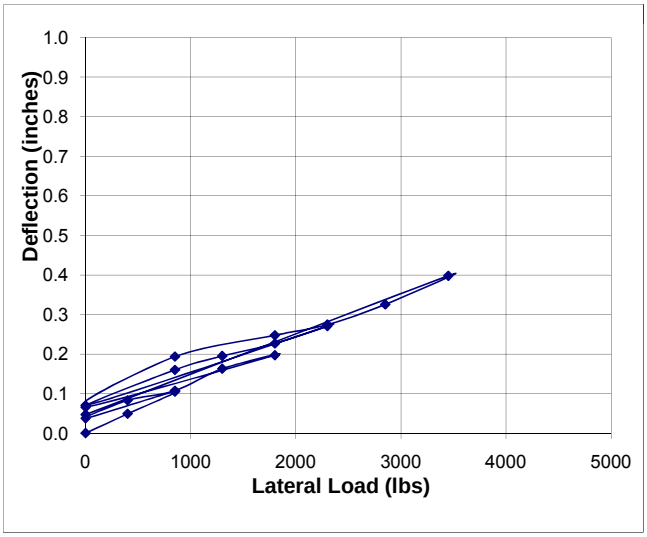
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-3A
Date:	12/14/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
12:55	0	0	0.000	0.000	0.000		1:14	0	0	0.000	0.000	
	200	400	0.002	0.000	0.001			200	400	0.049	0.049	
	400	850	0.007	0.000	0.004			400	850	0.105	0.105	
	600	1300	0.033	0.021	0.027			0	0	0.038	0.038	
	800	1800	0.077	0.066	0.071			200	400	0.083	0.083	
	1000	2300	0.126	0.111	0.118			400	850	0.108	0.108	
	1200	2850	0.168	0.152	0.160			600	1300	0.163	0.163	
	1400	3450	0.212	0.192	0.202			800	1800	0.197	0.197	
	1600	3950	0.259	0.236	0.248			0	0	0.066	0.066	
	1800	4450	0.292	0.271	0.281			400	850	0.160	0.160	
1:00	2000	5000	0.330	0.309	0.319			600	1300	0.195	0.195	
1:05	2000	5000	0.334	0.328	0.331			800	1800	0.227	0.227	
	0	0	0.298	0.296	0.297			1000	2300	0.271	0.271	
								0	0	0.070	0.070	
								400	850	0.194	0.194	
								800	1800	0.248	0.248	
								1000	2300	0.275	0.275	
								1200	2850	0.326	0.326	
								1400	3450	0.398	0.398	
							1:15	0	0	0.047	0.047	

Notes:





EARTH SYSTEMS SOUTHWEST

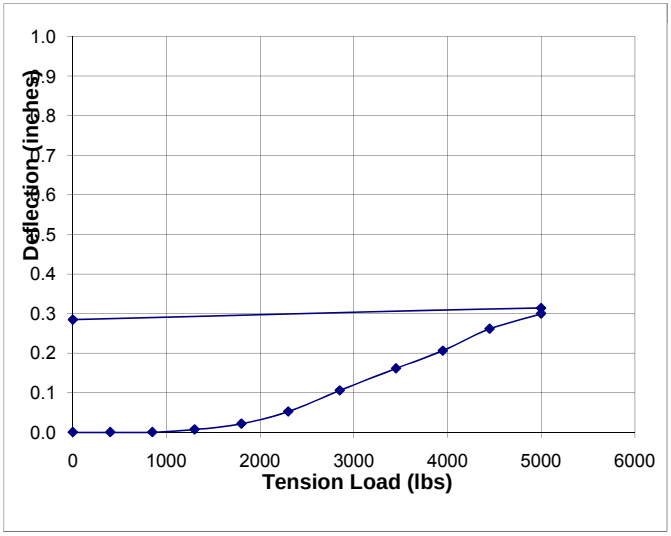
* - Gages reading positive with vertical displacement

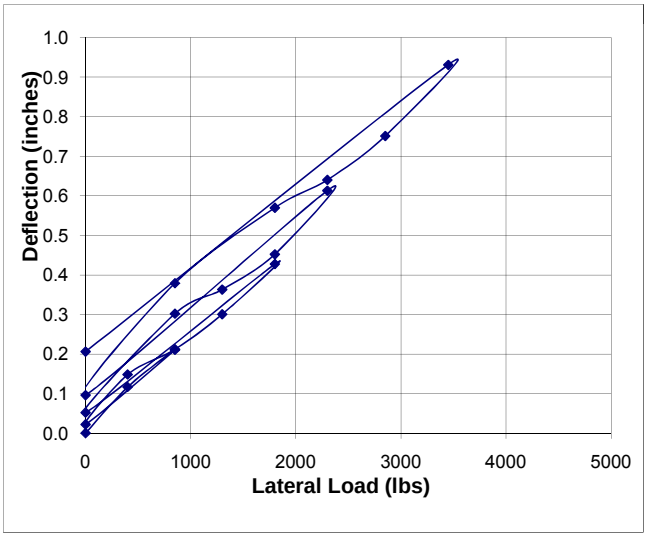
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-3B
Date:	14-Dec
Pile Size:	W6 x 7.2
Driven Depth (in.):	**58**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
12:22	0	0	0.000	0.000	0.000		12:41	0	0	0.000	0.000	
	200	400	0.000	0.000	0.000			200	400	0.117	0.117	
	400	850	0.000	0.000	0.000			400	850	0.211	0.211	
	600	1300	0.007	0.007	0.007			0	0	0.022	0.022	
	800	1800	0.023	0.021	0.022			200	400	0.148	0.148	
	1000	2300	0.053	0.052	0.052			400	850	0.212	0.212	
	1200	2850	0.112	0.100	0.106			600	1300	0.301	0.301	
	1400	3450	0.171	0.152	0.161			800	1800	0.428	0.428	
	1600	3950	0.222	0.191	0.206			0	0	0.052	0.052	
	1800	4450	0.283	0.240	0.261			400	850	0.302	0.302	
12:28	2000	5000	0.326	0.274	0.300			600	1300	0.363	0.363	
12:33	2000	5000	0.339	0.289	0.314			800	1800	0.452	0.452	
	0	0	0.293	0.277	0.285			1000	2300	0.613	0.613	
								0	0	0.096	0.096	
								400	850	0.379	0.379	
								800	1800	0.570	0.570	
								1000	2300	0.640	0.640	
								1200	2850	0.751	0.751	
								1400	3450	0.931	0.931	
							12:42	0	0	0.206	0.206	

Notes:





EARTH SYSTEMS SOUTHWEST

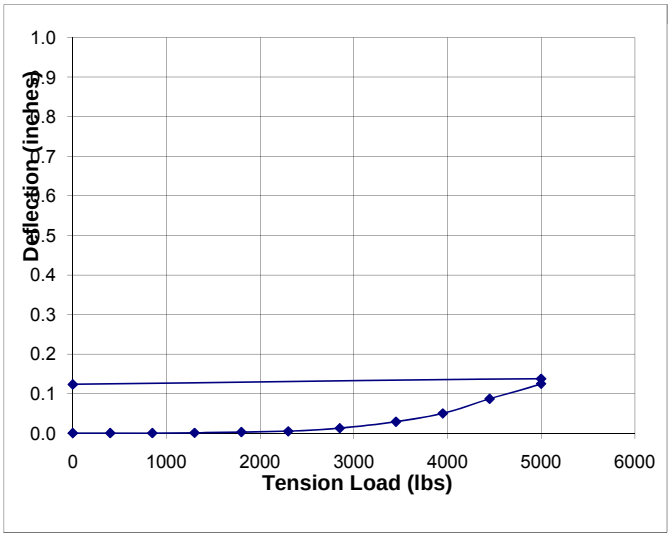
* - Gages reading positive with vertical displacement

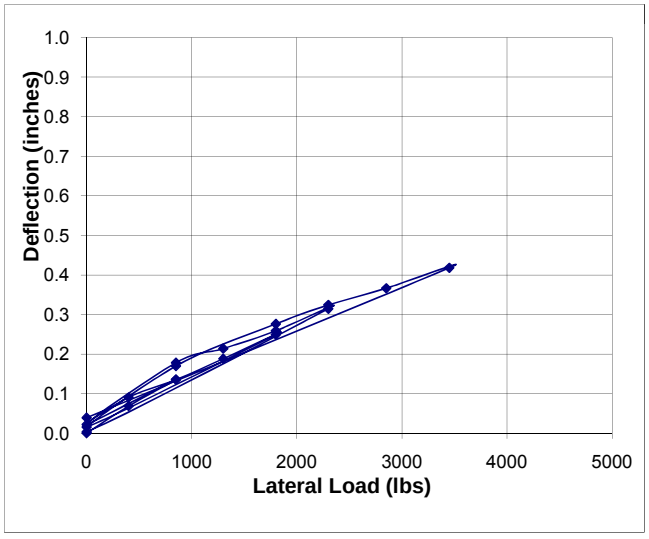
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-4A
Date:	12/14/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**47**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
11:30	0	0	0.000	-0.001	0.000		11:50	0	0	0.000	0.000	
	200	400	0.001	-0.002	0.000			200	400	0.069	0.069	
	400	850	0.000	-0.001	0.000			400	850	0.136	0.136	
	600	1300	0.000	0.001	0.001			0	0	0.022	0.022	
	800	1800	0.002	0.003	0.003			200	400	0.091	0.091	
	1000	2300	0.004	0.005	0.005			400	850	0.135	0.135	
	1200	2850	0.012	0.013	0.013			600	1300	0.188	0.188	
	1400	3450	0.028	0.030	0.029			800	1800	0.249	0.249	
	1600	3950	0.048	0.051	0.050			0	0	0.016	0.016	
	1800	4450	0.086	0.087	0.087			400	850	0.178	0.178	
11:36	2000	5000	0.124	0.126	0.125			600	1300	0.214	0.214	
11:41	2000	5000	0.137	0.138	0.138			800	1800	0.259	0.259	
	0	0	0.124	0.122	0.124			1000	2300	0.315	0.315	
								0	0	0.003	0.003	
								400	850	0.170	0.170	
								800	1800	0.276	0.276	
								1000	2300	0.324	0.324	
								1200	2850	0.366	0.366	
								1400	3450	0.418	0.418	
							12:00	0	0	0.039	0.039	

Notes:





EARTH SYSTEMS SOUTHWEST

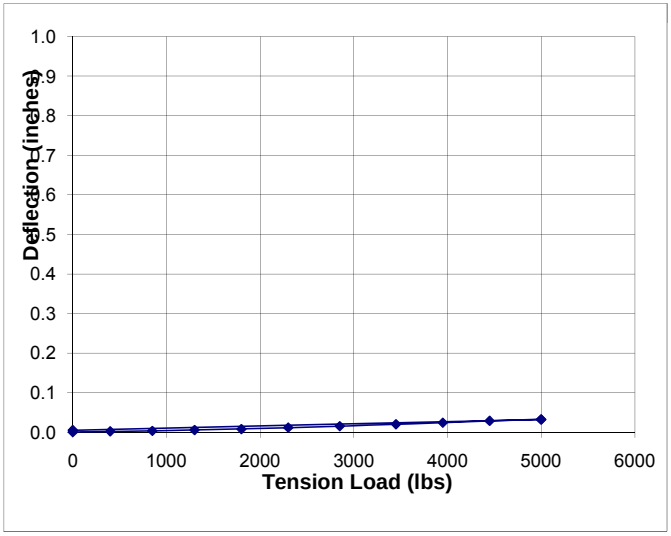
* - Gages reading positive with vertical displacement

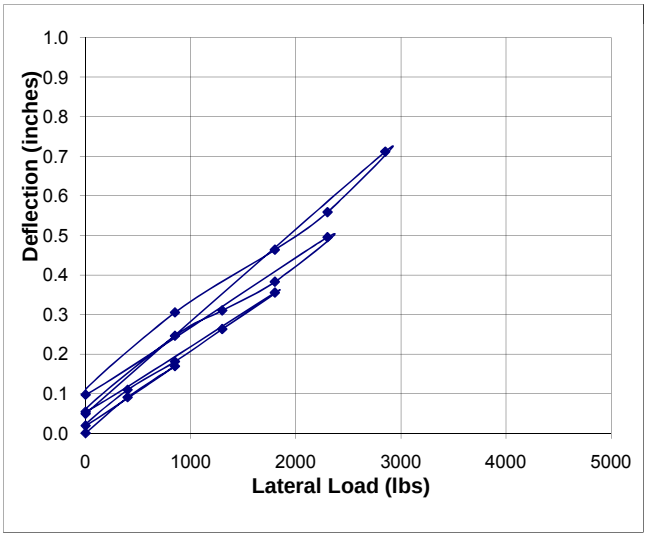
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-4B
Date:	12/14/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**40**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
10:57	0	0	0.000	0.000	0.000		11:12	0	0	0.000	0.000	
	200	400	0.002	0.002	0.002			200	400	0.091	0.091	
	400	850	0.003	0.004	0.003			400	850	0.169	0.169	
	600	1300	0.007	0.005	0.006			0	0	0.019	0.019	
	800	1800	0.010	0.006	0.008			200	400	0.110	0.110	
	1000	2300	0.017	0.007	0.012			400	850	0.181	0.181	
	1200	2850	0.024	0.007	0.015			600	1300	0.263	0.263	
	1400	3450	0.036	0.005	0.020			800	1800	0.355	0.355	
	1600	3950	0.050	-0.002	0.024			0	0	0.054	0.054	
	1800	4450	0.072	-0.014	0.029			400	850	0.246	0.246	
11:01	2000	5000	0.099	-0.034	0.033			600	1300	0.310	0.310	
11:06	2000	5000	0.100	-0.036	0.032			800	1800	0.383	0.383	
	0	0	0.060	-0.050	0.005			1000	2300	0.495	0.495	
								0	0	0.097	0.097	
								400	850	0.305	0.305	
								800	1800	0.464	0.464	
								1000	2300	0.559	0.559	
								1200	2850	0.712	0.712	
							11:21	0	0	0.049	0.049	

Notes:





EARTH SYSTEMS SOUTHWEST

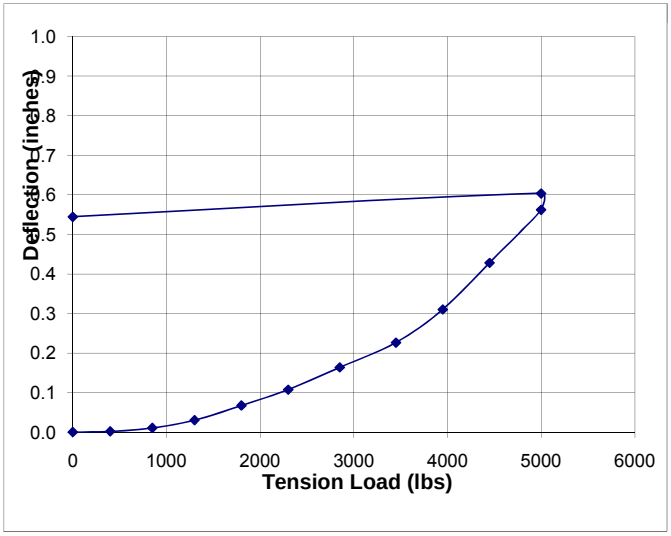
* - Gages reading positive with vertical displacement

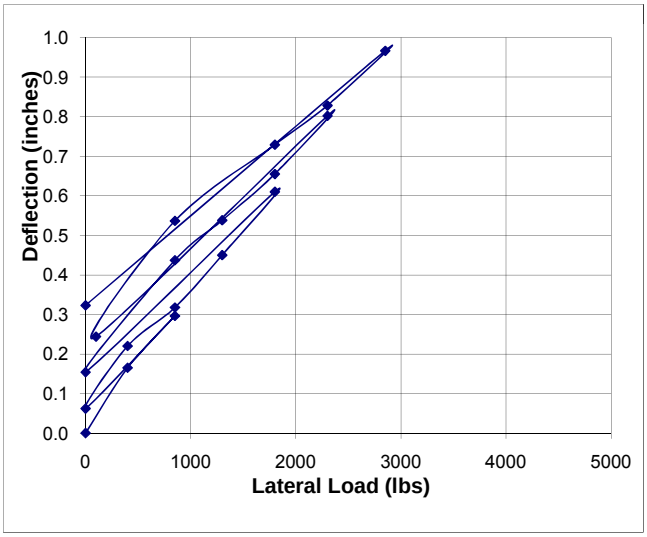
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-5A
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
3:12	0	0	0.000	0.000	0.000		3:27	0	0	0.000	0.000	
	200	400	0.004	0.001	0.002			200	400	0.165	0.165	
	400	850	0.013	0.008	0.011			400	850	0.296	0.296	
	600	1300	0.035	0.026	0.030			0	0	0.062	0.062	
	800	1800	0.073	0.062	0.067			200	400	0.220	0.220	
	1000	2300	0.115	0.100	0.108			400	850	0.318	0.318	
	1200	2850	0.171	0.157	0.164			600	1300	0.450	0.450	
	1400	3450	0.235	0.218	0.227			800	1800	0.610	0.610	
	1600	3950	0.317	0.303	0.310			0	0	0.154	0.154	
	1800	4450	0.430	0.426	0.428			400	850	0.437	0.437	
3:16	2000	5000	0.562	0.563	0.563			600	1300	0.538	0.538	
3:21	2000	5000	0.603	0.605	0.604			800	1800	0.655	0.655	
	0	0	0.548	0.541	0.545			1000	2300	0.802	0.802	
								0	0	0.244	0.244	
								400	850	0.537	0.537	
								800	1800	0.729	0.729	
								1000	2300	0.828	0.828	
								1200	2850	0.967	0.967	
							3:36	0	0	0.323	0.323	

Notes:





EARTH SYSTEMS SOUTHWEST

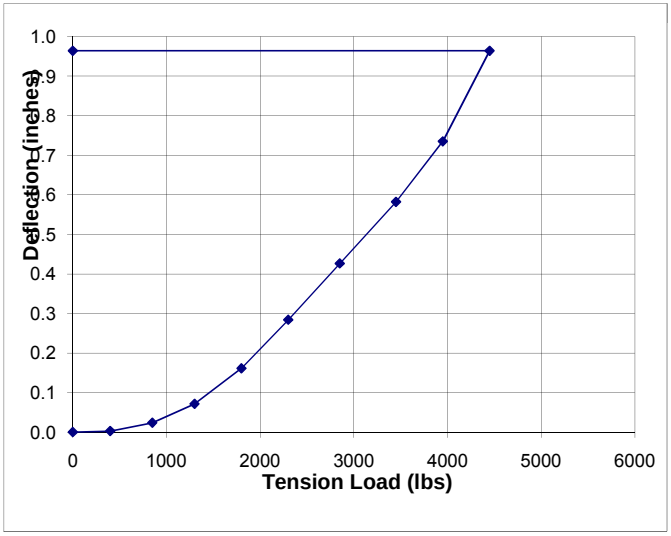
* - Gages reading positive with vertical displacement

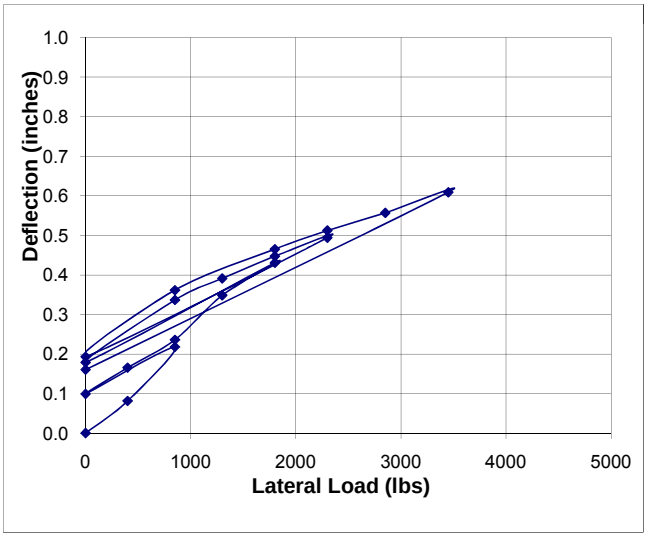
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-5B
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**36**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
2:52	0	0	0.000	0.000	0.000		3:01	0	0	0.000	0.000	
	200	400	0.006	0.000	0.003			200	400	0.082	0.082	
	400	850	0.031	0.017	0.024			400	850	0.218	0.218	
	600	1300	0.080	0.063	0.072			0	0	0.099	0.099	
	800	1800	0.173	0.150	0.161			200	400	0.166	0.166	
	1000	2300	0.297	0.272	0.284			400	850	0.236	0.236	
	1200	2850	0.443	0.411	0.427			600	1300	0.349	0.349	
	1400	3450	0.598	0.566	0.582			800	1800	0.431	0.431	
	1600	3950	0.755	0.715	0.735			0	0	0.179	0.179	
	1800	4450	0.987	0.941	0.964			400	850	0.337	0.337	
2:55	0	0	0.987	0.941	0.964			600	1300	0.391	0.391	
								800	1800	0.447	0.447	
								1000	2300	0.494	0.494	
								0	0	0.193	0.193	
								400	850	0.362	0.362	
								800	1800	0.465	0.465	
								1000	2300	0.512	0.512	
								1200	2850	0.557	0.557	
								1400	3450	0.609	0.609	
							3:11	0	0	0.161	0.161	

