GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
CALIFORNIA CORRECTIONAL INSTITUTION
TEHACHAPI, CALIFORNIA

BSK PROJECT G18-227-11B

PREPARED FOR:

FOREFRONT POWER
100 MONTGOMERY STREET, 1400
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OCTOBER 18, 2018

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CALIFORNIA CORRECTIONAL INSTITUTION
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Bakersfield Project: G18-227-11B

October 18, 2018

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1. INTRODUCTION

This report presents the results of a Geotechnical Engineering Investigation Report conducted by BSK Associates (BSK), for the California Correctional Institution Solar Project in Tehacahpi, California (Site). The Site is located at 24900 CA Highway 202 in Tehacahpi, California, as shown on the Site Vicinity Map, Figure A-1. The geotechnical engineering investigation was conducted in accordance with BSK Proposal GB17-16065, dated April 17, 2018.

This report provides a description of the geotechnical conditions at the Site and provides specific recommendations for earthwork and foundation design with respect to the planned structures. In the event that changes occur in the design of the project, this report's conclusions and recommendations will not be considered valid unless the changes are reviewed with BSK and the conclusions and recommendations are modified or verified in writing. Examples of such changes would include location, size of structures, foundation loads, etc.

1.1. Planned Construction

BSK understands that the site is located at the existing California Correction Institute in Tehachapi, California. The proposed solar carport structures will be located in the field located to the east of the prison. BSK understands that the total system size will be 3,625 kW AC. The PV panels will be supported on pole-type foundations, such as driven piers. AC electrical equipment will be supported on drilled piers, shallow foundations, or mat foundations.

In the event that significant changes occur in the design of the proposed improvements, this report's conclusions and recommendations will not be considered valid unless the changes are reviewed with BSK and the conclusions and recommendations are modified or verified in writing.

1.2. Purpose and Scope of Services

The objective of this geotechnical investigation was to characterize the subsurface conditions in the areas of the proposed structures, and provide geotechnical engineering recommendations for the preparation of plans and specifications and bearing and lateral earth pressure conditions. The scope of the investigation included a field exploration, laboratory testing, field resistivity testing, thermal resistivity testing, engineering analyses, and preparation of this report.

2. FIELD INVESTIGATION AND LABORATORY TESTING

2.1. Field Exploration

The field exploration for this investigation was conducted under the oversight of a BSK staff member. A total of ten (10) borings were drilled at the site on September 27, 2018 using a Mobile B-61 Drill Rig provided by Dave's Drilling. The borings were drilled to a maximum depth of 16.5 feet beneath the existing ground surface (bgs).

The soil materials encountered in the Borings were visually classified in the field, and the logs were recorded during the drilling and sampling operations. Visual classification of the materials encountered

in the borings was made in general accordance with the Unified Soil Classification System (ASTM D 2488). A soil classification chart is presented in Appendix A.

Boring logs are presented in Appendix A and should be consulted for more details concerning subsurface conditions. Stratification lines were approximated by the field staff based on observations made at the time of drilling, while the actual boundaries between soil types may be gradual and soil conditions may vary at other locations.

2.2 Laboratory Testing

Laboratory tests were performed on selected soil samples to evaluate moisture content, dry density, moisture density relationship, shear strength, expansion index, California bearing ratio (CBR), thermal resistivity, fines content, and corrosion characteristics. A description of the laboratory test methods and results are presented in Appendix B.

2.3 Field Resistivity

Field resistivity tests were performed on-site in accordance with ASTM G57. Approximate field resistivity test locations are presented in Figure A-3 and the results are presented in Figure A-5 and A-6.

2.4 Thermal Resistivity

Representative soil samples will be evaluated for thermal resistivity of soil using accepted test methods. The samples were taken at Borings B-2 and B-9. The test results are presented in Appendix C.

3. SITE GEOLOGY/SEISMICITY CONDITIONS

The following sections address the Site descriptions and surface conditions, regional geology and seismic hazards, subsurface conditions, and groundwater conditions at the Site. This information is based on BSK's field exploration and published maps and reports.

3.1. Site Description and Surface Conditions

The Site is located at the existing California Correctional Institute in Tehachapi, California. The proposed solar structures will be located in an empty field located to the east of the prison. The Site surface is currently a grass area. The Site is located in Section 29, Township 32 South, and Range 32 East of the Mount Diablo Meridian. The WGS84 GPS coordinates for the center of the Site are 35.1147 degrees North latitude and 118.5625 degrees West longitude.

3.2. Regional Geology and Seismic Hazards Assessment

Our Scope of services included a review of published maps and reports to assess the regional geology and potential for seismic hazards.

3.2.1 Regional Geology

The site is located in the Sierra Nevada geomorphic province. The Sierra Nevada is a tilted fault block nearly 400 miles long. Its east face is a high, rugged multiple scarp, contrasting with the gentle western slope (about 2^{o}) that disappears under sediments of the Great Valley. Deep River canyons are cut into the western slope. Their upper courses, especially in massive granites of the higher sierra, are modified by glacial sculpturing, forming such scenic features as Yosemite Valley. The high crest culminates in Mt.

Whitney with an elevation of 14,495 feet above sea level near the eastern scarp. The metamorphic bedrock contains gold bearing veins in the northwest trending Mother Lode. The northern Sierra boundary is marked where bedrock disappears under the Cenozoic volcanic cover of the Cascade Range.

3.2.2 Seismic Hazards Assessment

The types of geologic and seismic hazards assessed include surface ground fault rupture, liquefaction, and slope failure.

The purpose of the Alquist-Priolo Geologic Hazards Zones Act, as summarized in CDMG Special Publication 42 (SP 42), is to "prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture." As indicated by SP 42, "the State Geologist is required to delineate "earthquake fault zones" (EFZs) along known active faults in California. Cities and counties affected by the zones must regulate certain development 'projects' within the zones. They must withhold development permits for Sites within the zones until geologic investigations demonstrate that the Sites are not threatened by surface displacement from future faulting.

The Site is not located within an Alquist-Priolo Geologic Hazard Zone (A-P Zone). The closest fault zone is associated with the White Wolf fault located approximately 10.9 miles northwest of the Site and the San Andreas fault zone (Cholame-Carrizo section), located approximately 32.4 miles southwest of the site.

Zones of Required Investigation referred to as "Seismic Hazard Zones" in CCR Section 3722, are areas shown on Seismic Hazard Zone Maps where Site investigations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements.

The Site is not located in a Liquefaction or Landslide Seismic Hazard Zone specified by the State of California.

3.3 Subsurface Conditions

The subsurface material generally consisted of fine to coarse grained gravelly silty sand in the upper 5 feet. The material varies from gravelly silty sand, clayey silty sand, and silty clayey sand through out to the bottom of the boreholes. Cobbles were encountered throughout the site. The boring logs in Appendix A provide a more detailed description of the materials encountered, including the applicable Unified Soil Classification System symbols.

The upper 5 feet of on-site soil is considered to have a low expansion potential with an expansion index of 26 at Boring B-5.

3.4 Groundwater Conditions

Groundwater was not encountered at the Site on September 27, 2018. Based on the groundwater elevation data from the California Department of Water Resources (DWR), the historic high

groundwater depth in the vicinity was recorded to be 64.3 feet bgs on March 4, 1953 from State Well 32S32E31A001M located approximately 1.0-mile southwest of the site.

Please note that the groundwater level may fluctuate both seasonally and from year to year due to variations in rainfall, temperature, pumping from wells and possibly as the result of other factors such as irrigation, that were not evident at the time of our investigation.

4. CONCLUSIONS AND RECOMMENDATIONS

Based upon the data collected during this investigation, and from a geotechnical engineering standpoint, it is our opinion that the soil conditions would not preclude the construction of the proposed improvements.

The proposed improvements may be supported on shallow or mat foundations or drilled piers if the recommendations presented herein are incorporated into the design and construction of the project. Difficult pile driving should be anticipated due to on site cobbles and pre-drilling may be required. BSK recommends an indicator pile driving program be developed and implemented prior to pile driving production operations.

4.1 Seismic Design Criteria

Based on Section 1613.3.2 of the 2016 California Building Code (CBC), the Site shall be classified as Site Class A, B, C, D, E or F based on the Site soil properties and in accordance with Chapter 20 of ASCE 7-10. Based on the "N" values from our soil Borings, as per Table 20.3-1 of ASCE 7-10, the Site is Class D ($15 \leq N \leq 50$).

The 2016 California Building Code (CBC) utilizes ground motion based on the Risk-Targeted Maximum Considered Earthquake (MCER) that is defined in the 2016 CBC as the most severe earthquake effects considered by this code, determined for the orientation that results in the largest maximum response to horizontal ground motions and with adjustment for targeted risk. Ground motion parameters in the 2016 CBC are based on ASCE 7-10, Chapter 11.

The United States Geologic Survey (USGS) has prepared maps presenting the Risk-Targeted MCE spectral acceleration (5 percent damping) for periods of 0.2 seconds (S_S) and 1.0 seconds (S_1). The values of S_S and S_1 can be obtained from the USGS Ground Motion Parameter Application available at: http://earthquake.usgs.gov/designmaps/us/application.php.

The USGS Ground Motion Parameter Application and Chapter 16 of the 2016 CBC based on ASCE 7-10 produced the spectral acceleration parameters risk targeted maximum considered earthquake values in Table 1 based on Site Class D conditions.

As per Section 1803.5.12 of the CBC, peak ground acceleration (PGA) utilized for dynamic lateral earth pressures and liquefaction, shall be based on a site-specific study (ASCE 7-10, Section 21.5) or ASCE 7-10,

Section 11.8.3. The USGS Ground Motion Parameter Application and based on ASCE 7-10, Section 11.8.3 produced the Geometric Mean PGA value in Table 1 based on Site Class D conditions.

Table 1: Seismic Design Parameters

Seismic Design Parameter	2016 CBC Value		Reference
MCE Mapped Spectral Acceleration (g)	S_S = 1.387	S_1 = 0.536	USGS Mapped Value
Amplification Factors (Site Class D)	F_a = 1.000	F_v = 1.500	Table 1613.3.3
Site Adjusted MCE Spectral Acceleration (g)	S_{MS} = 1.387	S_{M1} = 0.804	Equations 16-37, 38
Design Spectral Acceleration (g)	S_{DS} = 0.924	S_{D1} = 0.536	Equations 16-39, 40
Geometric Mean PGA (g)	PGA = 0.5		ASCE Equations 11.8-1

As shown above, the short period design spectral response acceleration coefficient, S_{DS}, is greater than 0.5, therefore the Site lies in Seismic Design Category D as specified in Section 1613.3.5 of the 2016 CBC. The long period design spectral response acceleration coefficient, S_{D1}, is greater than 0.2, therefore the Site lies in Seismic Design Category D as specified in Section 1613.3.5 of the 2016 CBC. In accordance with the 2016 CBC, each structure shall be assigned to the more severe seismic design category in accordance with Table 1613.3.5(1) or 1613.3.5(2), irrespective of the fundamental period of vibration of the structure.

4.2 Soil Corrosivity

A surface soil sample obtained from the Site was tested to provide a preliminary screening of the potential for concrete deterioration or steel corrosion due to attack by soil-borne soluble salts. The test results are presented in Appendix B.

The corrosivity evaluation was performed by BSK on soil samples obtained at the time of drilling. The soil was evaluated for minimum resistivity (ASTM G57), pH (ASTM D4972), and soluble sulfate and chlorides (CT 417 and CT 422). At Boring B-5, the minimum resistivity was 3,000 ohm-cm, pH was 8.45, sulfate and chloride were not detected.

The water-soluble sulfate content severity class is considered not severe to concrete (Exposure Category S0 per Table 4.2.1 of ACI 318-11). Representative samples of the Site soil in the vicinity has a minimum resistivity of 3,000 ohm-cm which is considered moderately corrosive, respectively, to buried metal conduit. Therefore, buried metal conduits, ferrous metal pipes, and exposed steel should have a protective coating in accordance with the manufacturer's specification.

4.3 Site Preparation Recommendations

The following procedures must be implemented during Site preparation for the proposed Site improvements. References to maximum dry density, optimum moisture content, and relative compaction are based on ASTM D 1557 (latest test revision) laboratory test procedures.

