GEOTECHNICAL ENGINEERING REPORT
UCI PRODUCTION WAREHOUSE

Property location:
UTAH CORRECTIONS INDUSTRIES
14126 SOUTH PONY EXPRESS ROAD
DRAPER, UTAH
DFCM PROJECT NO. 07284100

Prepared for:
DEPARTMENT OF FACILITIES CONSTRUCTION AND MANAGEMENT
4230 STATE OFFICE BUILDING
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APPENDIX

LIST OF TABLES AND FIGURES

1. EXECUTIVE SUMMARY

This report presents the field investigation for the proposed UCI Production Warehouse to be located at 14126 South Pony Express Road in Draper, Utah. This project is referenced to the Department of Facilities Construction and Management (DFCM) Project # 07284100. The subsurface field investigation was performed in accordance with Wilding Engineering Proposal dated September 5, 2007 and authorized by Joanna Fisher on September 13, 2007, DFCM Contract # 087137. The proposed development consists of about 3.21 acres in area and is located on the west side of Pony Express Road at about 14126 South.

The purpose of this investigation was to determine the suitability of on site soils and identify the design parameters for the construction of a single story industrial warehouse building with the associated utilities and asphalt paved drive areas. A future phase will consist of an addition to the warehouse on the east side to be used as office administrative building.

Subsurface conditions at the project site were evaluated using nine (9) borings designated as B-1 through B-9 and two CPT soundings advanced near drilled boring locations as indicated on Plate A-2, Site Map and Boring Locations in the Appendix. Four (4) Borings were drilled in the proposed building footprint area to a depth ranging between 21½ and 51½ feet below existing site grades, and five (5) borings were drilled in the proposed parking and drive areas to a depth ranging between 6½ and 21½ feet below existing site grades. CPT soundings were advanced to a depth of 50 feet below the ground surface.

The soil profile generally consists of silty clay to silty sand (CL - SM), followed by lean clay (CL) to sandy lean clay (CL), underlain by poorly graded sand with silt and gravel (SP-SM) to sandy lean clay (CL) to the maximum depth explored of about 51½ feet.

Based on the subsurface conditions encountered at the site, it is our opinion that the proposed site is suitable for the development of the industrial warehouse site if the recommendations of this report are followed.

- Shallow foundation bearing on undisturbed native soils (silt and clays) may be designed with a maximum net allowable bearing capacity of 1500 pounds per square foot (psf), or a subgrade modulus value of 10 pounds per cubic inch (pci). Alternatively, shallow foundations placed on at-least 2½ feet of properly placed and compacted granular structural fill may be designed using a maximum net allowable bearing pressure of 2,000 psf, or subgrade modulus of 14 pci.

- Soil Corrosivity from samples obtained onsite indicate high corrosion attack on subsurface steel structures and moderate to negligible degree of sulfate attack on concrete structures.

- Design values and a code specified response spectrum for this site were based upon a site class of "D" for the stiff soil profile encountered on the site with site specific shear wave velocities ranging from 624 to 959 (ft/s). The design spectral accelerations were found to be 0.93g and 0.59g for S_{DS} and $S_{D1,}$ respectively.

- A review of the geologic hazards maps for Salt Lake County indicates that the project site is located in an area designated as “moderate” in liquefaction potential. This suggests that the probability of liquefaction to occur at the project site is between 10% and 50% in 100 year return period. Ground water was encountered during the subsurface exploration at a depth between 30 and 47 feet below the ground surface. Calculations using maximum considered earthquake (MCE) magnitude M_L=7.5 for the main segment of the Wasatch Fault Zone resulted of induced ground surface settlements of up to 1.29 inches due to liquefaction or lateral spreading. We recommend connecting the footings and columns together to minimize settlement due to liquefaction.
- Flexible pavement for the anticipated drive, parking and delivery areas shall be 4-inches of asphalt over 8-inches of roadbase for heavy duty traffic areas.
- Rigid pavement for the anticipated loading dock areas shall be 6-inches of concrete over 6-inches of roadbase and standards duty pavement section with 5-inches over 4-inches of roadbase.

The executive summary is only to provide an overview of the report and shall not replace or be used separate from the geotechnical report. The conclusions and recommendations included within this report are based upon and limited to the information obtained from the borings drilled at the site.

2. INTRODUCTION

This report presents the field investigation for the proposed UCI Production Warehouse to be located at 14126 South Pony Express Road in Draper, Utah, see site and vicinity plan in appendix. This project is referenced to the Department of Facilities Construction and Management (DFCM) Project # 07284100. The subsurface field investigation was performed in accordance with Wilding Engineering Proposal dated September 5, 2007 and authorized by Joanna Fisher on September 13, 2007, DFCM Contract # 087137.

The field investigation consisted of nine (9) borings drilled to a depth ranging between 6½ and 51½ feet below the ground surface and two (2) Cone Penetrometer Test (CPT) soundings advanced to 50 feet below the ground surface. Detailed Boring and CPT Logs (B-1 through B-9, CPT-1 and CPT-2) can be found in Appendix. Recommendations in this report are based upon information gathered from the field investigation, site inspection, lab testing, and from reviewing geologic maps and reports of the area.

3. PURPOSE AND SCOPE

The purpose of this investigation was to determine the suitability of on site soils for the development of a single story industrial building with the associated utilities and asphalt drive areas. The investigation includes a review of surface water and ground water conditions and their affects. A liquefaction analysis was performed in accordance with the Salt Lake County Geologic Hazard Ordinance. Engineering and construction recommendations are presented based on subsurface conditions encountered in the field along with the effects of both subsurface and surface waters.

4. SITE AND PROJECT INFORMATION

4.1. Proposed Project Description

Based on the information provided by the client and the site plan created by Wilding Engineering, the proposed development will consist of two phases. The first phase will include a 24,000 square foot production warehouse building with the associated utilities, detention basin, asphalt paved parking and drive areas. The proposed building will be a single story structure with concrete slab-on-grade floors. Based on our experience and understanding of the proposed construction, maximum column and continuous wall loads are assumed to be about 75 kips and 5 to 6 kip/ft, respectively. Asphaltic concrete will be used to construct paved drive areas and approximately 17 automobile parking stalls. We anticipate the second phase will consist of an addition to the warehouse on the east side. The addition will be used for administrative office purposes. As the actual development of this phase is undetermined we have performed our subsurface exploration and calculations with assumed loadings similar to the Production Warehouse Building of the first phase. Changes in design or structure for phase two may require additional subsurface exploration. A site plan is located in the Appendix of this report.

Recommendations presented in this report are based upon the current available information. If the assumed building loads or any information presented is incorrect or has changed, please inform Wilding Engineering in writing so that we may amend the recommendations presented in this report appropriately.

4.2 Existing Site Conditions

The proposed development consists of about 3.21 acres in area and is located at on the west side of Pony Express Road at 14126 South in Draper, Utah. The site is located in Section 36, Township 3 South, Range 1 West, Salt Lake Base and Meridian, Utah.

The property is a parcel of vacant land vegetated with various weeds and grasses. The property is enclosed by barbed wire and chain link fence. Access to the site is from the northwest corner under high surveillance from surrounding Utah State Prison Security. Land use in the vicinity of the area is primarily institutional with some commercial.

The topography of the site ranges in elevation from 4449 to 4459 feet above mean sea level. The site generally slopes towards the northwest at less than two (<2%) percent. The property is bound by vacant land on the west, Pony Express Road on the east, Utah State Corrections Facility on the north and a juvenile institution center on the south. Access to the site is proposed from Pony Express Road on the east side of the site.

5. GENERAL GEOLOGY AND HYDROLOGY

5.1. Surficial Geology

Based on the available geologic maps, the project site is underlain by Lacustrine clay and silt, undivided (Uppermost Pleistocene). The site is mapped with the soil unit; "lbpm- clay, silt and minor fine sand and pebble gravel; bedding locally disrupted by soft-sediment deformation or liquefaction. Deposited in deep and (or) quiet water in lower part of basin. Usually grades in laterally into other deposits of the Bonneville lake cycle. Unit probably contains small deposits of unit "clsp" in urbanized areas. Thickness ranges from 1 to >10 meters thick."[1]

5.2. Geologic Hazards

5.2.1. Faulting

The site is located about three (3) miles west of the Wasatch Fault, which runs along the foothills of the Wasatch Mountain Range from Davis to Utah County. There is no fault mapped through the project area.

5.2.2. Liquefaction

Liquefaction is a common earthquake condition in which soils lose virtually all shear strength and act as viscous liquids during severe ground shaking. A physical change occurs to the soil transforming it "from solid ground capable of supporting a structure, to

[1] Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone; U.S. Geological Survey, Stephen F. Personius and William E. Scott, 1992.

quicksand-like liquid with a greatly reduced ability to bear the weight of a building."[2] This site is mapped as having a "moderate" potential for liquefaction.[3] This suggests that the probability of liquefaction to occur at the project site is between 10% and 50% in 100 year return period.

5.3 Ground Water

The site is mapped as having a depth to ground water less than 30 feet.[4] Ground water pore pressure stabilized during our CPT subsurface field exploration at 30 feet (CPT-1) and 47 feet (CPT-2) below the existing ground surface. However, ground water was not encountered in borings drilled to 51½ feet below existing grades during our investigation. For further ground water evaluation see section 5.2.2 of this report.

5.4 Surface Water

The storm drainage plan must include measures to properly convey surface water runoff from the paved surfaces and structures into a detention pond. The site should be graded to direct any surface flows away from buildings and structures. Natural drainage is generally from southeast to northwest.

This site is mapped by Federal Emergency Management Agency (FEMA) as Zone X, which is an area described as being located outside the 500-year flood event.[5] FEMA Map is included in the Appendix.

6 FIELD EXPLORATIONS

6.1 Subsurface Investigation

Subsurface conditions at the project site were evaluated using nine (9) borings designated as B-1 through B-9 and two CPT soundings advanced near drilled boring locations as indicated on Plate A-2, Site Map and Boring Locations in the Appendix. Four (4) Borings were drilled in the proposed building footprint area to a depth ranging between 21½ and 51½ feet below existing site grades, and five (5) borings were drilled in the proposed parking and drive areas to a depth ranging between 6½ and 21½ feet below existing site grades. CPT soundings were advanced to a depth of 50 feet below the ground surface.

Borings were drilled with a truck mounted drill rig using a 3¼-inch inside diameter continuous-flight hollow-stem auger. Stratigraphy and classification of the soils were logged under the direction of a geotechnical engineer.

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[2] Liquefaction- A Guide To Land Use Planning, Craig V. Nelson, S.L. County Public Works- Planning Division.

[3] Geologic Hazards, Salt Lake County, Utah, L.R. Anderson, J.R. Keaton, J.E. Spitzley, and A.C, Allen in 1986 under U.S. Geological Survey Contract 14-08-0001-1991.

[4] Shallow Ground Water and Related Hazards in Utah, Utah Geological and Mineral Survey, Suzanne Hecker, Kimm M. Harty, and Gary E. Christensen, 1988

[5] FEMA FIRM, West Jordan,Utah, Salt Lake County, Only Panel Printed, Community Panel Number 4901450005A, Effective September 29 1989.

Samples were obtained at about 2½ to 5 foot intervals in each boring. Disturbed and undisturbed samples of the soils were obtained for subsequent laboratory testing and examination. Disturbed samples were obtained by driving a standard 2-inch (O.D.) split-spoon sampler into the soil a distance of 18 inches using a 140-lb hammer dropped from a height of 30 inches. The number of blows required to drive the sampler 12 inches is known as the standard penetration resistance (SPT), or N-value. The N-values provide a measure of the relative density of granular soils, such as sand, and the relative consistency, or stiffness of cohesive soils, such as clay or silt. Empirical correlations with SPT data and engineering properties require N-values to be corrected to N_{70}. This means that the hammer energy has been normalized to 70% of the theoretical maximum. From the field sampling conditions we applied the following factors: hammer energy ratio (h_1), rod length (h_2), no sample liner (h_3), 3.25 I.D. borehole diameter (h_4) and depth (C_N). SPT blow counts taken at sample intervals in each of the borings with N-values ranging from 10 to 100 to the maximum depth explored of 31½ feet.

Two CPT soundings were performed by Conetec, Inc. The CPT soundings were performed using a 25-ton CPT rig mounted on an International 6 wheeled chassis. The electronic cone tip is directly pushed into the soil. CPT has been proven to provide reliable information for soil stratigraphy, relative density, strength, and equilibrium ground water pressures. The cone was advanced near drilled borings within the building footprint to a depth of 50 feet below the ground surface.

The disturbed samples were taken at various depths and examined in the field and representative portions were stored in sealed plastic bags. The samples were transported to our laboratory for further examination and testing. The borings were backfilled up to the ground surface with auger cuttings and on-site soils. Sample types with depths are shown in detail in the Boring and CPT Logs found in the Appendix.

6.2 Subsurface Conditions

6.2.1 Soils

The soil profile generally consists of silty clay to silty sand (CL - SM), followed by lean clay (CL) to sandy lean clay (CL), underlain by poorly graded sand with silt and gravel (SP-SM) to sandy lean clay (CL) to the maximum depth explored of about 51½ feet.

The subsurface profile description above is a generalized interpretation provided to highlight the major subsurface stratification features and material characteristics. The boring and CPT logs included in the Appendix should be reviewed for more specific information. The stratifications shown on the boring and CPT logs represent the conditions only at the boring and CPT log locations. The stratifications represent the approximate boundary between subsurface materials and the transition may be gradual.

6.2.2 Ground Water

In borings drilled to a depth of 51½ feet, ground water was not encountered. CPT-1 and CPT-2 were advanced to 50 feet below the ground surface. Pore water pressure was allowed to dissipate and indicate ground water stabilized at 30 and 47 feet below the ground surface. It should be noted that it is possible for the ground water levels to fluctuate during the year depending on the season and climate. Additionally discontinuous zones of perched water may exist at various locations and depths beneath the ground surface. This could result in encountering ground water conditions during construction which may have been different than during our field investigation. If ground water is encountered during construction Wilding Engineering must be notified to observe changing conditions and provide recommendations.

7 LABORATORY TESTING

Representative soil samples were tested to evaluate physical and engineering properties. Laboratory testing included: natural water content, unit weight, grain size analysis, Atterberg Limits, Ph, resistivity and sulfates tests.

Moisture content was tested on each specimens transported to the laboratory. Moisture contents in the upper five feet ranged from 2 to 15 percent. Below five feet moisture increased with depth ranging between 3 and 28 percent.

Grain size analyses (gradation) were performed according to ASTM D422. Maximum and minimum fine content from select specimens tested are 94% and 2% passing #200 sieve. Maximum and minimum sand content contained between the #4 and #200 sieves are 61% and 6%. Maximum and minimum gravel content retained on the #4 sieve is 25% and 0%.

Atterberg Limits tests were performed according to ASTM D4318. This test provides a plasticity index used for soil classification and strength properties. The majority of the soils onsite were plastic. Silty sand to sandy lean clay was generally encountered in the upper fifteen feet of the borings.

One-dimensional consolidation tests were performed according to ASTM D2435. This test provides soil strength characteristics used for estimating bearing capacity and potential settlement. Two samples specimens were tested to be over consolidated with an estimated preconsolidation ranging from 3100 to 4100 psf.

Resistivity, pH and sulfates tests are discussed further in section 8.2.8 Soil Corrosivity.

Lab results are presented on the Test Pit Logs and Summary of Lab Results in the Appendix.

8 RECOMMENDATIONS AND CONCLUSIONS

8.1 Geotechnical Discussion

Wilding Engineering, Inc. has provided the following geotechnical-related recommendations based on the information provided by the client and the soils encountered during our field investigation for the proposed development. The proposed industrial site is suitable for construction if the recommendations of this report are adhered to. The primary geotechnical factors that will impact the proposed construction include compressible behavior of subsurface fine-grained soils, the moisture sensitivity of on-site soils, foundation preparation, potential caving of deeper excavations in granular soils, and surface drainage. Further information is provided in the following sections of this report.