Notes:





EARTH SYSTEMS SOUTHWEST

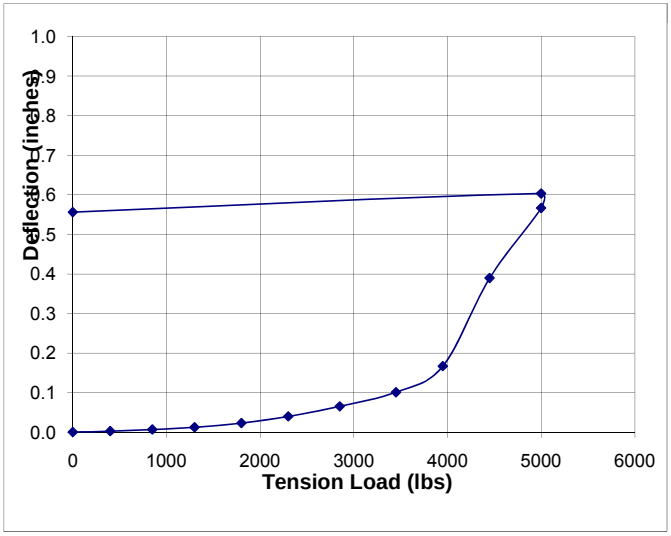
* - Gages reading positive with vertical displacement

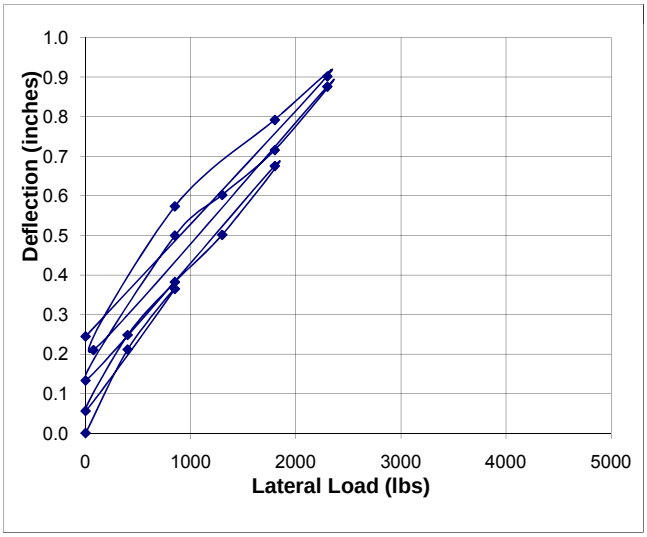
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-6A
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
11:34	0	0	0.000	0.000	0.000		11:53	0	0	0.000	0.000	
	200	400	0.002	0.003	0.003			200	400	0.212	0.212	
	400	850	0.003	0.010	0.007			400	850	0.365	0.365	
	600	1300	0.008	0.017	0.012			0	0	0.056	0.056	
	800	1800	0.017	0.030	0.023			200	400	0.248	0.248	
	1000	2300	0.030	0.050	0.040			400	850	0.382	0.382	
	1200	2850	0.052	0.079	0.065			600	1300	0.502	0.502	
	1400	3450	0.084	0.119	0.101			800	1800	0.676	0.676	
	1600	3950	0.145	0.189	0.167			0	0	0.133	0.133	
	1800	4450	0.361	0.419	0.390			400	850	0.500	0.500	
11:39	2000	5000	0.546	0.588	0.567			600	1300	0.602	0.602	
11:44	2000	5000	0.583	0.624	0.603			800	1800	0.716	0.716	
	0	0	0.543	0.569	0.556			1000	2300	0.876	0.876	
								0	0	0.210	0.210	
								400	850	0.574	0.574	
								800	1800	0.792	0.792	
								1000	2300	0.902	0.902	
							12:04	0	0	0.245	0.245	

Notes:





EARTH SYSTEMS SOUTHWEST

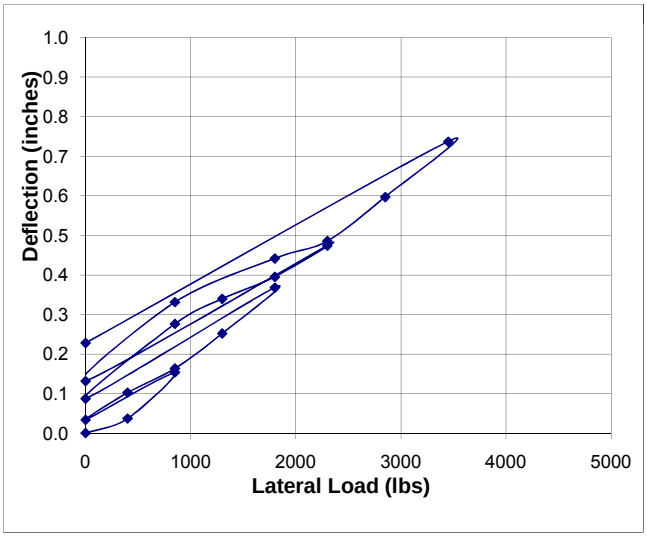
* - Gages reading positive with vertical displacement

Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-6B
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**37**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
11:22	0	0	0.000	0.000	0.000		12:02	0	0	0.000	0.000	
	200	400	0.002	0.006	0.004			200	400	0.037	0.037	
	400	850	0.017	0.029	0.023			400	850	0.154	0.154	
	600	1300	0.055	0.068	0.061			0	0	0.034	0.034	
	800	1800	0.118	0.134	0.126			200	400	0.103	0.103	
	1000	2300	0.181	0.197	0.189			400	850	0.164	0.164	
	1200	2850	0.232	0.250	0.241			600	1300	0.252	0.252	
	1400	3450	0.314	0.330	0.322			800	1800	0.368	0.368	
	1600	3950	0.420	0.439	0.429			0	0	0.087	0.087	
11:27	1800	4450	0.701	0.718	0.710			400	850	0.276	0.276	
								600	1300	0.340	0.340	
								800	1800	0.395	0.395	
								1000	2300	0.474	0.474	
								0	0	0.132	0.132	
								400	850	0.331	0.331	
								800	1800	0.442	0.442	
								1000	2300	0.486	0.486	
								1200	2850	0.597	0.597	
								1400	3450	0.737	0.737	
							12:12	0	0	0.228	0.228	

Notes:



EARTH SYSTEMS SOUTHWEST

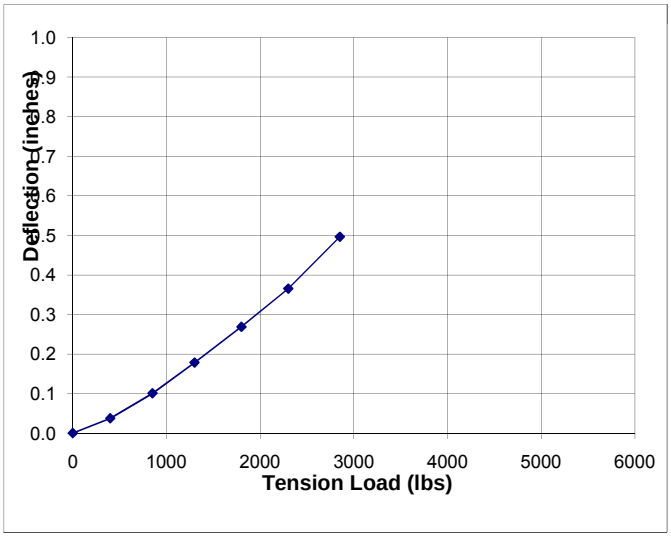
* - Gages reading positive with vertical displacement

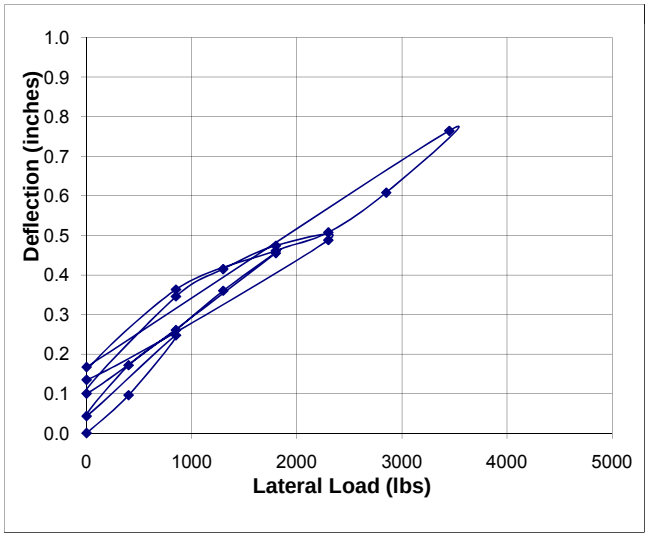
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-7A
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
7:44	0	0	0.000	0.002	0.000		8:08	0	0	0.000	0.000	
	200	400	0.037	0.040	0.038			200	400	0.096	0.096	
	400	850	0.100	0.103	0.101			400	850	0.248	0.248	
	600	1300	0.177	0.182	0.179			0	0	0.043	0.043	
	800	1800	0.266	0.273	0.269			200	400	0.172	0.172	
	1000	2300	0.363	0.370	0.366			400	850	0.261	0.261	
7:47	1200	2850	0.494	0.501	0.497			600	1300	0.360	0.360	
								800	1800	0.455	0.455	
								0	0	0.100	0.100	
								400	850	0.346	0.346	
								600	1300	0.415	0.415	
								800	1800	0.474	0.474	
								1000	2300	0.488	0.488	
								0	0	0.135	0.135	
								400	850	0.363	0.363	
								800	1800	0.461	0.461	
								1000	2300	0.508	0.508	
								1200	2850	0.608	0.608	
								1400	3450	0.765	0.765	
							8:17	0	0	0.167	0.167	

Notes:





EARTH SYSTEMS SOUTHWEST

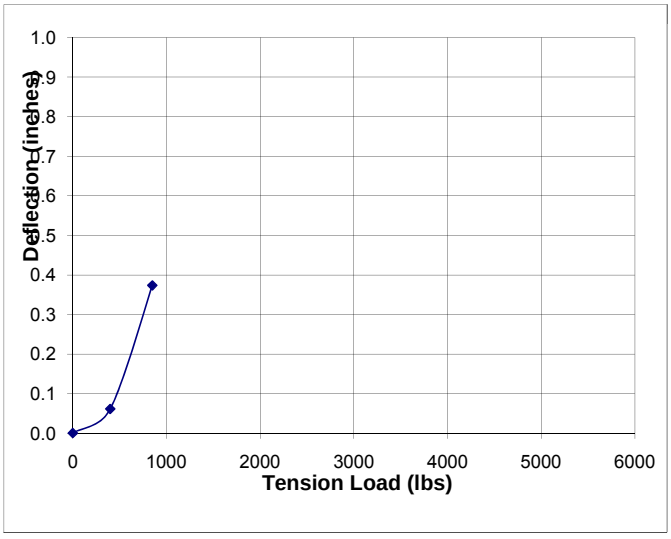
* - Gages reading positive with vertical displacement

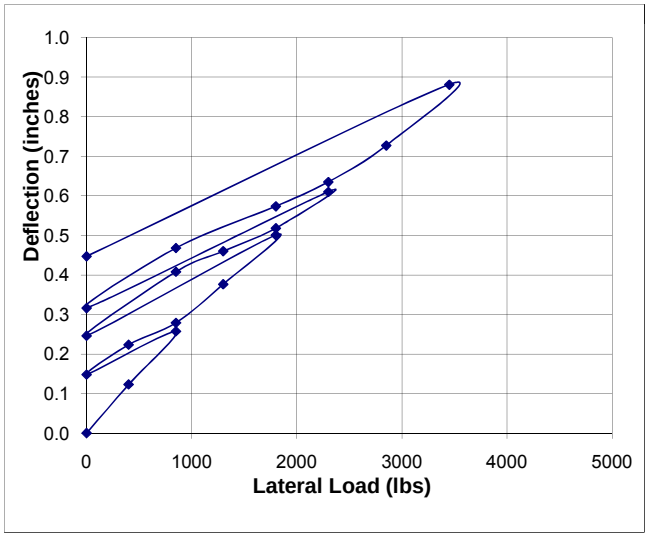
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-7B
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**36**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
7:33	0	0	0.000	0.000	0.000		7:58	0	0	0.002	0.000	
	200	400	0.054	0.069	0.061			200	400	0.125	0.123	
7:34	400	850	0.361	0.387	0.374			400	850	0.260	0.258	
								0	0	0.150	0.148	
								200	400	0.226	0.224	
								400	850	0.281	0.279	
								600	1300	0.379	0.377	
								800	1800	0.503	0.501	
								0	0	0.248	0.246	
								400	850	0.410	0.408	
								600	1300	0.462	0.460	
								800	1800	0.520	0.518	
								1000	2300	0.612	0.610	
								0	0	0.318	0.316	
								400	850	0.470	0.468	
								800	1800	0.576	0.574	
								1000	2300	0.637	0.635	
								1200	2850	0.729	0.727	
								1400	3450	0.883	0.881	
							8:09	0	0	0.449	0.447	

Notes:





EARTH SYSTEMS SOUTHWEST

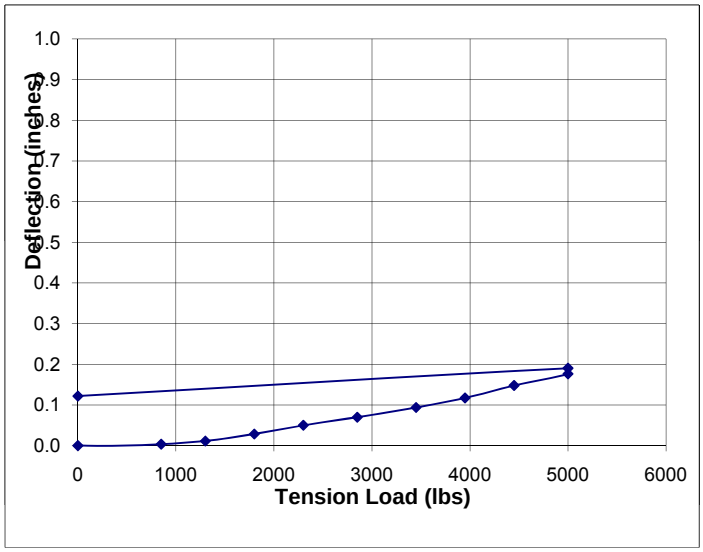
* - Gages reading positive with vertical displacement

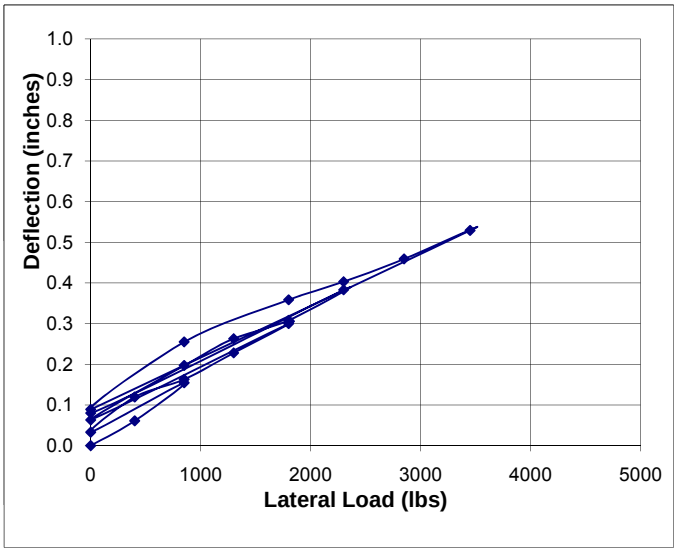
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-8A
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
7:18	0	0	0.000	0.000	0.000		8:01	0	0	0.000	0.000	
	200	400	-0.003	0.002	-0.001			200	400	0.061	0.061	
	400	850	-0.001	0.008	0.004			400	850	0.155	0.155	
	600	1300	0.006	0.017	0.011			0	0	0.033	0.033	
	800	1800	0.022	0.035	0.029			200	400	0.120	0.120	
	1000	2300	0.044	0.057	0.050			400	850	0.163	0.163	
	1200	2850	0.063	0.077	0.070			600	1300	0.228	0.228	
	1400	3450	0.086	0.102	0.094			800	1800	0.300	0.300	
	1600	3950	0.108	0.126	0.117			0	0	0.063	0.063	
	1800	4450	0.140	0.156	0.148			400	850	0.197	0.197	
7:23	2000	5000	0.166	0.187	0.176			600	1300	0.263	0.263	
7:28	2000	5000	0.180	0.201	0.190			800	1800	0.308	0.308	
	0	0	0.114	0.130	0.122			1000	2300	0.383	0.383	
								0	0	0.080	0.080	
								400	850	0.255	0.255	
								800	1800	0.359	0.359	
								1000	2300	0.403	0.403	
								1200	2850	0.459	0.459	
								1400	3450	0.529	0.529	
							8:11	0	0	0.089	0.089	

Notes:





EARTH SYSTEMS SOUTHWEST

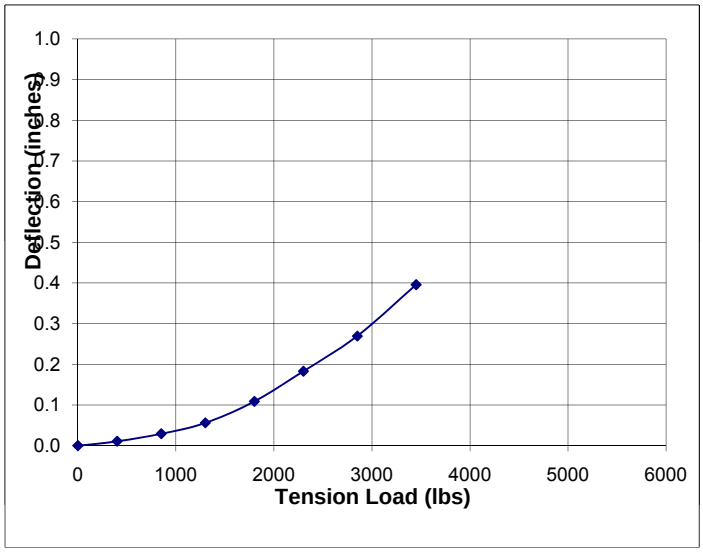
* - Gages reading positive with vertical displacement

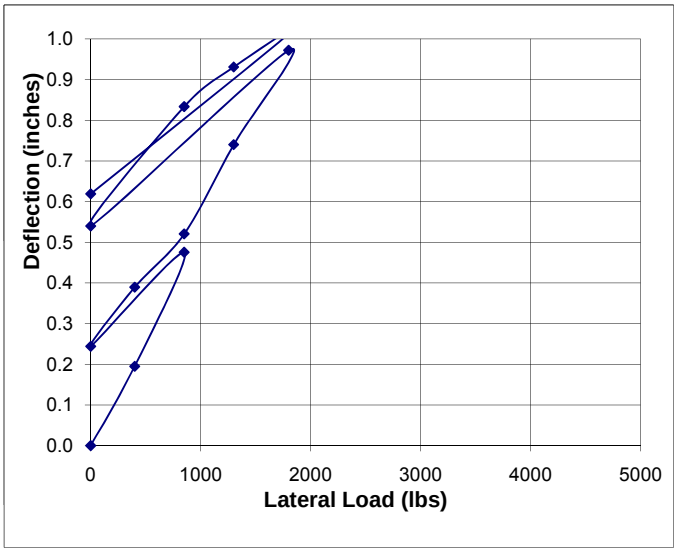
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-8B
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**35**
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
8:37	0	0	0.000	0.000	0.000		7:50	0	0	0.000	0.000	
	200	400	0.015	0.007	0.011			200	400	0.195	0.195	
	400	850	0.033	0.026	0.029			400	850	0.476	0.476	
	600	1300	0.059	0.053	0.056			0	0	0.244	0.244	
	800	1800	0.110	0.108	0.109			200	400	0.390	0.390	
	1000	2300	0.185	0.182	0.183			400	850	0.521	0.521	
	1200	2850	0.271	0.269	0.270			600	1300	0.740	0.740	
8:40	1400	3450	0.398	0.394	0.396			800	1800	0.972	0.972	
								0	0	0.540	0.540	
								400	850	0.834	0.834	
								600	1300	0.931	0.931	
							7:53	800	1800	1.013	1.013	
								0	0	0.619	0.619	