1. The areas of proposed improvements must be cleared of surface vegetation and debris. Materials resulting from the clearing and stripping operations must be removed and properly disposed of off-site. In addition, all undocumented fills should be removed where encountered and where fills or structural improvements will be placed.
2. Where existing utilities, inlets, or underground tanks are present, they should be removed to a point at least 2 feet horizontally outside the proposed foundation and pavement areas. Resultant cavities must be backfilled with engineered fill compacted in accordance with the recommendations presented in this report.
3. Following the stripping operations, the areas where shallow foundations are proposed must be overexcavated to a minimum depth of two feet below existing site grades or one foot below the bottom of the footing elevation, whichever is deeper. Over excavation should extend laterally three feet beyond the edge of foundations for shallow footings. After overexcavation, the bottom of the exposed soil should be scarified 12 inches, moisture conditioned to near optimum moisture content, and compacted to 90% of ASTM D1557. We recommend that non-expansive soil (EI < 20) be used below the bottom of shallow foundations.
4. Following the required stripping and overexcavation, in the areas of proposed shallow foundations, the exposed ground surface at the bottom of the overexcavation must be inspected by the Geotechnical Engineer to evaluate if loose or soft zones are present that will require additional overexcavation.
5. Imported soil or native excavated soils, free of organic materials or deleterious substances, may be placed as compacted engineered fill. The material must be free of oversized fragments greater than 3-inches in greatest dimension. Engineered fill must be placed in uniform layers not exceeding 8-inches in loose thickness, moisture conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction. Engineered fill placed on fill slopes must be placed in uniform layers not exceeding 8-inches in loose thickness, moisture conditioned to near optimum moisture content, and compacted to at least 90 percent of relative compaction.
6. BSK must be called to the site to verify the import material properties through laboratory testing.
7. If possible, earthwork operations should be scheduled during a dry, warm period of the year. Should these operations be performed during or shortly following periods of inclement weather, unstable soil conditions may result in the soils exhibiting a “pumping” condition. This condition is caused by excess moisture in combination with moving construction equipment, resulting in saturation and zero air voids in the soils. If this condition occurs, the adverse soils will need to be over-excavated to the depth at which stable soils are encountered, and replaced with suitable soils compacted as engineered fill. Alternatively, the Contractor may proceed with grading operations after utilizing a method to stabilize the soil subgrade, which should be subject to review and approval by BSK prior to implementation.
8. Import fill materials must be free from organic materials or deleterious substances. The project specifications must require the contractor to contact BSK to review the proposed import fill materials for conformance with these recommendations at least one week prior to importing to the Site, whether from on-site or off-site borrow areas. Imported fill soils must be non-

hazardous and derived from a single, consistent soil type source conforming to the following criteria:

Plasticity Index:	< 12
Expansion Index:	< 20 (Very Low Expansion Potential)
Maximum Particle Size:	3 inches
Percent Passing #4 Sieve:	65 - 100
Percent Passing #200 Sieve:	20 - 45
Low Corrosion Potential:	Soluble Sulfates < 1,500 ppm
	Soluble Chlorides < 150 ppm
	Minimum Resistivity > 3,000 ohm-cm

4.4 Foundations

Provided the recommendations contained in this report are implemented during design and construction, it is our opinion that the structures can be supported on shallow, mat foundations, or driven piles. Difficult pile driving should be anticipated due to on site cobbles and pre-drilling may be required. BSK recommends an indicator pile driving program be developed and implemented prior to pile driving production operations. BSK may provide pile load test observation if requested for an additional fee. A structural engineer should evaluate reinforcement, embedment depth and pile type based on the requirements for the structural loadings, shrinkage and temperature stresses, and soil conditions present at the site.

4.4.1 Shallow Foundations

Continuous and isolated spread footings must have a minimum width of 12 inches and 24 inches, respectively. Continuous footing foundations may be designed using a net allowable bearing pressure of 3,000 pounds per square foot (psf). Isolated spread footing foundations may be designed using a net allowable bearing pressure of 3,000 psf. The net allowable bearing pressure applies to the dead load plus live load (DL + LL) condition; it may be increased by 1/3 for wind or seismic loads. Total foundation settlements are expected to be less than 0.5 inches and differential settlements between similarly loaded (DL + LL) and sized footings are anticipated to be less than 0.25 inches. Differential settlement of continuous footings, expressed in terms of angular distortion, is estimated to be approximately 1/600. For slab on grades, a soil modulus of 250 pci may be used for design.

4.4.2 Mat Foundations

We understand that the structure may be supported on a concrete mat foundation. The mat foundation may be designed to impose a maximum allowable pressure of 3,000 psf due to dead plus live loads. This value may be increased by one-third for transient loads such as seismic or wind. The concrete mat foundation should be embedded at least 8 inches below the lowest adjacent grade.

Settlements: Based on the results of our laboratory tests and analyses, total static settlements of the mat foundation under the allowable bearing pressure are expected to be approximately 1-inch, and maximum differential settlements are expected to be about 1/2-inch.

4.4.3 Pole-Type Foundations

It is anticipated that the structures will be supported on driven piles. This type of foundation should be designed in accordance with Section 1807.3.2 of the 2016 CBC. However, it is recommended that an allowable lateral soil bearing pressure of 280 psf per foot of embedment be used to develop parameters S1 and S3 rather than one of the values given in Table 1806.2. This value includes a factor of safety of 2. The upper foot of soil should be ignored when calculating the minimum embedment depth.

The allowable lateral bearing pressure includes a factor of 2 and may be doubled according to the CBC Section 1806.3.4 for pole type foundations not adversely affected by ½ inch of movement at the ground surface. The lateral bearing pressure is permitted to be increased by 1/3 where used with the alternative basic load combinations of CBC Section 1605A.3.2 that include wind or earthquake loads. The lateral bearing pressure shall be permitted to be increased for each additional foot of embedment up to a maximum of 8 times the allowable bearing pressure.

To support vertical loads applied to the pile foundations, an allowable static downward skin friction value of 250 psf may be used, which includes a factor of safety of 1.5, per the 2016 CBC. The total settlement of pole foundations designed in accordance with these recommendations should not exceed one-half inch.

Where uplift is due to wind or seismic loading, an allowable skin friction of 250 psf may be used, which includes a factor of safety of 1.5, to resist transient uplift loads, per the 2016 CBC. Skin friction may be increased by 1/3 where used with the alternative basic load combinations of CBC Section 1605A.3.2 that include wind or earthquake loads. The weight of the pile may be taken into consideration when determining resistance to uplift loads.

Please note, the outside perimeter of the pile may be used in skin friction calculation and the upper 1 (one) foot of soil should be neglected.

We have provided the modulus of subgrade reaction, 150 pci, for the structural designers to use in their LPILE analysis. We recommend using the LPILE's Reese et al., 1974 option for the p-y curve soil model in the Soil Layers dialog box for site. The following soil parameters may be used in the analysis:

Table 2: LPILE Input Parameters

Soil Type	Clayey Silty Sand
p-y curve model	Reese et al., 1974
Internal Friction Angle, degrees	34
Effective Unit Weight, pcf	130
Elastic Subgrade Reaction, pci	150

4.5 Lateral Earth Pressures and Frictional Resistance

Provided the Site is prepared as recommended above, the following earth pressure parameters for footings may be used for design purposes. The parameters shown in the following table are for drained conditions of select engineered fill or undisturbed native soil.

Table 3: Recommended Static Lateral Earth Pressures for Footings

Lateral Pressure Condition	Equivalent Fluid Density (pcf) Drained Condition
Active Pressure	30
At Rest Pressure	50
Passive Pressure	570

The lateral earth pressures listed herein are obtained by the conventional equation for active, at rest, and passive conditions assuming level backfill and a bulk unit weight of 130 pcf for the Site soils. A coefficient of friction of 0.40 may be used between soil sub-grade and the bottom of footings.

The coefficient of friction and passive earth pressure values given above represent ultimate soil strength values. BSK recommends that a safety factor consistent with the design conditions be included in their usage in accordance with Sections 1806.3.1 through 1806.3.3 of the 2016 CBC. For stability against lateral sliding that is resisted solely by the passive earth pressure against footings or friction along the bottom of footings, a minimum safety factor of 1.5 is recommended. For stability against lateral sliding that is resisted by combined passive pressure and frictional resistance, a minimum safety factor of 2.0 is recommended. For lateral stability against seismic loading conditions, a minimum safety factor of 1.2 is recommended.

4.6 Excavation Stability

Soils encountered within the depth explored are generally classified as Type C soils in accordance with OSHA (Occupational Safety and Health Administration). The slopes surrounding or along temporary excavations may be vertical for excavations that are less than five feet deep and exhibit no indication of potential caving, but should be no steeper than 1.5H:1V for excavations that are deeper than five feet, up to a maximum depth of 15 feet. Certified trench shields or boxes may also be used to protect workers during construction in excavations that have vertical sidewalls and are greater than 5 feet deep. Temporary excavations for the project construction should be left open for as short a time as possible and should be protected from water runoff. In addition, equipment and/or soil stockpiles must be maintained at least 10 feet away from the top of the excavations. Because of variability in soils, BSK must be afforded the opportunity to observe and document sloping and shoring conditions at the time of construction. Slope height, slope inclination, and excavation depths (including utility trench excavations) must in no case exceed those specified in local, state, or federal safety regulations, (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations).

4.7 Trench Backfill and Compaction

Processed on-Site soils, which are free of organic material, are suitable for use as general trench backfill above the pipe envelope. Native soil with particles less than three inches in the greatest dimension may be incorporated into the backfill and compacted as specified above, provided they are properly mixed into a matrix of friable soils. The backfill must be placed in thin layers not exceeding 12 inches in loose thickness, be well-blended and consistent texture, moisture conditioned to at least optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by the ASTM D1557. The uppermost 12 inches of trench backfill below pavement sections must be compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Moisture content within two percent of optimum must be maintained while compacting this upper 12-inch trench backfill zone.

We recommend that trench backfill be tested for compliance with the recommended Relative Compaction and moisture conditions. Field density testing should conform to ASTM Test Methods D1556 or D6938. We recommend that field density tests be performed in the utility trench bedding, envelope and backfill for every vertical lift, at an approximate longitudinal spacing of not greater than 150 feet. Backfill that does not conform to the criteria specified in this section should be removed or reworked, as applicable over the trench length represented by the failing test so as to conform to BSK recommendations.

4.8 Drainage Considerations

The control surface drainage in the project areas is an important design consideration. BSK recommends that final grading around shallow foundations must provide for positive and enduring drainage away from the structures, and ponding of water must not be allowed around, or near the shallow foundations. Ground surface profiles next to the shallow foundations must have at least a 2 percent gradient away from the structures.

5. PLANS AND SPECIFICATIONS REVIEW

BSK recommends that it be retained to review the draft plans and specifications for the project, with regard to foundations and earthwork, prior to their being finalized and issued for construction bidding.

6. CONSTRUCTION TESTING AND OBSERVATIONS

Geotechnical testing and observation during construction is a vital extension of this geotechnical investigation. BSK recommends that it be retained for those services. Field review during Site preparation and grading allows for evaluation of the exposed soil conditions and confirmation or revision of the assumptions and extrapolations made in formulating the design parameters and recommendations. BSK's observations must be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. BSK must also be called to the Site to observe foundation excavations, prior to placement of reinforcing steel or concrete, in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. BSK must also be called to the Site to observe placement of foundation and slab concrete.

If a firm other than BSK is retained for these services during construction, then that firm must notify the owner, project designers, governmental building officials, and BSK that the firm has assumed the responsibility for all phases (i.e., both design and construction) of the project within the purview of the geotechnical engineer. Notification must indicate that the firm has reviewed this report and any subsequent addenda, and that it either agrees with BSK's conclusions and recommendations, or that it will provide independent recommendations.

7. LIMITATIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the Borings performed at the locations shown on the Boring Location Map, Figure A-2. The report does not reflect variations which may occur between or beyond the Borings. The nature and extent of such variations may not become evident until construction is initiated. If variations then appear, a re-evaluation of the recommendations of this report will be necessary after performing on-Site observations during the excavation period and noting the characteristics of the variations.

The validity of the recommendations contained in this report is also dependent upon an adequate testing and observation program during the construction phase. BSK assumes no responsibility for construction compliance with the design concepts or recommendations unless it has been retained to perform the testing and observation services during construction as described above.

The findings of this report are valid as of the present. However, changes in the conditions of the Site can occur with the passage of time, whether caused by natural processes or the work of man, on this property or adjacent property. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation, governmental policy or the broadening of knowledge.

BSK has prepared this report for the exclusive use of the Client and members of the project design team. The report has been prepared in accordance with generally accepted geotechnical engineering practices which existed in Kern County at the time the report was written. No other warranties either expressed or implied are made as to the professional advice provided under the terms of BSK's agreement with Client and included in this report.

8. REFERENCES

Department of Water Resources. http://www.water.ca.gov/waterdatalibrary/, Water Data Library, October 2018.

Lee, Norman. California Geomorphic Provinces (2012): n. pag. California Department of Conservation. California Geological Survey. <http://www.conservation.ca.gov/cgs/information/publications/cgs_notes/note_36/Documents/note_36.pdf>.