8.2 Site Work

8.2.1 Site Preparation

It is the contractor's responsibility to locate and protect all existing utility lines, whether shown on the drawings or not.

In general 12 inches of topsoil was encountered during our investigation. All topsoil or any soil containing organic materials should be stripped from the site where structures or pavement are to be placed. Topsoil may be stockpiled on site for subsequent use in landscape areas. Any unsuitable material (loose, soft, saturated, or otherwise unstable soils where structures are to be placed), shall be replaced with structural fill according to the standards set forth in section 8.2.3 and 8.2.4 of this report.

Upon completion of site stripping and prior to placement of any fill, the exposed subgrade should be evaluated by a representative of the Geotechnical Engineer. Proof rolling with loaded construction equipment may be a part of this evaluation. Soils that are observed to rut or deflect excessively (typically greater than 1-inch) under the moving load of a loaded rubber-tired dump truck or other suitable construction vehicle should be over-excavated down to firm undisturbed native soils and backfilled with properly placed and compacted structural fill.

The near surface on-site soils contain significant amount of sensitive fine-grained soils. These types of soil can become weak and unstable during construction activities due to excessive amounts of moisture. Ideally, site preparation, earthwork, and pavement subgrade preparation may be best achieved during warmer, drier months (mid-May to mid-October). If site and earthwork should occur during wetter months, we recommend the use of Tensar BX-1100 Geo-grid reinforcement placed on top of prepared subgrade surface followed by at least 12 inches of crushed aggregate for a temporary construction roadway. This will provide a suitable working surface to reduce the effects of construction traffic on the exposed subgrade.

Subgrade which is disturbed or experiencing "pumping" shall be over excavated down to firm native soils and replaced with compacted granular fill meeting the requirements in sections 8.2.3 and 8.2.4 of this report. Areas experiencing very soft or wet conditions will become more difficult to achieve compaction. These areas shall be replaced with a minimum of two (2) feet of “free draining” gravel placed in 8-inch lifts and either tampered or vibrated to provide stability.

8.2.2 Excavation Consideration

All utilities encountered in excavating shall be carefully supported, maintained, and protected during construction in accordance with OSHA Regulations as stated in 29 CFR Part 1926. It is the responsibility of the contractor to have safe working conditions. Temporary construction excavations should be properly sloped or shored, in compliance with current federal, state, and local requirements.

Construction excavations up to 4 feet deep may be constructed with near-vertical side slopes. Excavations between 4 feet and 10 feet deep should have side slopes not steeper than 2 to 1, or a trench box or shoring may be used. Excavations are to be made to minimize subsequent filling. Coarse-grained material can easily become unstable and is anticipated in localized areas to experience toppling, cave-in or sliding. Boulders and cobbles larger than six inches shall be removed from trenches.

Wilding Engineering does not assume responsibility for construction site safety or the contractor's or other parties’ compliance with local, state, and federal safety or other regulations. As stated in the OSHA regulations, “a competent person shall evaluate the soil exposed in the excavations as part of his/her safety procedures”. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

8.2.3 Structural Fill Material

Structural fill shall consist of well-graded granular material, with a maximum aggregate size of 2 inches, and a maximum of 15% passing the #200 sieve. The fill material which is finer than the number 40 sieve shall have a liquid limit (LL) less than 35 and a Plastic Index (PI) less than 25, see table 8.2.1 for gradation specification. This material shall be free from organics, garbage, frost, and other loose, compressible, or deleterious materials.

Table 8.2.1 Structural Fill Requirements

Grain Size	Percent Passing
2-inch	100
¾-inch	85 to 100
No. 4	15 to 45
No. 200	< 15
Plastic Index (PI)	< 25
Liquid Limit (LL)	< 35

Fine-grained materials (clays and silts) are not suitable for use as fill in areas that will be carrying a structural load such as roads, buildings, and utility trenches in roadways. However, they may be used as site grading fills in landscaped areas.

8.2.4 Fill Placement and Compaction

Fill under structures, roads, driveways, and parking areas and utilities should be placed in nine (9) inch lifts (loose) and shall be compacted to at least 95% of the modified proctor (maximum dry density as determined by the ASTM D 1557 method of compaction). Landscaped areas are to be compacted to at least 90% of the modified proctor. Each lift shall be tested for adequate compaction (see section 8.3.1 for fills placement and compaction under foundations).

8.2.5 Utility Trenches

Construction of the pipe bedding shall consist of preparing an acceptable pipe foundation, excavating the pipe groove in the prepared foundation and backfilling from the foundation to 12 inches above the top of the pipe. All piping shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded. In our experience individual municipalities will have local requirements regarding installation of utilities. However, in the absence of specified requirements the following is recommended:

The soils in the utility pipe zones consist of silty clay to poorly graded sand soils. These soils are suitable as trench backfill pending they meet the specified structural fill requirements in Section 8.2.3.

> **Pipe foundation:** shall consist of native soils if the soils are stable and undisturbed. Wherever the trench subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, the trench shall be excavated below the bottom of the pipe to such depth as may be necessary, and this additional excavation filled with compacted well-graded, granular soil (per 8.2.3), compacted to 95% of the modified proctor.
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> **Pipe groove:** shall be excavated in the pipe foundation to receive the bottom quadrant of the pipe so that the installed pipe will be true to line and grade. Bell holes shall be dug after the trench bottom has been graded. Bell holes shall be excavated so that only the barrel of the pipe bears on the pipe foundation.
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> **Pipe bedding:** (from pipe foundation to 12 inches above top of pipe) shall be deposited and compacted in layers not to exceed 9 inches in uncompacted depth. Deposition and compaction of bedding materials shall be done simultaneously and uniformly on both sides of the pipe. All bedding materials shall be placed in the trench in such a manner that they will be scattered alongside the pipe and not dropped into the trench in compact masses.

Backfill for utility trenches located beneath roads shall be compacted to 95% of the modified proctor. In non-load bearing areas (landscape), trenches shall be compacted to 90% of the modified proctor (ASTM D 1557).

8.2.6 Native Soil As Fill

The native soils generally consist of non-plastic silty sand to silty clay (CL-SM), followed by lean clay (CL) to sandy lean clay (CL). If clayey soils are encountered they are generally not acceptable as fill, because of the difficulty in achieving compaction due to their moisture sensitivity. If the onsite native soils meet the structural fill requirements in section 8.2.3 of this report they can be used as structural fill, otherwise, we recommend that a well-graded granular material be imported. Any tested fill material that does not achieve either the required dry density or moisture content requirements should be recorded, the location noted, and reported to the contractor and owner. A retest of that area shall be performed after the contractor has completed all necessary remedial measures including moisture conditioning (wetting to drying) and reworking the fill.

8.2.7 Surface Drainage

A grading and drainage plan shall be prepared for the site by a qualified engineer, and adhered to for the site drainage. Generally, site grading should be carefully planned to promote positive drainage away from structures. Water shall not be allowed to collect near the foundations of the building, floor-slab areas or in pavement areas either during or after construction. Natural drainage is generally from southeast to northwest. Surface water should be prevented from entering trenches during construction through the use of earth berms or other suitable methods.

8.2.8 Soil Corrosivity

Three (3) soil samples were collected in the upper 2½ feet from selected borings. Chemical reactivity tests of soil pH, resistivity, and water- soluble sulfate ion contents were performed in general accordance with AASHTO T 289-91, ASTM G57-78, and AASHTO T 290-95 procedures, respectively. The following table summarizes the results to those tests performed on soil samples collected from the site:

Table 8.2.2 Summary of Chemical Reactivity Tests

Boring ID	Depth (feet)	Sulfates (mg/kg-dry)=ppm	Resistivity (ohm-cm)	Soil pH @ 25°C
B-6	2.5	<5.0	5600	8.59
B-8	2.5	450	510	8.57
B-9	2.5	130	1600	8.84

Test results indicate soil in the upper 2½ feet contain a soluble sulfate concentration ranging from about less than 5 ppm to 450 ppm. Based on the American Concrete Institute (ACI) Building Code, these concentrations represent "moderate" degree of sulfate attack on concrete structures. Considering the negligible to moderate concentration of sulfates in the subsurface soils, Type I or II Portland Cement Concrete (PCC) should be used for concrete elements in contact with the onsite soils or properly placed and compacted granular structural fill.

Soil resistivity has a direct impact on the degree of corrosion in underground steel structures. A decrease in resistivity relates to an increase in corrosion activity and therefore dictates the protective treatment to be used. Results from the resistivity tests indicate a range of conductivity from 510 to 5600 ohm-cm. Based on the resistivity test results, the onsite soils are considered to be “moderately” to “extremely corrosive”[6].

Results of the ion hydrogen concentration (pH) tests were about 8.57 and 8.84. Concentrations above 7 are considered basic and are less likely to contribute to corrosion attack on subsurface steel structures. Anticipated underground steel structures (i.e., pipes, exposed steel) are to be protected against corrosion.

8.3 Foundations

8.3.1 Installation and Bearing Material

Shallow foundations must be placed on undisturbed native soils or on structural fill which is bearing on native soils and is compacted to 95% of the modified proctor (maximum dry density as determined with ASTM D1557 method of test).

- All organic material, soft areas, frozen material or other inappropriate material shall be removed from the footing zone to a depth determined by the Geotechnical Engineer and be replaced with structural fill.
- All load bearing soils which are disturbed or considered soft or loose areas are unsuitable for support for foundations and should be removed down to firm native soils and properly replaced and compacted with structural fill within ±2% of the optimum moisture content.
- Structural fill, if used beneath footings to obtain a higher net allowable bearing capacity as described in section 8.3.2, should extend laterally a minimum of ½ the depth of fill beneath the footing beyond the outside edge of the foundation.
- Foundations shall have minimum dimensions of 18-inches for continuous wall footings and 24-inches for isolated column footings adhering to the maximum prescribed bearing capacity in section 8.3.2 of this report.

If perched water conditions are encountered during excavation and installation the geotechnical engineer must be notified to provide recommendations.

Footing excavations shall be inspected by a Geotechnical Engineer prior to placement of structural fill, concrete or reinforcement steel to verify their suitability for placement of the

[6] Roberge, Pierre R., Handbook of Corrosion Engineering, McGraw-Hill; Publication Date: 2000; ISBN 007-076516-2; 1140 pages

footings. The Geotechnical Engineer shall approve the preparation of the foundation soils prior to footing placement.

8.3.2 Bearing Pressure

Shallow foundation bearing on undisturbed native soils (silt and clays) may be designed with a maximum net allowable bearing capacity of 1500 pounds per square foot (psf), or a subgrade modulus value of 10 pounds per cubic inch (pci). Alternatively, shallow foundations placed on at-least 2½ feet of properly placed and compacted granular structural fill may be designed using a maximum net allowable bearing pressure of 2,000 psf, or subgrade modulus of 14 pci. The recommended allowable bearing pressure refers to the total dead load and can be increased by 1/3 to included the sum of all loads including wind and seismic. Confirmation of our recommendation was made using Meyerhof's modifications to Terzahgi's original bearing capacity equation and similar onsite soil characteristics in the area with values correlating to an internal friction angle (φ) of 30 degrees[7] with cohesion (*c*) of zero. The calculation yielded a factor of safety well above the typically accepted value of 3.

8.3.3 Settlement

Several factors are generally considered in settlement. They are immediate settlement, consolidation settlement and secondary settlement. Immediate settlement occurs very quickly, as the building is constructed. Since this factor is generally small and adjustments are made during construction to compensate, this factor is usually neglected. Secondary settlement or creep occurs over a very long period of time.

Soils encountered at the site generally consist of silty clay to silty sand (cohesion to cohesionless soils). A settlement analysis was performed using Schmertmann's method of approach on immediate settlement of cohesionless soils and Holtz and Kovaks 2:1 Stress Distribution Method with Terzahgi's one dimensional consolidation method to estimate settlement due to consolidation. The anticipated total settlement due to immediate and consolidation of the soils is not expected to exceed 1-inch, which is the recommended maximum settlement for these types of structures. Differential settlement is expected to approach about 50 to 75 percent of the total settlement under static conditions. Due to the fine grain soils on this site settlement controls bearing capacity. Our recommendation for unimproved soils remains 1500 psf.

8.3.4 Frost Depth

All exterior footings are to be at least 30 inches below the ground surface to protect against frost heave potential. This may require fill placement around the building. With slab on grade construction, interior footings require 18 inches of cover. If foundations are constructed through the winter months, all soils on which footings will bear shall be protected from freezing following American Concrete Institute requirements (ACI 306R-88 Cold Weather Concreting).

[7] Bowles, J.E. Foundation Analysis and Design

8.3.5 Construction Observation

A geotechnical engineer shall periodically monitor excavations prior to installation of footings. Inspection of soil before placement of structural fill or concrete is required to detect any field conditions not encountered in the investigation, which would alter the recommendations of this report. All structural fill material shall be tested under direction of a geotechnical engineer for adequate compaction.

8.3.6 Resistance for Footings

Wind and seismic forces, which cause lateral loads on foundations, are resisted by friction and passive earth pressures at the foundation ground interface. In the design of spread footings against shear forces, the total dead weight is multiplied by the coefficient of friction for lateral sliding (μ) which is estimated to be 0.25 for sands, and the resistance of lateral sliding is 130 psf for clays and silts. [8]

8.4 Seismic Information

8.4.1 Faulting

Based on the Salt Lake County Geologic Hazards Map the project site is located about three (3) miles to the west of the Wasatch Fault. Surface rupture has not been mapped and was not observed at the site. However, strong ground motion due to earthquake events must be considered. The International Building Code (IBC 2006), and the USGS Earthquake Hazards Program interpolated probabilistic ground motion values for S_S an S_1 are 1.39g and 0.60g, respectively. Values from the NEHRP were estimated with latitude of 40.494556 degrees and longitude of -111.893239 degrees.

Table 8.6 USGS Earthquake Hazards Estimated Values

	10% PE in 50 year	2% PE in 50 year
Peak Ground Acceleration	22.6	59.6
0.2 sec Spectral Acceleration	53.6	139.3
1.0 sec Spectral Acceleration	18.2	59.1

The design spectral accelerations were determined according to IBC 2006 and ASCE 07-05 and were found to be 0.93g and 0.59g for S_{DS} and S_{D1} respectively. The figure below shows the spectral response parameters used to develop the design values and a code specified response spectrum for the site based upon a site class of "D" for a stiff soil profile.