Notes:





EARTH SYSTEMS SOUTHWEST

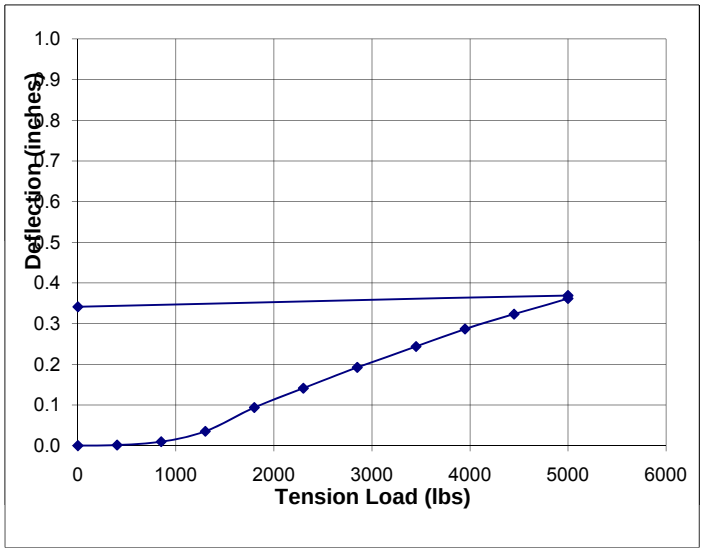
* - Gages reading positive with vertical displacement

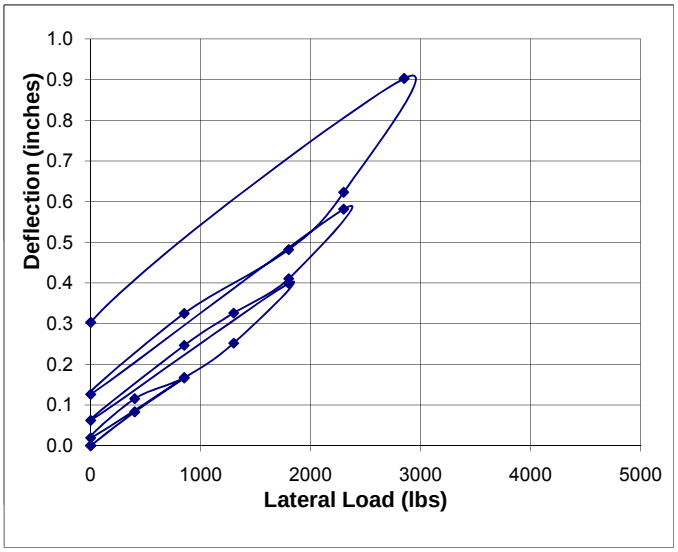
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-9A
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
9:08	0	0	0.000	0.001	0.000		9:27	0	0	0.000	0.000	
	200	400	0.001	0.003	0.002			200	400	0.083	0.083	
	400	850	0.009	0.012	0.010			400	850	0.167	0.167	
	600	1300	0.034	0.038	0.035			0	0	0.019	0.019	
	800	1800	0.091	0.098	0.094			200	400	0.116	0.116	
	1000	2300	0.136	0.148	0.141			400	850	0.168	0.168	
	1200	2850	0.185	0.202	0.193			600	1300	0.252	0.252	
	1400	3450	0.234	0.255	0.244			800	1800	0.399	0.399	
	1600	3950	0.275	0.300	0.287			0	0	0.062	0.062	
	1800	4450	0.311	0.337	0.324			400	850	0.247	0.247	
9:15	2000	5000	0.348	0.378	0.362			600	1300	0.326	0.326	
9:20	2000	5000	0.355	0.385	0.369			800	1800	0.411	0.411	
	0	0	0.337	0.348	0.342			1000	2300	0.582	0.582	
								0	0	0.126	0.126	
								400	850	0.325	0.325	
								800	1800	0.482	0.482	
								1000	2300	0.623	0.623	
								1200	2850	0.903	0.903	
							9:36	0	0	0.303	0.303	

Notes:





EARTH SYSTEMS SOUTHWEST

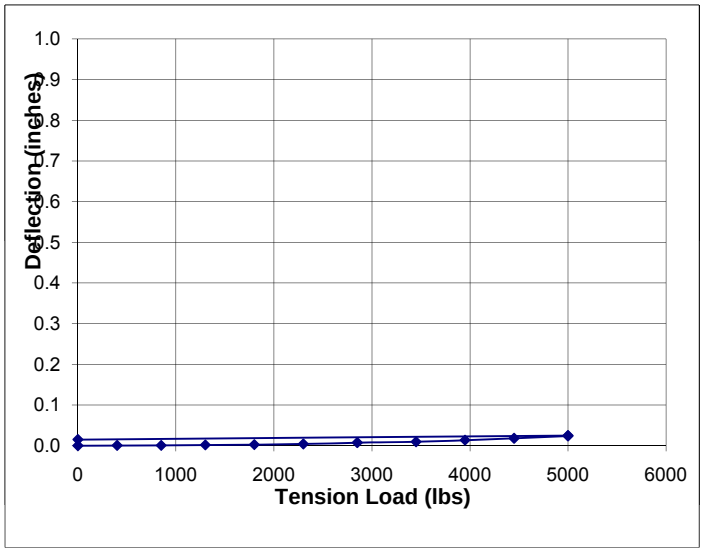
* - Gages reading positive with vertical displacement

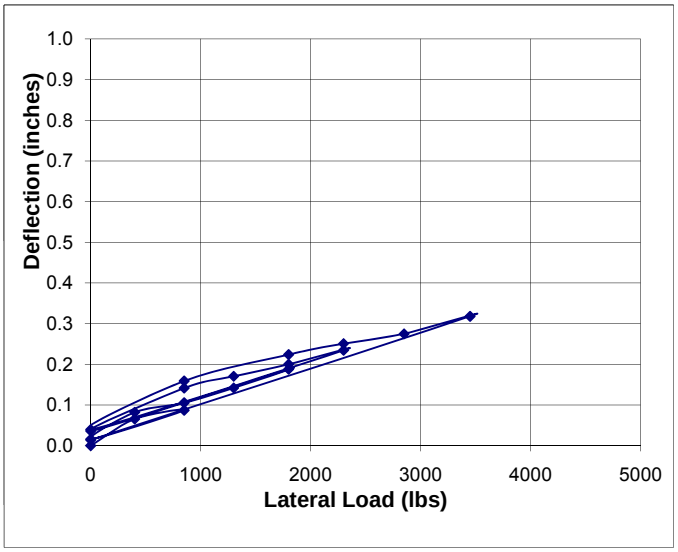
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-9B
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**56**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
8:47	0	0	0.000	0.000	0.000		9:38	0	0	0.000	0.000	
	200	400	0.000	0.001	0.001			200	400	0.066	0.066	
	400	850	-0.001	0.002	0.001			400	850	0.087	0.087	
	600	1300	0.001	0.003	0.002			0	0	0.016	0.016	
	800	1800	0.001	0.004	0.003			200	400	0.082	0.082	
	1000	2300	0.003	0.005	0.004			400	850	0.106	0.106	
	1200	2850	0.007	0.008	0.008			600	1300	0.142	0.142	
	1400	3450	0.008	0.011	0.010			800	1800	0.188	0.188	
	1600	3950	0.013	0.014	0.014			0	0	0.036	0.036	
	1800	4450	0.019	0.018	0.018			400	850	0.142	0.142	
8:54	2000	5000	0.025	0.023	0.024			600	1300	0.171	0.171	
	2000	5000	0.026	0.024	0.025			800	1800	0.200	0.200	
	0	0	0.015	0.015	0.015			1000	2300	0.235	0.235	
								0	0	0.040	0.040	
								400	850	0.159	0.159	
								800	1800	0.224	0.224	
								1000	2300	0.251	0.251	
								1200	2850	0.275	0.275	
								1400	3450	0.318	0.318	
							9:48	0	0	0.014	0.014	

Notes:





EARTH SYSTEMS SOUTHWEST

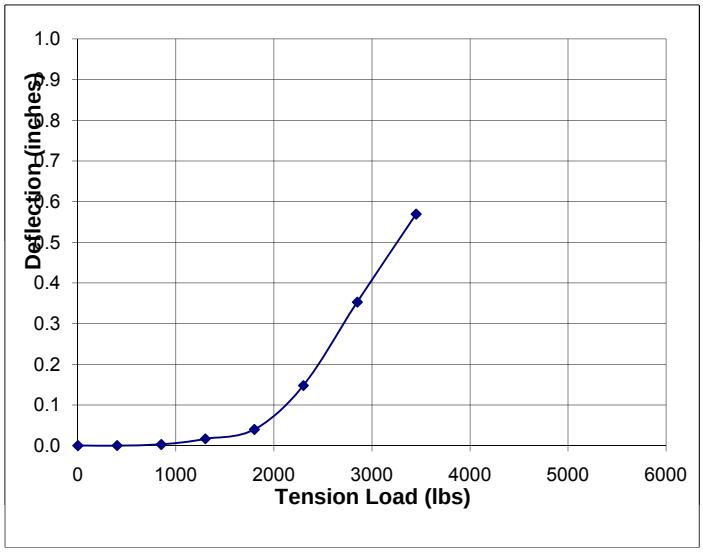
* - Gages reading positive with vertical displacement

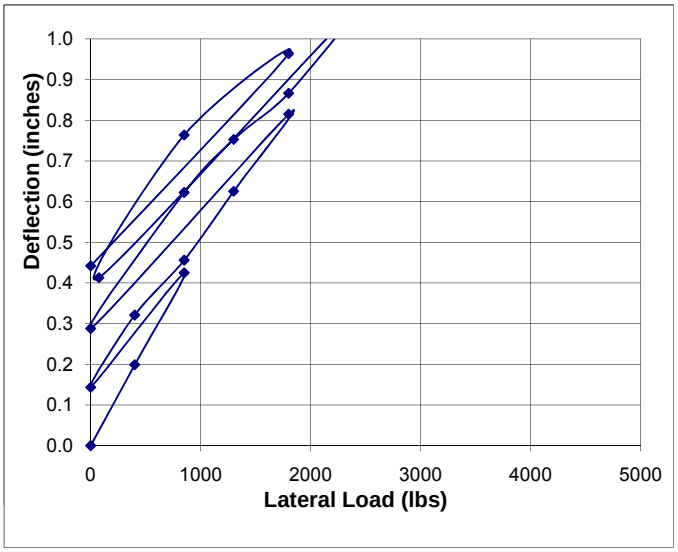
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-10A
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**45**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
12:50	0	0	0.000	0.000	0.000		1:01	0	0	0.000	0.000	
	200	400	0.002	-0.001	0.000			200	400	0.199	0.199	
	400	850	0.006	-0.001	0.003			400	850	0.425	0.425	
	600	1300	0.021	0.013	0.017			0	0	0.144	0.144	
	800	1800	0.045	0.035	0.040			200	400	0.321	0.321	
	1000	2300	0.153	0.143	0.148			400	850	0.456	0.456	
	1200	2850	0.358	0.348	0.353			600	1300	0.626	0.626	
12:53	1400	3450	0.573	0.566	0.570			800	1800	0.815	0.815	
								0	0	0.288	0.288	
								400	850	0.623	0.623	
								600	1300	0.753	0.753	
								800	1800	0.867	0.867	
								1000	2300	1.044	1.044	
								0	0	0.413	0.413	
								400	850	0.764	0.764	
								800	1800	0.964	0.964	
							1:08	0	0	0.442	0.442	

Notes: Vert. 1"+@ 1500 lbs.





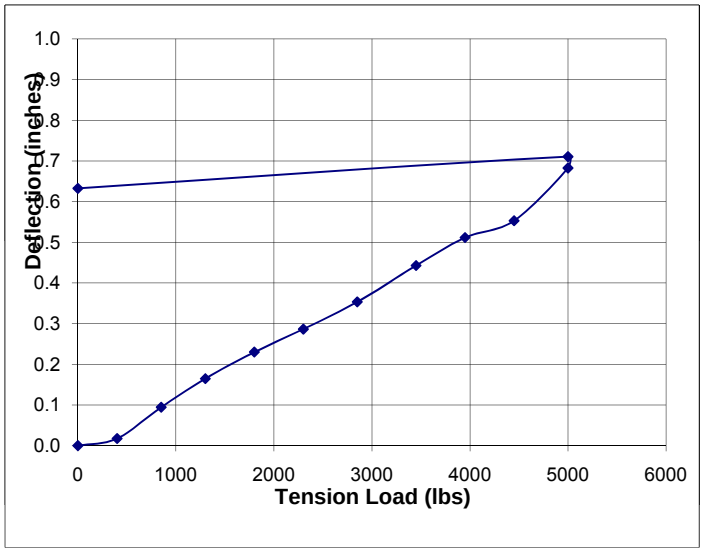
* - Gages reading positive with vertical displacement

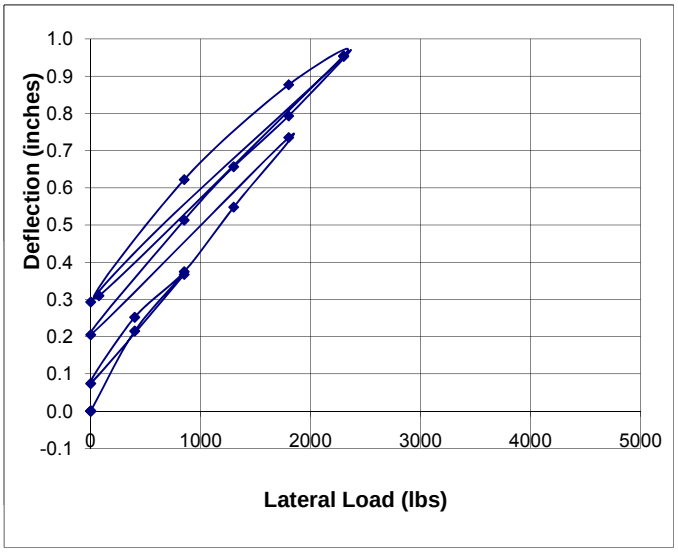
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-10B
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**60**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
1:21	0	0	0.000	0.000	0.000		1:36	0	0	0.000	0.000	
	200	400	0.020	0.016	0.018			200	400	0.215	0.215	
	400	850	0.097	0.092	0.095			400	850	0.367	0.367	
	600	1300	0.168	0.162	0.165			0	0	0.074	0.074	
	800	1800	0.235	0.226	0.230			200	400	0.252	0.252	
	1000	2300	0.290	0.284	0.287			400	850	0.375	0.375	
	1200	2850	0.358	0.349	0.354			600	1300	0.548	0.548	
	1400	3450	0.447	0.439	0.443			800	1800	0.735	0.735	
	1600	3950	0.517	0.507	0.512			0	0	0.205	0.205	
	1800	4450	0.557	0.550	0.553			400	850	0.513	0.513	
1:25	2000	5000	0.688	0.678	0.683			600	1300	0.657	0.657	
1:30	2000	5000	0.715	0.707	0.711			800	1800	0.793	0.793	
	0	0	0.634	0.632	0.633			1000	2300	0.953	0.953	
								0	0	0.310	0.310	
								400	850	0.622	0.622	
								800	1800	0.877	0.877	
								1000	2300	0.955	0.955	
								0	0	0.293	0.293	

Notes:





EARTH SYSTEMS SOUTHWEST

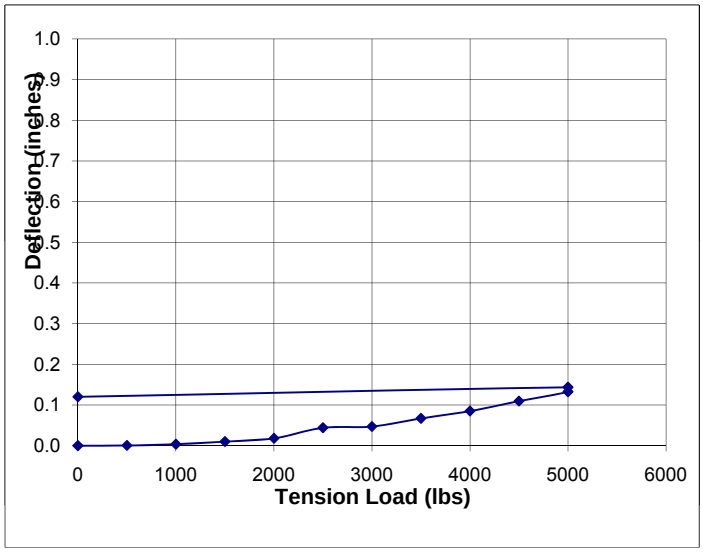
* - Gages reading positive with vertical displacement

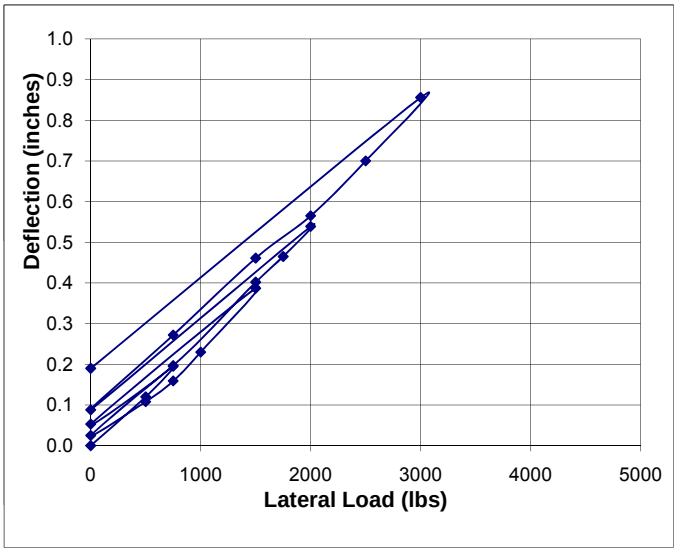
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-11A
Date:	12/18/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	20 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
10:52	0	0	0.000	0.000	0.000		11:10	0	0	0.000	0.000	
	500	500	0.001	0.000	0.001			500	500	0.120	0.120	
	1000	1000	0.005	0.002	0.004			750	750	0.195	0.195	
	1500	1500	0.013	0.007	0.010			0	0	0.025	0.025	
	2000	2000	0.020	0.016	0.018			500	500	0.108	0.108	
	2500	2500	0.057	0.031	0.044			750	750	0.159	0.159	
	3000	3000	0.048	0.046	0.047			1000	1000	0.230	0.230	
	3500	3500	0.067	0.067	0.067			1500	1500	0.387	0.387	
	4000	4000	0.086	0.084	0.085			0	0	0.053	0.053	
	4500	4500	0.111	0.108	0.110			750	750	0.197	0.197	
10:57	5000	5000	0.134	0.131	0.133			1500	1500	0.402	0.402	
11:02	5000	5000	0.145	0.142	0.144			1750	1750	0.465	0.465	
	0	0	0.122	0.118	0.120			2000	2000	0.539	0.539	
								0	0	0.088	0.088	
								750	750	0.272	0.272	
								1500	1500	0.461	0.461	
								2000	2000	0.565	0.565	
								2500	2500	0.700	0.700	
								3000	3000	0.856	0.856	
							11:19	0	0	0.190	0.190	

Notes:





EARTH SYSTEMS SOUTHWEST

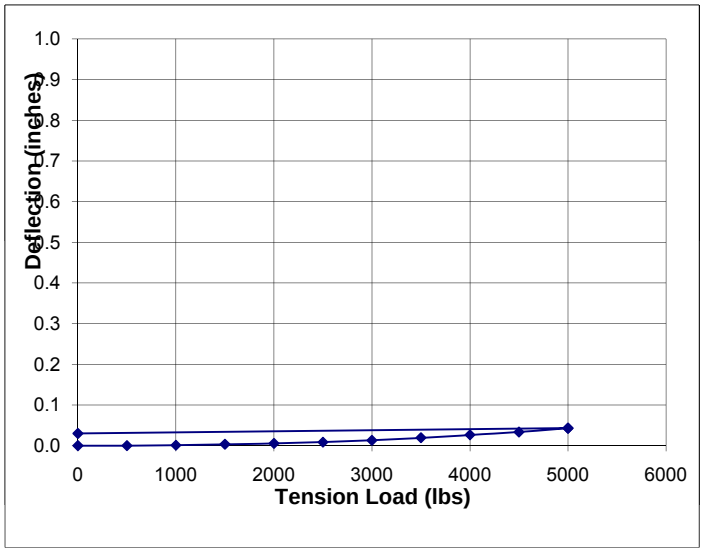
* - Gages reading positive with vertical displacement