United States Geological Survey. http://earthquake.usgs.gov/designmaps/us/application.php, United States Design Maps, October 2018.

APPENDIX A

FIELD EXPLORATION

APPENDIX A
FIELD EXPLORATION

The field exploration for this investigation was conducted under the oversight of a BSK staff member. A total of ten (10) borings were drilled at the site on September 27, 2018 using a Mobile B-61 Drill Rig provided by Dave's Drilling. The borings were drilled to a maximum depth of 16.5 feet beneath the existing ground surface (bgs).

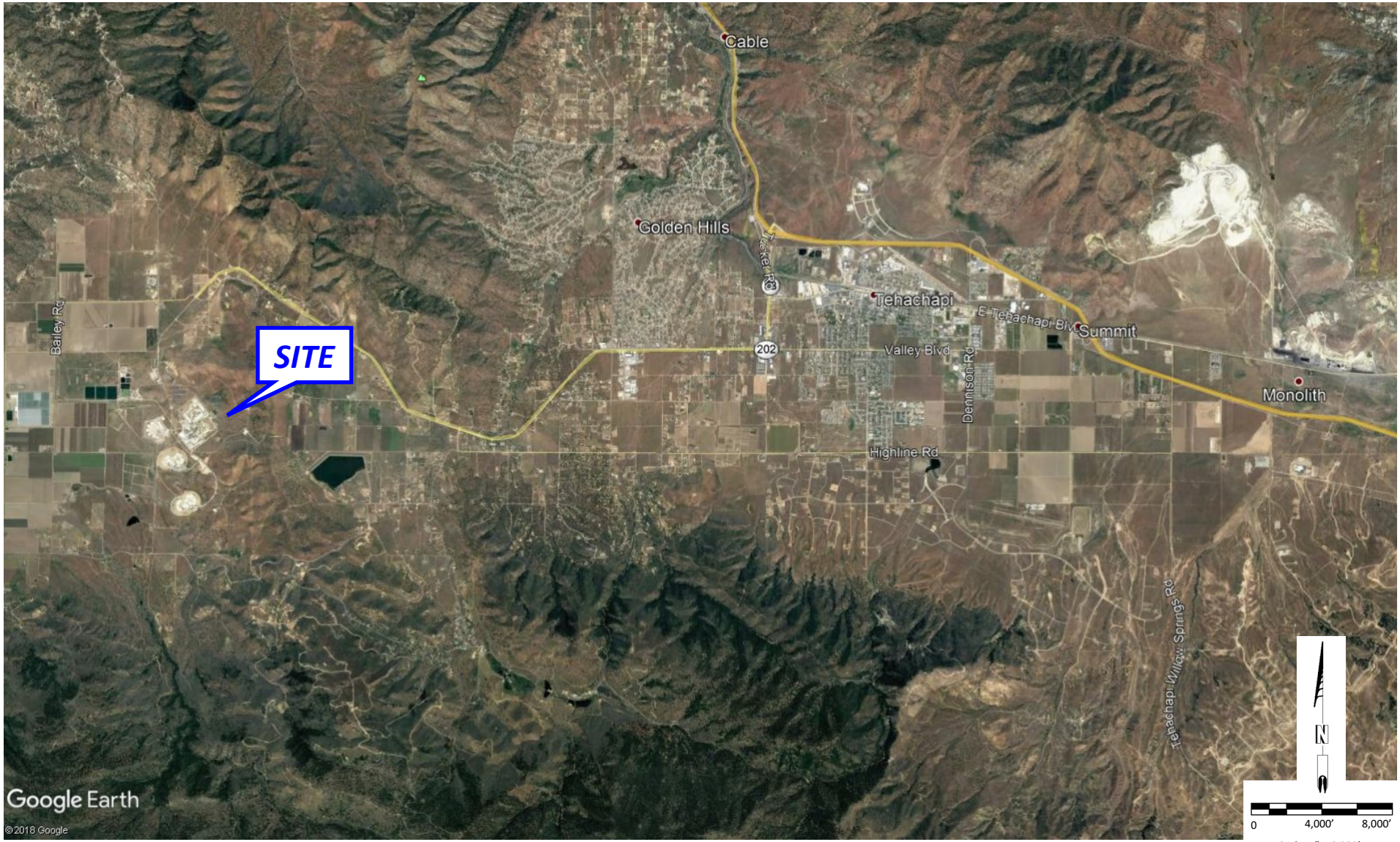
The soil materials encountered in the test borings were visually classified in the field, and the logs were recorded during the drilling and sampling operations. Visual classification of the materials encountered in the test borings was made in general accordance with the Unified Soil Classification System (ASTM D 2488). A soil classification chart is presented herein. Boring logs are presented herein and should be consulted for more details concerning subsurface conditions. Stratification lines were approximated by the field staff based on observations made at the time of drilling, while the actual boundaries between soil types may be gradual and soil conditions may vary at other locations.

Subsurface samples were obtained at the successive depths shown on the boring logs by driving samplers which consisted of a 2.5-inch inside diameter (I.D.) California Sampler and a 1.4-inch I.D. Standard Penetration Test (SPT) Sampler. The samplers were driven 18 inches using a 140-pound hammer dropped from a height of 30 inches by means of either an automatic hammer or a down-hole safety hammer. The number of blows required to drive the last 12 inches was recorded as the blow count (blows/foot) on the boring logs. The relatively undisturbed soil core samples were capped at both ends to preserve the samples at their natural moisture content. Soil samples were also obtained using the SPT Sampler lined with metal tubes or unlined in which case the samples were placed and sealed in polyethylene bags. At the completion of the field exploration, the test borings were backfilled with the excavated soil cuttings.

It should be noted that the use of terms such as "loose", "medium dense", "dense" or "very dense" to describe the consistency of a soil is based on sampler blow count and is not necessarily reflective of the in-place density or unit weight of the soils being sampled. The relationship between sampler blow count and consistency is provided in the following Tables A-1 and A-2 for coarse-grained (sandy and gravelly) soils and fine grained (silty and clayey) soils, respectively.

Table A-1: Consistency of Coarse-Grained Soil by Sampler Blow Count		
Consistency Descriptor	**SPT Blow Count (#Blows / Foot)**	**2.5" I.D. California Sampler Blow Count (#Blows / Foot)**
Very Loose	<4	<6
Loose	4 – 10	6 – 15
Medium Dense	10 – 30	15 – 45
Dense	30 – 50	45 – 80
Very Dense	>50	>80

Table A-2: Apparent Relative Density of Fine-Grained Soil by Sampler Blow Count		
Consistency Descriptor	**SPT Blow Count (#Blows / Foot)**	**2.5" I.D. California Sampler Blow Count (#Blows / Foot)**
Very Soft	<2	<3
Soft	2 – 4	3 – 6
Firm	4 – 8	6 – 12
Very Firm	8 – 15	12 – 24
Hard	15 – 30	24 – 45
Very Hard	>30	>45



REFERENCE IMAGE: Google Earth 2018

BSK ASSOCIATES
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SITE VICINITY MAP

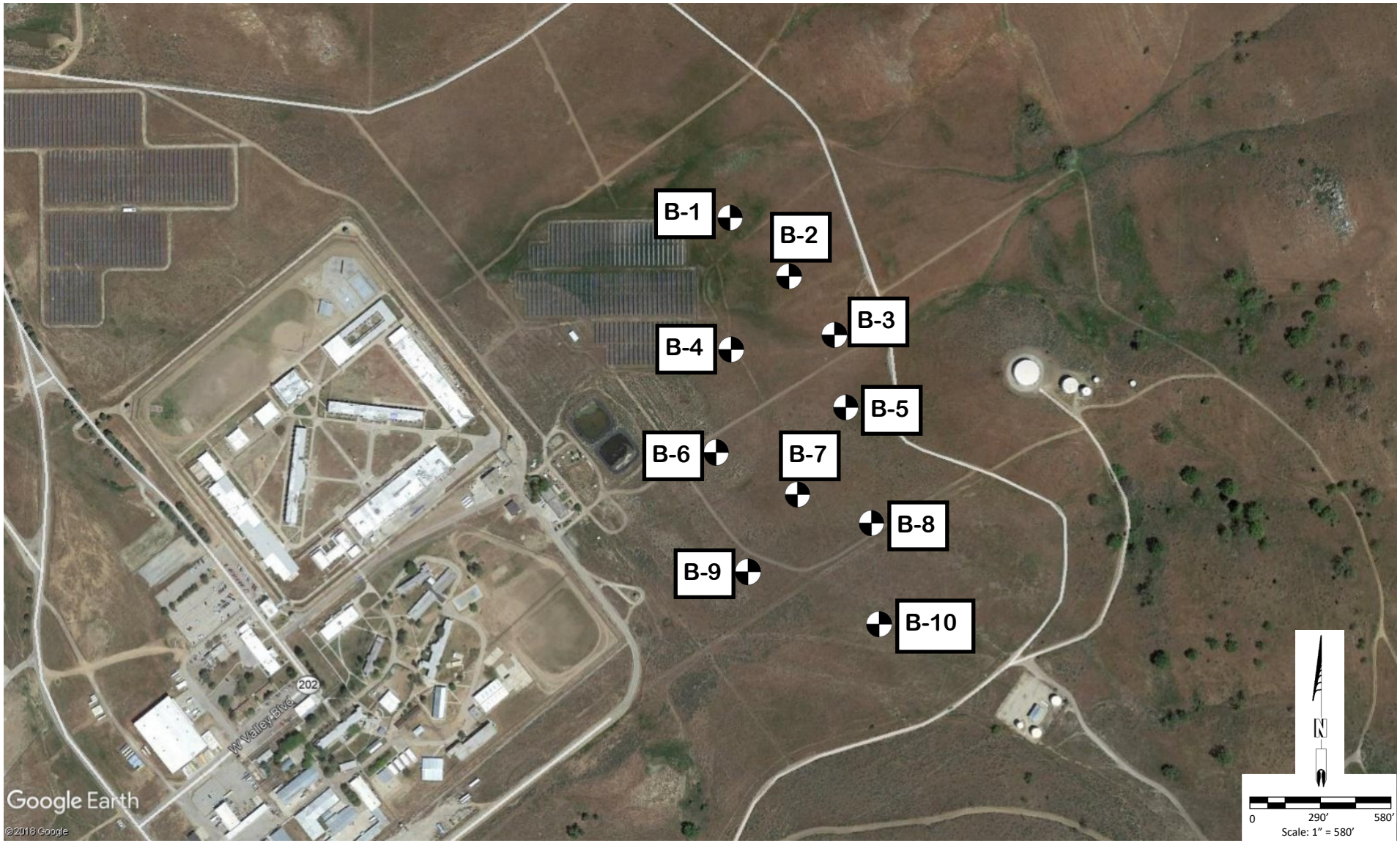
California Correctional Institution
24900 CA Highway 202
Tehachapi, California