[8] International Building Code 2006, Ch. 18, Table 1804.2

Seismic Provisions ASCE 7-05

			Mapped MCE Spectral Response Acceleration Parameters F_a and F_v				
Site Class:	D	Short Period	1.6	1.4	1.2	1.1	1.0
		1 Second	2.4	2.0	1.8	1.6	1.5

Obtained S_s and S_1 from http://eqint.cr.usgs.gov/eq-men/cgi-bin/find-ll-2002-interp.cgi

S_S:	1.3930	F_a=	1.00	S_{MS}=	1.3930	S_{DS}=	0.9287
S_1:	0.5910	F_v=	1.50	S_{M1}=	0.8865	S_{D1}=	0.5910

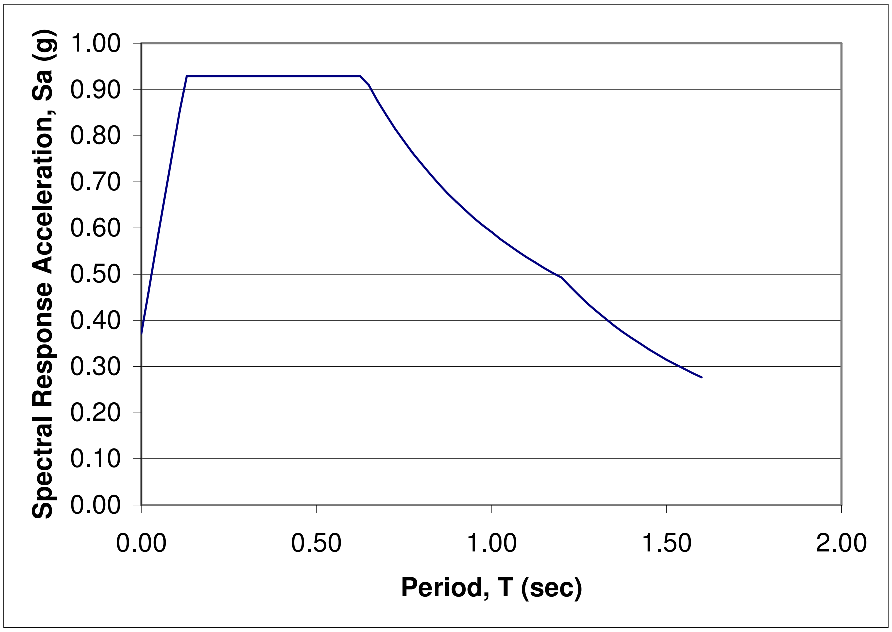


Figure 8.5 ASCE 7-05 Seismic Provisions

8.4.2 Liquefaction

A review of the geologic hazards maps for Salt Lake County indicates that the project site is located in an area designated as "moderate" in liquefaction potential.[9] This suggests that the potential is defined as having between ten and fifty (10%-50%) percent chance in a 100 year return period. Three conditions must be present for liquefaction to occur, in soils:

- The soil must be susceptible to liquefaction, i.e., granular layers with less than fifteen percent fines, existing below the ground water table.
- The soil must be in a loose state.
- Ground shaking strong enough to cause liquefaction.

[9] Geologic Hazards, Salt Lake County, Utah, L.R. Anderson, J.R. Keaton, J.E. Spitzley, and A.C, Allen in 1986 under U.S. Geological Survey Contract 14-08-0001-1991.

Two CPT soundings were performed on the east and west sides of the proposed building to a depth of 50 feet. The ground water table was indicated at 30 and 47 feet after the pore pressure had dissipated around the tip of the cone. The subsurface conditions encountered indicate liquefaction is a concern. An analysis was performed using the CPT data from CPT-1 and CPT-2. Possible discontinuous zones of ground water and ground water table fluctuations were considered. The software package *LiquefyPro*, version 5 was used to estimate liquefaction potential and possible settlement. The analysis was performed assuming the ground water table was to rise to the ground surface during the seismic event. The peak ground acceleration (PGA) value presented in Table 7.6 was used to perform a liquefaction analysis in accordance with procedures outlined in the National Center for Earthquake Engineering and Research Technical Report NCEER-97-0022, dated December 31, 1997 and Ishihara and Yoshimine (1990) for volumetric strain. Estimated fines content were correlated to tip resistance using the Modified Robertson method (after NCEER 1997). Calculated factors of safety indicate that generally loose silty sand to sandy soils located below the water table will liquefy. Multiple techniques yield earthquake magnitude estimates for independent events of 5.8 (M_L) to 7.0 (M_S), with an average value of 6.7[2]. Calculations were performed using a 2 percent probability of exceedance in a 50 year return period and an maximum considered earthquake (MCE) magnitude M_L=7.5 for the main segment of the Wasatch Fault Zone resulting in ground surface settlements of up to 1.3 inches. (See liquefaction analyses plates CPT-1 and CPT-2) The soils encountered in our exploration exhibit the characteristics necessary for liquefaction to occur. Calculations are included in the appendix of this addendum. We recommend connecting the footings and columns together to minimize settlement due to liquefaction

8.4.3 Structures

Structures are to be designed for lateral loading as defined in the International Building Code. The site location has a design spectral response acceleration of 0.93g for short periods (S_{DS}) and 0.59g for a one second period (S_{D1}). Lateral loading is to be the greater of seismic loads or wind loads.

8.5 Pavement Design and Construction

A pavement design has been prepared for the anticipated drive and parking areas to be located in front and around the proposed building. On-site soil characteristics from the boring samples collected were used in determining soil strength. The pavement design assumptions consist of traffic of about 250,000 Equivalent Single Axle Loads (ESALs) with a twenty (20) year design life at 90% reliability, a California Bearing Ratio CBR value as stated in the Appendix of this report, standard deviation of 0.35, and Initial and Terminal serviceability of 4.2 and 2.5, respectively. A CBR value of 3 was applied to this site based on similar site soils with a factor of safety above one. The following sections will provide preparation and design for pavement based on AASHTO design procedures.

[2] Black, B.D., Hylland, Mike (Utah Geological Survey) and Hecker, Suzanne (U.S. Geological Survey), 10/1999, Structure Number 2386, West Valley Fault Zone,.

8.5.1 Sub-base Preparation

All topsoil, or any soil containing organic materials, must be removed from locations where pavement will be applied. The sub-base should be scarified to a depth of at least 12-inches and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. To evaluate its stability, the sub-base shall be "proof rolled" with a loaded dump truck or tested with a nuclear density gauge. Any unsuitable soils shall be removed and replaced with structural fill according to Section 8.2.3. Any areas of fill or disturbed areas shall be compacted to 95% of the ASTM D1557 modified proctor. A geotechnical engineer shall observe unsuitable sub-base remediation.
Sub-base below drive areas shall be compacted to a minimum to 95% compaction of the maximum dry density using ASTM D1557 to minimize settlement.

8.5.2 Base Course

A minimum of eight (8) inches of untreated base course is required for heavy duty roadways, i.e. parking lot entrances and six (6) inches of untreated base course for light duty areas, i.e. parking lot and low traffic areas. The base course shall comply with Utah Department of Transportation (UDOT) Standard Specifications, Section 02721, “Untreated Base Course.” Base course material used to support pavement section should meet the following criteria:

Table 8.6.1 Base Course Material (UDOT)

Sieve Size	Percent Passing of Total Aggregate (Dry Weight)		
	1 ½ inch Size	**1 inch Size**	**¾ inch Size**
1 ½ inch	100	--	--
1 inch	--	100	--
¾ inch	81-91	--	100
½ inch	67-77	79-91	--
3/8 inch	--	--	78-92
No. 4	43-53	49-61	55-67
No. 16	23-29	27-35	28-38
No. 200	6-10	7-11	7-11

Based on the AASHTO flexible pavement design the following pavement sections shall be used in pavement areas:

Table 8.6.2 Pavement Design Recommended Thickness

Pavement Materials	Recommended Minimum Thickness (inches)	
	Light Duty Section	**Heavy Duty Section**
Asphaltic Concrete	3	4
Granular Base Course	6	8

8.5.3 Surface Course

A minimum of three (3) inches of asphalt concrete pavement is required for light duty traffic areas (parking lot) and four (4) inches is required for heavy duty traffic areas (main drive approach, loading areas). This asphalt concrete pavement is to comply with UDOT Standard Specifications, Section 02741, and "Hot Mix Asphalt (HMA)."

8.5.4 Rigid Pavement

The rigid concrete pavement is anticipated for floor slab areas, delivery loading dock areas and where the trash dumpsters are to be located with a considerable amount of point loads from the small wheels. It is recommended that concrete be used rather than asphalt to aid against excessive future maintenance. We recommend that concrete pavement be designed for a modulus of subgrade reaction, *k*, of 150 pci.

Table 8.6.3 Rigid Pavement Design Thicknesses

Pavement Materials	Recommended Minimum Pavement Thickness (inches)	
	Standard Duty Pavement	Heavy Duty Pavement
Concrete (4,000 psi)	5	6
Granular Base Course	4	6

Sub-grade should meet structural fill requirements and be compacted using typical compaction methods with 95 percent compaction of the maximum dry density within +/- 2% of the optimum moisture determined by ASTM D1557. Prior to placement of concrete the sub-grade should be inspected by the Geotechnical Engineer.

Concrete for exposed conditions should meet IBC 2006 requirements with six (6) to five (5) percent air content; maximum temperature of ninety degrees, maximum allowable slump shall not exceed four (4) inches. Joints shall be in a rectangular pattern and spacing shall not exceed thirty (30) times the thickness of the slab. The depth of the joints should be approximately ¼ times the slab thickness. This will allow for expansion and contraction of the concrete with the change in seasons.

8.5.5 Drainage and Maintenance

Drainage shall be designed to ensure direct positive surface water away from proposed buildings and into proper discharge locations. Water shall not be allowed to puddle in low areas of the pavement. Pooling areas could decrease the design life of the asphalt and cause cracking or uplift. Periodic seasonal maintenance should be anticipated by sealing cracks and joints. A storm drainage plan is suggested to detain and convey storm water. IBC 2006 recommends that a minimum of five percent gradient for a ten feet distance away from any structures.

9 LIMITATIONS AND PROFESSIONAL STATEMENT

This report has been prepared in accordance with generally accepted geologic and geotechnical engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from the borings at the locations indicated on the site plan, laboratory results, data obtained from the U.S.G.S. Library, and previous reports and studies. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the subsurface soil or ground water conditions are found to be significantly different than that which is described in this report, we should be notified so that we can re-evaluate recommendations.

We have correlated soil types and properties such as bearing pressure with U.S.G.S. surveys, the International Building Code, and surrounding investigations. Any assumptions made, based on these correlations, are conservative.

We appreciate the opportunity of providing this service for you. If you have any questions concerning this report or require additional information or services please contact us at 801-553-8112.

Report prepared by:

WILDING ENGINEERING, INC.

Benjamin S. Fowler, PEI
Geotechnical Project Manager

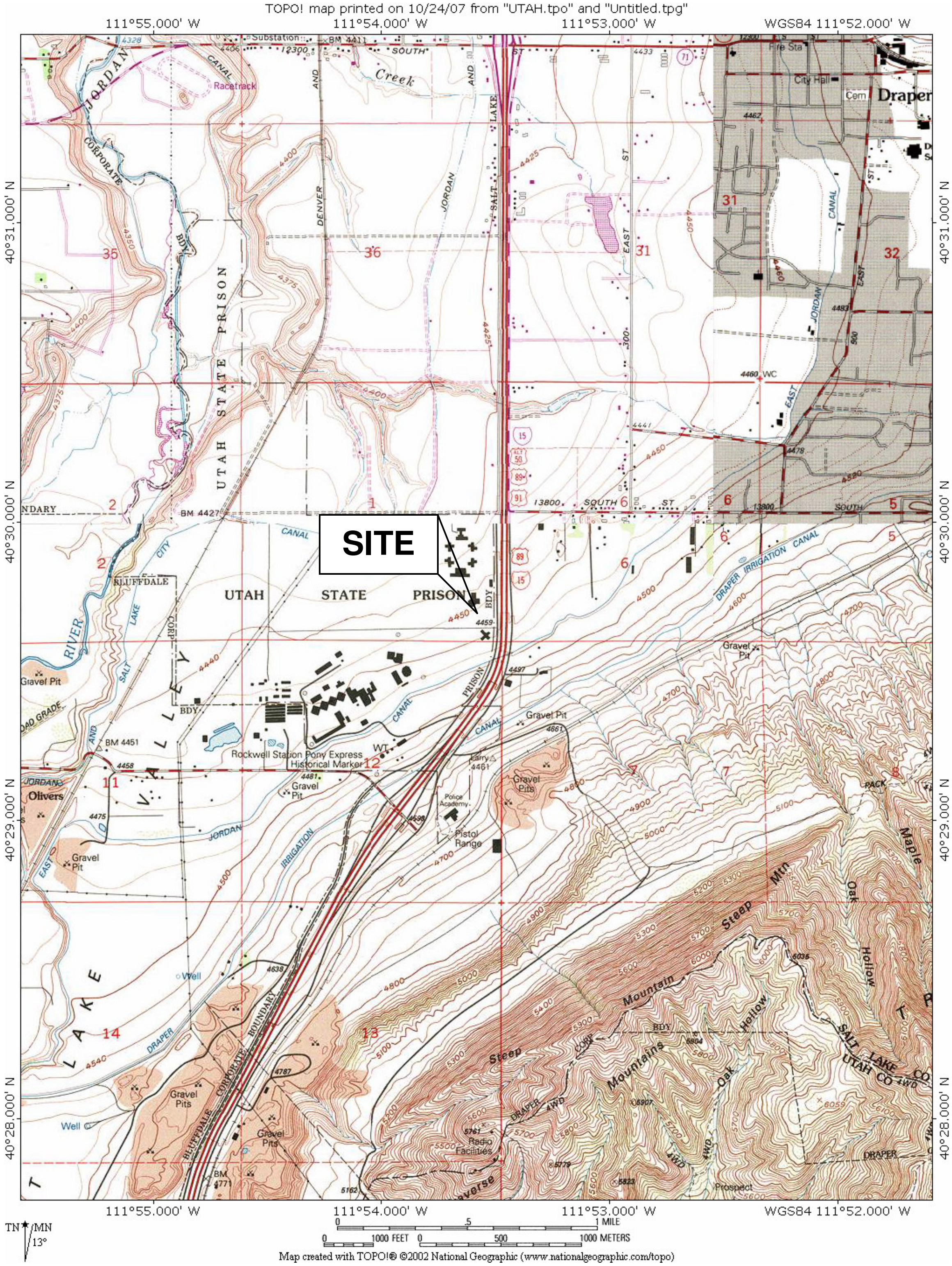
David P. Wilding, PE
President

BSF/DPW

APPENDIX

VICINITY MAP

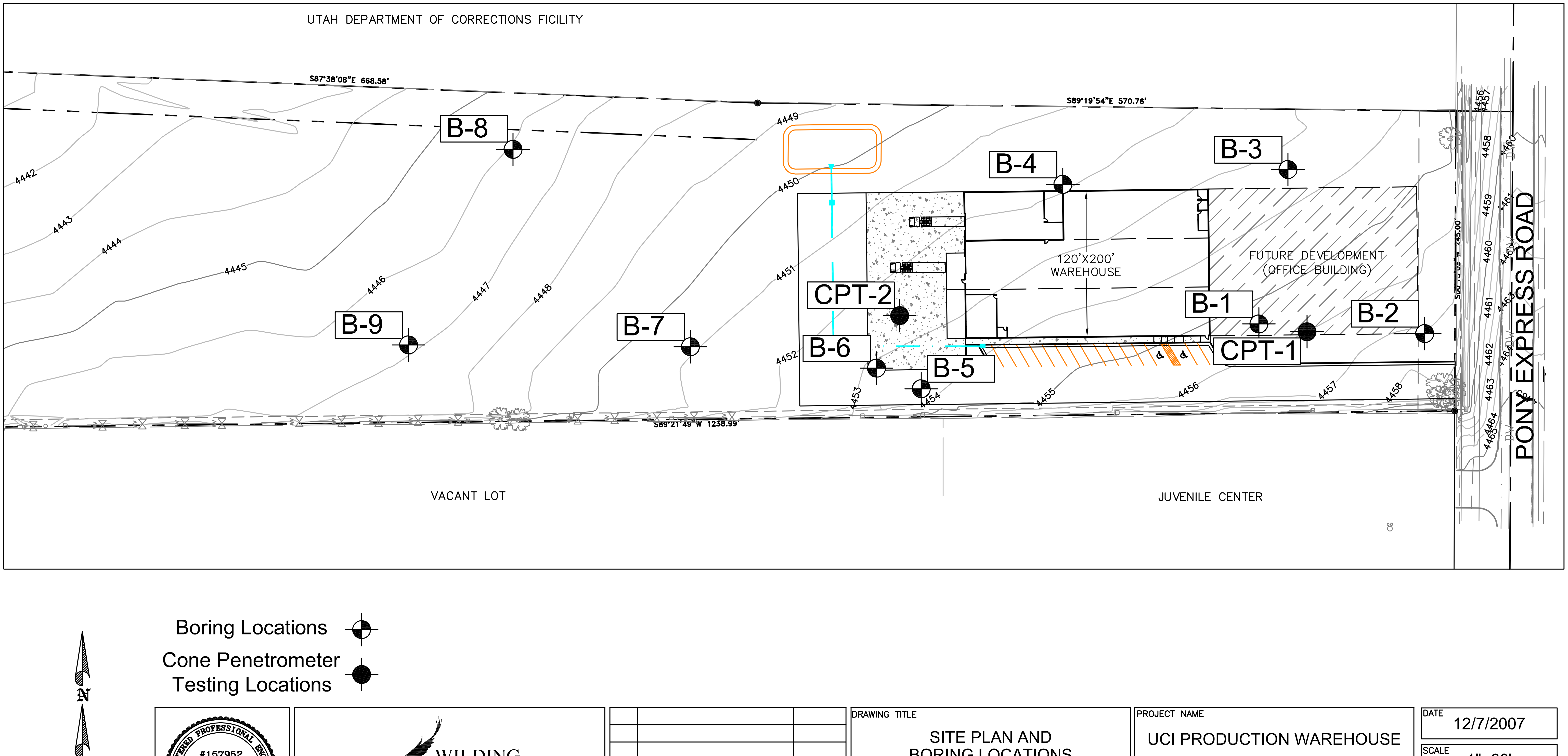
TOPO! map printed on 10/24/07 from "UTAH.tpo" and "Untitled.tpg"



Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

Project:	Date: October 2007	
UCI Production Warehouse 14126 South Pony Express Road Draper, Utah	Drawn By: RDF	WILDING ENGINEERING, INC 14721 SOUTH HERITAGE CREST WAY BLUFFDALE, UTAH 84065 (801)553-8112
Project No: **07114**	Figure: A-1	

UCI PRODUCTION WAREHOUSE



REGISTERED PROFESSIONAL ENGINEER #157952 DAVID PRESTON WILDING STATE OF UTAH

WILDING ENGINEERING, INC
14721 SOUTH HERITAGE CREST WAY
BLUFFDALE, UTAH 84065
(801)553-8112

NO.	REVISION	DATE

DRAWING TITLE: SITE PLAN AND BORING LOCATIONS

LOCATION: 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UTAH

PROJECT NAME: UCI PRODUCTION WAREHOUSE

DRAWN: RDF | CHECKED: DPW

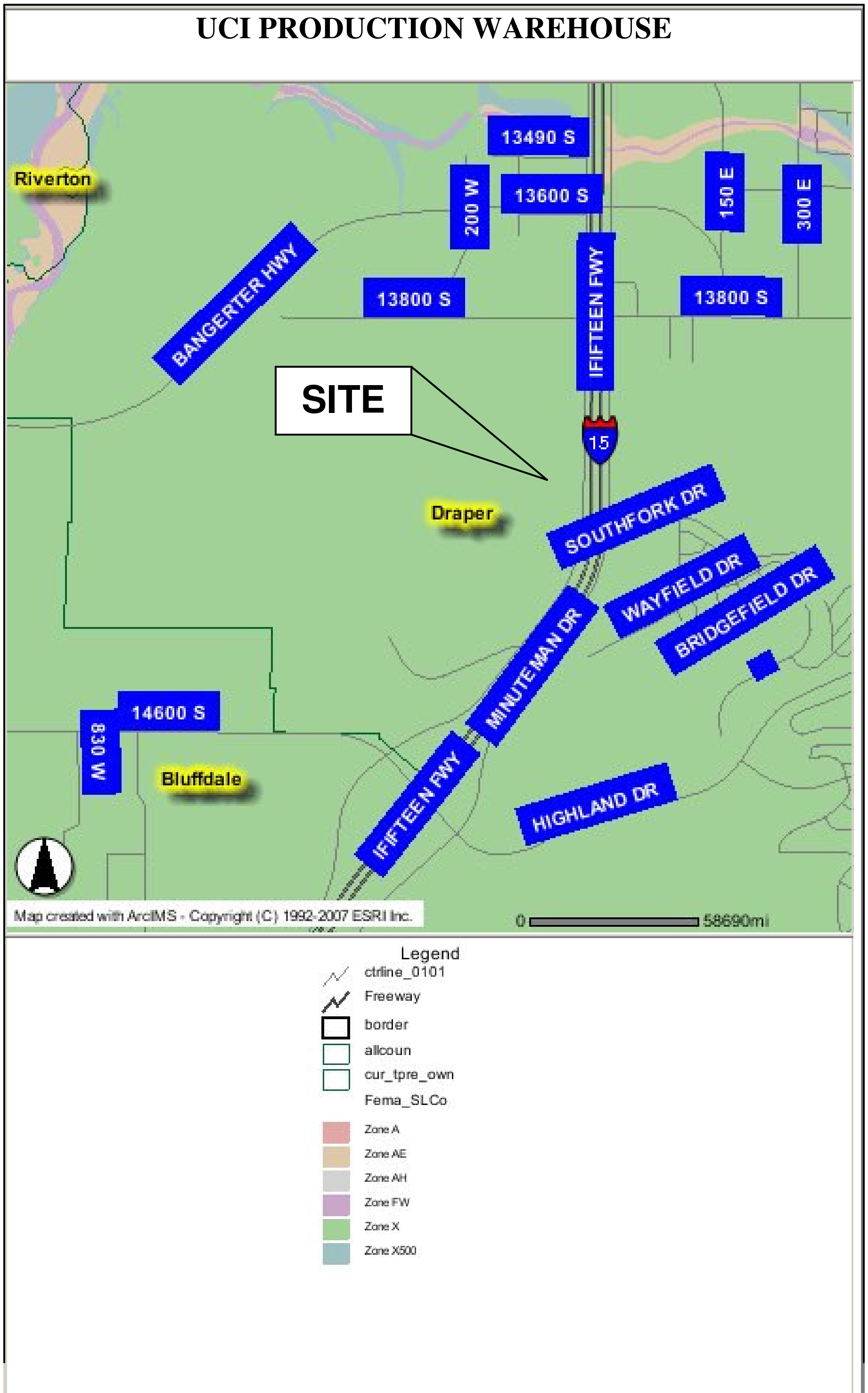
FILE NAME: G:\DATA\07114 DFW...\dwg\...Boring Locations 2...

DATE: 12/7/2007

SCALE: 1"=80'

SHEET: A-2

FEMA MAP



Project: **UCI Production Warehouse 14126 South Pony Express Road Draper, Utah** Project No: **07114**	Date: October 2007 Drawn By: RDF Figure: A-3	WILDING ENGINEERING, INC 14721 SOUTH HERITAGE CREST WAY BLUFFDALE, UTAH 84065 (801)553-8112

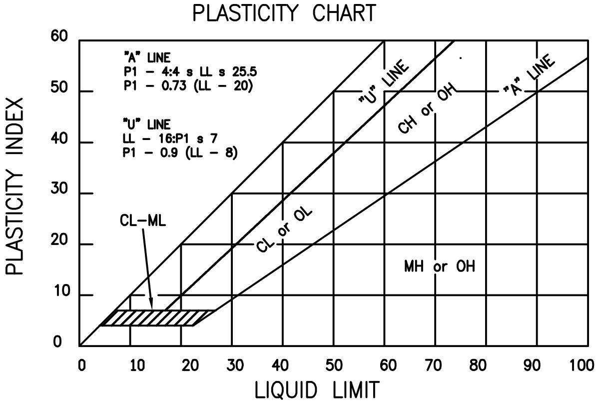
UNIFIED SOIL CLASSIFICATION SYSTEM

Soils are visually classified for engineering purposes by the Unified Soil Classification System. Grain–sized analyses and Atterberg Limits tests often are performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. Graphic symbols are used on boring logs presented on this report. For a more detailed description of the system, see "Standard Pratice for Description and Identification of Soils (Visual–Manual Procedure)" ASTM Designation:2488–84 and "Standard Test Method for Classification of Soils for Engineering Purposes" ASTM Designation: 2487–85.

MAJOR DIVISIONS				GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE–GRAINED SOILS Less than 50% passes No. 200 sieve	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No, 200 sieve)			GW	WELL GRADED GRAVELS, GRAVEL–SAND MIXTURES, OR SAND –GRAVEL–COBBLE MIXTURES
					GP	POORLY GRADED GRAVELS, GRAVEL–SAND MIXTURES, OR SAND–GRAVEL–COBBLE MIXTURES
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Lines plot below "A" line & hatched zone on plasticity chart		GM	SILTY GRAVELS, GRAVEL–SAND–SILT MIXTURES
			Lines plot above "A" line & hatched zone on plasticity chart		GC	CLAYEY GRAVELS, GRAVEL–SAND–CLAY MIXTURES
	SANDS (50% or more of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)			SW	WELL GRADED SANDS, GRAVELLY SANDS
					SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Lines plot below "A" line & hatched zone on plasticity chart		SM	SILTY SANDS, SAND–SILT MIXTURES
			Lines plot above "A" line & hatched zone on plasticity chart		SC	CLAYEY SANDS, SAND–CLAY MIXTURES
FINE–GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS Limited plot below "A" line & hatched zone on plasticity chart	SILTS OF LOW PLASTICITY (Liquid limit less than 50)			ML	INORGANIC SILTS, CLAYEY SILTS OF LOW TO MEDIUM PLASTICITY
		SILTS OF HIGH PLASTICITY (Liquid limit 50 or more)			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS, ELASTIC SILTS
	CLAYS Limited plot above "A" line & hatched zone on plasticity chart	CLAYS OF LOW PLASTICITY (Liquid limit less than 50)			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, AND SILTY CLAYS
		CLAYS OF HIGH PLASTICITY (Liquid limit 50 or more)			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS, SANDY CLAYS OF HIGH PLASTICITY
	ORGANIC SILTS AND CLAYS	ORGANIC SILTS AND CLAYS OF LOW PLASTICITY (Liquid limit less than 50)			OL	ORGANIC SILTS AND CLAYS OF LOW TO MEDIUM PLASTICITY, SANDY ORGANIC SILTS AND CLAYS
		ORGANIC SILTS AND CLAYS OF HIGH PLASTICITY (Liquid limit 50 or more)			OH	ORGANIC SILTS AND CLAYS OF HIGH PLASTICITY, SANDY ORGANIC SILTS AND CLAYS
ORGANIC SOILS		PRIMARILY ORGANIC MATTER (dark in color and organic odor)			PT	PEAT

NOTE: Coarse–grained soils with between 5% and 12% passing thru No. 200 sieve and fine–grained soils with limit plotting in the hatched zone on the plasticity chart have dual classifications.

PLASTICITY CHART



DEFINITION OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Boulders	Above 12 in.
Cobbles	12 in. to 3 in.
Gravel	3 in. to No. 4 sieve
Coarse Gravel	3 in. to 3/4 in.
Fine Gravel	3/4 in. to No. 4 sieve
Sand	No. 4 to No. 200 sieve
Coarse sand	No. 4 to No. 10 sieve
Medium sand	No. 10 to No. 40 sieve
Fine sand	No. 40 to No. 200 sieve
Fines(silt and clay)	Less than No. 200 sieve

DATE 10/24/2007

LOG OF BORING NO. 1

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS
RIG TYPE EARTHCORE, B-80
DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER
SURFACE ELEVATION 4459 (ESTIMATED FROM SITE PLAN)
FIELD ENGINEER BSF, RDF

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0	1	T	3-10-21		31	15	CL-ML	**TOPSOIL:** Silty clay, hard, moist, brown.	--roots and vegetation.
								SILTY CLAY: hard, dry, gray.	
	2	T	18-22-27	92	28	6.9			
5	3	T	19-35-30		31	9.4	CL-ML		
	4	T	12-17-21	93	22	11.5		-- stains of iron oxides	
10	5	T	8-8-10		44	6.3	SM	**SILTY SAND:** medium dense, dry, gray.	
15	6	T	5-6-9	92	94	26.2	CL	**LEAN CLAY:** stiff, moist, gray to brown.	Atterberg Limits @ 15-ft: LL = 33% PL = 19% PI = 14%
20	7	T	8-6-7		8			**LEAN CLAY WITH SAND:** stiff, moist, gray to orange.	
25	8	T	4-6-9		72	22.2	CL	-- stains of iron oxides	
30	9	T	17-10-18	74	72	14.3	ML	**SILT WITH SAND:** very stiff, moist, gray with stains of iron oxides.	Atterberg Limits @ 30-ft: Non Plastic

CONTINUED NEXT PAGE

GROUNDWATER ELEVATION
- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD
- A - AUGER CUTTINGS
- S - 3" O.D. THIN WALLED SHELBY TUBE
- U - 3" O.D. 2.42" I.D. TUBE SAMPLE
- T - 2" O.D. SPLIT SPOON
- H - HAND SAMPLE

WILDING ENGINEERING, INC
14721 SOUTH HERITAGE CREST WAY
BLUFFDALE, UTAH 84065
(801)553-8112

DATE 10/24/2007

LOG OF BORING NO. 1

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS
RIG TYPE EARTHCORE, B-80
DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER
SURFACE ELEVATION 4459 (ESTIMATED FROM SITE PLAN)
FIELD ENGINEER BSF, RDF

DEPTH IN FEET	GRAPHICAL LOG	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
									CONTINUED	
30		9	T	17-10-18	74	72	14.3	ML	**SILT WITH SAND**: very stiff, moist, gray with stains of iron oxides.	
35		10	T	10-12-20		69	10.4	SM	**SILTY SAND**: dense, moist, gray.	
40		11	T	14-26-30		83	10.4	SP-SM	**POORLY GRADED SAND WITH SILT AND GRAVEL**: very dense, moist, gray to orange.	-- Bottom 3 inches lean clay with stains of iron oxides.
45		12	T	4-4-4	91	100	27.6	CL	**LEAN CLAY**: medium stiff, moist, gray with stains of iron oxides.	Atterberg Limits @ 45-ft: LL = 42% PL = 17% PI = 25%
50		13	T	5-11-20		72	21.3	CL	**SANDY LEAN CLAY**: hard, wet, gray.	
									BOTTOM OF BORING @ 51.5 FEET	-- ground water was not encountered during exploration.