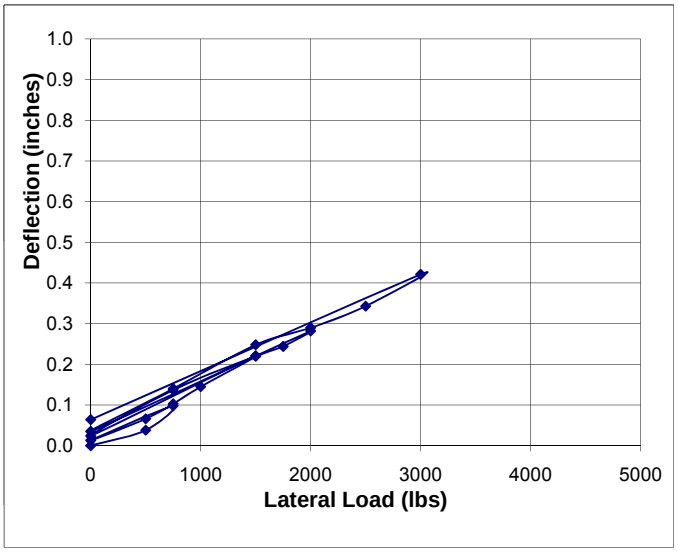
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-11B
Date:	12/18/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**60**
Jack:	20 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
10:35	0	0	0.000	0.000	0.000		11:20	0	0	0.000	0.000	
	500	500	0.000	0.000	0.000			500	500	0.038	0.038	
	1000	1000	0.001	0.001	0.001			750	750	0.098	0.098	
	1500	1500	0.005	0.002	0.004			0	0	0.013	0.013	
	2000	2000	0.008	0.003	0.006			500	500	0.066	0.066	
	2500	2500	0.012	0.005	0.009			750	750	0.103	0.103	
	3000	3000	0.017	0.009	0.013			1000	1000	0.145	0.145	
	3500	3500	0.024	0.015	0.020			1500	1500	0.221	0.221	
	4000	4000	0.031	0.022	0.027			0	0	0.024	0.024	
	4500	4500	0.038	0.029	0.034			750	750	0.137	0.137	
10:40	5000	5000	0.049	0.037	0.043			1500	1500	0.220	0.220	
10:45	5000	5000	0.048	0.038	0.043			1750	1750	0.244	0.244	
	0	0	0.029	0.031	0.030			2000	2000	0.282	0.282	
								0	0	0.035	0.035	
								750	750	0.140	0.140	
								1500	1500	0.248	0.248	
								2000	2000	0.290	0.290	
								2500	2500	0.343	0.343	
								3000	3000	0.421	0.421	
							11:30	0	0	0.064	0.064	

Notes:





EARTH SYSTEMS SOUTHWEST

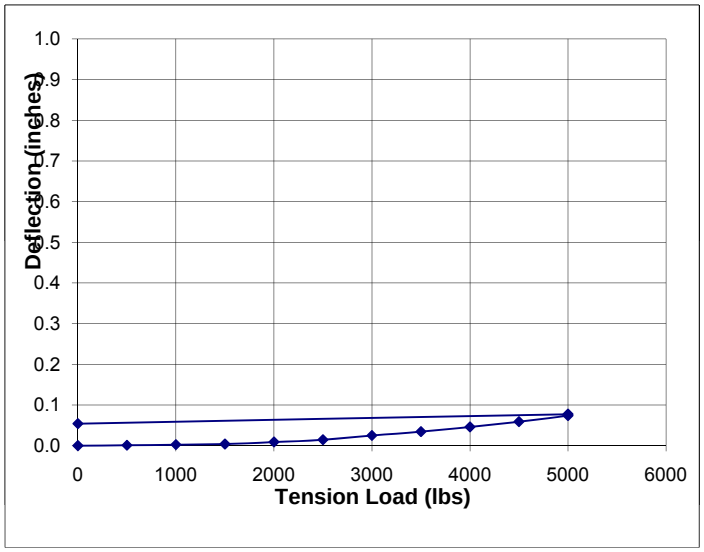
* - Gages reading positive with vertical displacement

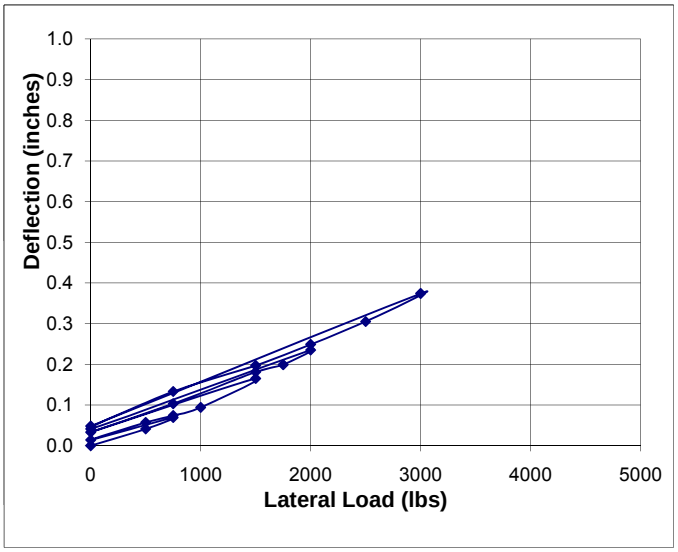
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-12A
Date:	12/18/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	20 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
7:59	0	0	0.000	0.000	0.000		8:15	0	0	0.000	0.000	
	500	500	0.000	0.002	0.001			500	500	0.041	0.041	
	1000	1000	0.000	0.005	0.003			750	750	0.069	0.069	
	1500	1500	0.000	0.008	0.004			0	0	0.014	0.014	
	2000	2000	0.008	0.010	0.009			500	500	0.057	0.057	
	2500	2500	0.013	0.016	0.015			750	750	0.074	0.074	
	3000	3000	0.021	0.029	0.025			1000	1000	0.094	0.094	
	3500	3500	0.030	0.039	0.035			1500	1500	0.165	0.165	
	4000	4000	0.042	0.050	0.046			0	0	0.033	0.033	
	4500	4500	0.055	0.063	0.059			750	750	0.103	0.103	
8:03	5000	5000	0.070	0.078	0.074			1500	1500	0.181	0.181	
8:08	5000	5000	0.074	0.081	0.078			1750	1750	0.199	0.199	
	0	0	0.050	0.058	0.054			2000	2000	0.235	0.235	
								0	0	0.041	0.041	
								750	750	0.133	0.133	
								1500	1500	0.197	0.197	
								2000	2000	0.249	0.249	
								2500	2500	0.305	0.305	
								3000	3000	0.374	0.374	
							8:24	0	0	0.048	0.048	

Notes:





EARTH SYSTEMS SOUTHWEST

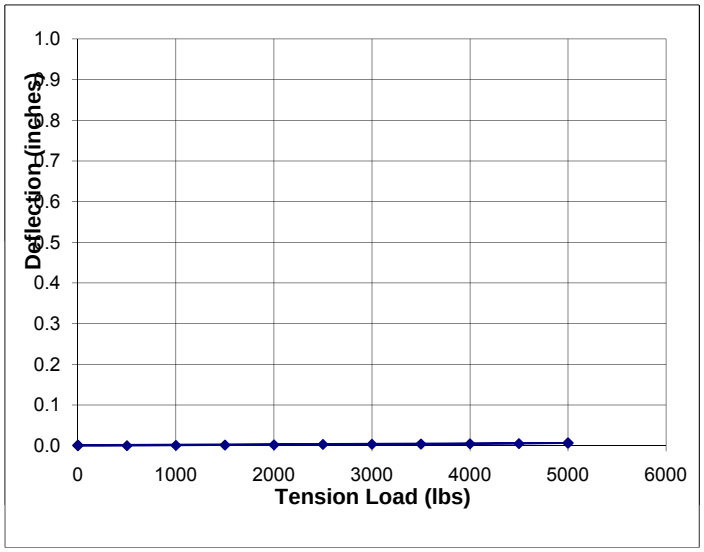
* - Gages reading positive with vertical displacement

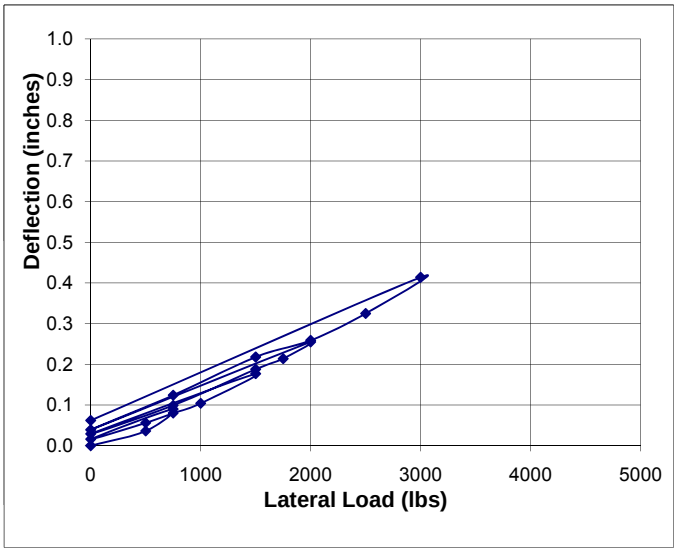
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-12B
Date:	12/18/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**58**
Jack:	20 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
7:38	0	0	0.000	0.000	0.000		8:25	0	0	0.000	0.000	
	500	500	0.000	0.000	0.000			500	500	0.036	0.036	
	1000	1000	0.000	0.001	0.001			750	750	0.090	0.090	
	1500	1500	0.001	0.002	0.002			0	0	0.016	0.016	
	2000	2000	0.001	0.003	0.002			500	500	0.056	0.056	
	2500	2500	0.002	0.004	0.003			750	750	0.080	0.080	
	3000	3000	0.001	0.006	0.004			1000	1000	0.104	0.104	
	3500	3500	0.001	0.007	0.004			1500	1500	0.177	0.177	
	4000	4000	0.001	0.008	0.005			0	0	0.029	0.029	
	4500	4500	0.001	0.009	0.005			750	750	0.099	0.099	
7:45	5000	5000	0.003	0.010	0.007			1500	1500	0.188	0.188	
7:50	5000	5000	0.003	0.010	0.007			1750	1750	0.214	0.214	
	0	0	0.001	0.002	0.002			2000	2000	0.255	0.255	
								0	0	0.039	0.039	
								750	750	0.124	0.124	
								1500	1500	0.218	0.218	
								2000	2000	0.259	0.259	
								2500	2500	0.325	0.325	
								3000	3000	0.414	0.414	
							8:35	0	0	0.062	0.062	

Notes:





EARTH SYSTEMS SOUTHWEST

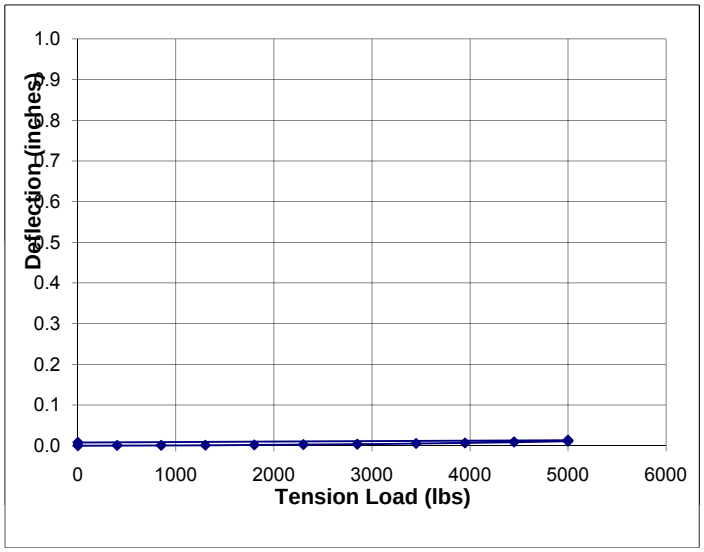
* - Gages reading positive with vertical displacement

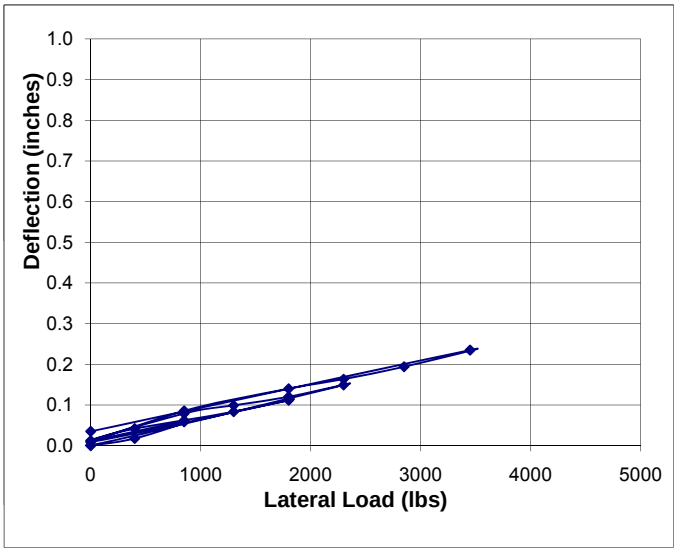
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-13A
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
3:12	0	0	0.000	0.001	0.000		3:26	0	0	0.000	0.000	
	200	400	0.001	0.002	0.001			200	400	0.018	0.018	
	400	850	0.001	0.002	0.001			400	850	0.059	0.059	
	600	1300	0.002	0.002	0.001			0	0	0.013	0.013	
	800	1800	0.002	0.003	0.002			200	400	0.042	0.042	
	1000	2300	0.003	0.003	0.003			400	850	0.062	0.062	
	1200	2850	0.004	0.004	0.004			600	1300	0.084	0.084	
	1400	3450	0.006	0.006	0.005			800	1800	0.112	0.112	
	1600	3950	0.008	0.007	0.007			0	0	0.009	0.009	
	1800	4450	0.011	0.009	0.009			400	850	0.079	0.079	
3:15	2000	5000	0.013	0.011	0.011			600	1300	0.099	0.099	
3:20	2000	5000	0.015	0.013	0.013			800	1800	0.120	0.120	
	0	0	0.009	0.008	0.008			1000	2300	0.149	0.149	
								0	0	0.001	0.001	
								400	850	0.086	0.086	
								800	1800	0.140	0.140	
								1000	2300	0.164	0.164	
								1200	2850	0.194	0.194	
								1400	3450	0.235	0.235	
							3:35	0	0	0.035	0.035	

Notes:





EARTH SYSTEMS SOUTHWEST

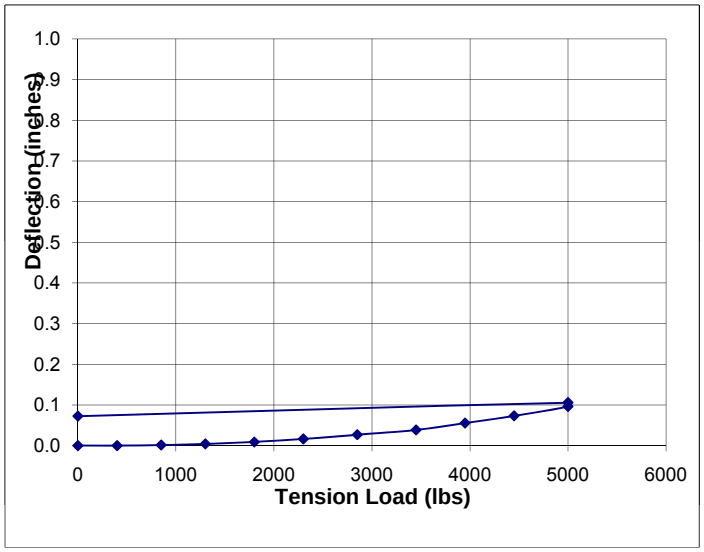
* - Gages reading positive with vertical displacement

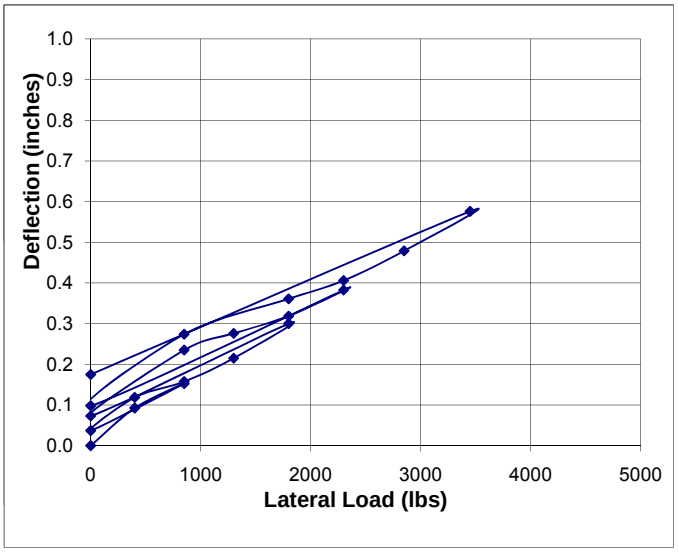
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-13B
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**34**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
2:50	0	0	0.000	0.000	0.000		3:40	0	0	0.000	0.000	
	200	400	0.000	0.000	0.000			200	400	0.093	0.093	
	400	850	0.003	0.000	0.002			400	850	0.153	0.153	
	600	1300	0.007	0.002	0.004			0	0	0.037	0.037	
	800	1800	0.012	0.006	0.009			200	400	0.119	0.119	
	1000	2300	0.020	0.013	0.017			400	850	0.158	0.158	
	1200	2850	0.032	0.023	0.027			600	1300	0.215	0.215	
	1400	3450	0.043	0.035	0.039			800	1800	0.300	0.300	
	1600	3950	0.062	0.049	0.056			0	0	0.073	0.073	
	1800	4450	0.082	0.065	0.073			400	850	0.235	0.235	
2:58	2000	5000	0.105	0.088	0.096			600	1300	0.276	0.276	
3:03	2000	5000	0.115	0.097	0.106			800	1800	0.319	0.319	
	0	0	0.075	0.070	0.073			1000	2300	0.383	0.383	
								0	0	0.098	0.098	
								400	850	0.274	0.274	
								800	1800	0.361	0.361	
								1000	2300	0.406	0.406	
								1200	2850	0.479	0.479	
								1400	3450	0.576	0.576	
							3:50	0	0	0.175	0.175	

Notes:





EARTH SYSTEMS SOUTHWEST

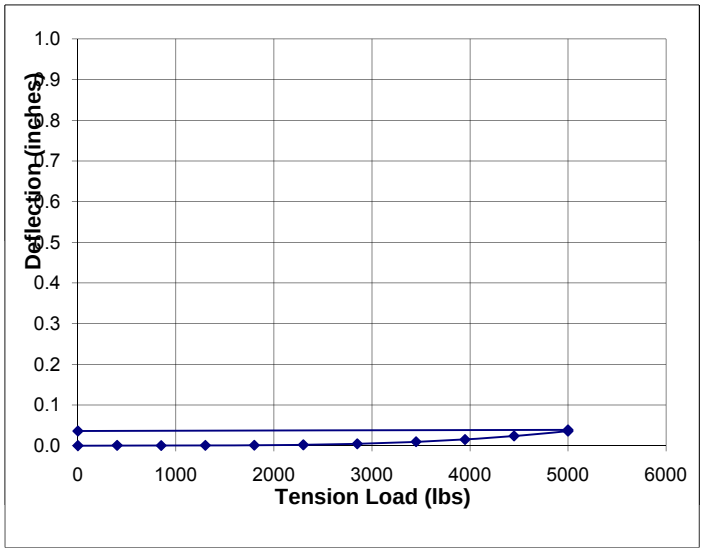
* - Gages reading positive with vertical displacement