FIGURE A-1

JOB NO. G18-227-11B
DATE October 2018

DR. BY AR
CH. BY AXT
SCALE AS SHOWN

SHEET NO. 1
OF 1 SHEETS



REFERENCE IMAGE: Site Map

APPROXIMATE BORING LOCATION B-1

BSK ASSOCIATES
700 22nd Street
Bakersfield, California 93301
Tel. (661) 327-0671

BORING LOCATION MAP

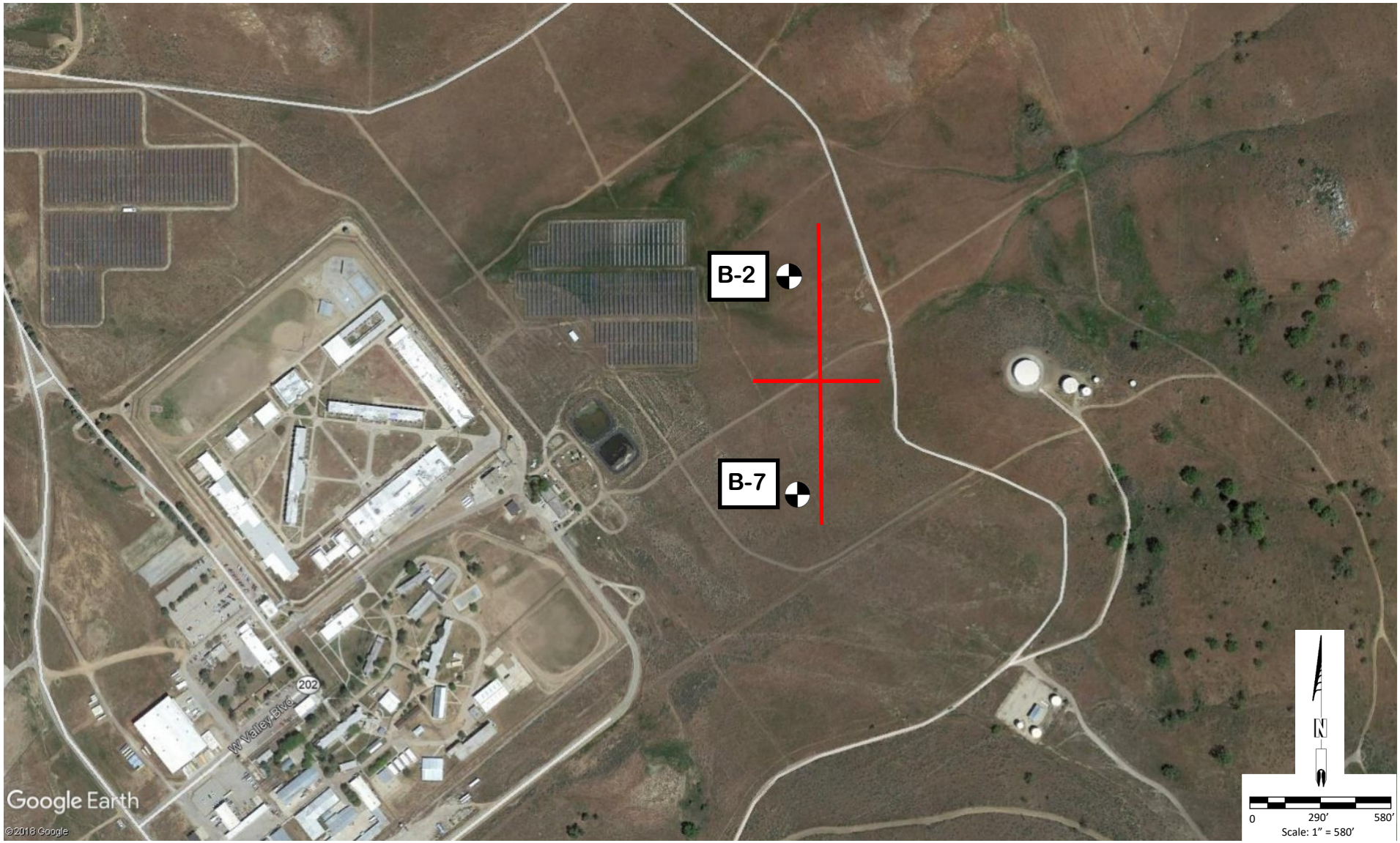
California Correctional Institution
24900 CA Highway 202
Tehachapi, California

FIGURE A-2

JOB NO. G18-227-11B
DATE August 2018

DR. BY AR
CH. BY AXT
SCALE AS SHOWN

SHEET NO. 1
OF 1 SHEETS



REFERENCE IMAGE: Site Map

APPROXIMATE BORING LOCATION B-1

APPROXIMATE FIELD RESISTIVITY TEST LOCATION

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Bakersfield, California 93301
Tel. (661) 327-0671

FIELD RESISTIVITY LOCATION MAP

California Correctional Institution
24900 CA Highway 202
Tehachapi, California

FIGURE A-3

JOB NO. G18-227-11B
DATE August 2018

DR. BY AR
CH. BY AXT
SCALE AS SHOWN

SHEET NO. 1 OF 1 SHEETS

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half >#200	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL- SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half <#200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS , MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

Note: Dual symbols are used to indicate borderline soil classifications.

	Pushed Shelby Tube	RV	R-Value
	Standard Penetration Test	SA	Sieve Analysis
	Modified California	SW	Swell Test
	Auger Cuttings	TC	Cyclic Triaxial
	Grab Sample	TX	Unconsolidated Undrained Triaxial
	Sample Attempt with No Recovery	TV	Torvane Shear
CA	Chemical Analysis	UC	Unconfined Compression
CN	Consolidation	(1.2)	(Shear Strength, ksf)
CP	Compaction	WA	Wash Analysis
DS	Direct Shear	(20)	(with % Passing No. 200 Sieve)
PM	Permeability		Water Level at Time of Drilling
PP	Pocket Penetrometer		Water Level after Drilling (with date measured)

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA
Unified Soil Classification System

BSK ASSOCIATES

PLATE: Figure A-4

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LOG OF BORING NO. B-01

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terrronez**

Depth, feet	Graphic Log	Surface El.: / Location: / MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		SM: GRAVELLY SILTY SAND: light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
		End of boring. Refusal due to cobbles.										
5												
10												
15												
20												

Completion Depth: 1.0
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

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LOG OF BORING NO. B-02

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
		... dense, light yellowish brown, dry.	■		50/ 6"							
		End of boring. Auger refusal.										
5												
10												
15												
20												

Completion Depth: 4.5
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

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LOG OF BORING NO. B-03

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
		...dark brown, moist, moderately graded, subangular, fine gravel.			11			108	1			
		End of boring. Auger refusal.										
5												
10												
15												
20												

Completion Depth: 4.0
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

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LOG OF BORING NO. B-04

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
					32							
		...medium dense clayey silty sand, light brown, fine to medium grained, slighlty moist, poorly graded.										
5					45							
		...dense, fine to coarse grained, moist, increased cementation, trace fine gravel.										
		End of boring. Refusal due to cobbles.										
10												
15												
20												

Completion Depth: 9.0
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

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LOG OF BORING NO. B-05

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
		...clayey silty sand, olive brown, fine to coarse grained, moist.					46					
					19							
		...medium dense, light olive brown, poorly graded, subangular.										
5		...medium dense, olive brown, moderately cemented.						124	9			
		End of boring. Refusal due to cobbles.										
10												
15												
20												

Completion Depth: 9.5
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

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LOG OF BORING NO. B-06

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
			◯		16							
		NO RECOVERY										
5			■		34							
		...medium dense clayey silty sand, light olive brown, fine to coarse grained, moist, poorly graded, subangular.										
10			■		45			114	11			
		... dense, yellowish brown, fine to coarse grained, moist, poorly graded, subangular, fine to coarse gravel.										
		End of boring.										
15												
20												

Completion Depth: 12.0
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

GEO_TARGET BORING LOGS.GPJ GEOTECHNICAL 08.GDT 10/16/18

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LOG OF BORING NO. B-07

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
		...medium dense, clayey silty sand, dark olive brown, fine grained, slightly moist, poorly graded.			37			119	9			
5		...medium dense, olive brown, fine grained, moist, poorly graded.			44			116	11			
10		...medium dense, olive brown.			23			113	17			
15		...loose, olive brown, trace fine gravel.			12				7			
		End of boring.										
20												

Completion Depth: 16.5
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

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LOG OF BORING NO. B-08

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
			■		37			119	9			
		...mediumd dense, olive brown, fine to medium grained, poorly graded.										
5			■		45			116	11			
		...dense, fine grained.										
10			■		26			113	17			
		SC: SILTY CLAYEY SAND: dark olive brown, fine to medium grained, moist, poorly graded.										
15		**SM: CLAYEY SILTY SAND:** olive brown, fine to coarse grained, moist, poorly graded, subangular, trace fine gravel.	☒		58				7			
		End of boring.										
20												

Completion Depth: 16.5
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

GEO_TARGET BORING LOGS.GPJ GEOTECHNICAL 08.GDT 10/16/18

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LOG OF BORING NO. B-09

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
		...dark olive, fine to coarse grained, moist, trace fine gravel.										
		...medium dense clayey silty sand, pale olive, moist, poorly graded.			43							
5		...dense, olive brown, fine to medium grained, moist, poorly graded.			49			112	15			
10		...very dense, weathered rock and clayey silty sand.			20, 50/ 3"			118	14			
		End of boring. Auger refusal due to cobbles.										
15												
20												

Completion Depth: 13.0
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

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LOG OF BORING NO. B-10

Project Name: **California Correctional Institution**
Project Number: **G18-227-11B**
Project Location: **Tehachapi, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: gravelly silty sand, light olive brown, fine to coarse grained, dry, fine to coarse gravel.										
		...dense clayey silty sand, weathered rock, pale olive, fine grained, slightly moist, poorly graded.	■		50			126	6			
5		...dense clayey silty sand, pale olive, moist, poorly graded, subangular.	■		52							
		End of boring.										
10												
15												
20												

Completion Depth: 7.0
Date Started: 9/27/18
Date Completed: 9/24/18
California Sampler: 2.4 inch inner diameter
SPT Sampler: 1.4 inch inner diameter

Drilling Equipment: B-61 Drill Rig with auto hammer
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with soil cuttings.

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Field Resistivty Test

ASTM G57 (Wenner 4-pin Method)

Project Name: DGS California Correctional Facility **Project Number:** G18 227 11B

Test Conducted by	Date	Location	Latitude (degrees)	Longitude (degrees)	Weather	Equipment
Logan Prosser	9/26/2018	Tehachapi, CA	35.11552	-118.56251	Sunny; warm	MC Miller 400D

Field Resistance (Ω), measured at each pin spacing

Location	Test Line	Orientation	Pin Spacing (feet)									
			2	4	6	8	10	25	50	75	100	200
FR-1	1	E-W	85100.00	68900.00	30500.00	21900.00	17500.00	4080.00	2870.00	1650.00	649.00	29.40
	2	N-S	79800.00	62400.00	35500.00	29900.00	22200.00	3850.00	2830.00	1430.00	810.00	5.58

Field Resistivity (Ω-m)

Location	Test Line	Orientation	Pin Spacing (feet)									
			2	4	6	8	10	25	50	75	100	200
FR-1	1	E-W	325,953	527,806	350,466	335,528	335,145	195,342	274,819	236,995	124,291	11,261
	2	N-S	305,652	478,013	407,919	458,095	425,156	184,330	270,989	205,396	155,124	2,137

Field Resistivity (Ω-cm)

Location	Test Line	Orientation	Pin Spacing (feet)									
			2	4	6	8	10	25	50	75	100	200
FR-1	1	E-W	32,595,300	52,780,600	35,046,600	33,552,800	33,514,500	19,534,200	27,481,900	23,699,500	12,429,100	1,126,100
	2	N-S	30,565,200	47,801,300	40,791,900	45,809,500	42,515,600	18,433,000	27,098,900	20,539,600	15,512,400	213,700

Figure A-5

APPENDIX B

LABORATORY TESTING RESULTS

APPENDIX B
LABORATORY TESTING RESULTS

Moisture-Density Tests
The field moisture content, as a percentage of dry weight of the soils, was determined by weighing the samples before and after oven drying in accordance with ASTM D 2216 test procedures. Test results are presented on the boring logs in Appendix A.

California Bearing Ratio Test
One (1) California Bearing Ratio (CBR) Tests was performed on representative bulk samples that were obtained by combining bulk samples from the Site at the time of drilling. The test was performed in general accordance with Test Method ASTM D 1883. The results of the test are presented on Figure B-1.

Moisture-Density Relationship Test
One (1) Moisture-Density Relationship Test was ran on combined representative bulk samples that were obtained from the Site at the time of drilling. The representative bulk sample was tested for optimum moisture content and maximum dry density per both Test Methods ASTM D 1557 and ASTM D 698. The test results are presented on Figure B-2.

Direct Shear Test
Three (3) Direct Shear Tests were performed on a relatively undisturbed soil sample obtained at the time of drilling in the area of planned construction. The tests were conducted to determine the soil strength characteristics. The standard test method is ASTM D3080, Direct Shear Test for Soil under Consolidated Drained Conditions. The direct shear tests results are presented graphically on Figures B-3 through B-5.

Expansion Index Test
One (1) Expansion Index Test was performed on a bulk soil sample obtained at the time of drilling in the area of planned construction to determine the expansion characteristics of the sample. The test was performed in general accordance with ASTM D4829. The test result is presented on Figure B-6.

Soil Corrosivity
One (1) Corrosivity Evaluation was performed on bulk soil samples obtained at the time of drilling in the area of planned construction. The soil was evaluated for minimum resistivity (ASTM G57), sulfate ion concentration (CT 417), chloride ion concentration (CT 422), and pH of soil (ASTM D4972). The test results are presented in Table B-1.

Minus #200 Wash Tests
One (1) #200 Wash Test was performed on selected soil samples obtained at the time of drilling in the area of planned construction. The test was performed to determine the amount of fine material present in the subsurface material. The test was performed in general accordance with ASTM Test Method D1140. The test results are presented in Table B-2 and the boring logs in Appendix A.