GROUNDWATER ELEVATION
- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD
- A - AUGER CUTTINGS
- S - 3" O.D. THIN WALLED SHELBY TUBE
- U - 3" O.D. 2.42" I.D. TUBE SAMPLE
- T - 2" O.D. SPLIT SPOON
- H - HAND SAMPLE

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DATE 10/24/2007

LOG OF BORING NO. 2

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS

RIG TYPE EARTHCORE, B-80

DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER

SURFACE ELEVATION 4461 (ESTIMATED FROM SITE PLAN)

FIELD ENGINEER BSF, RDF

DEPTH IN FEET	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0	1	T	3-7-13		56		CL-ML	**TOPSOIL**: Silty clay, very stiff, moist, brown to gray.	--roots and vegetation.
								SILTY CLAY: hard, moist, gray.	
	2	T	10-15-22	92	28	8	CL-ML		
5	3	T	10-14-16	90	72	11.2		-- tan	
	4	T	16-16-22		61		CL-ML	**SILTY CLAY WITH SAND**: hard, moist, light brown with stains of iron oxides.	
10	5	T	10-10-10		11	9.7		**LEAN CLAY**: very stiff, moist, light brown.	Atterberg Limits @ 10-ft: LL = 34% PL = 18% PI = 16%
15	6	S		94		23			
							CL		
20	7	T	10-15-20	94	94	33.4		-- hard, gray with stains of iron oxides	-- Dry Density: 83.6 lbs/ft^3.
								BOTTOM OF BORING @ 21.5 FEET	-- ground water was not encountered during exploration.
25									
30									

GROUNDWATER ELEVATION

- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD

A - AUGER CUTTINGS
S - 3" O.D. THIN WALLED SHELBY TUBE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 2" O.D. SPLIT SPOON
H - HAND SAMPLE

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14721 SOUTH HERITAGE CREST WAY
BLUFFDALE, UTAH 84065
(801)553-8112

DATE 10/24/2007

LOG OF BORING NO. 3

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD , DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS

RIG TYPE EARTHCORE, B-80

DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER

SURFACE ELEVATION 4457 (ESTIMATED FROM SITE PLAN)

FIELD ENGINEER BSF, RDF

DEPTH IN FEET	GRAPHICAL LOG	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0		1	T	4-20-16		28	19.1	CL-ML	**TOPSOIL:** Silty clay, hard, moist, brown.	--roots and vegetation.
									SILT: stiff, moist, gray.	
		2	T	9-6-7		17				
								ML		
5		3	T	8-8-10	88	33	9.4		-- with some sand, very stiff	
									BOTTOM OF BORING @ 6.5 FEET	-- ground water was not encountered during exploration.
10										
15										
20										
25										
30										

GROUNDWATER ELEVATION

- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD

- A - AUGER CUTTINGS
- S - 3" O.D. THIN WALLED SHELBY TUBE
- U - 3" O.D. 2.42" I.D. TUBE SAMPLE
- T - 2" O.D. SPLIT SPOON
- H - HAND SAMPLE

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DATE 10/24/2007

LOG OF BORING NO. 4

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS

RIG TYPE EARTHCORE, B-80

DRILLING METHOD 3.25" I.D HOLLOW STEM AUGER

SURFACE ELEVATION 4456 (ESTIMATED FROM SITE PLAN)

FIELD ENGINEER BSF, RDF

DEPTH IN FEET	GRAPHICAL LOG	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0		1	T	18-5-10		89	13.8	CL-ML	**TOPSOIL**: Silty clay, stiff, moist, brown to gray.	--roots and vegetation.
									SILTY SAND: medium dense, dry, gray to tan.	
		2	T	5-7-10	18	100	2			
5		3	T	5-8-9		83	2.1		-- tan	
		4	T	10-11-12		100		SM	-- dense, with stains of iron oxides	
10		5	T	5-8-13	32	78	4		-- medium dense, with stains of iron oxides	Atterberg Limits @ 10-ft: Non Plastic
15		6	S		85		26.6	CL	**LEAN CLAY WITH SAND**: very stiff, moist, light brown.	-- Dry Density: 89.6 lbs/ft^3. Atterberg Limits @ 20-ft: LL = 35% PL = 21% PI = 14%
20		7	T	12-12-15	23	78	5.3	SC	**CLAYEY SAND**: medium dense, wet, top 8 inches gray clay, bottom 6 inches orange sand.	-- Dry Density: 110.8 lbs/ft^3.
									BOTTOM OF BORING @ 21.5 FEET	-- ground water was not encountered during exploration.
25										
30										

GROUNDWATER ELEVATION

- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD

A - AUGER CUTTINGS
S - 3" O.D. THIN WALLED SHELBY TUBE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 2" O.D. SPLIT SPOON
H - HAND SAMPLE

WILDING ENGINEERING, INC
14721 SOUTH HERITAGE CREST WAY
BLUFFDALE, UTAH 84065
(801)553-8112

DATE 10/24/2007

LOG OF BORING NO. 5

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS

RIG TYPE EARTHCORE, B-80

DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER

SURFACE ELEVATION 4458 (ESTIMATED FROM SITE PLAN)

FIELD ENGINEER BSF, RDF

DEPTH IN FEET	GRAPHICAL LOG	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0		1	T	10-9-10		61	10.2	CL-ML	**TOPSOIL:** Silty clay, very stiff, moist, brown to gray.	--roots and vegetation.
		2	T	5-5-5	90	67	12.2	CL-ML	**SILTY CLAY:** stiff, moist, gray with stains of iron oxides.	
5		3	T	5-7-7		89	2.2	SM	**SILTY SAND:** medium dense, moist, gray.	
									BOTTOM OF BORING @ 6.5 FEET	-- ground water was not encountered during exploration.
10										
15										
20										
25										
30										

GROUNDWATER ELEVATION

- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD

- A - AUGER CUTTINGS
- S - 3" O.D. THIN WALLED SHELBY TUBE
- U - 3" O.D. 2.42" I.D. TUBE SAMPLE
- T - 2" O.D. SPLIT SPOON
- H - HAND SAMPLE

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14721 SOUTH HERITAGE CREST WAY
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DATE 10/24/2007

LOG OF BORING NO. 6

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS

RIG TYPE EARTHCORE, B-80

DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER

SURFACE ELEVATION 4457 (ESTIMATED FROM SITE PLAN)

FIELD ENGINEER BSF, RDF

DEPTH IN FEET	GRAPHICAL LOG	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0		1	T	2-5-9		78	14	CL-ML	**TOPSOIL:** Silty clay, stiff, moist, brown to gray.	--roots and vegetation.
									POORLY GRADED SAND: medium dense, dry, tan.	
		2	T	4-5-7	2	94	2.5	SP		
5		3	T	5-7-8		89				
		4	T	7-14-20	10	100	2.9	SP-SM	**POORLY GRADED SAND WITH SILT:** very dense, moist, tan with some stains of iron oxides.	
10		5	T	7-7-7		72	2.7		**SILTY SAND:** medium dense, moist, tan with some stains of iron oxides.	
15		6	S		22		15.6	SM	-- wet	Atterberg Limits @ 15-ft: Non Plastic Gradation @ 20-ft: Gravel= 25% Sand= 61% Fines= 14% Atterberg Limits @ 20-ft: LL = 33% PL = 19% PI = 14%
20		7	T	10-10-10	14	94	4.5	SC	**CLAYEY SAND WITH GRAVEL:** medium dense, wet, orange to brown.	-- Top 9 inches of orange silty sand with gravel, bottom 8 inches of lean clay
									BOTTOM OF BORING @ 21.5 FEET	-- ground water was not encountered during exploration.
25										
30										

GROUNDWATER ELEVATION

- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD

A - AUGER CUTTINGS
S - 3" O.D. THIN WALLED SHELBY TUBE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 2" O.D. SPLIT SPOON
H - HAND SAMPLE

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DATE 10/24/2007

LOG OF BORING NO. 7

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS
RIG TYPE EARTHCORE, B-80
DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER
SURFACE ELEVATION 4456 (ESTIMATED FROM SITE PLAN)
FIELD ENGINEER BSF, RDF

DEPTH IN FEET	GRAPHICAL LOG	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0		1	T	6-8-20		61	10.5	CL-ML	**TOPSOIL:** Silty clay, very stiff, moist, brown.	--roots and vegetation.
									SILTY SAND: medium dense, dry, tan.	
		2	T	4-5-6	20	83	2.8			
								SM		
5		3	T	8-8-9		100	4.7		-- Some stains of iron oxides	
		4	T	12-15-17	89	100	4.3	ML	**SILT:** hard, dry, tan with stains of iron oxides.	
10		5	T	6-7-9		100	25.8	CL-ML	**SANDY SILTY CLAY:** very stiff, moist, gray with some stains of iron oxides.	
15		6	S		91		24.5	CL	**LEAN CLAY**	Atterberg Limits @ 15-ft: LL = 30% PL = 19% PI = 11%
20		7	T	15-11-18	72	89	26.1	CL-ML	**SILTY CLAY WITH SAND:** very stiff, moist, brown to orange with some stains of iron oxides.	-- Dry Density: 90.2 lbs/ft^3.
									BOTTOM OF BORING @ 21.5 FEET	-- ground water was not encountered during exploration.
25										
30										

GROUNDWATER ELEVATION

- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD

- A - AUGER CUTTINGS
- S - 3" O.D. THIN WALLED SHELBY TUBE
- U - 3" O.D. 2.42" I.D. TUBE SAMPLE
- T - 2" O.D. SPLIT SPOON
- H - HAND SAMPLE

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14721 SOUTH HERITAGE CREST WAY
BLUFFDALE, UTAH 84065
(801)553-8112

DATE 10/24/2007

LOG OF BORING NO. 8

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS

RIG TYPE EARTHCORE, B-80

DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER

SURFACE ELEVATION 4453 (ESTIMATED FROM SITE PLAN)

FIELD ENGINEER BSF, RDF

DEPTH IN FEET	GRAPHICAL LOG	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0		1	T	4-11-20		64	9.5	CL-ML	**TOPSOIL:** Silty clay, hard, moist, brown.	--roots and vegetation.
									SILTY CLAY WITH SAND: hard, moist, gray.	
		2	T	14-14-22	84	94	14.6	CL-ML		
5		3	T	10-14-23		72	14.5		-- Stains of iron oxides	
									BOTTOM OF BORING @ 6.5 FEET	-- ground water was not encountered during exploration.
10										
15										
20										
25										
30										

GROUNDWATER ELEVATION

- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD

A - AUGER CUTTINGS
S - 3" O.D. THIN WALLED SHELBY TUBE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 2" O.D. SPLIT SPOON
H - HAND SAMPLE

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14721 SOUTH HERITAGE CREST WAY
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(801)553-8112

DATE 10/24/2007

LOG OF BORING NO. 9

PROJECT UCI PRODUCTION WAREHOUSE

PROJECT LOCATION 14126 SOUTH PONY EXPRESS ROAD, DRAPER, UT

BORING LOCATION SEE SITE PLAN AND BORING LOCATIONS

RIG TYPE EARTHCORE, B-80

DRILLING METHOD 3.25" I.D. HOLLOW STEM AUGER

SURFACE ELEVATION 4455 (ESTIMATED FROM SITE PLAN)

FIELD ENGINEER BSF, RDF

DEPTH IN FEET	GRAPHICAL LOG	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION RESISTANCE (per 6-inch)	% FINER THAN #200 SIEVE	% RECOVERY	% MOISTURE	UNIFIED SOIL CLASSIFICATION	VISUAL CLASSIFICATION	REMARKS
0		1	T	2-5-9		67	13.6	CL-ML	**TOPSOIL:** Silty clay, stiff, moist, brown to gray.	--roots and vegetation.
									SILTY CLAY WITH SAND: very stiff, moist, light tan.	
		2	T	10-11-11	81	61	9.6	CL-ML		
5		3	T	9-6-9	82	56	8.4		-- stains of iron oxides	
									BOTTOM OF BORING @ 6.5 FEET	-- ground water was not encountered during exploration.
10										
15										
20										
25										
30										

GROUNDWATER ELEVATION

- DURING EXCAVATION
- AFTER EXCAVATION
- HIGH GROUND WATER 2007

SAMPLE METHOD

A - AUGER CUTTINGS
S - 3" O.D. THIN WALLED SHELBY TUBE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 2" O.D. SPLIT SPOON
H - HAND SAMPLE

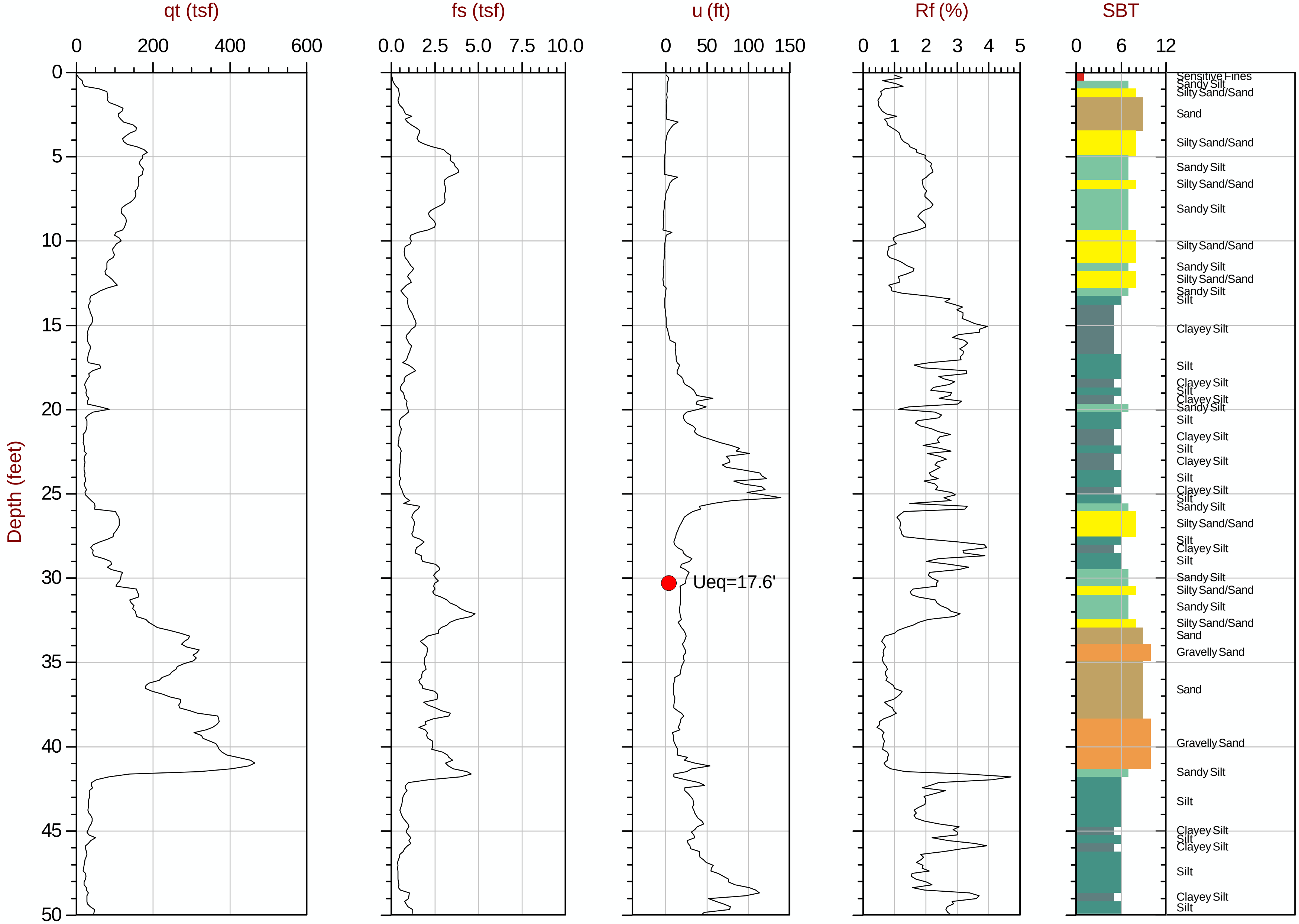
WILDING ENGINEERING, INC
14721 SOUTH HERITAGE CREST WAY
BLUFFDALE, UTAH 84065
(801)553-8112

CONETEC

Wilding Eng.