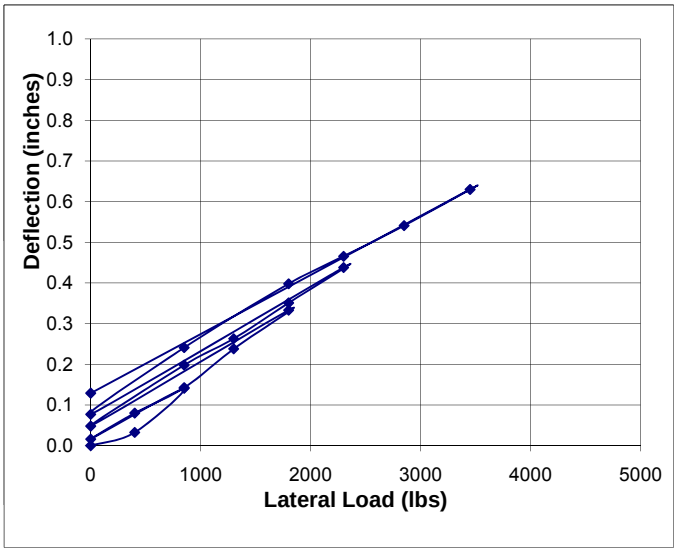
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-14A
Date:	12/14/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
9:25	0	0	-0.001	-0.001	0.000		9:45	0	0	0.000	0.000	
	200	400			0.001			200	400	0.033	0.033	
	400	850	-0.001	-0.001	0.000			400	850	0.141	0.141	
	600	1300			0.001			0	0	0.016	0.016	
	800	1800	0.000	0.001	0.001			200	400	0.080	0.080	
	1000	2300	0.002	0.001	0.002			400	850	0.143	0.143	
	1200	2850	0.004	0.004	0.005			600	1300	0.238	0.238	
	1400	3450	0.009	0.010	0.010			800	1800	0.333	0.333	
	1600	3950	0.014	0.015	0.015			0	0	0.048	0.048	
	1800	4450	0.023	0.024	0.024			400	850	0.198	0.198	
9:29	2000	5000	0.034	0.036	0.036			600	1300	0.263	0.263	
9:34	2000	5000	0.037	0.039	0.039			800	1800	0.351	0.351	
	0	0	0.035	0.036	0.036			1000	2300	0.438	0.438	
								0	0	0.077	0.077	
								400	850	0.241	0.241	
								800	1800	0.398	0.398	
								1000	2300	0.466	0.466	
								1200	2850	0.541	0.541	
								1400	3450	0.630	0.630	
							9:55	0	0	0.129	0.129	

Notes:





EARTH SYSTEMS SOUTHWEST

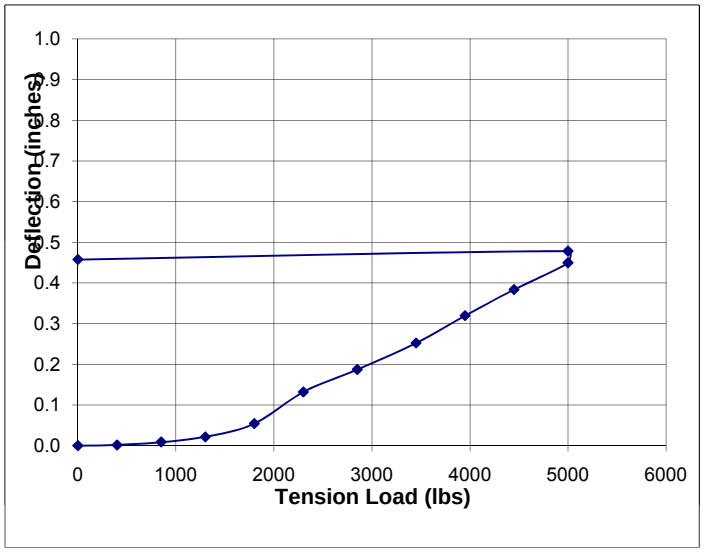
* - Gages reading positive with vertical displacement

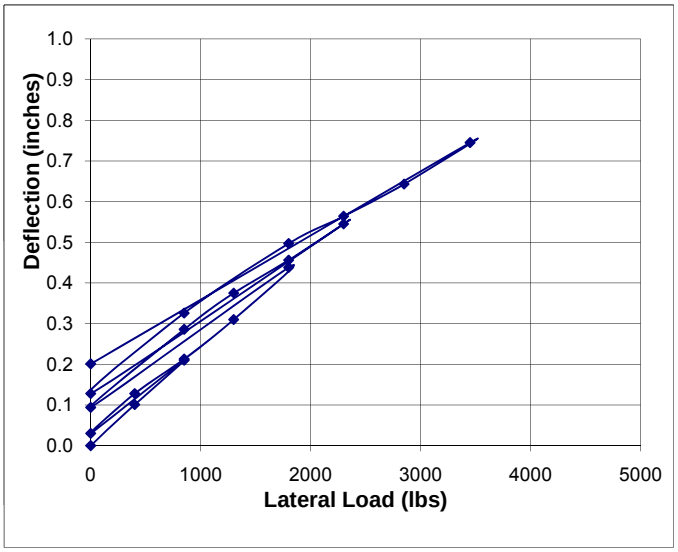
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-14B
Date:	12/14/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**36**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
10:03	0	0	0.000	0.000	0.000		10:18	0	0	0.000	0.000	
	200	400	0.001	0.003	0.002			200	400	0.101	0.101	
	400	850	0.007	0.012	0.009			400	850	0.210	0.210	
	600	1300	0.021	0.023	0.022			0	0	0.030	0.030	
	800	1800	0.056	0.053	0.054			200	400	0.128	0.128	
	1000	2300	0.135	0.129	0.132			400	850	0.213	0.213	
	1200	2850	0.191	0.184	0.187			600	1300	0.310	0.310	
	1400	3450	0.257	0.248	0.252			800	1800	0.438	0.438	
	1600	3950	0.325	0.315	0.320			0	0	0.094	0.094	
	1800	4450	0.389	0.379	0.384			400	850	0.286	0.286	
10:07	2000	5000	0.457	0.443	0.450			600	1300	0.375	0.375	
10:12	2000	5000	0.486	0.471	0.478			800	1800	0.456	0.456	
	0	0	0.463	0.452	0.458			1000	2300	0.545	0.545	
								0	0	0.128	0.128	
								400	850	0.326	0.326	
								800	1800	0.497	0.497	
								1000	2300	0.564	0.564	
								1200	2850	0.643	0.643	
								1400	3450	0.745	0.745	
							10:28	0	0	0.201	0.201	

Notes:





EARTH SYSTEMS SOUTHWEST

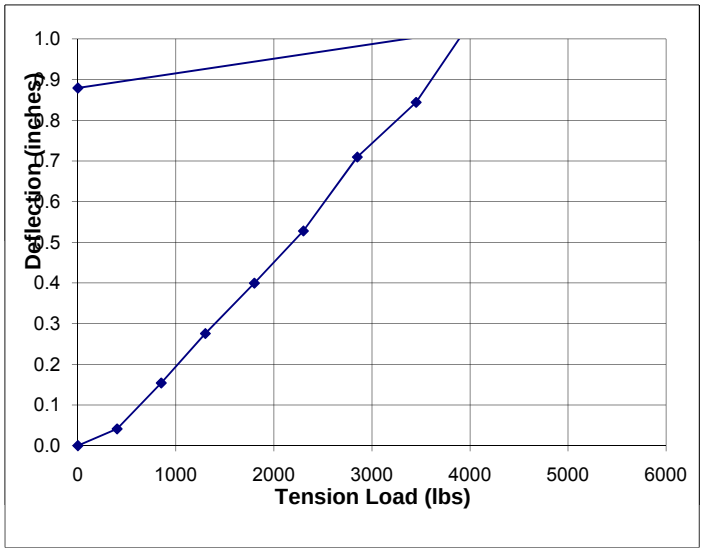
* - Gages reading positive with vertical displacement

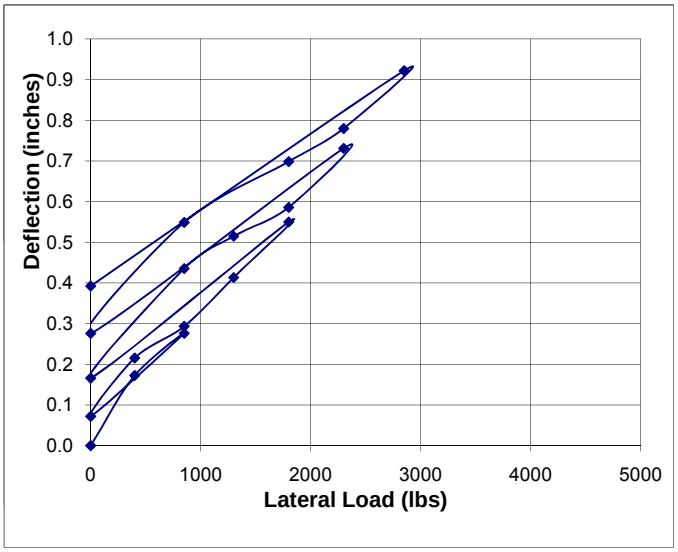
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-15A
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
2:15	0	0	0.000	0.000	0.000		2:25	0	0	0.000	0.000	
	200	400	0.041	0.042	0.041			200	400	0.173	0.173	
	400	850	0.153	0.155	0.154			400	850	0.276	0.276	
	600	1300	0.274	0.278	0.276			0	0	0.072	0.072	
	800	1800	0.397	0.402	0.400			200	400	0.216	0.216	
	1000	2300	0.525	0.531	0.528			400	850	0.294	0.294	
	1200	2850	0.706	0.714	0.710			600	1300	0.414	0.414	
	1400	3450	0.842	0.847	0.844			800	1800	0.550	0.550	
2:18	1600	3950	1.032	1.012	1.022			0	0	0.166	0.166	
	0	0	0.881	0.878	0.880			400	850	0.436	0.436	
								600	1300	0.515	0.515	
								800	1800	0.586	0.586	
								1000	2300	0.731	0.731	
								0	0	0.276	0.276	
								400	850	0.549	0.549	
								800	1800	0.699	0.699	
								1000	2300	0.780	0.780	
								1200	2850	0.922	0.922	
							2:32	0	0	0.393	0.393	

Notes:





EARTH SYSTEMS SOUTHWEST

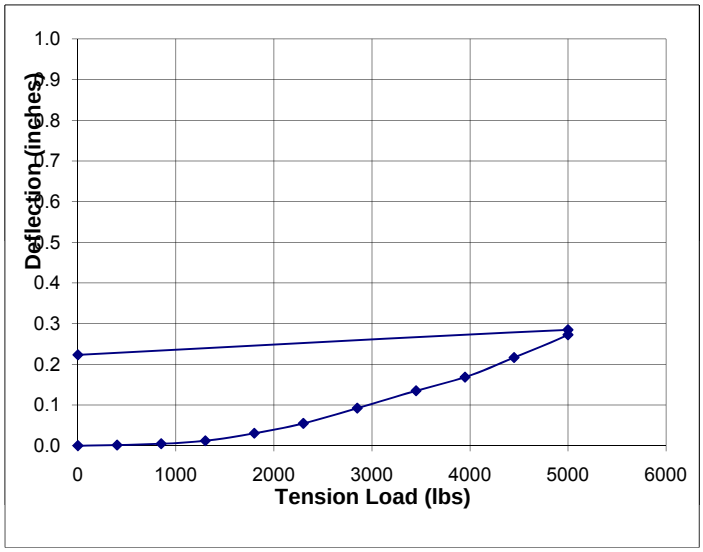
* - Gages reading positive with vertical displacement

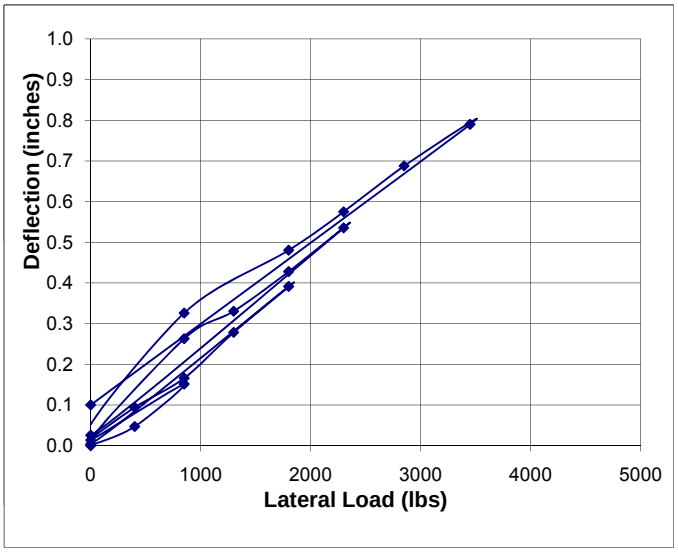
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-15B
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**60**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
1:34	0	0	0.000	0.000	0.000		1:57	0	0	0.000	0.000	
	200	400	0.003	0.000	0.002			200	400	0.047	0.047	
	400	850	0.007	0.003	0.005			400	850	0.152	0.152	
	600	1300	0.014	0.010	0.012			0	0	0.014	0.014	
	800	1800	0.033	0.029	0.031			200	400	0.094	0.094	
	1000	2300	0.057	0.053	0.055			400	850	0.166	0.166	
	1200	2850	0.095	0.090	0.092			600	1300	0.279	0.279	
	1400	3450	0.137	0.134	0.135			800	1800	0.392	0.392	
	1600	3950	0.170	0.168	0.169			0	0	0.004	0.004	
	1800	4450	0.223	0.211	0.217			400	850	0.263	0.263	
1:40	2000	5000	0.282	0.264	0.273			600	1300	0.331	0.331	
1:45	2000	5000	0.293	0.277	0.285			800	1800	0.428	0.428	
	0	0	0.222	0.226	0.224			1000	2300	0.536	0.536	
								0	0	0.026	0.026	
								400	850	0.326	0.326	
								800	1800	0.481	0.481	
								1000	2300	0.575	0.575	
								1200	2850	0.688	0.688	
								1400	3450	0.790	0.790	
							2:07	0	0	0.100	0.100	

Notes:





EARTH SYSTEMS SOUTHWEST

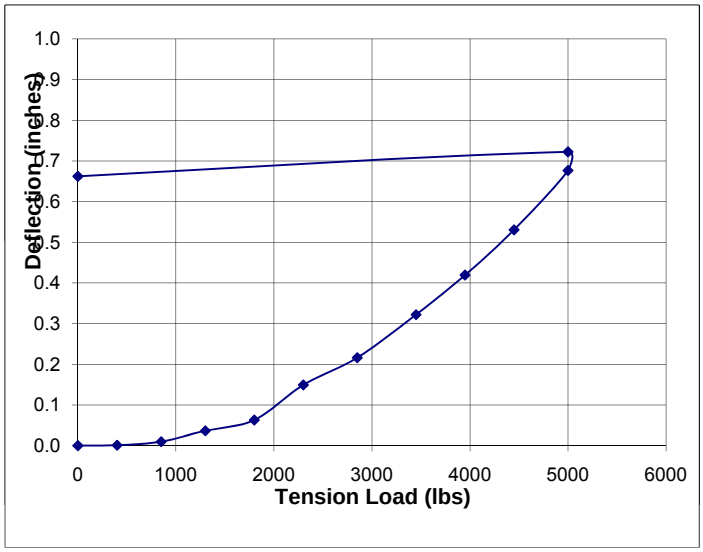
* - Gages reading positive with vertical displacement

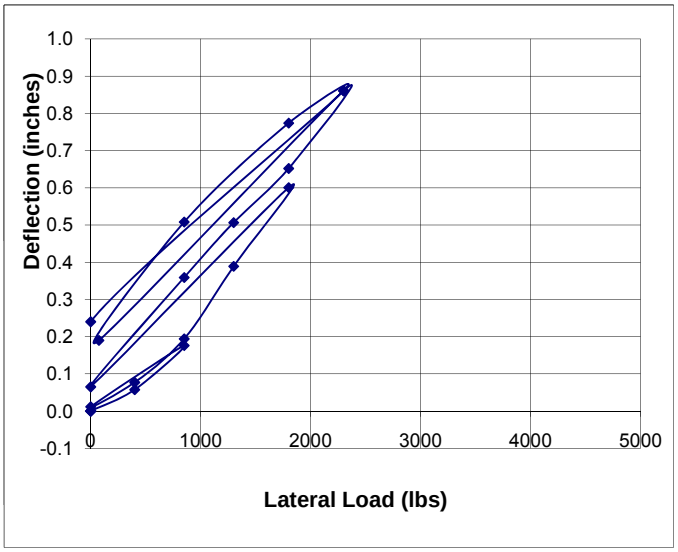
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-16A
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
12:40	0	0	0.000	0.000	0.000		1:00	0	0	0.000	0.000	
	200	400	0.001	0.001	0.001			200	400	0.058	0.058	
	400	850	0.010	0.010	0.010			400	850	0.176	0.176	
	600	1300	0.037	0.036	0.037			0	0	0.012	0.012	
	800	1800	0.064	0.063	0.063			200	400	0.077	0.077	
	1000	2300	0.151	0.148	0.149			400	850	0.194	0.194	
	1200	2850	0.218	0.215	0.216			600	1300	0.389	0.389	
	1400	3450	0.324	0.320	0.322			800	1800	0.601	0.601	
	1600	3950	0.422	0.418	0.420			0	0	0.065	0.065	
	1800	4450	0.534	0.528	0.531			400	850	0.359	0.359	
12:46	2000	5000	0.680	0.674	0.677			600	1300	0.507	0.507	
12:51	2000	5000	0.725	0.720	0.723			800	1800	0.652	0.652	
	0	0	0.663	0.662	0.662			1000	2300	0.861	0.861	
								0	0	0.190	0.190	
								400	850	0.508	0.508	
								800	1800	0.774	0.774	
								1000	2300	0.861	0.861	
							1:10	0	0	0.240	0.240	

Notes:





EARTH SYSTEMS SOUTHWEST

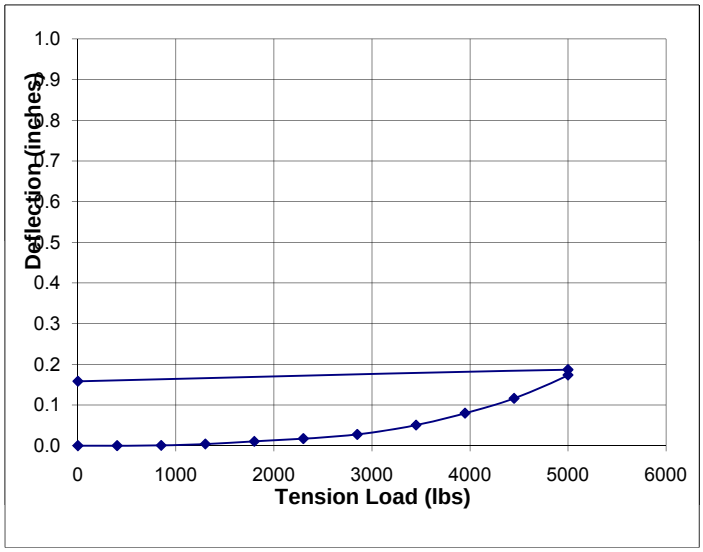
* - Gages reading positive with vertical displacement

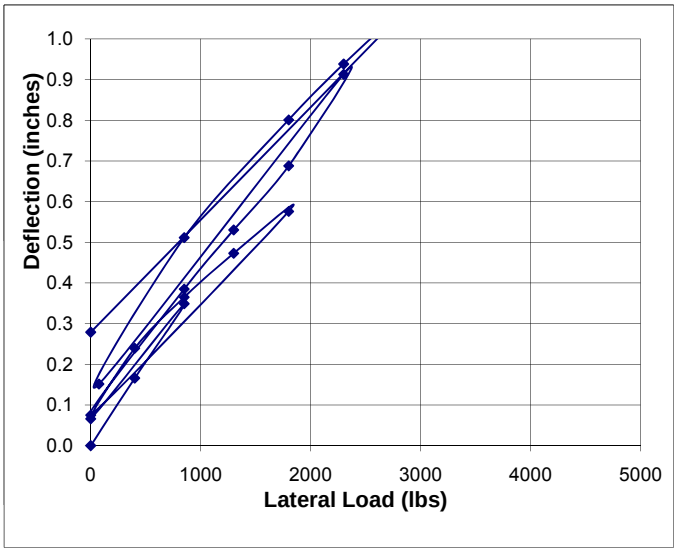
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-16B
Date:	
Pile Size:	W6 x 7.2
Driven Depth (in.):	**60**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
12:03	0	0	0.001	0.000	0.000		12:23	0	0	0.000	0.000	
	200	400	0.001	0.000	0.000			200	400	0.166	0.166	
	400	850	0.002	0.000	0.001			400	850	0.349	0.349	
	600	1300	0.008	0.001	0.004			0	0	0.066	0.066	
	800	1800	0.022	0.001	0.011			200	400	0.240	0.240	
	1000	2300	0.030	0.006	0.017			400	850	0.365	0.365	
	1200	2850	0.045	0.011	0.028			600	1300	0.473	0.473	
	1400	3450	0.071	0.032	0.051			800	1800	0.576	0.576	
	1600	3950	0.104	0.057	0.080			0	0	0.075	0.075	
	1800	4450	0.144	0.090	0.116			400	850	0.385	0.385	
12:09	2000	5000	0.206	0.143	0.174			600	1300	0.531	0.531	
12:14	2000	5000	0.221	0.154	0.187			800	1800	0.688	0.688	
	0	0	0.169	0.149	0.158			1000	2300	0.913	0.913	
								0	0	0.152	0.152	
								400	850	0.512	0.512	
								800	1800	0.801	0.801	
								1000	2300	0.939	0.939	
								1200	2850	1.070	1.070	
								0	0	0.279	0.279	

Notes:





EARTH SYSTEMS SOUTHWEST

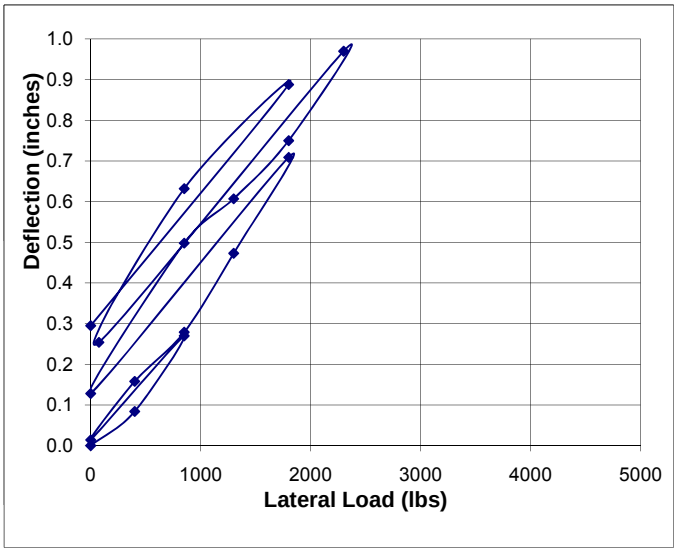
* - Gages reading positive with vertical displacement

Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-17A
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
11:12	0	0	0.000	0.000	0.000		11:22	0	0	0.000	0.000	
	200	400	0.018	0.007	0.013			200	400	0.084	0.084	
	400	850	0.230	0.201	0.215			400	850	0.270	0.270	
	600	1300	0.563	0.520	0.542			0	0	0.014	0.014	
	800	1800	0.787	0.736	0.762			200	400	0.158	0.158	
	1000	2300	0.883	0.899	0.891			400	850	0.279	0.279	
								600	1300	0.473	0.473	
								800	1800	0.709	0.709	
								0	0	0.128	0.128	
								400	850	0.498	0.498	
								600	1300	0.607	0.607	
								800	1800	0.750	0.750	
								1000	2300	0.970	0.970	
								0	0	0.254	0.254	
								400	850	0.632	0.632	
								800	1800	0.888	0.888	
								0	0	0.295	0.295	

Notes: 1" + @ 970 lbs Lat , 1" + @ 1100 lbs Vert.