Table B-1: Summary of Corrosion Test Results				
Sample Location	**pH**	**Sulfate, ppm**	**Chloride, ppm**	**Minimum Resistivity, ohm-cm**
B-5 @ 0-5 feet bgs	8.45	Not Detected	Not Detected	3,000

Table B-2: Summary of Minus #200 Wash Test Results	
Test Location	**Percent Fines**
B-5 @ 0-5 feet bgs	46

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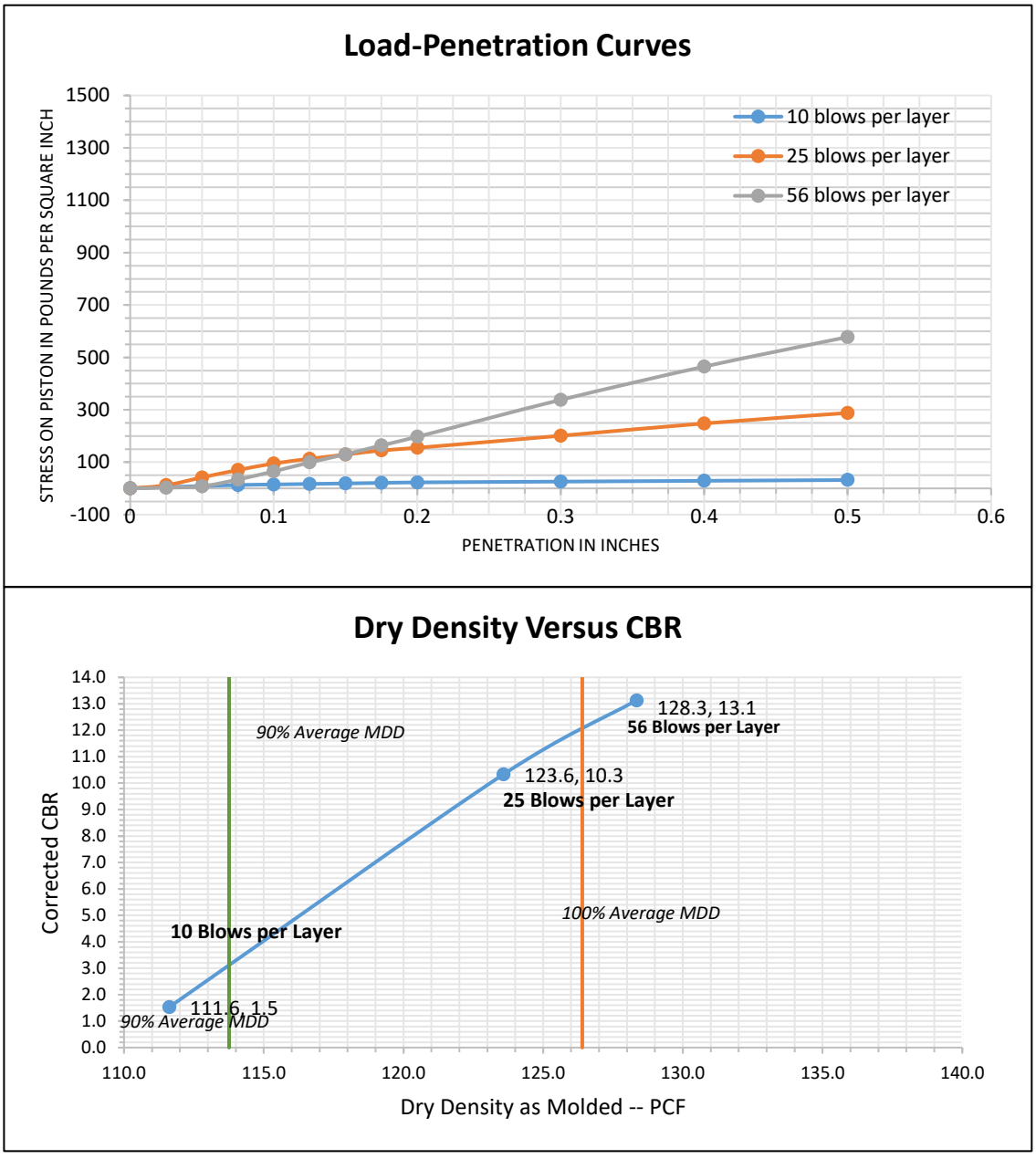
CBR (California Bearing Ratio) of Laboratory-Compacted Soils

ASTM D1883

Project Name:	CCI Techachapi	**Sample Date:**	9/27/2018
Project Number:	G18-227-11B	**Test Date:**	10/7/2018
Sample Location:	B-2, B-9 @0-5 feet bgs combined	**Sampled by:**	L. Prosser
Sample Description:	SM/SC: SILTY SAND/SILTY SAND; brown; fine to coarse, moist.	**Tested By:**	I. Remotigue



The CBR Test is based off of the compaction test method, ASTM D1557

At the Maximum Dry Density of ASTM D1557:	**CBR @ MDD (126.4) =**	**12.4**
At 90% of the Maximum Dry Density of ASTM D1557:	**CBR @ 0.90*MDD (113.76) =**	**3.2**

Figure B-1

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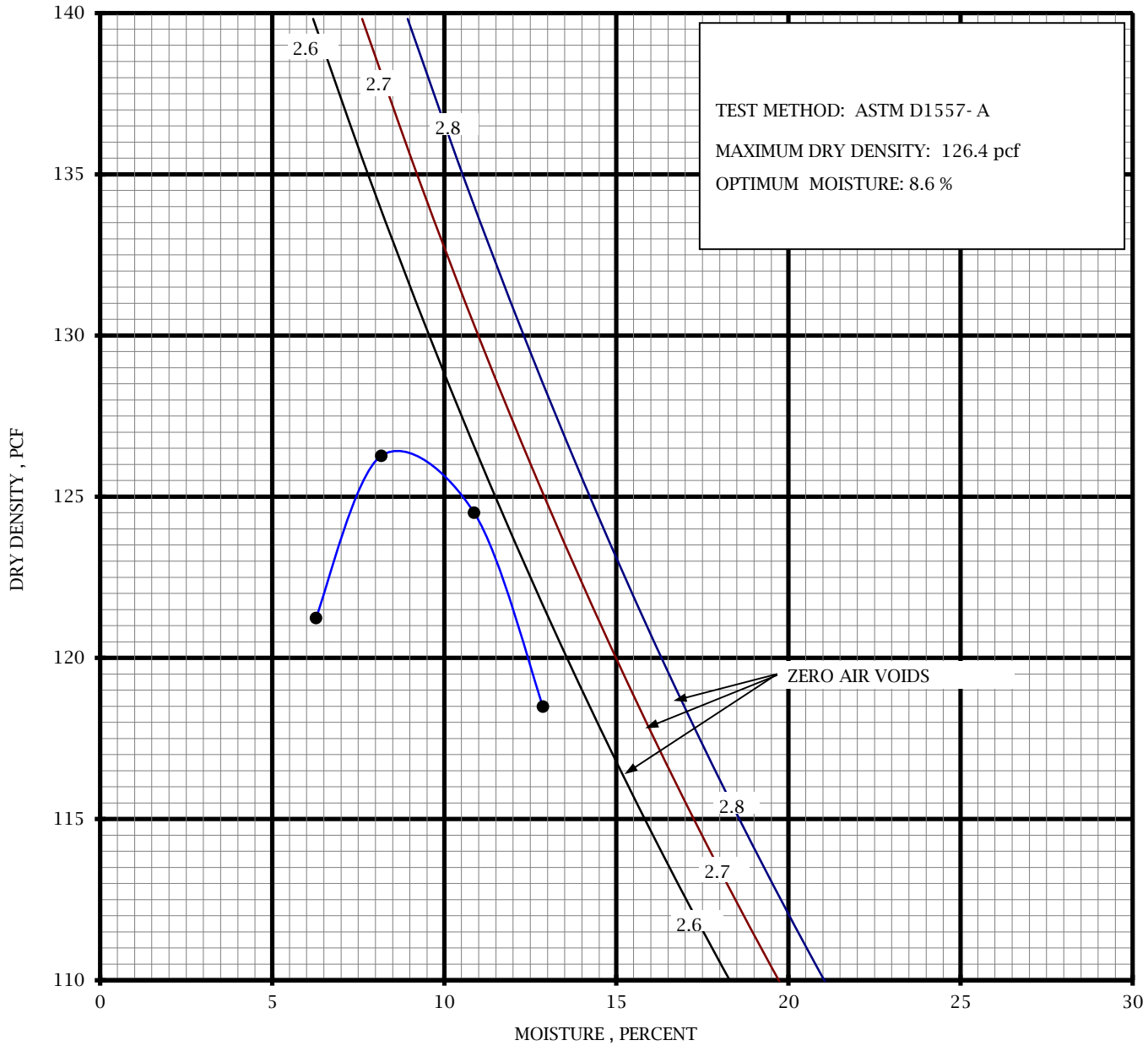
MOISTURE DENSITY RELATIONSHIP
ASTM D1557

Project Name:	CCI Tehachapi	**Project Number:**	G18-227-11B
Project Manager:	A. Terronez	**Lab Number:**	B18-397
Sample Location:	B-2 Bulk & B-9 Bulk	**Sample Date:**	9/27/2018
Sample Description:	SC/SM: SILTY CLAY/SILTY SAND; brown;fine to medium; dry		
Tested By:	M. Zavala **Tested Date:** 9/28/2018	**Sample By:**	L. Prosser



Reviewed by: D. Elizondo

Figure B-2

BSK ASSOCIATES
700 22nd St
Bakersfield, CA
Ph: (661) 327-0671
Fax: (661) 324-4218

Direct Shear Test

ASTM D 3080

Project Name:	CCI Tehachapi	**Sample Date:**	9/27/2018
Project Number:	G18-227-11B	**Test Date:**	10/10/2018
Lab Tracking ID:	B18-397	**Report Date:**	10/12/2018
Sample Location:	B-4 @ 6.0-6.5 feet bgs	**Sampled By:**	I. Prosser
Sample Description:	SM: CLAYEY SILTY SAND: light brown, fine to coarse grained, moist, increased cementation, trace fine gravel.	**Tested By:**	I.L.T.Remotigue

SHEAR STRENGTH DIAGRAM

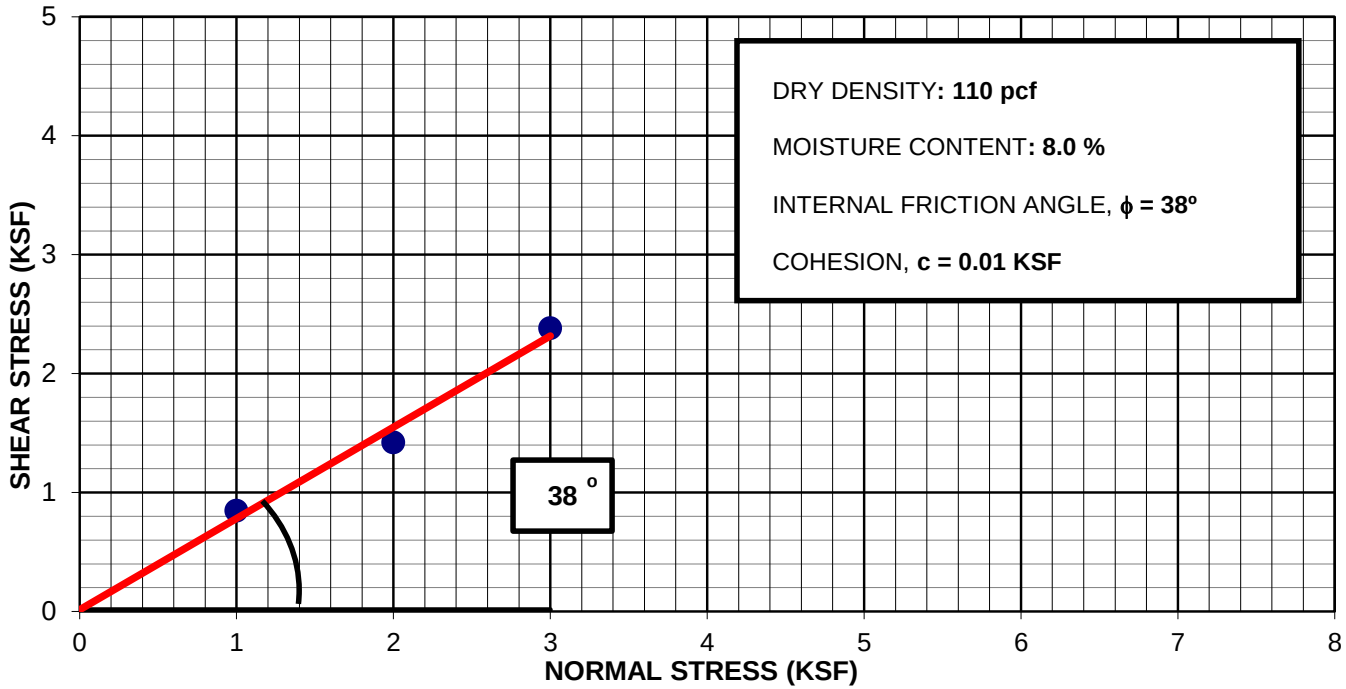


Figure B-3

Reviewed by: *Daisy Elizondo*

ASSOCIATES

700 22nd St
Bakersfield, CA
Ph: (661) 327-0671
Fax: (661) 324-4218

Direct Shear Test

ASTM D 3080

Project Name:	CCI Tehachapi	**Sample Date:**	9/27/2018
Project Number:	G18-227-11B	**Test Date:**	10/10/2018
Lab Tracking ID:	B18-397	**Report Date:**	10/12/2018
Sample Location:	B-7 @ 6.0-6.5 feet bgs	**Sampled By:**	I. Prosser
Sample Description:	SM: CLAYEY SILTY SAND: olive brown, fine grained, moist, poorly graded, subangular.	**Tested By:**	I.L.T.Remotigue