Job No: 07-439
Date: 10:02:07 09:16
Site: CPT-01

Sounding: CPT-01
Cone: STD 20T AD122



Max Depth: 15.250 m / 50.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 439CP01.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

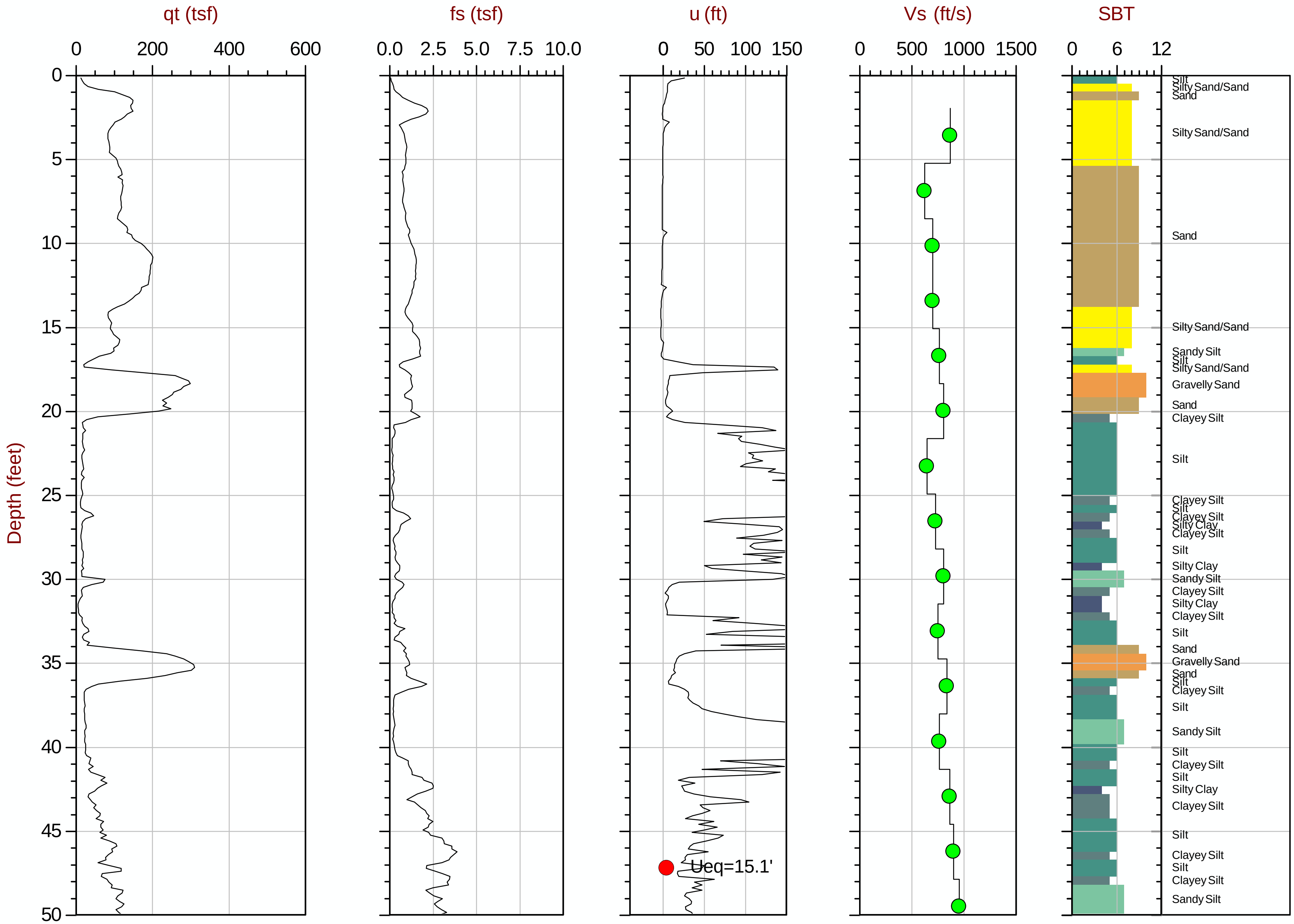
● Equilibrium Pore Pressure from Dissipation

CONETEC

Wilding Eng.

Job No: 07-439
Date: 10:02:07 10:35
Site: CPT-02

Sounding: CPT-02
Cone: STD 20T AD122



Max Depth: 15.800 m / 51.84 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 439CP02.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

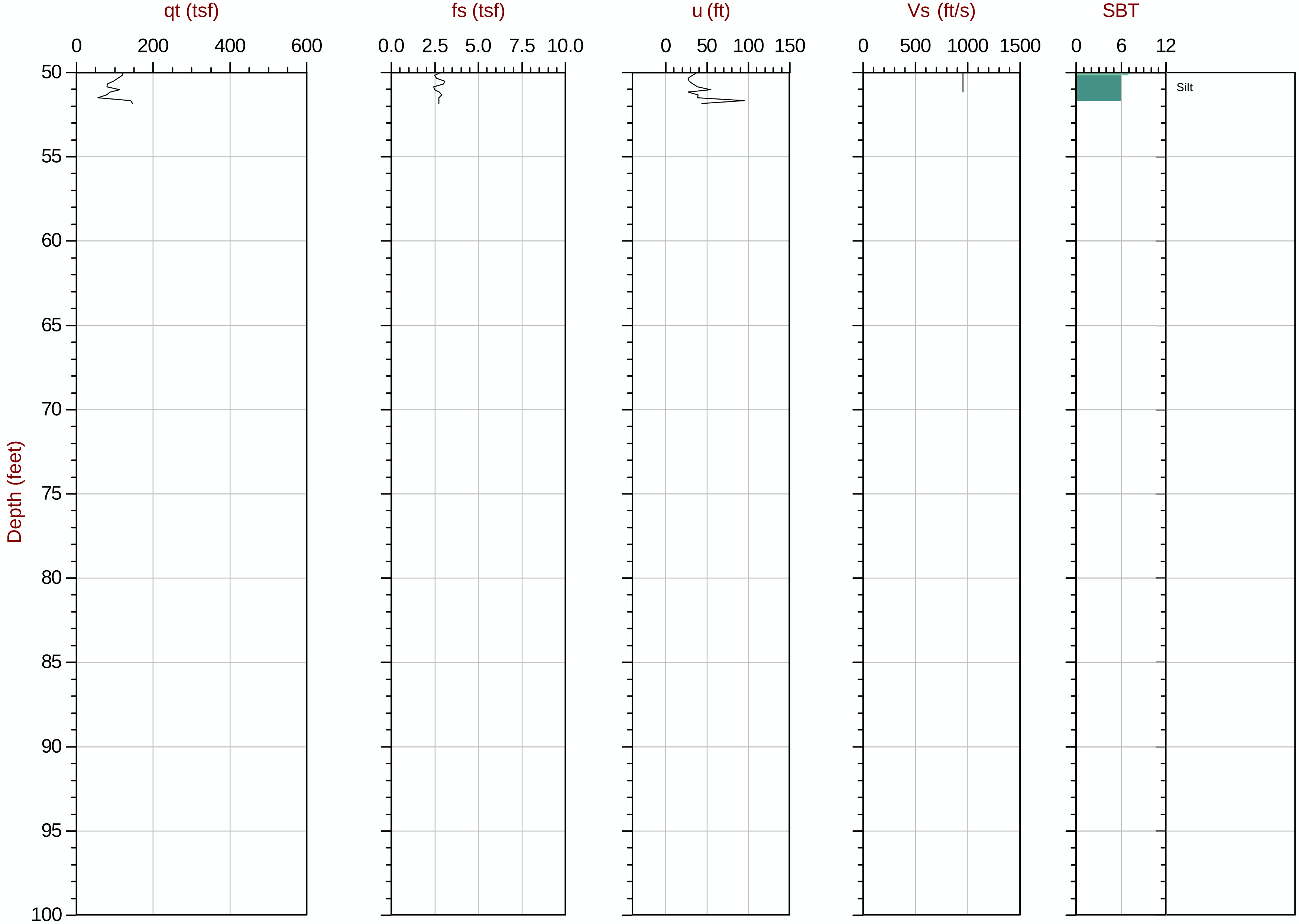
● Equilibrium Pore Pressure from Dissipation

ConeTec

Wilding Eng.

Job No: 07-439
Date: 10:02:07 10:35
Site: CPT-02

Sounding: CPT-02
Cone: STD 20T AD122



Max Depth: 15.800 m / 51.84 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 439CP02.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

● Equilibrium Pore Pressure from Dissipation

Shear Wave Velocity Calculations

Job No.: 07-439
Client: Wilding Eng.
CPT No.: CPT-02
Location Central Warehouse Facility
Date: 9/14/07

Geophone Offset (m): 0.20
Source Offset (18") (m): 0.46

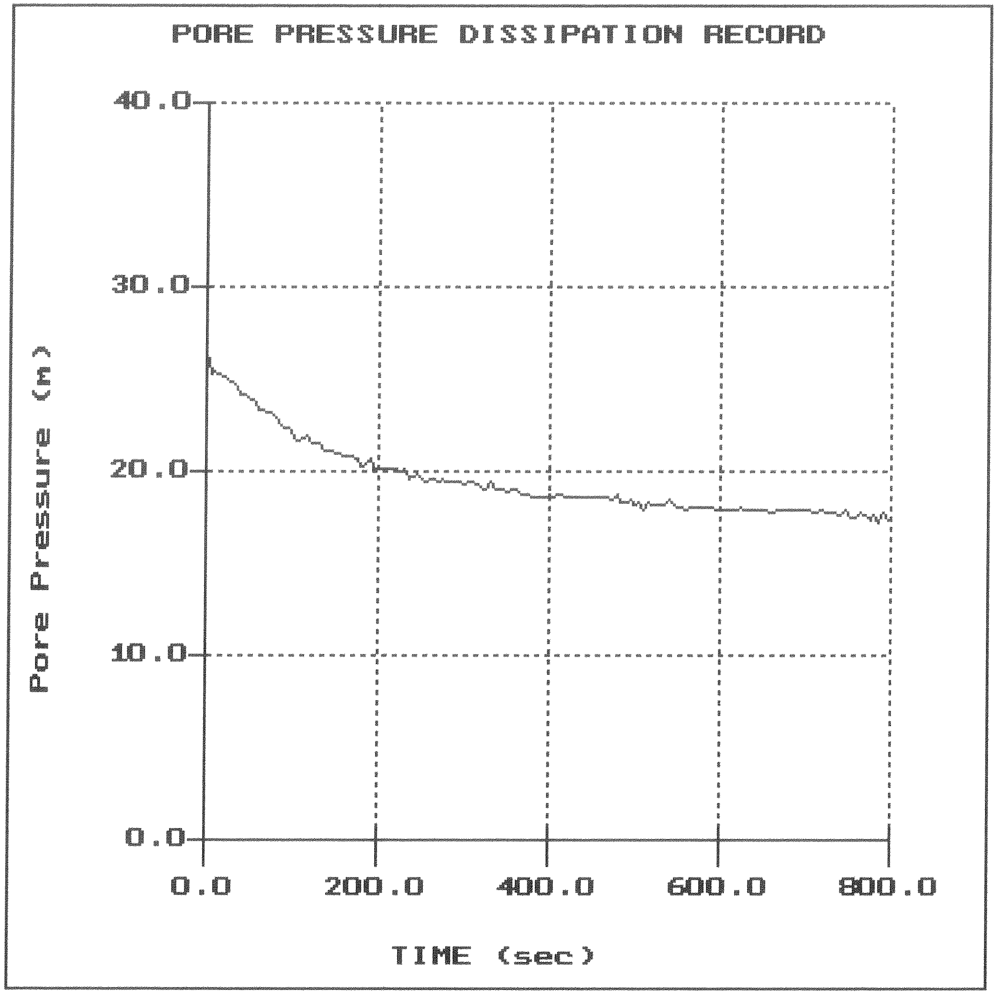
Test Depth (m)	Geophone Depth (m)	Ray Path (m)	Incremental Distance (m)	Time Interval (ms)	Interval Velocity (m/s)	Interval Depth (m)	Interval Velocity (ft/s)	Interval Depth (ft)
0.80	0.60	0.76						
1.80	1.60	1.66	0.91	3.42	266	1.10	872	3.6
2.80	2.60	2.64	0.98	5.13	190	2.10	624	6.9
3.80	3.60	3.63	0.99	4.63	214	3.10	701	10.2
4.80	4.60	4.62	0.99	4.63	215	4.10	704	13.4
5.80	5.60	5.62	1.00	4.27	233	5.10	764	16.7
6.80	6.60	6.62	1.00	4.06	246	6.10	806	20.0
7.80	7.60	7.61	1.00	5.06	197	7.10	647	23.3
8.80	8.60	8.61	1.00	4.49	223	8.10	730	26.6
9.80	9.60	9.61	1.00	4.06	246	9.10	807	29.8
10.80	10.60	10.61	1.00	4.34	230	10.10	754	33.1
11.80	11.60	11.61	1.00	3.92	255	11.10	837	36.4
12.80	12.60	12.61	1.00	4.27	234	12.10	767	39.7
13.80	13.60	13.61	1.00	3.77	265	13.10	868	43.0
14.80	14.60	14.61	1.00	3.63	275	14.10	903	46.2
15.80	15.60	15.61	1.00	3.42	292	15.10	959	49.5

Wilding Eng.

Hole: CPT-01
Location:CPT-01

Cone:STD 20T AD122
Date:10:02:07 09:16

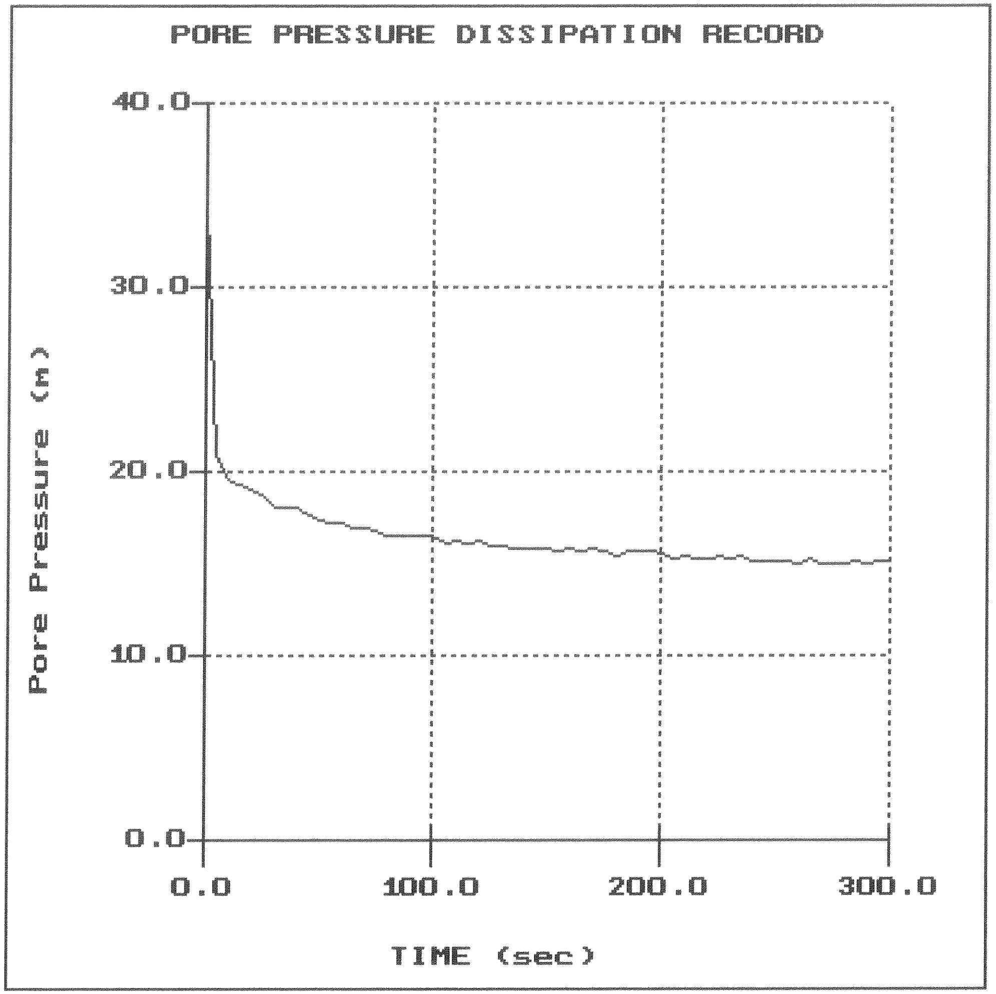
File: 439CP01.PPD
Depth (m): 9.25
(ft): 30.35
Duration : 800.0s
U-min: 17.27 785.0s
U-max: 26.37 0.0s



Wilding Eng.