EARTH SYSTEMS SOUTHWEST

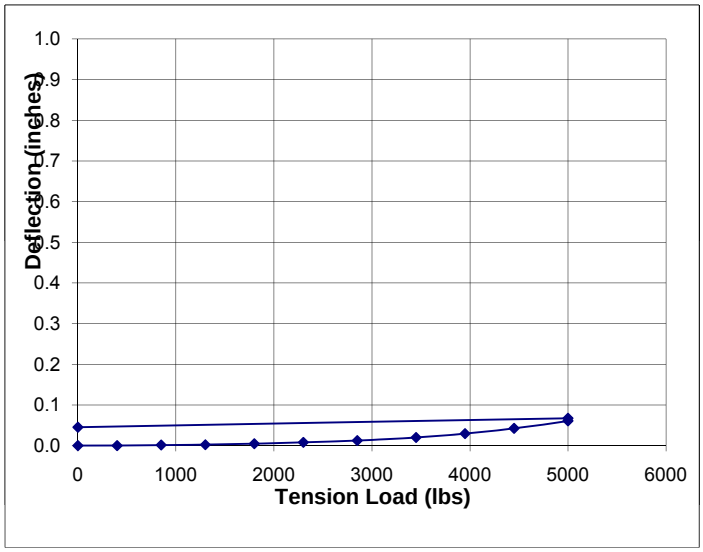
* - Gages reading positive with vertical displacement

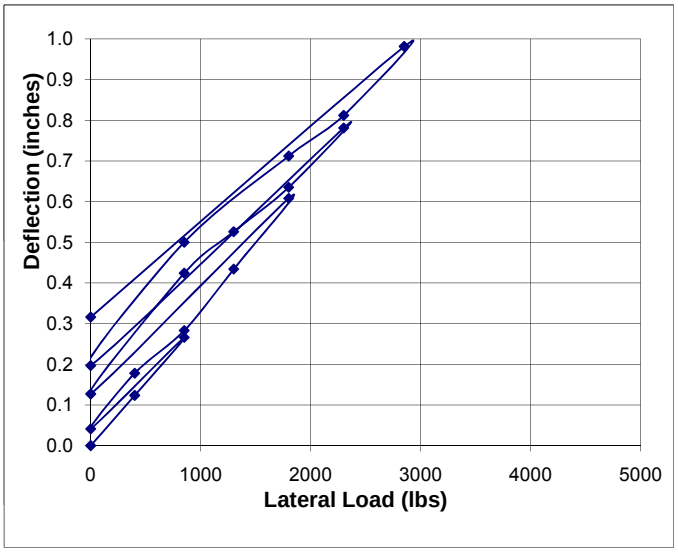
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-17B
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**60**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
10:40	0	0	0.000	0.000	0.000		11:00	0	0	0.000	0.000	
	200	400	0.000	0.000	0.000			200	400	0.124	0.124	
	400	850	0.003	0.000	0.002			400	850	0.266	0.266	
	600	1300	0.005	0.000	0.002			0	0	0.041	0.041	
	800	1800	0.008	0.002	0.005			200	400	0.178	0.178	
	1000	2300	0.012	0.004	0.008			400	850	0.283	0.283	
	1200	2850	0.019	0.007	0.013			600	1300	0.434	0.434	
	1400	3450	0.029	0.012	0.020			800	1800	0.608	0.608	
	1600	3950	0.041	0.018	0.030			0	0	0.127	0.127	
	1800	4450	0.057	0.029	0.043			400	850	0.424	0.424	
10:43	2000	5000	0.078	0.044	0.061			600	1300	0.526	0.526	
10:47	2000	5000	0.085	0.050	0.067			800	1800	0.635	0.635	
	0	0	0.051	0.040	0.045			1000	2300	0.781	0.781	
								0	0	0.197	0.197	
								400	850	0.500	0.500	
								800	1800	0.712	0.712	
								1000	2300	0.812	0.812	
								1200	2850	0.982	0.982	
								0	0	0.316	0.316	

Notes:





EARTH SYSTEMS SOUTHWEST

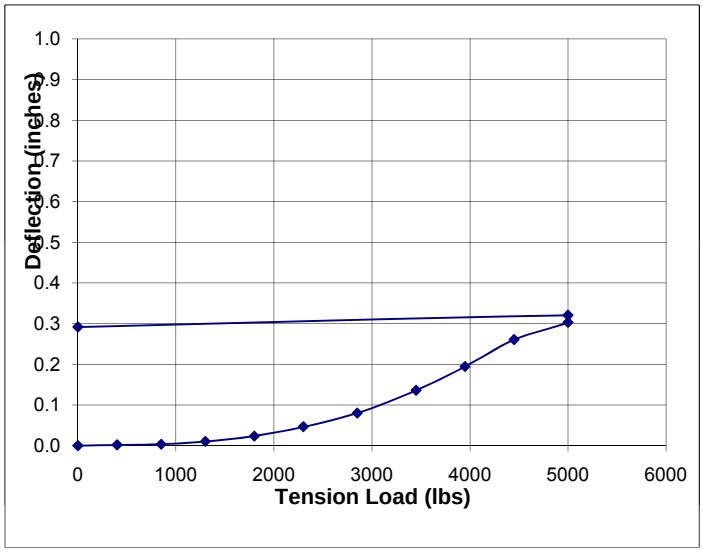
* - Gages reading positive with vertical displacement

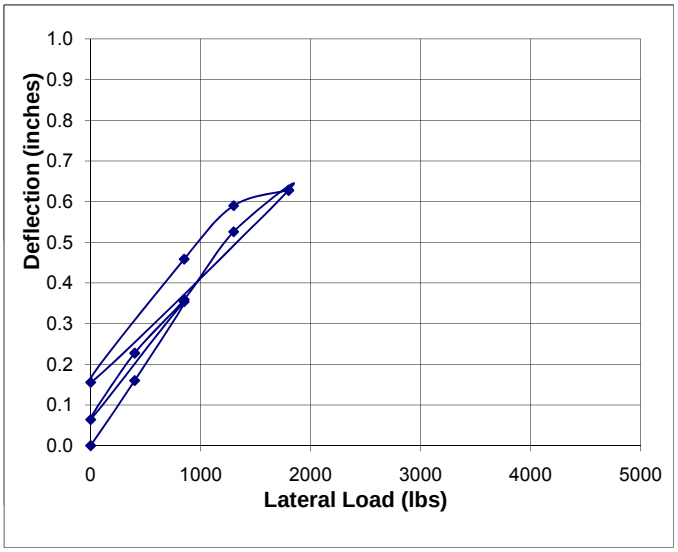
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-18A
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
9:43	0	0	0.000	0.000	0.000		10:07	0	0	0.000	0.000	
	200	400	0.004	0.000	0.002			200	400	0.160	0.160	
	400	850	0.007	0.000	0.003			400	850	0.354	0.354	
	600	1300	0.021	0.000	0.011			0	0	0.064	0.064	
	800	1800	0.041	0.007	0.024			200	400	0.228	0.228	
	1000	2300	0.067	0.026	0.047			400	850	0.360	0.360	
	1200	2850	0.106	0.055	0.080			600	1300	0.526	0.526	
	1400	3450	0.168	0.104	0.136			800	1800	0.628	0.628	
	1600	3950	0.235	0.155	0.195			0	0	0.156	0.156	
	1800	4450	0.309	0.213	0.261			400	850	0.459	0.459	
9:50	2000	5000	0.357	0.249	0.303			600	1300	0.590	0.590	
9:55	2000	5000	0.377	0.265	0.321			800	1800	0.628	0.628	
	0	0	0.296	0.288	0.292		10:14	0	0	0.097	0.097	

Notes:





EARTH SYSTEMS SOUTHWEST

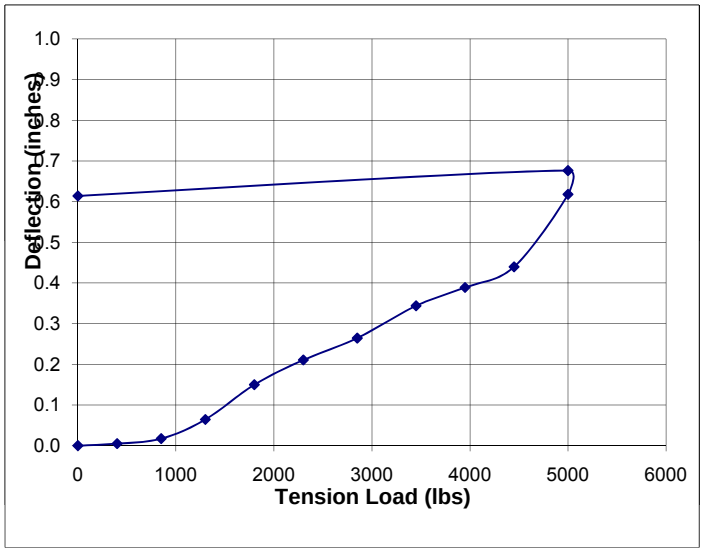
* - Gages reading positive with vertical displacement

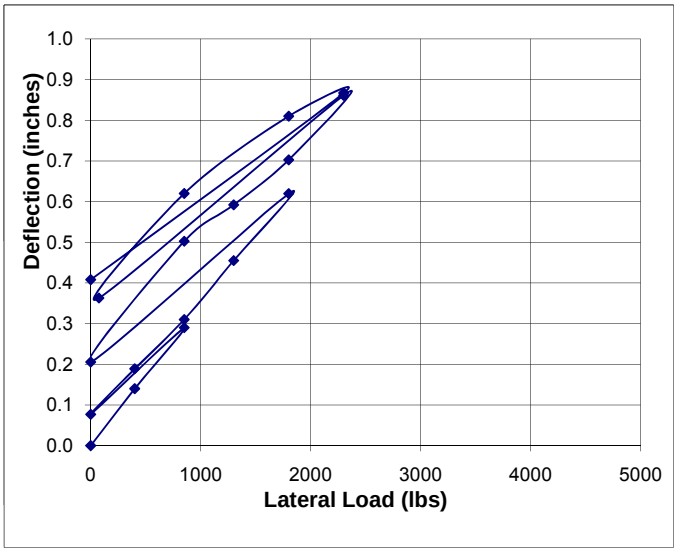
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-18B
Date:	12/15/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**36**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
9:12	0	0	0.000	0.000	0.000		9:28	0	0	0.000	0.000	
	200	400	0.008	0.003	0.005			200	400	0.140	0.140	
	400	850	0.021	0.014	0.017			400	850	0.290	0.290	
	600	1300	0.070	0.059	0.064			0	0	0.077	0.077	
	800	1800	0.157	0.144	0.150			200	400	0.189	0.189	
	1000	2300	0.217	0.205	0.211			400	850	0.310	0.310	
	1200	2850	0.269	0.260	0.265			600	1300	0.455	0.455	
	1400	3450	0.347	0.341	0.344			800	1800	0.620	0.620	
	1600	3950	0.390	0.388	0.389			0	0	0.206	0.206	
	1800	4450	0.440	0.440	0.440			400	850	0.503	0.503	
9:17	2000	5000	0.610	0.626	0.618			600	1300	0.592	0.592	
9:22	2000	5000	0.666	0.687	0.677			800	1800	0.703	0.703	
	0	0	0.617	0.612	0.614			1000	2300	0.861	0.861	
								0	0	0.363	0.363	
								400	850	0.620	0.620	
								800	1800	0.810	0.810	
								1000	2300	0.867	0.867	
							9:37	0	0	0.408	0.408	

Notes:





EARTH SYSTEMS SOUTHWEST

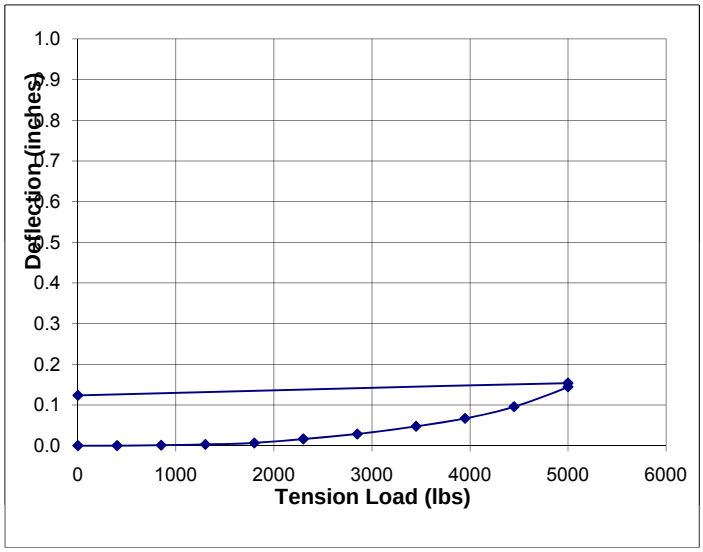
* - Gages reading positive with vertical displacement

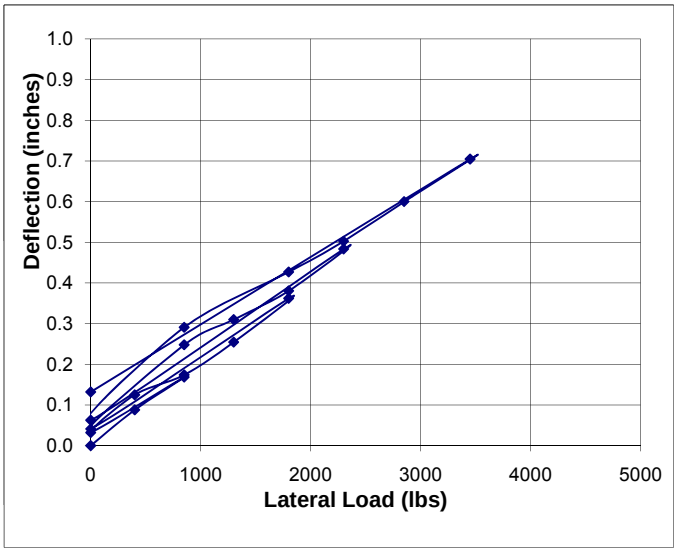
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-19A
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
10:18	0	0	-0.001	0.002	0.000		10:55	0	0	0.000	0.000	
	200	400	-0.001	0.002	0.000			200	400	0.088	0.088	
	400	850	0.000	0.003	0.001			400	850	0.169	0.169	
	600	1300	0.002	0.005	0.003			0	0	0.032	0.032	
	800	1800	0.006	0.009	0.007			200	400	0.125	0.125	
	1000	2300	0.017	0.018	0.017			400	850	0.174	0.174	
	1200	2850	0.031	0.027	0.029			600	1300	0.255	0.255	
	1400	3450	0.048	0.048	0.048			800	1800	0.362	0.362	
	1600	3950	0.066	0.070	0.067			0	0	0.041	0.041	
	1800	4450	0.095	0.098	0.096			400	850	0.248	0.248	
10:25	2000	5000	0.145	0.146	0.145			600	1300	0.310	0.310	
10:30	2000	5000	0.154	0.155	0.154			800	1800	0.381	0.381	
	0	0	0.123	0.126	0.124			1000	2300	0.484	0.484	
								0	0	0.063	0.063	
								400	850	0.291	0.291	
								800	1800	0.427	0.427	
								1000	2300	0.503	0.503	
								1200	2850	0.600	0.600	
								1400	3450	0.705	0.705	
							11:05	0	0	0.132	0.132	

Notes:





EARTH SYSTEMS SOUTHWEST

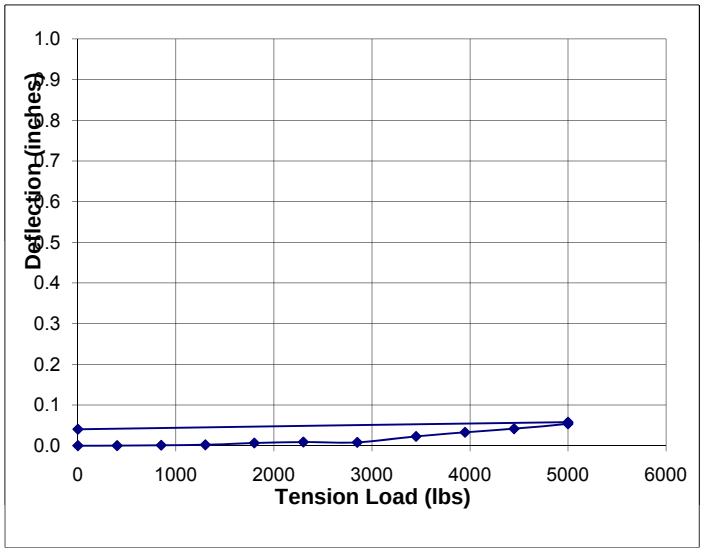
* - Gages reading positive with vertical displacement

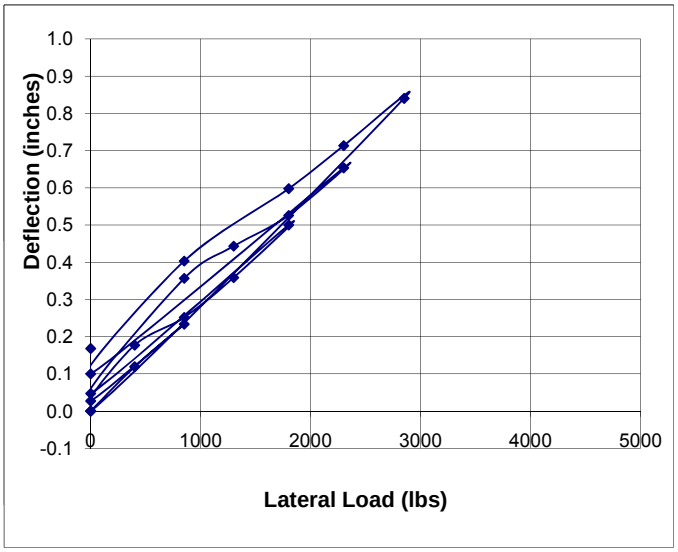
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-19B
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**60**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
9:57	0	0	0.000	0.000	0.000		10:43	0	0	0.000	0.000	
	200	400	0.000	0.000	0.000			200	400	0.119	0.119	
	400	850	0.000	0.002	0.001			400	850	0.234	0.234	
	600	1300	0.000	0.004	0.002			0	0	0.027	0.027	
	800	1800	0.007	0.007	0.007			200	400	0.177	0.177	
	1000	2300	0.008	0.010	0.009			400	850	0.252	0.252	
	1200	2850	0.014	0.002	0.008			600	1300	0.359	0.359	
	1400	3450	0.016	0.030	0.023			800	1800	0.500	0.500	
	1600	3950	0.026	0.040	0.033			0	0	0.047	0.047	
	1800	4450	0.035	0.049	0.042			400	850	0.357	0.357	
10:02	2000	5000	0.048	0.060	0.054			600	1300	0.443	0.443	
10:07	2000	5000	0.051	0.064	0.058			800	1800	0.526	0.526	
	0	0	0.043	0.038	0.040			1000	2300	0.654	0.654	
								0	0	0.100	0.100	
								400	850	0.403	0.403	
								800	1800	0.598	0.598	
								1000	2300	0.713	0.713	
								1200	2850	0.840	0.840	
							10:53	0	0	0.168	0.168	