SHEAR STRENGTH DIAGRAM

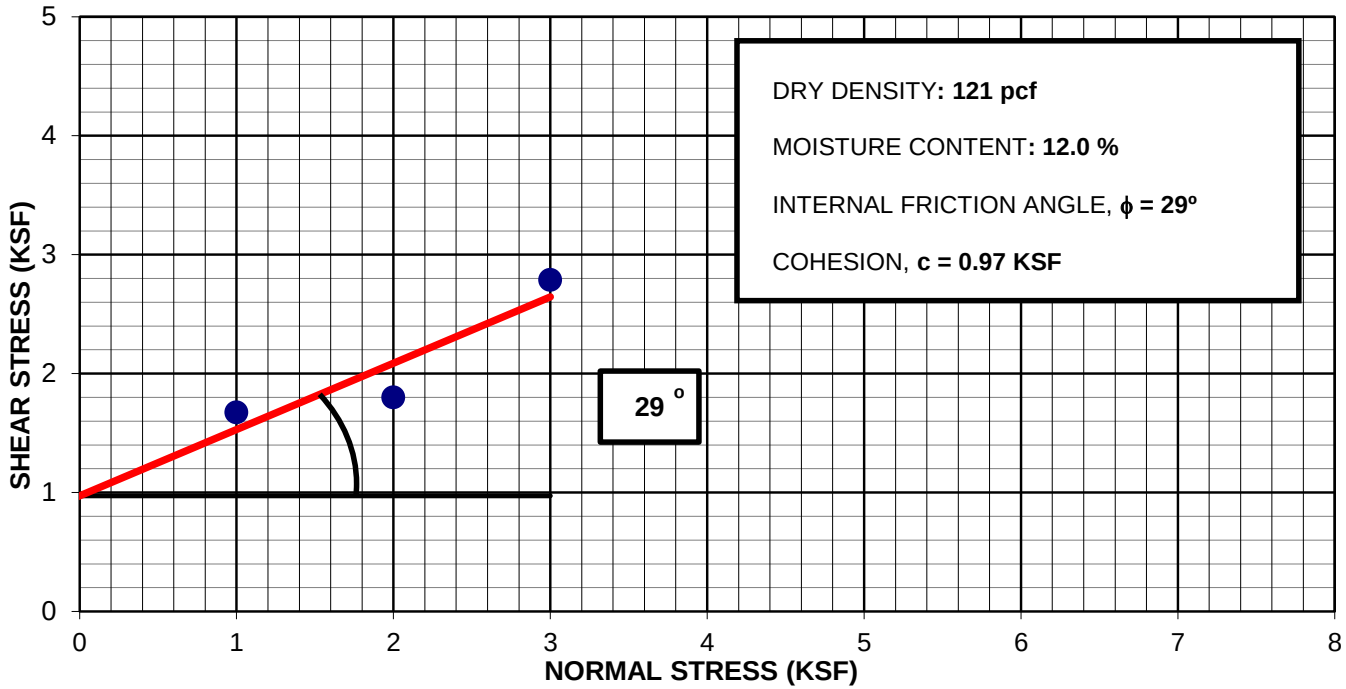


Figure B-4

Reviewed by: *Daisy Elizondo*

ASSOCIATES

700 22nd St
Bakersfield, CA
Ph: (661) 327-0671
Fax: (661) 324-4218

Direct Shear Test

ASTM D 3080

Project Name:	CCI Tehachapi	**Sample Date:**	9/27/2018
Project Number:	G18-227-11B	**Test Date:**	10/10/2018
Lab Tracking ID:	B18-397	**Report Date:**	10/12/2018
Sample Location:	B-9 @ 6.0-6.5 feet bgs	**Sampled By:**	I. Prosser
Sample Description:	SM: CLAYEY SILTY SAND: olive brown, fine to medium grained, moist, poorly graded, subangular.	**Tested By:**	I.L.T.Remotigue

SHEAR STRENGTH DIAGRAM

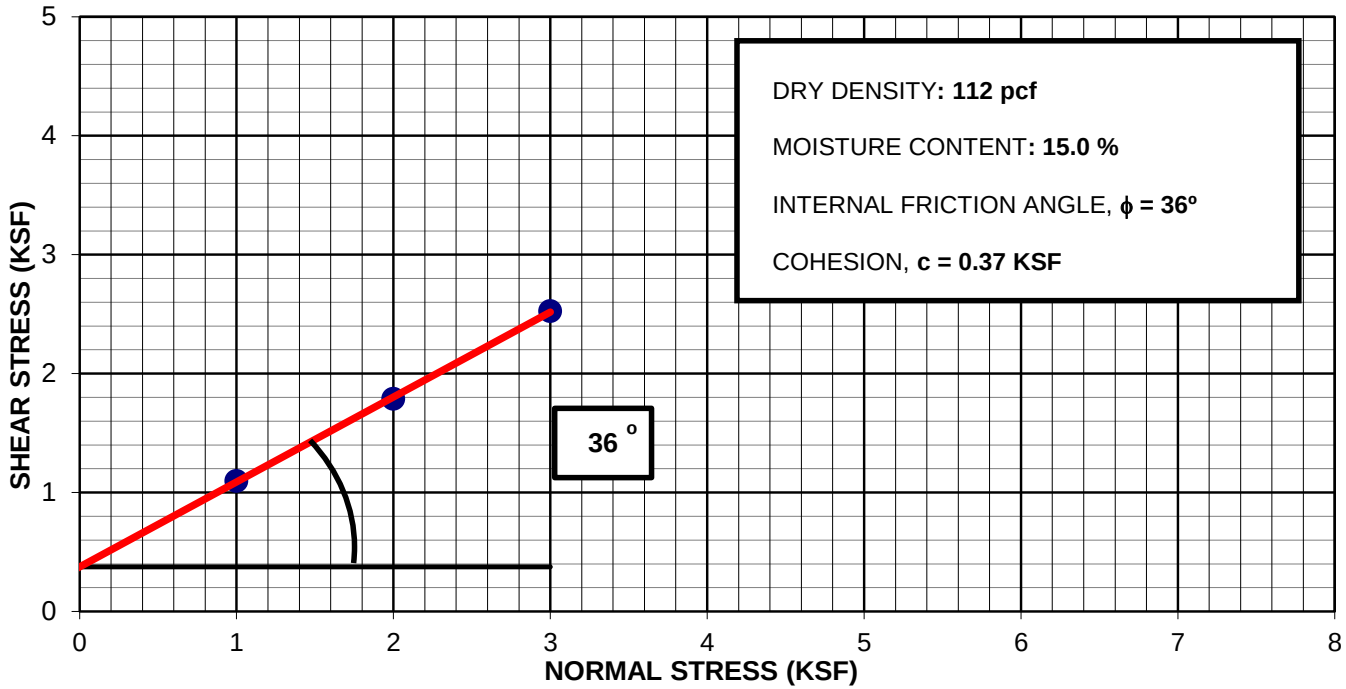


Figure B-5

Reviewed by: *Daisy Elizondo*

BSK ASSOCIATES

700 22nd Street
Bakersfield, CA 93301
Ph: (661) 327-0671
Fax: (661) 324-4218

EXPANSION INDEX OF SOILS

ASTM D 4829 / UBC STANDARD 18-2

Project Name: CCI Tehachpi
Project Number: G18-227-11B **Sample Date:** 9/27/2018
Lab Tracking ID: B18-397 **Test Date:** 10/3/2018
Sample Location: B-5 @ 0.0-5.0 feet bgs
Sample Source Native
Sampled By: L. Prosser **Tested By:** M. Zavala **Reviewed By:** D. Elizondo

TEST DATA

INITIAL SET-UP DATA		FINAL TAKE-DOWN DATA	
Sample + Tare Weight (g)	773.9	Sample + Tare Weight (g)	815.9
Tare Weight (g)	368.2	Tare Weight (g)	368.2
Moisture Content Data		**Moisture Content Data**	
Wet Weight + Tare	200.0	Wet Weight + Tare	815.9
Dry Weight + Tare	183.8	Dry Weight + Tare	739.6
Tare Weight (g)	0	Tare Weight (g)	368.2
Moisture Content (%)	8.8%	Moisture Content (%)	20.5%
Initial Volume (ft^3)	0.007272	Final Volume (ft^3)	0.007463
Remolded Wet Density (pcf)	123.0	Final Wet Density (pcf)	132.3
Remolded Dry Density (pcf)	113.0	Final Dry Density (pcf)	109.7
Degree of Saturation	**48.5**	**Degree of Saturation**	**104**

EXPANSION READINGS

Initial Gauge Reading (in)	0.2514
Final Gauge Reading (in)	0.2776
Expansion (in)	0.0262

Expansion Index, EI	**26**

Classification of Expansive Soil

EI	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Remarks: The material has a low potential expansion

Figure B-6

APPENDIX C

THERMAL RESISTIVITY TEST RESULTS

Laboratory Report for
BSK Associates Engineers &
Laboratories

DGS California Correctional Institution, G18-227-11B

October 15, 2018

Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113

October 15, 2018

Adam Terronez
BSK Associates
700 22nd Street
Bakersfield, CA 93301
(661) 327-0671

Re: DBS&A Laboratory Report for the BSK Associates DGS California Correctional Institution, G18-227-11B Project

Dear Mr. Terronez:

Enclosed is the report for the BSK Associates DGS California Correctional Institution, G18-227-11B project samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to BSK Associates and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Joleen Hines
Laboratory Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory
4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113
505-889-7752
FAX 505-889-0258

Summaries

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1]			Saturated Hydraulic Conductivity[2]			Moisture Characteristics[3]								Particle Size[4]			Specific Gravity[5]		Air Perm-eability	Atterberg Limits	Thermal Properties
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K_{unsat}	DS	WS	H	F	C			
B-2 @ 2.5 to 3 feet bgs	X	X																				X
B-9 @ 3.0-5.0 feet bgs	X	X																				X

[1] G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

[2] CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

[3] HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, Kunsat = Calculated Unsaturated Hydraulic Conductivity

[4] DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

[5] F = Fine (<4.75mm), C = Coarse (>4.75mm)

Notes

Sample Receipt:
Two samples, each in a 2.5" x 6" metal sleeve sealed with end caps, were received on October 2, 2018. Both samples were contained inside a small cardboard box, surrounded with packing material and were received in good order.

Sample Preparation and Testing Notes:
Both samples were subjected to thermal properties testing at the initial moisture content, the saturated moisture content, and at the oven dry state.

Each thermal properties reading was obtained in the same location.

Summary of Thermal Properties

Sample	Reading	Gravimetric Moisture Content (g/g, %)	Volumetric Moisture Content[1] (vol/vol, %)	Dry Bulk Density[1] (g/cm^3)	Temp °C	K W/(m·K)	ρ °C·m/W	C MJ/(m^3·K)	D mm^2/s
B-2 @ 2.5 to 3 feet bgs	Initial	10.21	18.52	1.81	25.10	0.885	113.0	2.023	0.437
B-2 @ 2.5 to 3 feet bgs	Saturated	18.04	32.09	1.78	20.71	1.615	61.9	3.271	0.494
B-2 @ 2.5 to 3 feet bgs	Oven Dry	0	0	1.81	25.38	0.484	206.7	1.508	0.321
B-9 @ 3.0-5.0 feet bgs	Initial	11.20	20.39	1.82	24.99	1.056	94.7	2.618	0.403
B-9 @ 3.0-5.0 feet bgs	Saturated	17.74	31.91	1.80	20.73	1.686	59.3	2.830	0.596
B-9 @ 3.0-5.0 feet bgs	Oven Dry	0	0	1.82	24.77	0.442	226.4	1.428	0.309

[1]Adjusted for volume changes during testing.