Hole: CPT-02
Location: CPT-02

Cone: STD 20T   AD122
Date: 10:02:07   10:35



File: 439CP02.PPD
Depth (m): 14.40
(ft): 47.24
Duration : 300.0s
U-min: 15.02 290.0s
U-max: 34.54 0.0s

SUMMARY OF LAB TEST RESULTS

Boring Number	Depth	Natural		Modified (ASTM D1557)		Atterberg Limits (ASTM D4318)			Sieve Analysis (ASTM C136)			Consolidated Drained Direct Shear Test (ASTM D5321)		USCS CLASSIFICATION Symbol and Group Name
		Moisture	Dry Density	Optimum Moisture	Maximum Dry Density	Liquid Limit	Plastic Limit	Plastic Index	Gravel > No. 4 Sieve	Sand < No. 4 and > No. 200 Sieve	Fines Passing No. 200 Sieve	Phi Angle ø'	Cohesion *C'*	
	(ft)	%	lbs/ft^3	%	lbs/ft^3	%	%	%	%	%	%	(deg)	(psf)	
1	0	15												CL-ML, Silty clay
1	2.5	6.9									92			CL-ML, Silty clay
1	5	9.4												CL-ML, Silty clay
1	7.5	11.5									93			CL-ML, Silty clay
1	10	6.3												SM, Silty sand
1	15	26.2				33	19	14			92			CL, Lean clay
1	25	22.2												CL, Lean clay with sand
1	30	14.3				NP	NP	NP			74			ML, Silt with sand
1	35	10.4												SM, Silty sand
1	40	10.4												SP-SM, Poorly graded sand with silt and gravel
1	45	27.6				42	17	25			91			CL, Lean clay
1	50	21.3												CL, Sandy lean clay
2	2.5	8									92			CL-ML, Silty clay
2	5	11.2									90			CL-ML, Silty clay
2	10	9.7				34	18	16						CL, Lean clay
2	15	23									94			CL, Lean clay
2	20	33.4	83.6								94			CL, Lean clay
3	0	19.1												CL-ML, Silty clay
3	5	9.4									88			ML, Silt
4	0	13.8												CL-ML, Silty clay
4	2.5	2									18			SM, Silty sand
4	5	2.1												SM, Silty sand
4	10	4				NP	NP	NP			32			SM, Silty sand

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SUMMARY OF LAB TEST RESULTS

Boring Number	Depth	Natural		Modified (ASTM D1557)		Atterberg Limits (ASTM D4318)			Sieve Analysis (ASTM C136)			Consolidated Drained Direct Shear Test (ASTM D5321)		USCS CLASSIFICATION Symbol and Group Name
		Moisture	Dry Density	Optimum Moisture	Maximum Dry Density	Liquid Limit	Plastic Limit	Plastic Index	Gravel > No. 4 Sieve	Sand < No. 4 and > No. 200 Sieve	Fines Passing No. 200 Sieve	Phi Angle ø'	Cohesion *C'*	
	(ft)	%	lbs/ft^3	%	lbs/ft^3	%	%	%	%	%	%	(deg)	(psf)	
4	15	26.6	89.6								85			CL, Lean clay with sand
4	20	5.3	110.8			35	21	14			23			SC, Clayey sand
5	0	10.2												CL-ML, Silty clay
5	2.5	12.2									90			CL-ML, Silty clay
5	5	2.2												SM, Silty sand
6	0	14												CL-ML, Silty clay
6	2.5	2.5									2			SP, Poorly graded sand
6	7.5	2.9									10			SP-SM, Poorly graded sand with silt
6	10	2.7												SM, Silty sand
6	15	15.6				NP	NP	NP			22			SM, Silty sand
6	20	4.5				33	19	14	25	61	14			SC, Clayey sand with gravel
7	0	10.5												CL-ML, Silty clay
7	2.5	2.8									20			SM, Silty sand
7	5	4.7												SM, Silty sand
7	7.5	4.3									89			ML, Silt
7	10	25.8												CL-ML, Sandy silty clay
7	15	24.5				30	19	11			91			CL, Lean clay
7	20	26.1	90.2								72			CL-ML. Silty clay with sand
8	0	9.5												CL-ML, Silty clay
8	2.5	14.6									84			CL-ML. Silty clay with sand
8	5	14.5												CL-ML. Silty clay with sand
9	0	13.6												CL-ML, Silty clay
9	2.5	9.6									81			CL-ML. Silty clay with sand
9	5	8.4									82			CL-ML. Silty clay with sand

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GRAIN SIZE ANALYSIS-- MECHANICAL

Project: UCI Production Warehouse | Boring No: 6

Location of Project: 14126 South Pony Express Road, Draper, Utal | Depth of Sample: 20 feet

Location of Sample: See site plans and boring locations | Date of Testing: October 9, 2007

Description of Soil: Clayey sand with gravel, moist, brown

Tested by: J. Clark

Soil Sample Size (ASTM D 1140-54)

Wt of wet sample	253.30
Wt of dry sample	242.36

Percent Content

Gravel:	25
Sand:	61
Fines:	14
	100 Total

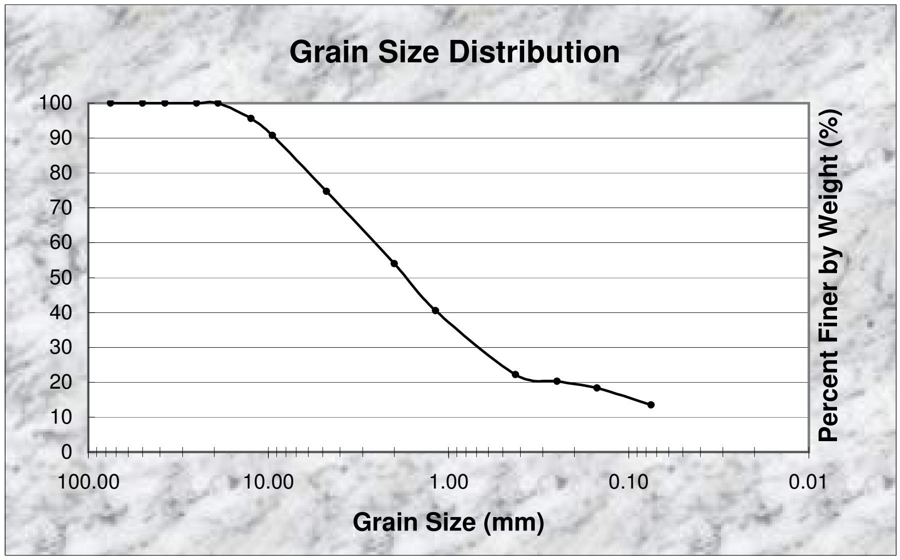

Table - U.S. Standard Sieve Analysis

Sieve No.	Diam. (mm)	Wt retained	% retained	% passing
3.00	75.00	0.0	0.0	100.00
2.00	50.00	0.0	0.0	100.00
1.50	37.50	0.0	0.0	100.00
1.00	25.00	0.0	0.0	100.00
0.75	19.000	0.0	0.0	100.00
0.50	12.500	10.7	4.4	95.59
0.38	9.500	22.5	9.3	90.72
4	4.750	61.4	25.3	74.67
10	2.000	111.6	46.0	53.95
16	1.180	144.2	59.5	40.50
40	0.425	188.5	77.8	22.22
60	0.250	193.3	79.8	20.24
100	0.150	197.9	81.7	18.34
200	0.075	209.6	86.5	13.52

NOTE: % passing = 100 - % retained

USCS Classification: **<u>SC, Clayey sand with gravel</u>**

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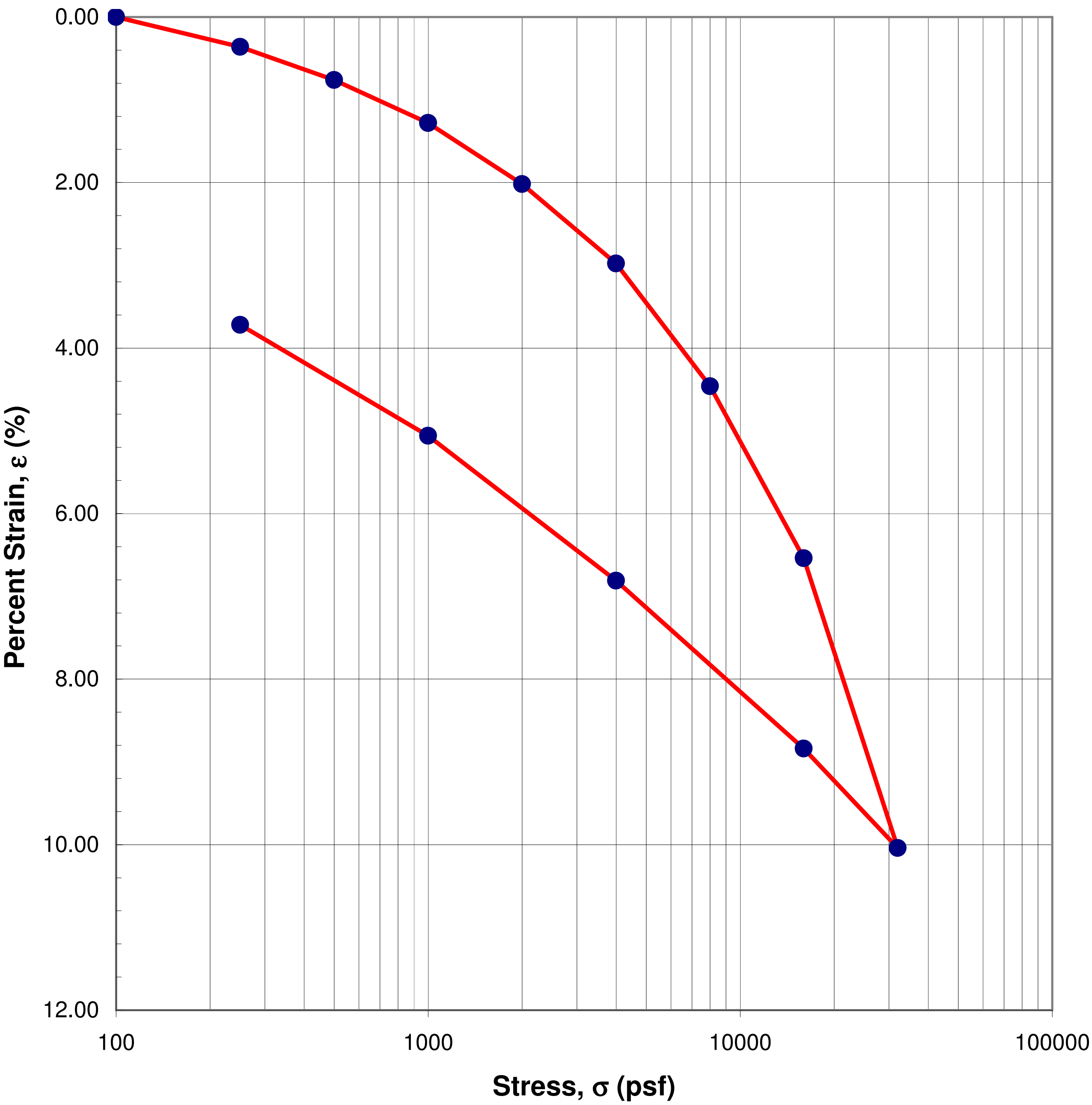
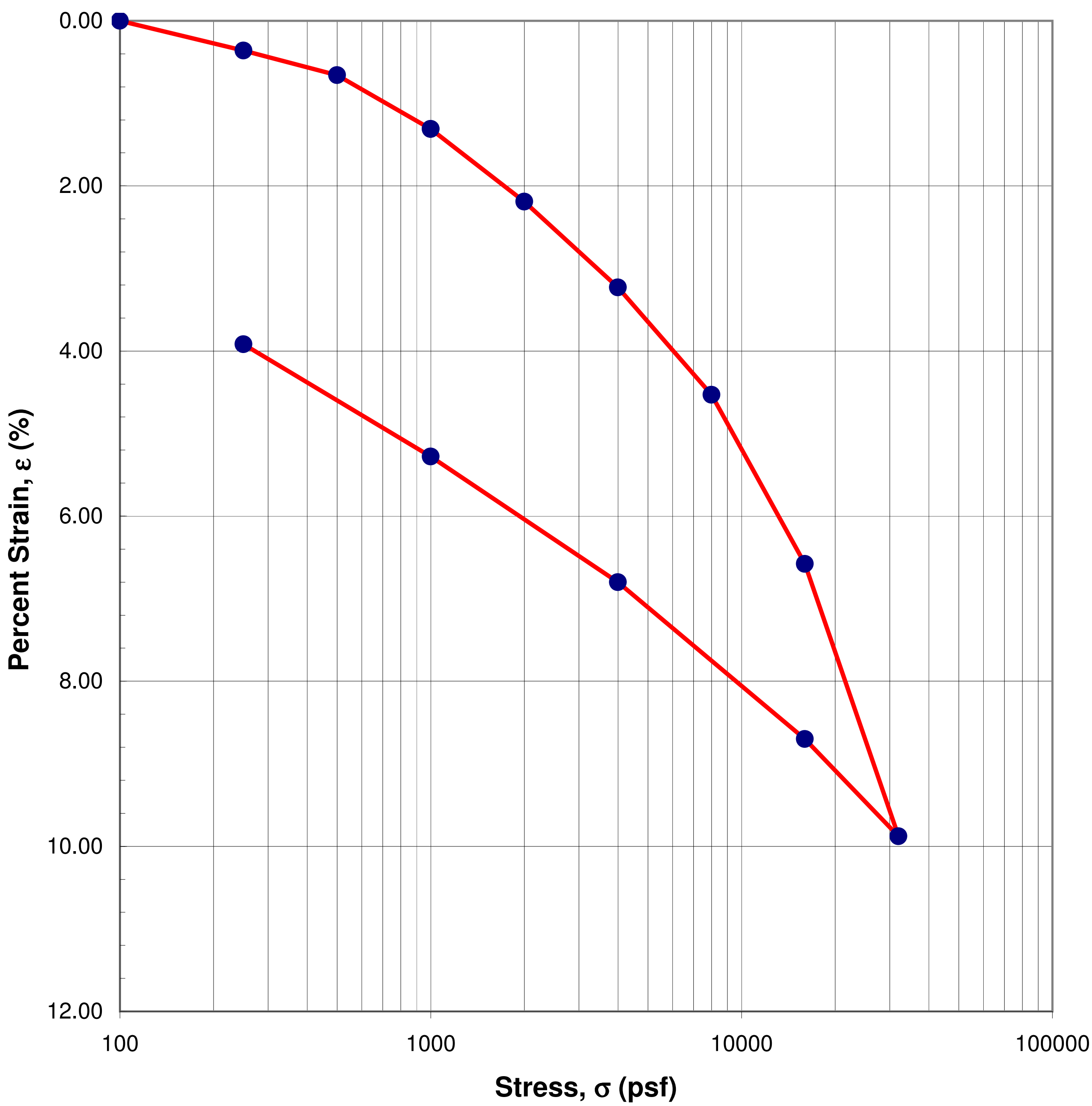
Collapse/1-D Consolidation Test



Sample Location	B-2	**Dry Density**	89	pcf
Sample Depth (ft)	15	**Initial Moisture Content**	27.2	%
Sample Description	Silty Clay	**Collapse**	N/M	%
USCS Classification	CL-ML	**Swell**	N/M	%

psi Information To Build On — Engineering • Consulting • Testing	**Central Warehouse Facility**	Job No.	710-75007
	1-D Consolidation Test	Figure No.	1

Collapse/1-D Consolidation Test



Sample Location	B-7	**Dry Density**	91	pcf
Sample Depth (ft)	15	**Initial Moisture Content**	26.4	%
Sample Description	Silty Clay	**Collapse**	N/M	%
USCS Classification	CL-ML	**Swell**	N/M	%