Notes:





EARTH SYSTEMS SOUTHWEST

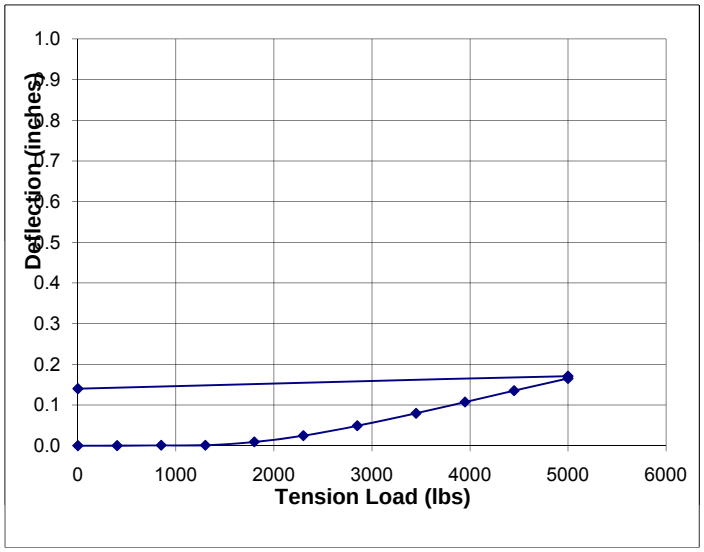
* - Gages reading positive with vertical displacement

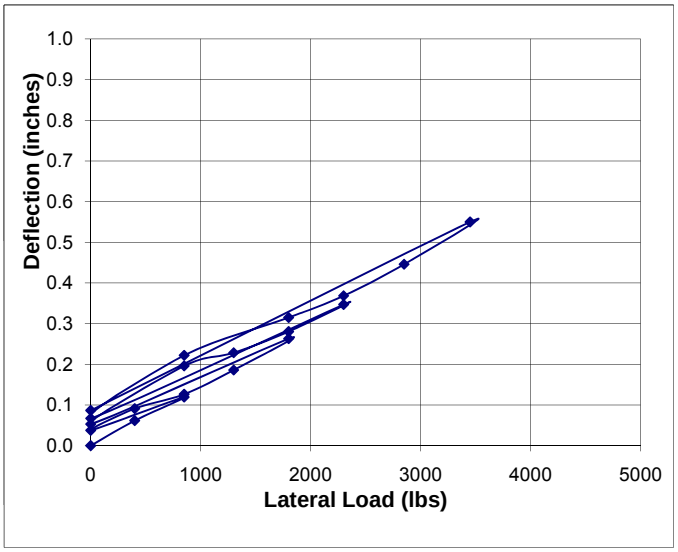
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-20A
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
8:58	0	0	0.000	0.000	0.000		9:18	0	0	0.000	0.000	
	200	400	0.000	0.000	0.000			200	400	0.062	0.062	
	400	850	0.000	0.002	0.001			400	850	0.120	0.120	
	600	1300	0.000	0.002	0.001			0	0	0.038	0.038	
	800	1800	0.008	0.011	0.009			200	400	0.091	0.091	
	1000	2300	0.024	0.025	0.025			400	850	0.127	0.127	
	1200	2850	0.051	0.048	0.049			600	1300	0.186	0.186	
	1400	3450	0.083	0.076	0.080			800	1800	0.263	0.263	
	1600	3950	0.113	0.102	0.107			0	0	0.053	0.053	
	1800	4450	0.144	0.127	0.135			400	850	0.196	0.196	
9:04	2000	5000	0.176	0.155	0.165			600	1300	0.229	0.229	
9:09	2000	5000	0.182	0.160	0.171			800	1800	0.281	0.281	
	0	0	0.143	0.138	0.140			1000	2300	0.347	0.347	
								0	0	0.067	0.067	
								400	850	0.222	0.222	
								800	1800	0.315	0.315	
								1000	2300	0.369	0.369	
								1200	2850	0.446	0.446	
								1400	3450	0.550	0.550	
							9:28	0	0	0.087	0.087	

Notes:





EARTH SYSTEMS SOUTHWEST

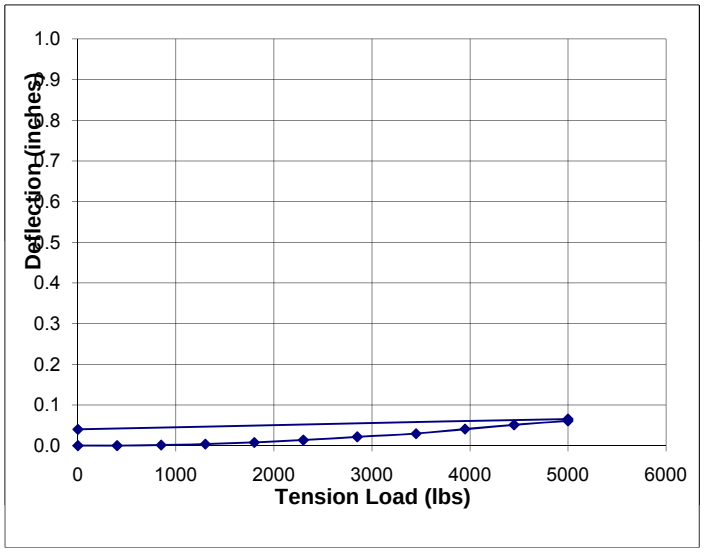
* - Gages reading positive with vertical displacement

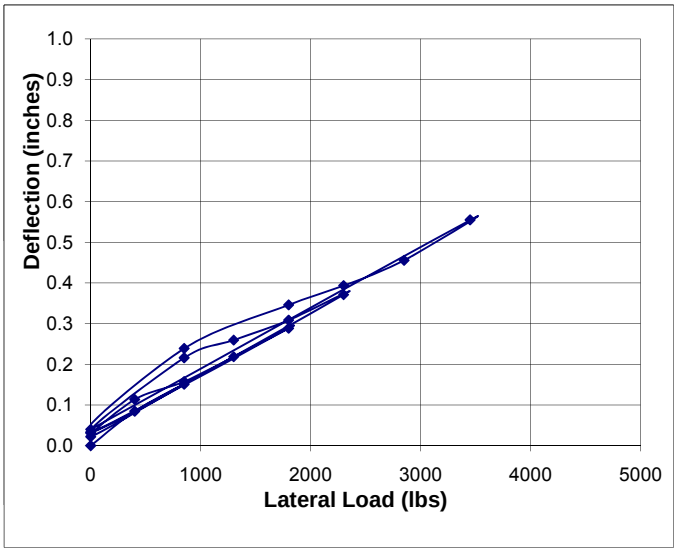
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-20B
Date:	12/16/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**60**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
8:40	0	0	0.001	0.002	0.000		9:27	0	0	0.000	0.000	
	200	400	0.001	0.002	0.000			200	400	0.085	0.085	
	400	850	0.004	0.003	0.002			400	850	0.151	0.151	
	600	1300	0.006	0.005	0.004			0	0	0.022	0.022	
	800	1800	0.009	0.010	0.008			200	400	0.114	0.114	
	1000	2300	0.014	0.017	0.014			400	850	0.158	0.158	
	1200	2850	0.024	0.023	0.022			600	1300	0.219	0.219	
	1400	3450	0.033	0.029	0.030			800	1800	0.289	0.289	
	1600	3950	0.043	0.042	0.041			0	0	0.031	0.031	
	1800	4450	0.055	0.051	0.051			400	850	0.216	0.216	
8:45	2000	5000	0.064	0.061	0.061			600	1300	0.260	0.260	
8:50	2000	5000	0.068	0.066	0.066			800	1800	0.309	0.309	
	0	0	0.042	0.041	0.040			1000	2300	0.371	0.371	
								0	0	0.033	0.033	
								400	850	0.239	0.239	
								800	1800	0.346	0.346	
								1000	2300	0.394	0.394	
								1200	2850	0.456	0.456	
								1400	3450	0.555	0.555	
							9:37	0	0	0.040	0.040	

Notes:





EARTH SYSTEMS SOUTHWEST

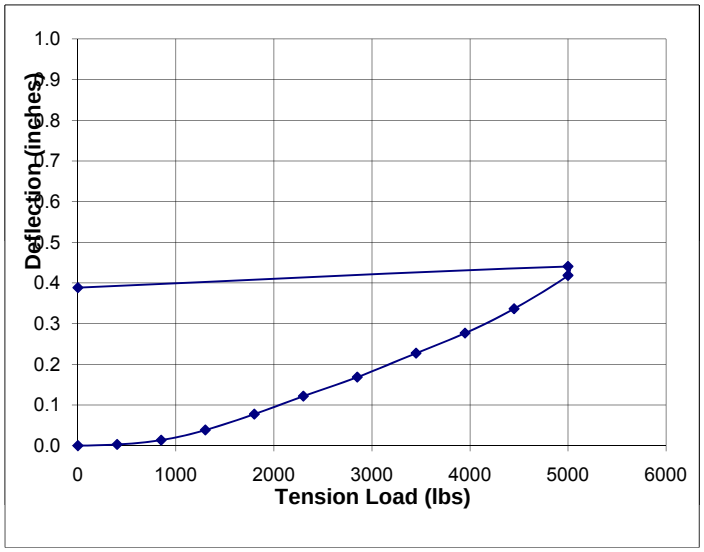
* - Gages reading positive with vertical displacement

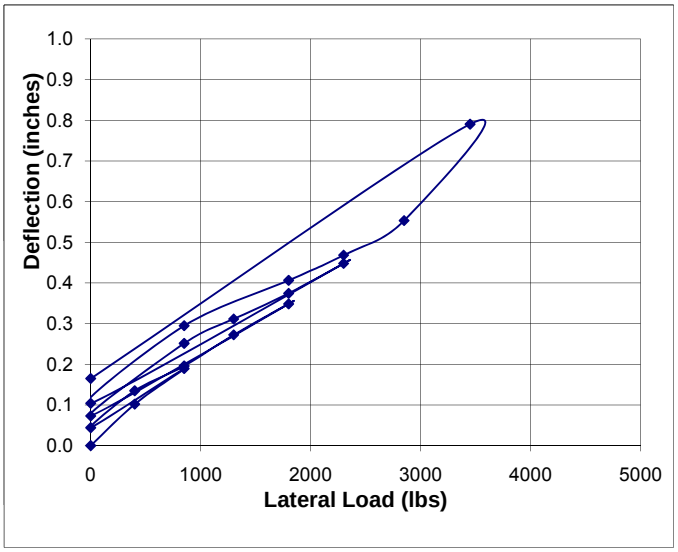
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-21A
Date:	17-Dec
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
11:53	0	0	-0.002	0.002	0.000		12:17	0	0	0.000	0.000	
	200	400	0.004	0.003	0.003			200	400	0.102	0.102	
	400	850	0.015	0.012	0.014			400	850	0.190	0.190	
	600	1300	0.041	0.036	0.039			0	0	0.044	0.044	
	800	1800	0.082	0.074	0.078			200	400	0.135	0.135	
	1000	2300	0.127	0.117	0.122			400	850	0.196	0.196	
	1200	2850	0.175	0.163	0.169			600	1300	0.273	0.273	
	1400	3450	0.232	0.223	0.228			800	1800	0.349	0.349	
	1600	3950	0.280	0.274	0.277			0	0	0.073	0.073	
	1800	4450	0.341	0.333	0.337			400	850	0.252	0.252	
12:03	2000	5000	0.423	0.415	0.419			600	1300	0.312	0.312	
12:08	2000	5000	0.443	0.439	0.441			800	1800	0.375	0.375	
	0	0	0.390	0.387	0.389			1000	2300	0.448	0.448	
								0	0	0.104	0.104	
								400	850	0.295	0.295	
								800	1800	0.407	0.407	
								1000	2300	0.469	0.469	
								1200	2850	0.554	0.554	
								1400	3450	0.791	0.791	
							12:27	0	0	0.165	0.165	

Notes:





EARTH SYSTEMS SOUTHWEST

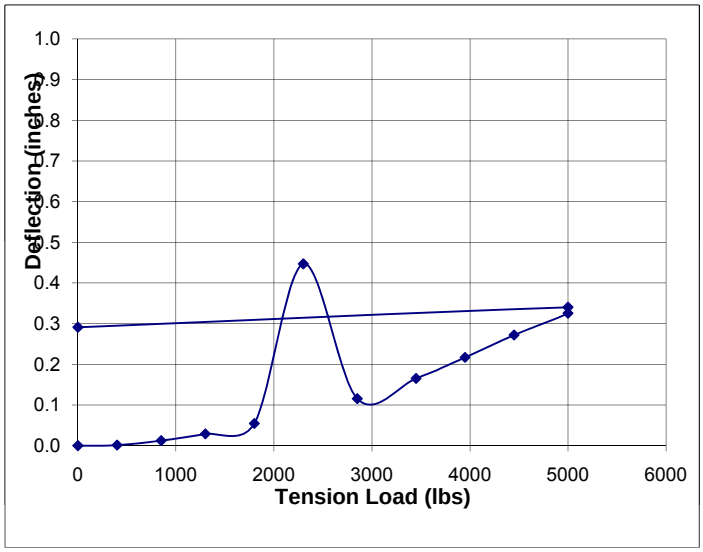
* - Gages reading positive with vertical displacement

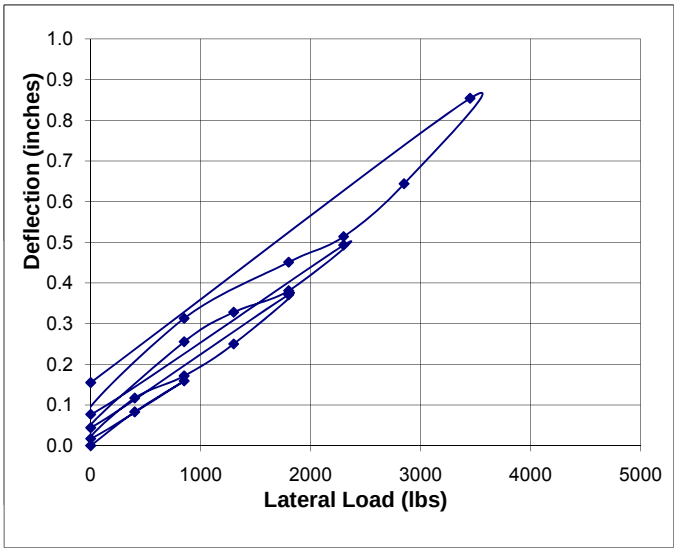
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-21B
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**56**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
11:34	0	0	0.000	0.000	0.000		12:31	0	0	0.000	0.000	
	200	400	0.001	0.002	0.001			200	400	0.083	0.083	
	400	850	0.011	0.014	0.013			400	850	0.159	0.159	
	600	1300	0.028	0.030	0.029			0	0	0.017	0.017	
	800	1800	0.055	0.055	0.055			200	400	0.117	0.117	
	1000	2300	0.069	0.825	0.447			400	850	0.172	0.172	
	1200	2850	0.118	0.113	0.116			600	1300	0.250	0.250	
	1400	3450	0.169	0.162	0.165			800	1800	0.371	0.371	
	1600	3950	0.224	0.211	0.217			0	0	0.044	0.044	
	1800	4450	0.280	0.265	0.272			400	850	0.256	0.256	
11:40	2000	5000	0.335	0.316	0.326			600	1300	0.328	0.328	
11:45	2000	5000	0.350	0.331	0.340			800	1800	0.381	0.381	
	0	0	0.294	0.289	0.291			1000	2300	0.493	0.493	
								0	0	0.077	0.077	
								400	850	0.313	0.313	
								800	1800	0.451	0.451	
								1000	2300	0.514	0.514	
								1200	2850	0.644	0.644	
								1400	3450	0.854	0.854	
							12:41	0	0	0.155	0.155	

Notes:





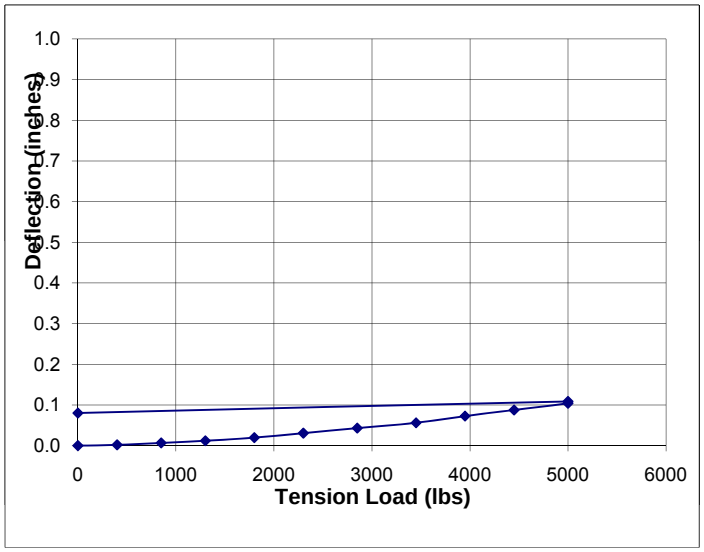
* - Gages reading positive with vertical displacement

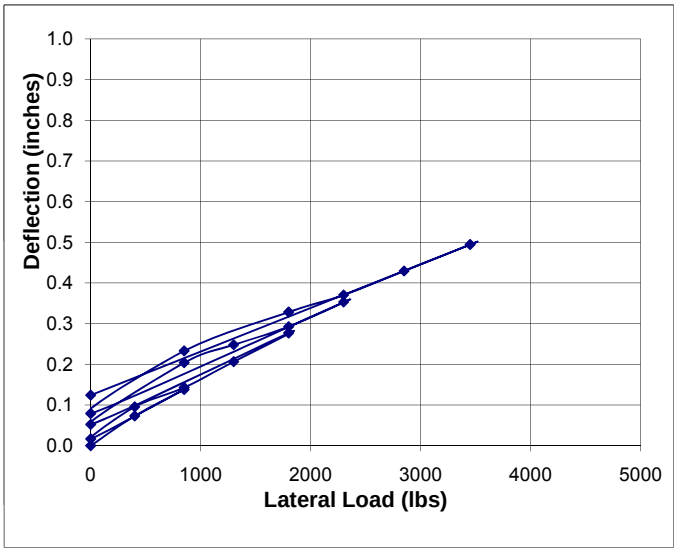
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-22A
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
10:15	0	0	0.000	0.002	0.000		11:07	0	0	0.000	0.000	
	200	400	0.002	0.004	0.002			200	400	0.073	0.073	
	400	850	0.007	0.008	0.007			400	850	0.138	0.138	
	600	1300	0.012	0.014	0.012			0	0	0.017	0.017	
	800	1800	0.020	0.022	0.020			200	400	0.096	0.096	
	1000	2300	0.032	0.032	0.031			400	850	0.143	0.143	
	1200	2850	0.047	0.041	0.043			600	1300	0.207	0.207	
	1400	3450	0.062	0.052	0.056			800	1800	0.277	0.277	
	1600	3950	0.081	0.066	0.073			0	0	0.052	0.052	
	1800	4450	0.097	0.080	0.088			400	850	0.204	0.204	
10:21	2000	5000	0.115	0.095	0.104			600	1300	0.248	0.248	
10:26	2000	5000	0.119	0.101	0.109			800	1800	0.293	0.293	
	0	0	0.081	0.081	0.080			1000	2300	0.353	0.353	
								0	0	0.079	0.079	
								400	850	0.233	0.233	
								800	1800	0.329	0.329	
								1000	2300	0.371	0.371	
								1200	2850	0.430	0.430	
								1400	3450	0.495	0.495	
							11:17	0	0	0.124	0.124	

Notes:





EARTH SYSTEMS SOUTHWEST

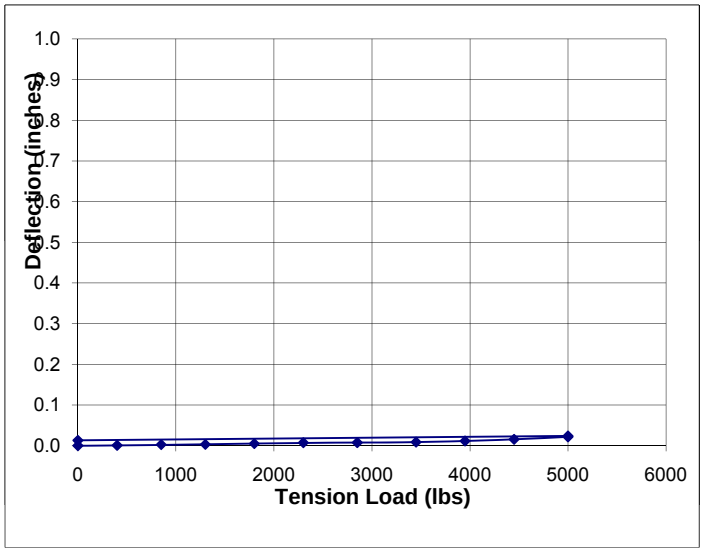
* - Gages reading positive with vertical displacement

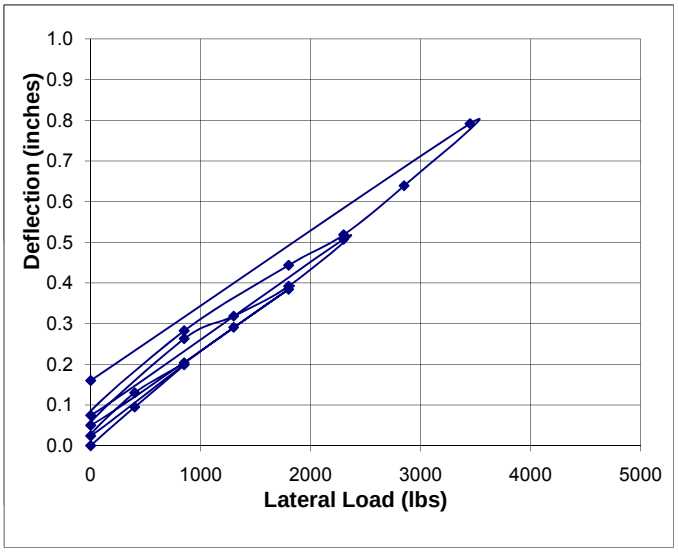
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-22B
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**58**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
10:34	0	0	0.000	0.000	0.000		10:53	0	0	0.000	0.000	
	200	400	0.001	0.001	0.001			200	400	0.095	0.095	
	400	850	0.004	0.001	0.003			400	850	0.199	0.199	
	600	1300	0.006	0.000	0.003			0	0	0.024	0.024	
	800	1800	0.009	0.001	0.005			200	400	0.130	0.130	
	1000	2300	0.015	-0.001	0.007			400	850	0.204	0.204	
	1200	2850	0.013	0.002	0.008			600	1300	0.291	0.291	
	1400	3450	0.013	0.005	0.009			800	1800	0.385	0.385	
	1600	3950	0.017	0.007	0.012			0	0	0.050	0.050	
	1800	4450	0.023	0.009	0.016			400	850	0.263	0.263	
10:40	2000	5000	0.031	0.013	0.022			600	1300	0.319	0.319	
10:45	2000	5000	0.033	0.015	0.024			800	1800	0.392	0.392	
	0	0	0.014	0.012	0.013			1000	2300	0.508	0.508	
								0	0	0.075	0.075	
								400	850	0.283	0.283	
								800	1800	0.444	0.444	
								1000	2300	0.519	0.519	
								1200	2850	0.639	0.639	
								1400	3450	0.792	0.792	
							11:03	0	0	0.160	0.160	

Notes:





EARTH SYSTEMS SOUTHWEST

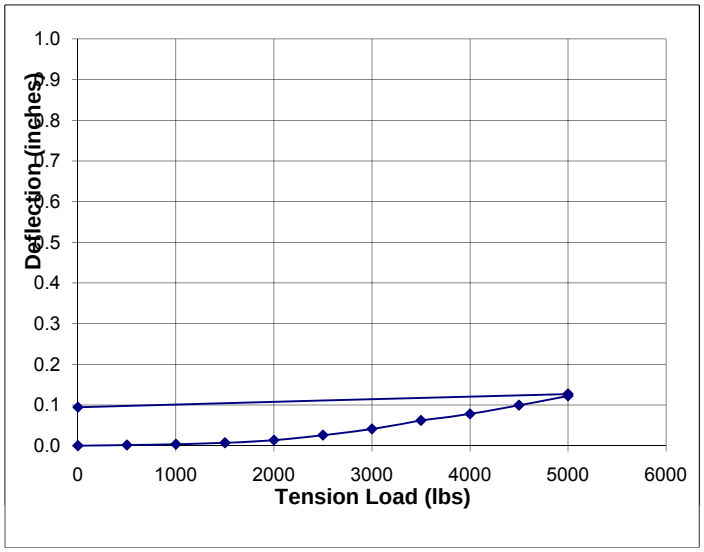
* - Gages reading positive with vertical displacement

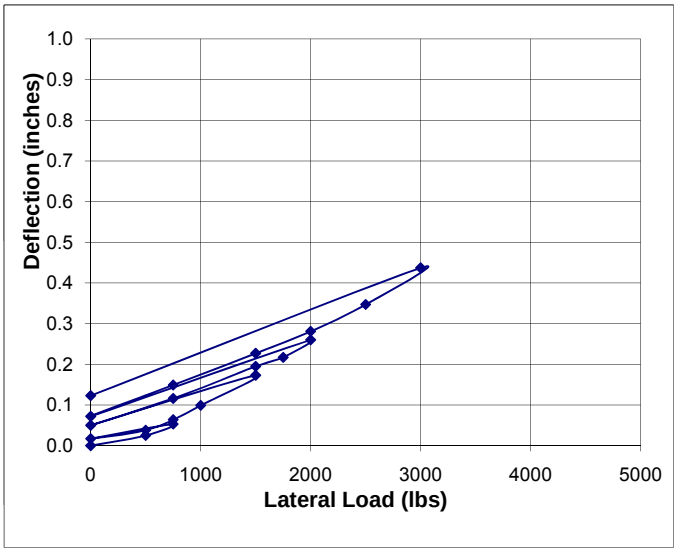
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-23A
Date:	12/18/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	20 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
9:28	0	0	0.000	0.000	0.000		9:45	0	0	0.000	0.000	
	500	500	0.002	0.001	0.002			500	500	0.025	0.025	
	1000	1000	0.004	0.003	0.004			750	750	0.053	0.053	
	1500	1500	0.008	0.006	0.007			0	0	0.017	0.017	
	2000	2000	0.015	0.012	0.014			500	500	0.038	0.038	
	2500	2500	0.028	0.024	0.026			750	750	0.064	0.064	
	3000	3000	0.043	0.039	0.041			1000	1000	0.099	0.099	
	3500	3500	0.065	0.059	0.062			1500	1500	0.173	0.173	
	4000	4000	0.081	0.075	0.078			0	0	0.050	0.050	
	4500	4500	0.101	0.098	0.100			750	750	0.116	0.116	
9:35	5000	5000	0.124	0.121	0.123			1500	1500	0.195	0.195	
9:40	5000	5000	0.128	0.126	0.127			1750	1750	0.217	0.217	
	0	0	0.097	0.092	0.095			2000	2000	0.260	0.260	
								0	0	0.072	0.072	
								750	750	0.149	0.149	
								1500	1500	0.227	0.227	
								2000	2000	0.281	0.281	
								2500	2500	0.347	0.347	
								3000	3000	0.437	0.437	
							9:55	0	0	0.123	0.123	

Notes:





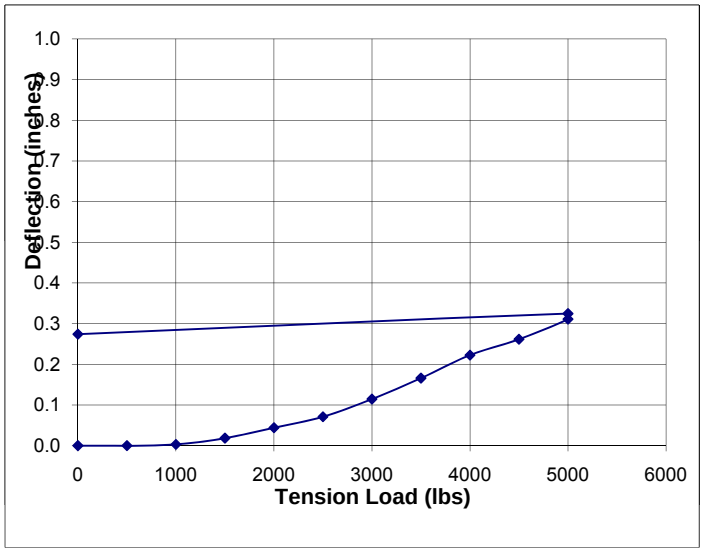
* - Gages reading positive with vertical displacement

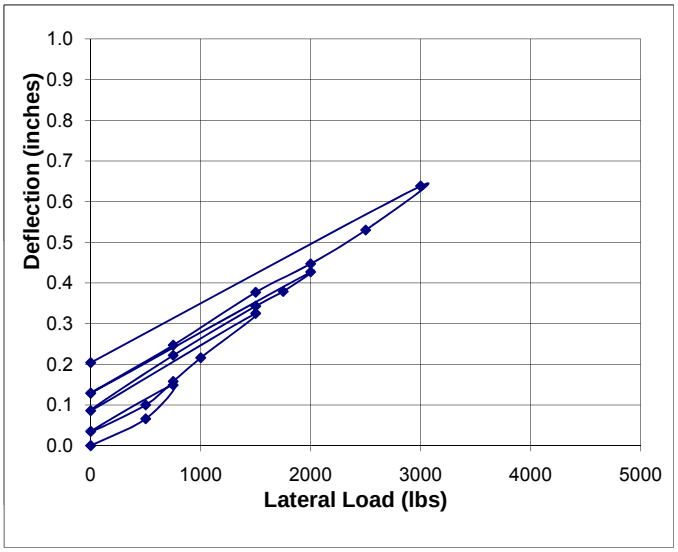
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-23B
Date:	12/18/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**36**
Jack:	20 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
9:07	0	0	0.000	0.000	0.000		9:53	0	0	0.000	0.000	
	500	500	0.000	0.000	0.000			500	500	0.066	0.066	
	1000	1000	0.003	0.003	0.003			750	750	0.149	0.149	
	1500	1500	0.020	0.017	0.019			0	0	0.035	0.035	
	2000	2000	0.046	0.042	0.044			500	500	0.100	0.100	
	2500	2500	0.073	0.069	0.071			750	750	0.158	0.158	
	3000	3000	0.117	0.112	0.115			1000	1000	0.216	0.216	
	3500	3500	0.166	0.166	0.166			1500	1500	0.325	0.325	
	4000	4000	0.223	0.222	0.223			0	0	0.086	0.086	
	4500	4500	0.259	0.264	0.262			750	750	0.222	0.222	
9:13	5000	5000	0.308	0.314	0.311			1500	1500	0.343	0.343	
9:18	5000	5000	0.322	0.327	0.325			1750	1750	0.379	0.379	
	0	0	0.283	0.265	0.274			2000	2000	0.427	0.427	
								0	0	0.129	0.129	
								750	750	0.247	0.247	
								1500	1500	0.377	0.377	
								2000	2000	0.447	0.447	
								2500	2500	0.530	0.530	
								3000	3000	0.638	0.638	
							10:04	0	0	0.204	0.204	

Notes:





EARTH SYSTEMS SOUTHWEST

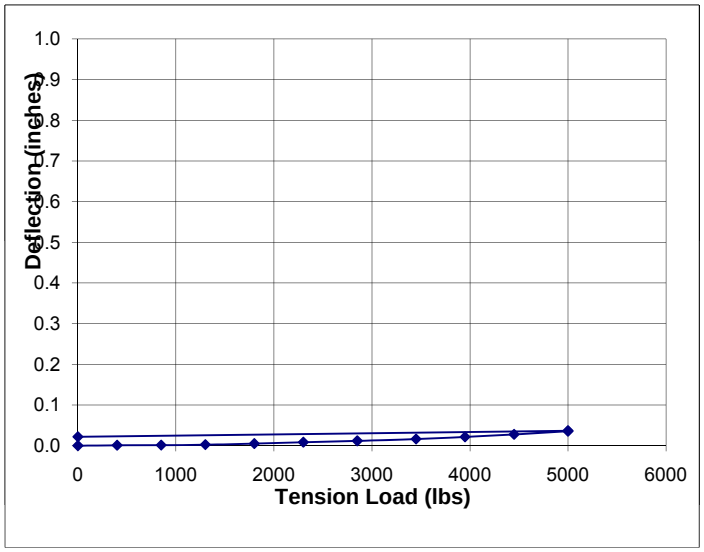
* - Gages reading positive with vertical displacement

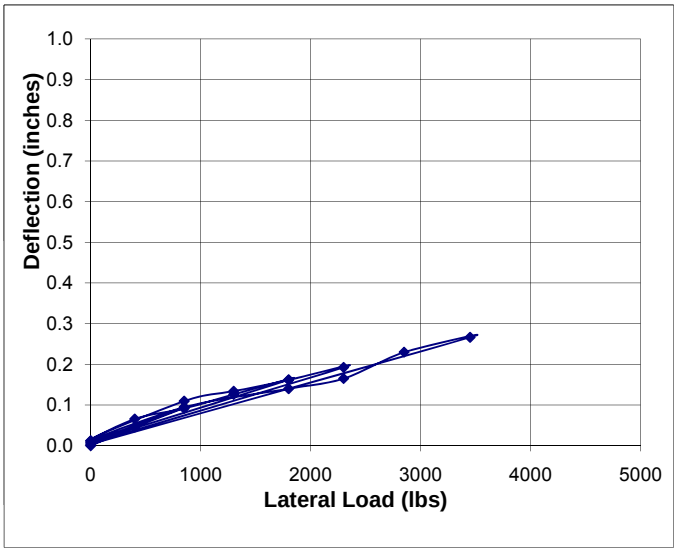
Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-24A
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**48**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
1:33	0	0	0.000	0.000	0.000		2:19	0	0	0.000	0.000	
	200	400	0.000	0.002	0.001			200	400	0.046	0.046	
	400	850	-0.001	0.003	0.001			400	850	0.094	0.094	
	600	1300	-0.001	0.006	0.003			0	0	0.012	0.012	
	800	1800	0.002	0.009	0.005			200	400	0.066	0.066	
	1000	2300	0.001	0.016	0.009			400	850	0.092	0.092	
	1200	2850	0.002	0.022	0.012			600	1300	0.126	0.126	
	1400	3450	0.005	0.028	0.016			800	1800	0.162	0.162	
	1600	3950	0.009	0.035	0.022			0	0	0.012	0.012	
	1800	4450	0.014	0.042	0.028			400	850	0.110	0.110	
1:40	2000	5000	0.022	0.049	0.036			600	1300	0.134	0.134	
1:45	2000	5000	0.023	0.051	0.037			800	1800	0.162	0.162	
	0	0	0.020	0.024	0.022			1000	2300	0.193	0.193	
								0	0	0.008	0.008	
								400	850	0.095	0.095	
								800	1800	0.140	0.140	
								1000	2300	0.165	0.165	
								1200	2850	0.230	0.230	
								1400	3450	0.267	0.267	
							2:30	0	0	0.004	0.004	

Notes:





EARTH SYSTEMS SOUTHWEST

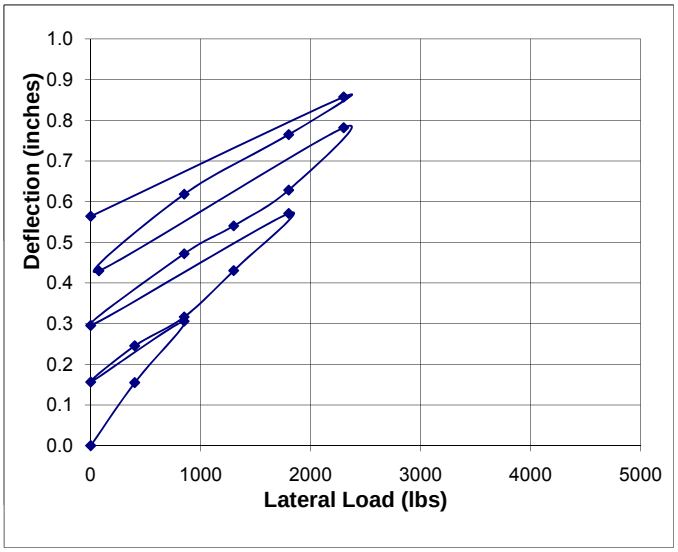
* - Gages reading positive with vertical displacement

Desert Sunlight Solar Farm, Desert Center, California
Pile Load Testing

Location:	Desert Sunlight Solar Farm, Desert Center, CA
Test No.:	PT-24B
Date:	12/17/2009
Pile Size:	W6 x 7.2
Driven Depth (in.):	**36**
Jack:	12 Tonn
Lateral Gage Position:	1 inch above grade

Axial Tension Load Test							Lateral Load Test					
Time	Enerpac Load (psi)	Axial Load (lbs)	Δ * Gage #1 (inches)	Δ * Gage #2 (inches)	Corrected Deflection Δ Average	Notes	Time	Enerpac Load (psi)	Lateral Load (lbs)	Δ Gage (inches)	Corrected Deflection Δ Average	Notes
1:50	0	0	0.001	0.001	0.000		2:06	0	0	0.000	0.000	
	200	400	0.008	0.008	0.007			200	400	0.155	0.155	
	400	850	0.024	0.024	0.023			400	850	0.306	0.306	
	600	1300	0.054	0.056	0.054			0	0	0.157	0.157	
	800	1800	0.141	0.147	0.143			200	400	0.246	0.246	
	1000	2300	0.235	0.250	0.241			400	850	0.317	0.317	
	1200	2850	0.324	0.348	0.335			600	1300	0.431	0.431	
	1400	3450	0.436	0.472	0.453			800	1800	0.571	0.571	
								0	0	0.296	0.296	
								400	850	0.472	0.472	
								600	1300	0.541	0.541	
								800	1800	0.629	0.629	
								1000	2300	0.782	0.782	
								0	0	0.430	0.430	
								400	850	0.619	0.619	
								800	1800	0.765	0.765	
								1000	2300	0.858	0.858	
							2:15	0	0	0.564	0.564	

Notes: .9905 & .7815 @ 1500 lbs Vert/ 1100 lbs =.924 Lat.



EARTH SYSTEMS SOUTHWEST

* - Gages reading positive with vertical displacement

Estimate for Desert Pavement Coverage

Earth Systems
Southwest

79-811B Country Club Drive
Bermuda Dunes, CA 92203
(760) 345-1588
(800) 924-7015
FAX (760) 345-7315

February 19, 2010 **DRAFT** File No.: 11666-01
Doc. No.: 10-02-744

First Solar Electric, LLC
1111 Broadway, 4th Floor
Oakland, California 94607

Attention: Mr. Robert Holbrook

Project: **Desert Sunlight Project**
Proposed 550 MW Solar Project
Desert Center, Riverside County, California

Subject: **Estimate of Desert Pavement Coverage**

As requested by Mr. Robert Holbrook on February 17, 2010, Earth Systems Southwest [ESSW] is providing an estimate of the percent coverage of the project site by desert pavement. We have utilized preliminary soil mapping by ECORP (unpublished), regional geologic maps and a cursory site visit by our senior engineering geologist (on February 19, 2009) to correlate surficial data and observations.

For the purposes of this preliminary estimate, desert pavement is categorized as moderate to strong and weak. Moderate to strong pavement is indicative of complete to nearly complete rock clasts coverage on the surface with minimal soil exposed. Weak desert pavement is where there is predominantly more soil exposed than rock clasts.

For this project, the moderate to strong desert pavement is exposed in areas where older alluvial soils have been mapped, including the southwest and northwest portions of the property. We estimate that in these areas, discounting localized stream channel deposits and sheet flow deposits, that the moderate to strong pavement areas encompass approximately 20 to 30 percent of the project.

Elsewhere within the mapped younger alluvial deposits, which include sheet flow deposits, stream channel deposits, aeolian sands, and undifferentiated younger alluvium, localized areas of weak desert pavement exist within or between the more defined drainage courses. We estimate that within the younger alluvial areas that about 5 to 15 percent of the site has a weakly developed desert pavement.

If you have any questions or require additional information, please contact this office at your convenience.

Respectfully submitted,
EARTH SYSTEMS SOUTHWEST

Craig S. Hill,
CE 38234

Letter/mss/csh/ajm

Distribution: 2/First Solar Electric, LLC
2/BD File