Thermal Properties

Summary of Thermal Properties

Sample	Reading	Gravimetric Moisture Content (g/g, %)	Volumetric Moisture Content[1] (vol/vol, %)	Dry Bulk Density[1] (g/cm^3)	Temp °C	K W/(m·K)	ρ °C·m/W	C MJ/(m^3·K)	D mm^2/s
B-2 @ 2.5 to 3 feet bgs	Initial	10.21	18.52	1.81	25.10	0.885	113.0	2.023	0.437
B-2 @ 2.5 to 3 feet bgs	Saturated	18.04	32.09	1.78	20.71	1.615	61.9	3.271	0.494
B-2 @ 2.5 to 3 feet bgs	Oven Dry	0	0	1.81	25.38	0.484	206.7	1.508	0.321
B-9 @ 3.0-5.0 feet bgs	Initial	11.20	20.39	1.82	24.99	1.056	94.7	2.618	0.403
B-9 @ 3.0-5.0 feet bgs	Saturated	17.74	31.91	1.80	20.73	1.686	59.3	2.830	0.596
B-9 @ 3.0-5.0 feet bgs	Oven Dry	0	0	1.82	24.77	0.442	226.4	1.428	0.309

[1]Adjusted for volume changes during testing.

Thermal Properties Results Sheet for Sample: B-2 @ 2.5 to 3 feet bgs

Job Name: BSK Associates
Job Number: DB18.1317.00
Sample Number: B-2 @ 2.5 to 3 feet bgs
Ring Number: DGS California Correctional Institution, G18-227-11B
Depth: 2.5'-3'

Instrument Description: Decagon KD2 Pro
Probe: ☐ KS-1, 6 cm length, 1.3 mm diameter, single needle
☐ TR-1, 10 cm length, 2.4 mm diameter, single needle
☑ SH-1, 3 cm length, 1.3 mm diameter, dual needle, 6 mm spacing
Test Start Date: 10/9/18

Reading	Water Potential (-cm water)	Gravimetric Moisture Content (g/g, %)	Volumetric Moisture Content[1] (vol/vol, %)	Dry Bulk Density[1] (g/cm^3)	Test Temperature (°C)	K Thermal Conductivity W/(m·K)	ρ Thermal Resistivity °C·cm/W	C Specific Heat Capacity $MJ/(m^3 \cdot K)$	D Thermal Diffusivity (mm^2/s)
Initial	---	10.21	18.52	1.81	25.10	0.885	113.0	2.023	0.437
Saturated	0	18.04	32.09	1.78	20.71	1.615	61.9	3.271	0.494
Oven Dry	---	0	0	1.81	25.38	0.484	206.7	1.508	0.321

--- = Value not measured.

[1] Adjusted for volume changes during testing, if applicable.

Thermal Properties Data

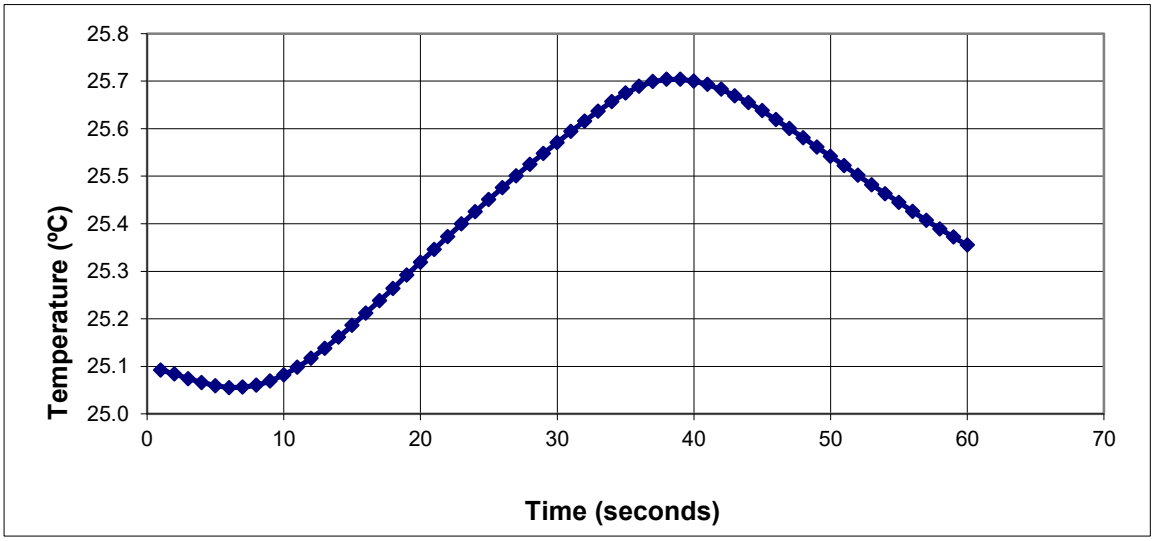
Sample Number: B-2 @ 2.5 to 3 feet bgs
Potential (-cm water): Initial

Test Date/Time:	10/9/2018 3:00 PM	*K (W/(m·K)):*	0.885
Sensor:	SH-1	*ρ (°C·cm/W):*	113.0
Test Temp.(°C):	25.1	*C (MJ/(m³·K)):*	2.023
KD2 Pro Sample ID:	B-2-AR	*D (mm²/s):*	0.437
Power (W/m):	22.590	*Err:*	0.0026
Current (amps):	0.147		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	25.092	16	25.212	31	25.594	46	25.619
2	25.084	17	25.238	32	25.616	47	25.600
3	25.074	18	25.264	33	25.637	48	25.581
4	25.066	19	25.292	34	25.657	49	25.561
5	25.059	20	25.319	35	25.675	50	25.542
6	25.055	21	25.346	36	25.689	51	25.522
7	25.056	22	25.373	37	25.699	52	25.502
8	25.060	23	25.400	38	25.704	53	25.482
9	25.069	24	25.425	39	25.704	54	25.463
10	25.082	25	25.451	40	25.700	55	25.445
11	25.098	26	25.476	41	25.693	56	25.426
12	25.117	27	25.501	42	25.683	57	25.407
13	25.138	28	25.525	43	25.669	58	25.389
14	25.161	29	25.548	44	25.655	59	25.372
15	25.186	30	25.571	45	25.638	60	25.355

B-2 @ 2.5 to 3 feet bgs,Potential: Initial - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Thermal Properties Data

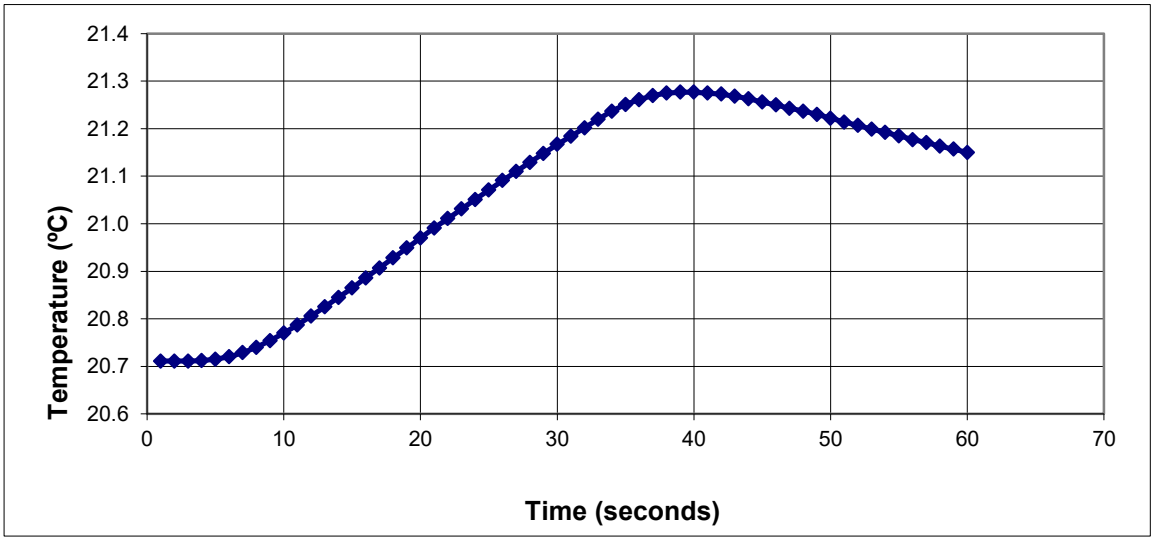
Sample Number: B-2 @ 2.5 to 3 feet bgs
Potential (-cm water): 0

Test Date/Time:	10/10/2018 9:23 AM	*K (W/(m·K)):*	1.615
Sensor:	SH-1	*ρ (°C·cm/W):*	61.9
Test Temp.(°C):	20.7	*C (MJ/(m³·K)):*	3.271
KD2 Pro Sample ID:	B-2-SA	*D (mm²/s):*	0.494
Power (W/m):	21.500	*Err:*	0.0012
Current (amps):	0.144		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	20.711	16	20.886	31	21.184	46	21.250
2	20.711	17	20.907	32	21.202	47	21.243
3	20.711	18	20.928	33	21.220	48	21.237
4	20.712	19	20.949	34	21.237	49	21.230
5	20.715	20	20.970	35	21.251	50	21.222
6	20.720	21	20.991	36	21.261	51	21.214
7	20.729	22	21.011	37	21.270	52	21.207
8	20.740	23	21.031	38	21.275	53	21.199
9	20.754	24	21.051	39	21.277	54	21.192
10	20.770	25	21.071	40	21.277	55	21.185
11	20.787	26	21.091	41	21.275	56	21.177
12	20.806	27	21.110	42	21.273	57	21.171
13	20.825	28	21.129	43	21.268	58	21.163
14	20.845	29	21.148	44	21.263	59	21.157
15	20.865	30	21.167	45	21.256	60	21.150

B-2 @ 2.5 to 3 feet bgs,Potential: 0 - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Thermal Properties Data

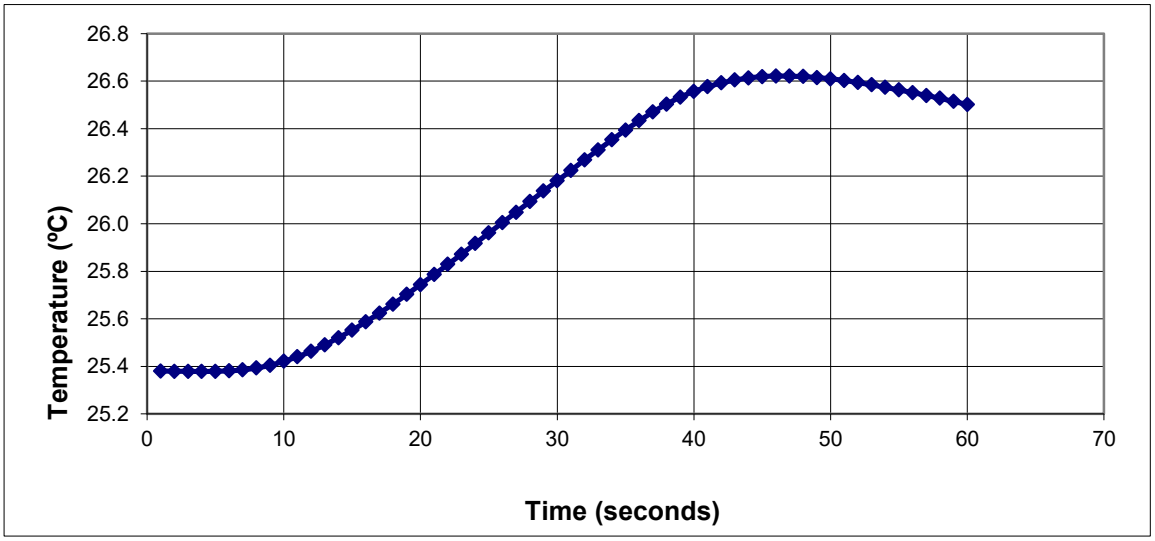
Sample Number: B-2 @ 2.5 to 3 feet bgs
Potential (-cm water): Oven Dry

Test Date/Time:	10/12/2018 9:56 AM	*K (W/(m·K)):*	0.484
Sensor:	SH-1	*ρ (°C·cm/W):*	206.7
Test Temp.(°C):	25.4	*C (MJ/(m³·K)):*	1.508
KD2 Pro Sample ID:	B-2-OD	*D (mm²/s):*	0.321
Power (W/m):	21.870	*Err:*	0.0014
Current (amps):	0.145		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	25.380	16	25.587	31	26.224	46	26.622
2	25.379	17	25.624	32	26.269	47	26.621
3	25.379	18	25.662	33	26.311	48	26.620
4	25.378	19	25.703	34	26.353	49	26.615
5	25.379	20	25.744	35	26.394	50	26.610
6	25.381	21	25.786	36	26.434	51	26.603
7	25.385	22	25.829	37	26.471	52	26.594
8	25.393	23	25.872	38	26.503	53	26.585
9	25.404	24	25.917	39	26.533	54	26.574
10	25.421	25	25.961	40	26.557	55	26.563
11	25.440	26	26.005	41	26.577	56	26.552
12	25.463	27	26.048	42	26.593	57	26.540
13	25.490	28	26.093	43	26.605	58	26.528
14	25.520	29	26.138	44	26.614	59	26.515
15	25.552	30	26.181	45	26.619	60	26.502

B-2 @ 2.5 to 3 feet bgs,Potential: Oven Dry - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Thermal Properties Results Sheet for Sample: B-9 @ 3.0-5.0 feet bgs

Job Name: BSK Associates
Job Number: DB18.1317.00
Sample Number: B-9 @ 3.0-5.0 feet bgs
Ring Number: DGS California Correctional Institution, G18-227-11B
Depth: 3'-5'

Instrument Description: Decagon KD2 Pro
Probe:
☐ KS-1, 6 cm length, 1.3 mm diameter, single needle
☐ TR-1, 10 cm length, 2.4 mm diameter, single needle
☑ SH-1, 3 cm length, 1.3 mm diameter, dual needle, 6 mm spacing
Test Start Date: 10/9/18

Reading	Water Potential (-cm water)	Gravimetric Moisture Content (g/g, %)	Volumetric Moisture Content[1] (vol/vol, %)	Dry Bulk Density[1] (g/cm^3)	Test Temperature (°C)	K Thermal Conductivity W/(m·K)	ρ Thermal Resistivity °C·cm/W	C Specific Heat Capacity $MJ/(m^3 \cdot K)$	D Thermal Diffusivity (mm^2/s)
Initial	---	11.20	20.39	1.82	24.99	1.056	94.7	2.618	0.403
Saturated	0	17.74	31.91	1.80	20.73	1.686	59.3	2.830	0.596
Oven Dry	---	0	0	1.82	24.77	0.442	226.4	1.428	0.309

--- = Value not measured.

[1] Adjusted for volume changes during testing, if applicable.

Thermal Properties Data

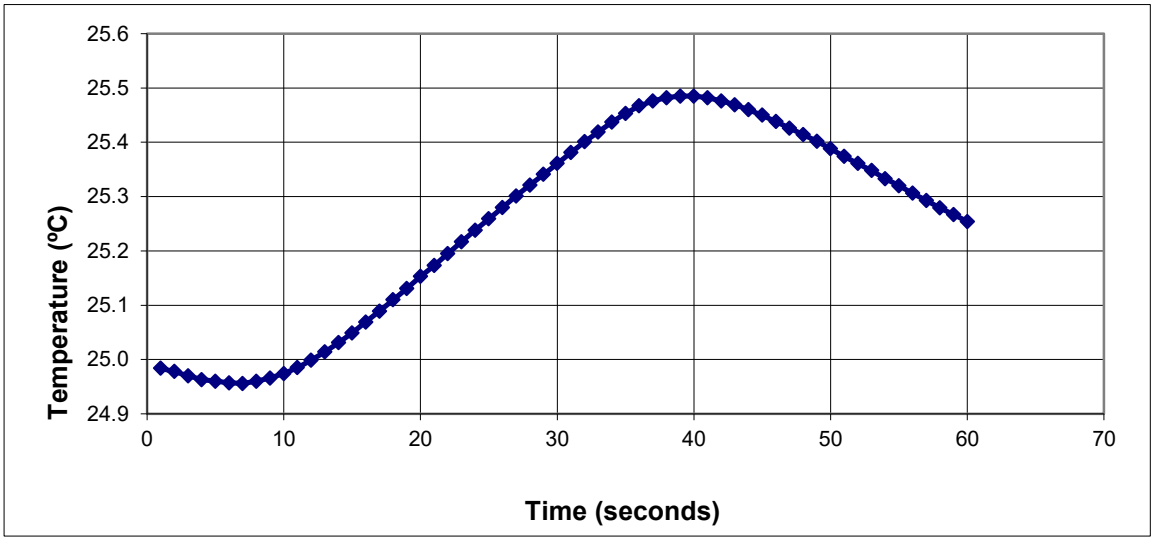
Sample Number: B-9 @ 3.0-5.0 feet bgs
Potential (-cm water): Initial

Test Date/Time:	10/9/2018 3:09 PM	*K (W/(m·K)):*	1.056
Sensor:	SH-1	*ρ (°C·cm/W):*	94.7
Test Temp.(°C):	25.0	*C (MJ/(m³·K)):*	2.618
KD2 Pro Sample ID:	B-9-AR	*D (mm²/s):*	0.403
Power (W/m):	22.810	*Err:*	0.0020
Current (amps):	0.148		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	24.984	16	25.069	31	25.381	46	25.438
2	24.978	17	25.089	32	25.401	47	25.426
3	24.970	18	25.110	33	25.419	48	25.414
4	24.963	19	25.131	34	25.437	49	25.402
5	24.960	20	25.153	35	25.453	50	25.388
6	24.957	21	25.173	36	25.467	51	25.374
7	24.956	22	25.195	37	25.476	52	25.361
8	24.960	23	25.217	38	25.482	53	25.348
9	24.966	24	25.238	39	25.485	54	25.333
10	24.974	25	25.259	40	25.485	55	25.320
11	24.985	26	25.280	41	25.482	56	25.306
12	24.999	27	25.301	42	25.476	57	25.293
13	25.014	28	25.321	43	25.469	58	25.279
14	25.031	29	25.341	44	25.460	59	25.267
15	25.049	30	25.361	45	25.450	60	25.254

B-9 @ 3.0-5.0 feet bgs,Potential: Initial - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Thermal Properties Data

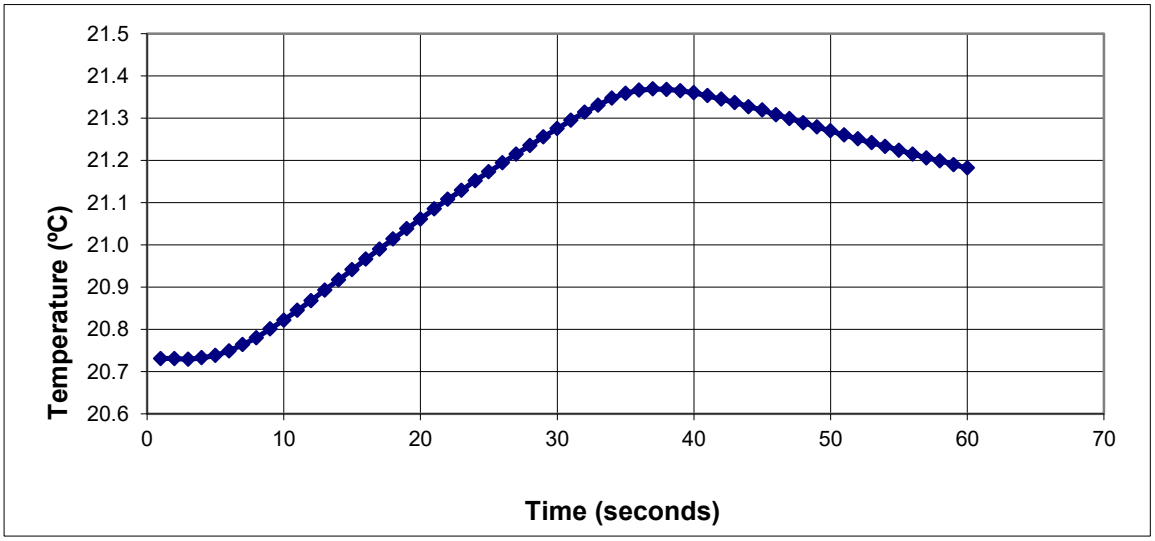
Sample Number: B-9 @ 3.0-5.0 feet bgs
Potential (-cm water): 0

Test Date/Time:	10/10/2018 9:28 AM	*K (W/(m·K)):*	1.686
Sensor:	SH-1	*ρ (°C·cm/W):*	59.3
Test Temp.(°C):	20.7	*C (MJ/(m³·K)):*	2.830
KD2 Pro Sample ID:	B-9-SA	*D (mm²/s):*	0.596
Power (W/m):	21.510	*Err:*	0.0019
Current (amps):	0.144		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	20.731	16	20.966	31	21.295	46	21.308
2	20.731	17	20.990	32	21.314	47	21.299
3	20.729	18	21.014	33	21.331	48	21.289
4	20.733	19	21.038	34	21.347	49	21.279
5	20.738	20	21.061	35	21.359	50	21.270
6	20.749	21	21.085	36	21.366	51	21.260
7	20.764	22	21.108	37	21.369	52	21.251
8	20.780	23	21.129	38	21.368	53	21.242
9	20.801	24	21.152	39	21.365	54	21.233
10	20.822	25	21.173	40	21.360	55	21.224
11	20.845	26	21.194	41	21.353	56	21.215
12	20.868	27	21.215	42	21.345	57	21.206
13	20.893	28	21.235	43	21.337	58	21.199
14	20.917	29	21.256	44	21.327	59	21.190
15	20.941	30	21.275	45	21.319	60	21.182

B-9 @ 3.0-5.0 feet bgs,Potential: 0 - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Thermal Properties Data

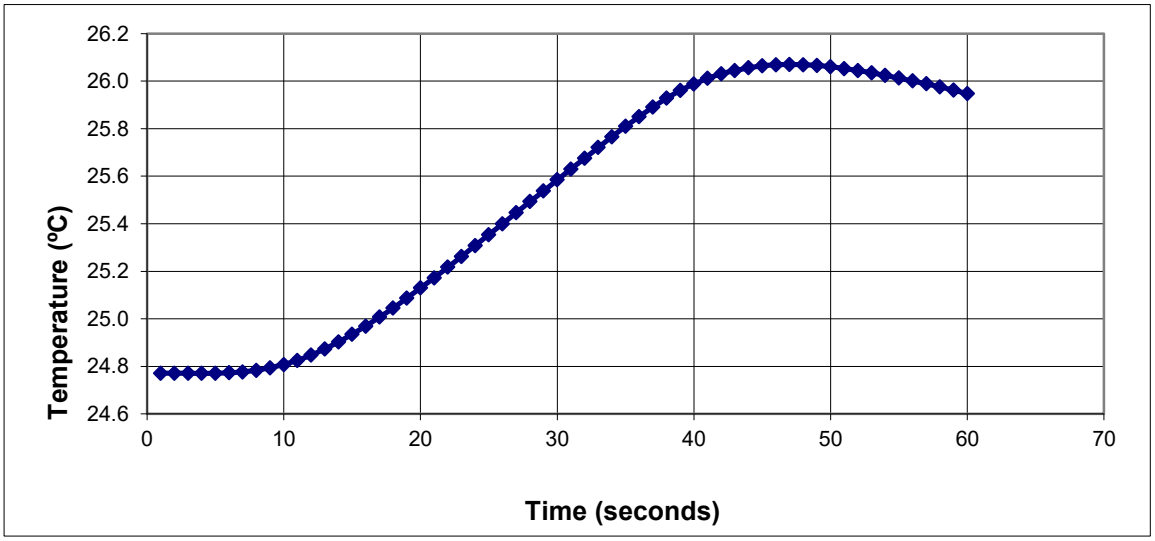
Sample Number: B-9 @ 3.0-5.0 feet bgs
Potential (-cm water): Oven Dry

Test Date/Time:	10/12/2018 9:50 AM	*K (W/(m·K)):*	0.442
Sensor:	SH-1	*ρ (°C·cm/W):*	226.4
Test Temp.(°C):	24.8	*C (MJ/(m³·K)):*	1.428
KD2 Pro Sample ID:	B-9-OD	*D (mm²/s):*	0.309
Power (W/m):	21.850	*Err:*	0.0020
Current (amps):	0.145		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	24.771	16	24.969	31	25.630	46	26.069
2	24.771	17	25.007	32	25.675	47	26.070
3	24.771	18	25.045	33	25.721	48	26.069
4	24.770	19	25.087	34	25.766	49	26.066
5	24.771	20	25.130	35	25.810	50	26.061
6	24.773	21	25.172	36	25.851	51	26.053
7	24.776	22	25.217	37	25.891	52	26.045
8	24.783	23	25.262	38	25.928	53	26.035
9	24.794	24	25.308	39	25.961	54	26.024
10	24.807	25	25.354	40	25.988	55	26.013
11	24.825	26	25.400	41	26.012	56	26.001
12	24.847	27	25.446	42	26.031	57	25.989
13	24.873	28	25.493	43	26.045	58	25.976
14	24.902	29	25.538	44	26.056	59	25.962
15	24.935	30	25.585	45	26.065	60	25.948

B-9 @ 3.0-5.0 feet bgs,Potential: Oven Dry - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Laboratory Tests and Methods

Tests and Methods

Dry Bulk Density:	ASTM D7263
Moisture Content:	ASTM D7263, ASTM D2216
Thermal Properties:	ASTM D5334