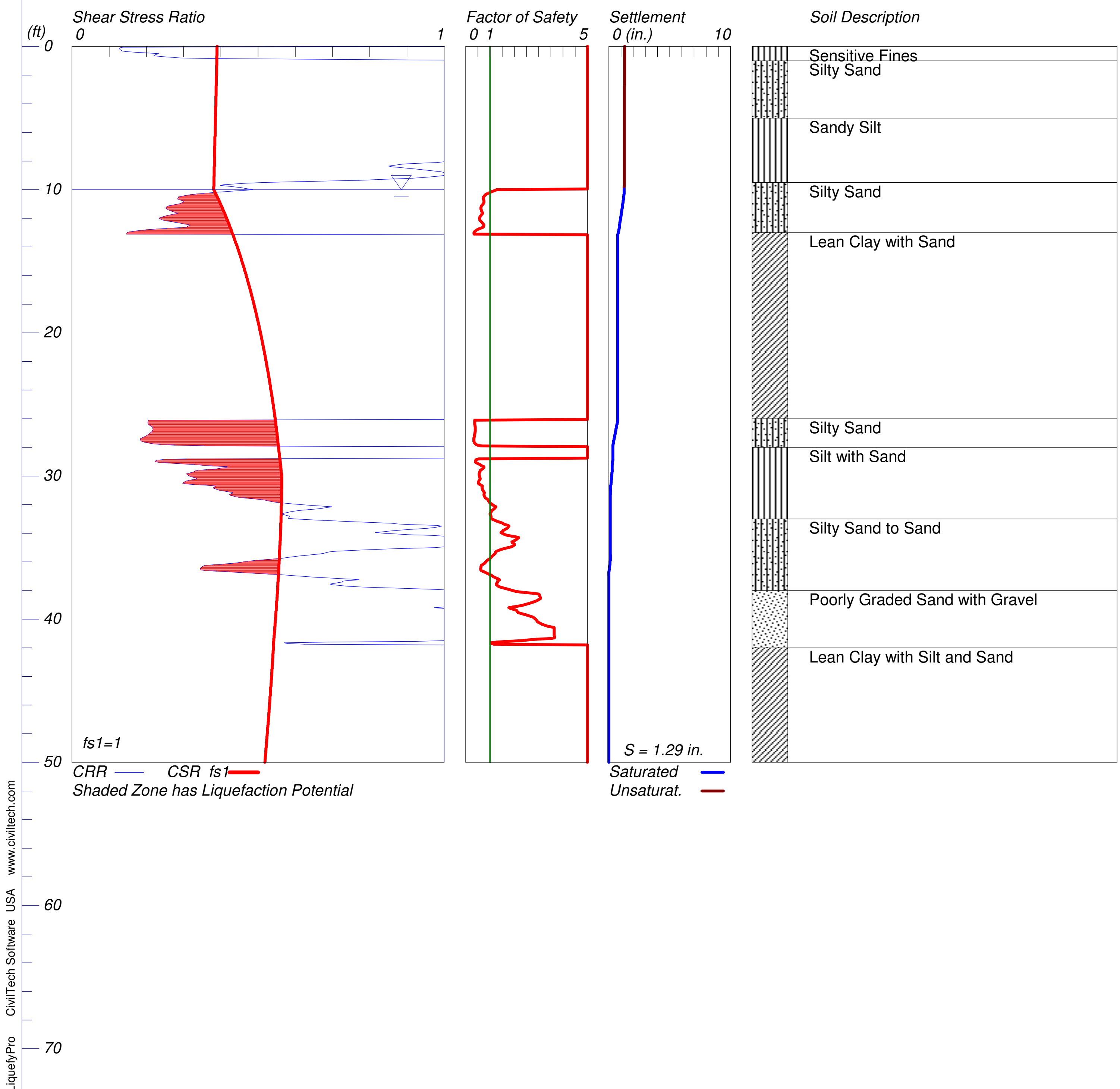
psi Information To Build On — Engineering • Consulting • Testing	**Central Warehouse Facility**	Job No.	710-75007
	1-D Consolidation Test	Figure No.	2

LIQUEFACTION ANALYSIS

Central Warehouse Facility

Hole No.=CPT-1 Water Depth=10 ft Surface Elev.=4454

Magnitude=7.5
Acceleration=0.60g



Proj No. 07114 **A-13**

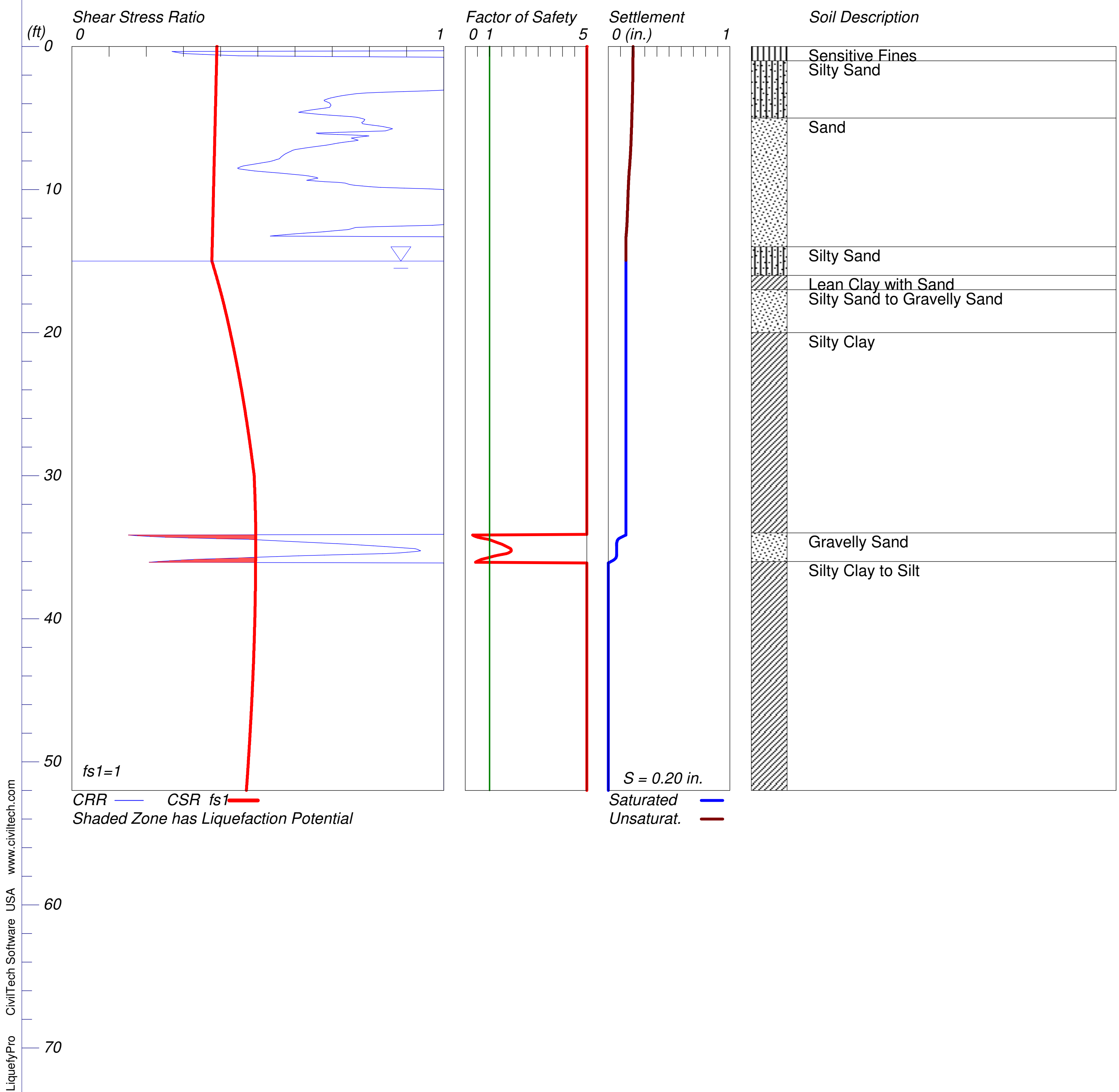
Wilding Engineering, Inc.

LIQUEFACTION ANALYSIS

Central Warehouse Facility

Hole No.=CPT-2   Water Depth=15 ft   Surface Elev.=4454

Magnitude=7.5
Acceleration=0.60g



Proj No. 07114

A-14

Wilding Engineering, Inc.

AMERICAN WEST ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, Utah
84115

(801) 263-8686
Toll Free (888) 263-8686
Fax (801) 263-8687
e-mail: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

October 18, 2007

Ben Fowler
Wilding Engineering, Inc.
14721 So. Heritage Crest Way
Bluffdale, UT 84065

TEL: (801) 553-8113
FAX: (801) 553-9108

RE: Central Storage / 07114

Lab Set ID: L80409

Dear Ben Fowler:

American West Analytical Labs received 3 samples on 10/9/2007 for the analyses presented in the following report.

All analyses were performed in accordance to National Environmental Laboratory Accreditation Program (NELAP) protocols unless noted otherwise. If you have any questions or concerns regarding this report please feel free to call.

Thank you.

Approved by: [signature]
Laboratory Director or designee

INORGANIC ANALYSIS REPORT

Client: Wilding Engineering, Inc. Contact: Ben Fowler
ProjectID: Central Storage / 07114

AMERICAN WEST ANALYTICAL LABORATORIES

Lab Sample ID: L80409-01
Field Sample ID: **B-8 @ 2.5**
Collected: 10/7/2007
Received: 10/9/2007

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Result	
pH @ 25° C	pH units	10/9/2007 11:58:00 PM	9045D	0	**8.57**	H
Resistivity	ohm-cm	10/10/2007 7:10:00 AM	2510B	10	**510**	*
Sulfate	mg/kg-dry	10/10/2007 7:15:00 AM	9038	120	**450**	*

H - Sample was received outside of holding time.
**Analysis is performed on a 1:1 DI water extract for soils.*

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Kyle F. Gross
Laboratory Director

INORGANIC ANALYSIS REPORT

Client: WildingEngineering,Inc. Contact: BenFowler
ProjectID: CentralStorage/07114

AMERICAN WEST ANALYTICAL LABORATORIES

Lab Sample ID: L80409-02
Field Sample ID: **B-9 @ 2.5**
Collected: 10/7/2007
Received: 10/9/2007

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Result	
pH @ 25° C	pH units	10/9/2007 11:58:00 PM	9045D	0	**8.84**	H
Resistivity	ohm-cm	10/10/2007 7:10:00 AM	2510B	10	**1600**	*
Sulfate	mg/kg-dry	10/10/2007 7:15:00 AM	9038	25	**130**	*

H - Sample was received outside of holding time.
**Analysis is performed on a 1:1 DI water extract for soils.*

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Kyle F. Gross
Laboratory Director

INORGANIC ANALYSIS REPORT

Client: Wilding Engineering, Inc. Contact: Ben Fowler
Project ID: Central Storage / 07114

AMERICAN WEST ANALYTICAL LABORATORIES

Lab Sample ID: L80409-03
Field Sample ID: **B-6 @ 2.5**
Collected: 10/7/2007
Received: 10/9/2007

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Result	
pH @ 25° C	pH units	10/9/2007 11:58:00 PM	9045D	0	**8.59**	H
Resistivity	ohm-cm	10/10/2007 7:10:00 AM	2510B	10	**5600**	*
Sulfate	mg/kg-dry	10/10/2007 7:15:00 AM	9038	5.0	< 5.0	*

H - Sample was received outside of holding time.
**Analysis is performed on a 1:1 DI water extract for soils.*

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Kyle F. Gross
Laboratory Director

American West Analytical Labs

WORK ORDER Summary

09-Oct-07

Work Order L80409

Client ID: WIL400 **QC Level:** 1

Project: Central Storage / 07114 **Location:** 2w **Contact:** Ben Fowler

Comments: QCLevel: 1. Footnote report, pH received outside of hold. HOK-DB

DB

Sample ID	Client Sample ID	Collection Date	Date Received	Date Due	Matrix	Test Code	Storage	
L80409-01A	B-8 @ 2.5	10/7/2007	10/9/2007	10/23/2007	Soil	PH-9045D	oct 9 - wc	1
				10/23/2007		RESIST-S	oct 9 - wc	1
				10/23/2007		Soil_Prep	oct 9 - wc	1
L80409-01B				10/23/2007		PMOIST	oct 9 - wc	1
				10/23/2007		SO4-S	oct 9 - wc	1
				10/23/2007		Soil_Prep	oct 9 - wc	1
L80409-02A	B-9 @ 2.5			10/23/2007		PH-9045D	oct 9 - wc	1
				10/23/2007		RESIST-S	oct 9 - wc	1
				10/23/2007		Soil_Prep	oct 9 - wc	1
L80409-02B				10/23/2007		PMOIST	oct 9 - wc	1
				10/23/2007		SO4-S	oct 9 - wc	1
				10/23/2007		Soil_Prep	oct 9 - wc	1
L80409-03A	B-6 @ 2.5			10/23/2007		PH-9045D	oct 9 - wc	1
				10/23/2007		RESIST-S	oct 9 - wc	1
				10/23/2007		Soil_Prep	oct 9 - wc	1
L80409-03B				10/23/2007		PMOIST	oct 9 - wc	1
				10/23/2007		SO4-S	oct 9 - wc	1
				10/23/2007		Soil_Prep	oct 9 - wc	1

Client WILDING ENGINEERING

Address 14721 South HeriTAge Crest way

BLUFFDALE Ut 84065

City State Zip

Phone 801-553-8112 Fax 801-553-9108

Contact Ben Fowler

E-mail bFowler@WildingEngineering.com

Project Name CenTral STorage

Project Number/P.O.# 07114

Sampler Name R. Fowler

AMERICAN WEST ANALYTICAL LABORATORIES
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Salt Lake City, Utah 84115
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CHAIN OF CUSTODY

Lab Sample Set # 80409

Page ______ of ______

Turn Around Time (Circle One)

1 day 2 day 3 day 4 day 5 day (Standard — circled)

Sample ID	Date/Time Collected	Matrix	Number of Containers (Total)	PH	Resistivity	Sulfate							COMMENTS
B-8 @ 2.5	10-7-07			/	/	/							
B-9 @ 2.5	↓			/	/	/							
B-6 @ 2.5	↓			/	/	/							

QC LEVEL

1 2 2+

3 3+ 4

Relinquished By: Signature	Date	Received By: Signature
Benny Cantrell (signature)	10-8-07	Denise Bruun (signature)
PRINT NAME: Benny CanTrell	Time: 1:45P	PRINT NAME: Denise Bruun
Relinquished By: Signature	Date	Received By: Signature
PRINT NAME	Time	PRINT NAME
Relinquished By: Signature	Date	Received By: Signature
PRINT NAME	Time	PRINT NAME
Relinquished By: Signature	Date	Received By: Signature
PRINT NAME	Time	PRINT NAME

Special Instructions:

LABORATORY USE ONLY

SAMPLES WERE:

1 Shipped or hand delivered (circled)
Notes:

2 Ambient (circled) or Chilled
Notes:

3 Temperature 25°

4 Received Broken/Leaking (Improperly Sealed)
Y N (circled)
Notes:

5 Properly Preserved
Y (circled) N
Notes:

6 Received Within Holding Times
Y N (circled)
Notes:
pH

COC Tape Was:

1 Present on Outer Package
Y N (circled) NA

2 Unbroken on Outer Package
Y N NA (circled)

3 Present on Sample
Y N (circled) NA

4 Unbroken on Sample
Y N NA (circled)
Notes:

Discrepancies Between Sample Labels and COC Record?
Y N (circled)
Notes: