

Appendix F

Preliminary Geotechnical Engineering Report
Proposed Solar Farm
APN: 061220101 & -05
City of Twentynine Palms, California

Prepared for

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Prepared by

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December 13, 2023



December 13, 2023

Project No. 23644

Mr. Peter Bobro
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Subject: Preliminary Geotechnical Engineering Report
Proposed Solar Farm
APN: 061220101 & -05, City of Twentynine Palms, California

Dear Mr. Bobro:

In accordance with your request and authorization, we are presenting the results of our geotechnical investigation for the proposed solar farm located at APN: 061220101 & -05, Twentynine Palms, California. The purpose of this investigation has been to evaluate the subsurface conditions at the site and to provide geotechnical engineering recommendations for the proposed construction.

Based on our findings, the proposed project is geotechnically feasible, provided that the recommendations in this report are incorporated into the design and are implemented during construction of the project. This report was prepared in accordance with the requirements of the 2022 California Building Code and the City of Twentynine Palms.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding this report or if we can be of further service, please do not hesitate to contact the undersigned at (657) 888-4608 or info@ntsgeo.com.

Respectfully submitted,
NTS GEOTECHNICAL, INC.

A handwritten signature in black ink, appearing to read "Nadim Sunna".

Nadim Sunna, M.Sc., Q.S.P, P.E., G.E. 3172
Principal Engineer



Table of Contents

INTRODUCTION.....	2
SITE AND PROJECT DESCRIPTION.....	2
SCOPE OF WORK.....	2
Background Review	2
Field Exploration.....	3
Geotechnical Laboratory Testing.....	3
GEOLOGIC FINDINGS	3
Regional Geologic Setting	3
Subsurface Materials	3
Groundwater	3
GEOLOGIC HAZARDS	4
Faulting and Seismicity	4
Liquefaction and Seismic Settlement.....	4
Landslides	4
Flooding	5
Tsunami and Seiches	5
GEOTECHNICAL ENGINEERING FINDINGS.....	5
Expansive Soil	5
Soil Corrosion	5
Excavation Characteristics	6
GEOTECHNICAL ENGINEERING CONCLUSIONS AND RECOMMENDATIONS.....	6
Conclusions.....	6
Site Preparation.....	7
Remedial Grading	8
Materials for Fill	8
Compacted Fill.....	9
Temporary Excavations.....	9
Seismic Design	10
Shallow Foundation Design and Construction	11
Driven Piles Design and Construction	11
Asphalt Concrete Pavement Design	13
Gravel Driveway Pavement Design.....	13
Drainage Control	14
Review, Observation, and Testing.....	15
LIMITATIONS.....	15
REFERENCES.....	17

Attachment(s):

Plate 1 – Location Map

Plate 2 – Geotechnical Map

Appendix A – Field Exploration

Appendix B – Geotechnical Laboratory Test Result

INTRODUCTION

This report presents the results of our geotechnical engineering evaluation performed for the proposed solar farm located APN: 061220101 & -05, Twentynine Palms, California. See (Plate 1, Location Map). The purpose of this study has been to evaluate the subsurface conditions at the site and to provide geotechnical recommendations related to the design and construction of the proposed buildings.

SITE AND PROJECT DESCRIPTION

The subject properties comprise approximately 477 acres and was nearly rectangular in shape. The subject property, APN 061-220-101 and 061-2220-105, is located in the City of Twentynine Palms, County of San Bernardino, California.

The legal description for the subject property is as follows:

- W 1/2 SEC 23 TP 1N R 8E EX S 50 FT ST, San Bernardino County

The properties are bound by Two Mile Rd to the south, and vacant lots to the north, east, and west.

At the time of the field study, vegetation across the site was light to moderate and consisted of seasonal native grasses, weeds, forbs, brush and some native trees. Also, at the time of the field study, buildings or other type structures were not present on the site.

It is our understanding that the proposed project consists of construction of a solar farm covering majority of the property, and grading of the a new roadway connecting the solar farm to the Two Mile Road.

SCOPE OF WORK

As part of the preparation of this report, we have performed the following tasks:

Background Review

We reviewed readily available background data including in-house geologic maps, topographic maps, and aerial photographs relevant to the subject site in preparation of this report. The list of documents reviewed is presented in the "References" section of this report.

Field Exploration

The subsurface conditions were evaluated on November 24, 25 and 26, 2023 by advancing a total of twenty-six (26) hand dug borings. The borings were advanced to depths ranging from 5.5 and 10.5 feet below the existing grade. The approximate locations of the borings are shown on Plate 2, Geotechnical Map. Detailed exploration information of soils borings is presented in Appendix A, Field Exploration.

Geotechnical Laboratory Testing

Laboratory tests were performed on selected samples obtained from the boring in order to aid in the soil classification and to evaluate the engineering properties of the foundation soils. The following tests were performed in general accordance with ASTM standards:

- In-situ moisture and density
- No. 200 wash;
- Direct shear;
- R-value; and
- Corrosivity suite.

Laboratory test results are presented within Appendix B of this report.

GEOLOGIC FINDINGS

Regional Geologic Setting

According to the Dibblee geologic map, the project site is underlain by alluvial deposits (Qa) consisting of gravel, sand, and silt.

Subsurface Materials

Earth materials encountered during our subsurface investigation consist of alluvium (Qa) extending to the total depth of the exploration. In general, the alluvium consists of brown, dry, medium dense, sands to silty sands.

Groundwater

Groundwater was not observed during our exploration. Groundwater conditions may vary across the site due to stratigraphic and hydrologic conditions and may change over time as a consequence of seasonal and meteorological fluctuations, or activities by humans at this site and nearby sites. However, based on the above findings, groundwater is unlikely to impact the proposed development.

GEOLOGIC HAZARDS

Faulting and Seismicity

The site is not located within an Alquist-Priolo Earthquake Fault Zone, and no known active faults are shown on the reviewed geologic maps crossing the site, however, the site is located in the seismically active region of Southern California. The nearest known active fault is the Pinto Mountain fault system, which is located approximately 1.34 miles from the site.

Given the proximity of the site to these and numerous other active and potentially active faults, the site will likely be subject to earthquake ground motions in the future. A site PGAM of 0.906g was calculated for the site in conformance with the 2022 CBC. This PGAM is primarily dominated by earthquakes with a mean magnitude of 7.09 at a mean distance of 4.36 km from the site using the USGS 2014 Interactive Deaggregation website.

Liquefaction and Seismic Settlement

Liquefaction occurs when the pore pressures generated within a soil mass approach the effective overburden pressure. Liquefaction of soils may be caused by cyclic loading such as that imposed by ground shaking during earthquakes. The increase in pore pressure results in a loss of strength, and the soil then can undergo both horizontal and vertical movements, depending on the site conditions. Other phenomena associated with soil liquefaction include sand boils, ground oscillation, and loss of foundation bearing capacity. Liquefaction is generally known to occur in loose, saturated, relatively clean, fine-grained cohesionless soils at depths shallower than approximately 50 feet. Factors to consider in the evaluation of soil liquefaction potential include groundwater conditions, soil type, grain size distribution, relative density, degree of saturation, and both the intensity and duration of ground motion.

The site is not located within a liquefaction hazard zone per our review of the County of San Bernardino Geologic Hazard Overlay maps. Based on the lack of shallow groundwater, the potential for liquefaction to impact the proposed improvement is considered low.

Landslides

Based on our review of the referenced geologic maps, literature, topographic maps, aerial photographs, and our subsurface evaluation, no landslides or related features underlie or are adjacent to the subject site. Due to the relatively level nature or gently sloping nature of the site and surrounding areas, the potential for landslides at the project site is considered low.

Flooding

The Federal Emergency Management Agency (FEMA) has prepared flood insurance rate maps (FIRMs) for use in administering the National Flood Insurance Program. Based on our review of the FEMA flood map, the site is located in an Area of Minimal Flood Hazard (Zone X).

Tsunami and Seiches

Tsunamis are waves generated by massive landslides near or under sea water. The site is not located on any State of California – County of San Bernadino Tsunami Inundation Map for Emergency Planning. The potential for the site to be adversely impacted by earthquake-induced tsunamis is considered to be negligible because the site is located several miles inland from the Pacific Ocean shore, at an elevation exceeding the maximum height of potential tsunami inundation.

Seiches are standing wave oscillations of an enclosed water body after the original driving force has dissipated. The potential for the site to be adversely impacted by earthquake-induced seiches is considered to be negligible due to the lack of any significant enclosed bodies of water located in the vicinity of the site.

GEOTECHNICAL ENGINEERING FINDINGS

Expansive Soil

Based on our evaluation and experience with similar material types, the soils encountered near the ground surface at the site exhibit a very low expansion potential.

Soil Corrosion

The potential for the on-site materials to corrode buried steel and concrete improvements was evaluated. Laboratory testing was performed on representative soil samples to evaluate pH, minimum resistivity, and soluble chloride and sulfate contents. The results of our corrosivity testing is presented within Appendix B of this report. General recommendations to address the corrosion potential of the on-site soils are provided below. Imported fill materials, if used, should be tested to evaluate whether their corrosion potential is more severe than those assumed.

Structural Concrete

Laboratory tests indicate that the potential of sulfate attack on concrete in contact with the on-site soils is “negligible” or “S0” exposure in accordance with ACI 318, Table 19.3.1.1. Therefore, restriction on the type of cement, water to cement ratio, and compressive strength is not required.

The aforementioned recommendations in regards to concrete are made from a soils perspective only. Final concrete mix design is beyond our purview. All applicable codes, ordinances, regulations, and guidelines should be followed in regard to the designing a durable concrete with respect to the potential for sulfate exposure from the on-site soils and/or changes in the environment.

Ferrous Metal

The results of the laboratory chemical tests performed on a sample of soil collected within the site indicate that the on-site soils are corrosive to ferrous metals. Consequently, metal structures which will be in direct contact with the soil (i.e., underground metal conduits, pipelines, metal sign posts, etc.) and/or in close proximity to the soil (wrought iron fencing, etc.) may be subject to corrosion. The use of special coatings or cathodic protection around buried metal structures has been shown to be beneficial in reducing corrosion potential.

The laboratory testing program performed for this project does not address the potential for corrosion to copper piping. In this regard, a corrosion engineer should be consulted to perform more detailed testing and develop appropriate mitigation measures (if necessary).

The above discussion is provided for general guidance in regards to the corrosiveness of the on-site soils to typical metal structures used for construction. Detailed corrosion testing and recommendations for protecting buried ferrous metal and/or copper elements are beyond our purview. If detailed testing is required, a corrosion engineer should be consulted to perform the testing and develop appropriate mitigation measures.

Excavation Characteristics

The majority of the soil materials underlying the site can be excavated with excavators and other conventional grading equipment.

GEOTECHNICAL ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the results of our field exploration and engineering analyses, it is our opinion that the proposed development is feasible from a geotechnical standpoint, provided that the recommendations in this report are incorporated into the design plans and are implemented during construction.

Based on the geologic and geotechnical findings, the following is a summary of our conclusions:

- The upper approximately 18 inches of the site soils is considered loose and compressible and will require remedial grading for pavement support.
- There are no known active faults crossing the subject site. The site seismicity is typical for the Twentynine Palms area. Structure design should be in accordance with the current 2022 CBC.
- The potential for liquefaction to impact the proposed development is considered low.
- The onsite soil is anticipated to exhibit very low expansion potential.
- The onsite soil has a negligible sulfate exposure, however, is corrosive to ferrous materials.
- We have provided different foundation options for the designer to utilize in designing appropriate support for the solar panels.

The actual conditions of the near-surface supporting material across the site may vary. The nature and extent of variations of the surface and subsurface conditions between the exploratory excavations may not become evident until construction. If variations of the material become evident during construction of the proposed development, NTS should be notified so that the project Geotechnical Consultant can reevaluate the characteristics of the material and the conclusions and recommendations of this report, and, if needed, revise the conclusions and recommendations presented herein.

Our geotechnical engineering analyses performed for this report were based on the earth materials encountered during the subsurface exploration for the site. If the design substantially changes, then our geotechnical engineering recommendations would be subject to revision based on our evaluation of the changes. The following sections present our conclusions and recommendations pertaining to the engineering design for this project.

Site Preparation

Site preparation should begin with the removal of utility lines, asphalt, concrete, vegetation, and other deleterious debris from areas to be graded. Tree stumps and roots should be removed to such a depth that organic material is generally not present. Clearing and grubbing should extend to the outside edges of the proposed excavation and fill areas. We recommend that unsuitable materials such as organic matter or oversized material be selectively removed and disposed offsite. The debris and unsuitable material generated during clearing and grubbing should be removed from areas to be graded and disposed at a legal dump site away from the project area.

Remedial Grading

Remedial grading will serve to create a firm and workable platform for construction of new roadway leading up to the solar farm. Due to the presence of loose/compressible near-surface soils, we recommend that the roadway section be excavated to a depth of 18 inches below the planned subgrade.

It should be noted that the recommendations provided herein are based on our subsurface exploration and knowledge of the on-site geology. Actual removals may vary in configuration and volume based on observations of geologic materials and conditions encountered during grading. The bottom of all corrective grading removals should be observed by a representative of NTS to verify the suitability of in-place soil prior to performing scarification and recompaction. Corrective grading recommendations are outlined below.

Roadway

In order to create a firm and stable platform on which to construct the new roadway we recommend the following:

- The roadway should be excavated to the planned elevation.
- Once planned elevation is achieved, the subgrade should be overexcavated to a depth of 18 inches below the planned subgrade.
- The bottom of the over excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to near optimum moisture content and recompacted to at least 95 percent relative compaction as determined in accordance with ASTM D1557.
- Following the approval of the over-excavation bottom by a representative of NTS, the onsite material may be used as fill material to achieve the planned rough grade.
- The fill material should then be placed in 6- to- 8-inch-thick lifts, moisture conditioned to near optimum moisture content and compacted to achieve 95 percent relative compaction.

Materials for Fill

On-site soils with an organic content of less than 3 percent by volume (or 1 percent by weight) are suitable for use as fill. Soil material to be used as fill should not contain contaminated materials, rocks, or lumps over 6 inches in largest dimension, and not more than 40 percent larger than $\frac{3}{4}$ inch. Utility trench backfill material should not contain rocks or lumps over 3 inches in largest dimension. Larger chunks, if generated during excavation, may be broken into acceptably sized pieces or may be disposed offsite.

Any imported fill material should consist of granular soil having a “very low” expansion potential (that is, expansion index of 20 or less). Import material should also have low corrosion potential (that is, chloride content less than 500 parts per million [ppm], soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher). Materials to be used as fill should be evaluated by a representative of NTS prior to importing or filling.

Compacted Fill

Prior to placement of compacted fill, the contractor should request an evaluation of the exposed excavation bottom by NTS. Unless otherwise recommended, the exposed ground surface should then be scarified to a depth of at least 8 inches and watered or dried, as needed, to achieve generally consistent moisture contents near optimum moisture content. The scarified materials should then be compacted to 90 percent relative compaction in accordance with the latest version of ASTM Test Method D1557.

Compacted fill should be placed in horizontal lifts of approximately 6 to 8 inches in loose thickness. Prior to compaction, each lift should be watered or dried as needed to achieve near optimum moisture condition, mixed, and then compacted by mechanical methods to a relative compaction of 90 percent. Successive lifts should be treated in a like manner until the desired finished grades are achieved.

Personnel from NTS should observe the excavations so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including CalOSHA requirements, should be met.

Temporary Excavations

Temporary excavations for the demolishing, earthwork, footing and utility trench are expected. We anticipate that unsurcharged excavations with vertical side slopes less than 3 feet high will generally be stable; however, sloughing of cohesionless sandy materials encountered at the site should be expected.

Where the space is available, temporary, unsurcharged excavation sides over 3 feet in height should be sloped no steeper than an inclination of 1.5H:1V (horizontal:vertical). Where sloped excavations are created, the tops of the slopes should be barricaded so that vehicles and storage loads do not encroach within 10 feet of the top of the excavated slopes. A greater setback may be necessary when considering heavy vehicles, such as concrete trucks and cranes. NTS should be advised of such heavy vehicle loadings so that specific setback requirements can be established. If the temporary construction slopes are to be maintained during the rainy season, berms are recommended to be graded along the tops of the slopes in order to prevent runoff water from entering the excavation and eroding

the slope faces. Where space for sloped excavations is not available, temporary shoring may be utilized.

Personnel from NTS should observe the excavation so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including CalOSHA requirements, should be met.

Seismic Design

Our recommendations for seismic design parameters have been developed in accordance with 2022 CBC and ASCE 7-16 (ASCE, 2016) standards. The applicable site class is D based on the results of our field investigation. The table presents the seismic design parameters for the site that are obtained from USGS Design Ground Motions website, and are based on the ASCE 7-16 and 2022 California Building Code, and the site coordinates of N34.15972071° and W116.11536766°.

CBC 2022 Seismic Design Parameters

Design Parameters	Value
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	1.849
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.691
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.7
Adjusted MCER1 Spectral Response Acceleration Parameter at Short Period, S_{MS}	1.849
1-Second Period Adjusted MCER1 Spectral Response Acceleration Parameter, S_{M1}	1.175
Short Period Design Spectral Response Acceleration Parameter, SDS	1.232
1-Second Period Design Spectral Response Acceleration Parameter, $SD1$	0.783
Peak Ground Acceleration, PGA	0.824
Peak Ground Acceleration, PGAM *	0.906
*Risk-targeted maximum considered earthquake	

Since the Site Class is designated as D and the S_1 value is greater than or equal to 0.2, the 2022 CBC requires either a site-specific seismic hazard analysis per Section 21.2 of ASCE 7-16 or the application of Exception 2 of Section 11.4.8 of ASCE 7-16. The project structural engineer should apply all requirements of Section 11.4.8 of ASCE 7-16 to determine if increases to the seismic response coefficient (i.e. increases to the loading of the structure) are required.

It should be recognized that much of southern California is subject to some level of damaging ground shaking as a result of movement along the major active (and potentially active) fault zones that characterize this region. Design utilizing the 2022 CBC is not meant to completely protect against damage or loss of function. Therefore, the preceding parameters should be considered as minimum design criteria.

Shallow Foundation Design and Construction

The following recommendations may be used to size a shallow foundation system if elected for use to support lightly-loaded axillary structures:

Bearing Material	Competent native soil
Minimum Footing Size	- Width: 12 inches - Depth: 18 inches below the lowest adjacent soil grade
Allowable Bearing Capacity	2,000 psf for the minimum footing size given above. - The above value may be increased by 1/3 for temporary loads such as wind or earthquake.
Settlement	Total static settlement of 1 inch with differential settlement estimated to be approximately ½ inch over a span of 30 feet.
Allowable Lateral Passive Resistance	300 pcf (equivalent fluid pressure)
Allowable Coefficient of Friction	0.35

Driven Piles Design and Construction

A driven pile foundation may be used to support the solar system, provided that the piles are driven into competent native soil. We anticipate competent native soil to be between about 5 and 10 feet below the existing grade. The following preliminary geotechnical parameters may be used to perform a preliminary design of the piles. The final structural capacity of the piles should be checked in the field by performing pile test to check for downward axial load, tension forces, and lateral forces. NTS should be onsite during the pile load testing to observe the test and document the data for final approval.

Bearing Material	Competent native soil
Minimum Depth	Minimum embedment of 6 feet into competent native soil.
Allowable Axial Capacity	- Estimated to be 4 kips based on the minimum embedment provided above. - The above value may be increased by 1/3 for temporary loads such as wind or earthquake.
Allowable Lateral Passive Resistance	300 pcf (equivalent fluid pressure) - Maximum allowable of 3,000 psf

Driven Piles Design and Construction Consideration:

- Pile capacities are based on piles that are spaced at least 3 pile diameters apart. Reduction in capacity can be provided if piles are less than 3 pile diameters apart.
- It is recommended that indicator piles be driven at various locations across the site to determine the final design criteria.
- Hard layers of gravel/rock should be anticipated during the pile driving based on our field exploration.
- In cases of shallow refusal during pile installation, remedial options to be considered, which include removal and/or extraction of the obstruction and replacement with compacted engineered fill and then re-driving the pile.
- Pre-drilling through obstructing layers is another option to be considered during pile installation.
- Based on the result of the investigation, much of the soils across the site exhibit weak cementation due to the dry and granular nature of the material encountered, and thus this should be taken into consideration when selecting equipment and deep foundation system.
- Some settlement around the piles should be anticipated during the pile driving due to the granular nature of the onsite soils. Settlement around the pile should be mitigated after the pile driving by replacing the settled soil with either compacted fill or 1.5 sac sand-cement slurry.
- The installation of the piles should be observed by the geotechnical engineer to verify the soil condition and that the design depth of pile are achieved. Piles should be true and plumb.

Asphalt Concrete Pavement Design

In accordance with Chapter 600 of the Caltrans Highway Design Manual, we have performed pavement structural design utilizing assumed traffic indices (TI) of 6 and our laboratory R-value test result of 50. Based on our analysis, we have developed the pavement structural sections presented in the following table. We note that the assumed TI's should be reviewed by a traffic engineer to confirm their applicability to the project.

Minimum Asphalt Concrete Pavement Structural Sections

Location	Traffic Index	Asphalt Concrete (in.)	Aggregate Base (in.)*
Driveway	6.0	3.5	4.0

The above design sections will need to be verified based on additional testing performed at the completion of future precise grading of the specific locations.

The planned pavement structural sections should consist of the following:

- Aggregate Base materials (AB) consisted of either Crushed Aggregate Base (CAB) or Crushed Miscellaneous Base (CMB).
- Asphalt Concrete (AC) material of a type meeting the minimum City of Twentynine Palms standards.
- The subgrade soils should be moisture conditioned to near optimum moisture content to a depth of at least 18 inches and compacted to 95 percent relative compaction.
- The AB and AC should be compacted to at least 95 percent relative compaction.

Gravel Driveway Pavement Design

In accordance with Chapter 600 of the Caltrans Highway Design Manual, we have performed pavement structural design utilizing assumed traffic indices (TI) of 6 and our laboratory R-value test result of 50. Based on our analysis, we have developed the pavement structural sections presented in the following table. We note that the assumed TI's should be reviewed by a traffic engineer to confirm their applicability to the project.

Minimum Gravel Pavement Structural Sections

Location	Traffic Index	Aggregate Base (in.)*
Driveway	6.0	11.0

The above design sections will need to be verified based on additional testing performed at the completion of future precise grading of the specific locations.

The planned pavement structural sections should consist of the following:

- Aggregate Base materials (AB) consisted of either Crushed Aggregate Base (CAB) or Crushed Miscellaneous Base (CMB).
- The subgrade soils should be moisture conditioned to near optimum moisture content to a depth of at least 18 inches and compacted to 95 percent relative compaction.
- The AB should be compacted to at least 95 percent relative compaction.

Drainage Control

The control of surface water is essential to the satisfactory performance of the building and site improvements. Surface water should be controlled so that conditions of uniform moisture are maintained beneath the improvements, even during periods of heavy rainfall. The following recommendations are considered minimal:

- Ponding and areas of low flow gradients should be avoided.
- If bare soil within 5 feet of the structure is not avoidable, then a gradient of 5 percent or more should be provided sloping away from the improvement. Corresponding paved surfaces should be provided with a gradient of at least 2 percent.
- The remainder of the unpaved areas should be provided with a drainage gradient of at least 2 percent.
- Positive drainage devices, such as graded swales, paved ditches, and/or catch basins should be employed to accumulate and to convey water to appropriate discharge points.
- Concrete walks and flatwork should not obstruct the free flow of surface water.
- Brick flatwork should be sealed by mortar or be placed over an impermeable membrane.
- Area drains should be recessed below grade to allow free flow of water into the basin.
- Enclosed raised planters should be sealed at the bottom and provided with an ample flow gradient to a drainage device. Recessed planters and

landscaped areas should be provided with area inlet and subsurface drain pipes.

- Planters should not be located adjacent to the structures wherever possible. If planters are to be located adjacent to the structures, the planters should be positively sealed, should incorporate a subdrain, and should be provided with free discharge capacity to a drainage device.
- Planting areas at grade should be provided with positive drainage. Wherever possible, the grade of exposed soil areas should be established above adjacent paved grades. Drainage devices and curbing should be provided to prevent runoff from adjacent pavement or walks into planted areas.
- Gutter and downspout systems should be provided to capture discharge from roof areas. The accumulated roof water should be conveyed to off-site disposal areas by a pipe or concrete swale system.
- Landscape watering should be performed judiciously to preclude either soaking or desiccation of soils. The watering should be such that it just sustains plant growth without excessive watering. Sprinkler systems should be checked.

Review, Observation, and Testing

The recommendations presented in this report are contingent upon review of final plans and specifications for the project by NTS. NTS Geotechnical, Inc. should review and verify in writing the compliance of the final grading plan and the final foundation plans with the recommendations presented in this report.

It is recommended that NTS be retained to provide continuous Geotechnical Consulting services during the earthwork operations (i.e., rough grading, subgrade preparation, finish grading, etc.) and foundation installation process. This is to observe compliance with the design concepts, specifications and recommendations and to allow for design changes in the event that subsurface conditions differ from those anticipated during our subsurface investigation.

LIMITATIONS

All parties reviewing or utilizing this report should recognize that the findings, conclusions, and recommendations presented represent the results of our professional geological and geotechnical engineering efforts and judgments. Due to the inexact nature of the state of the art of these professions and the possible occurrence of undetected variables in subsurface conditions, we cannot guarantee that the conditions actually encountered during grading and site construction will be identical to those observed, sampled, and interpreted during our study, or that there are no unknown subsurface conditions which could have an adverse effect on the use of the property. We have exercised a degree of care comparable to the standard of practice presently maintained by other professionals in the fields of

geotechnical engineering and engineering geology, and believe that our findings present a reasonably representative description of geotechnical conditions and their probable influence on the grading and use of the property.

Our conclusions and recommendations are based on the assumption that our firm will act as the geotechnical engineer of record during construction and grading of the project to observe the actual conditions exposed, to verify our design concepts and the grading contractor's general compliance with the project geotechnical specifications, and to provide our revised conclusions and recommendations should subsurface conditions differ significantly from those used as the basis for our conclusions and recommendations presented in this report. Since our conclusions and recommendations are based on a limited amount of current and previous geotechnical exploration and analysis, all parties should recognize the need for possible revisions to our conclusions and recommendations during grading of the project.

It should be further noted that the recommendations presented herein are intended solely to minimize the effects of post-construction soil movements. Consequently, minor cracking and/or distortion of all on-site improvements should be anticipated.

This report has not been prepared for the use by other parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

REFERENCES

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Coduto, Donald P., 1994, Foundation Design: Principles and Practices: Prentice-Hall, Inc, Englewood Cliffs, New Jersey.

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SITE LOCATION

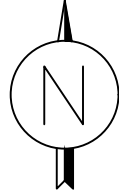


LOCATION MAP

	Date: December 12, 2023	Plate 1
	Project No.: 23644	








GEOTECHNICAL LEGEND

B-1  APPROXIMATE LOCATION OF BORING

GEOTECHNICAL MAP

Date: 12/12/2023	Project No.: 23644	Plate: 2
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APPENDIX A

Field Exploration

Appendix A

Field Exploration

The subsurface exploration program for the proposed project consisted of advancing twenty-six (26) 4-inch-diameter, hand borings. The borings were advanced to depths ranging from 5.5 to 10.5 feet below the existing grade.

The Borings Logs are presented as Figures A-2 to A-27. The Borings Logs describe the earth materials encountered, samples obtained, and show the field and laboratory tests performed. The log also shows the boring number, drilling date, and the name of the logger and drilling subcontractor. The borings were logged by an engineer using the Unified Soil Classification System. The boundaries between soil types shown on the logs are approximate because the transition between different soil layers may be gradual. Drive samples of representative earth materials were obtained from the borings.

A California modified sampler was used to obtain drive samples of the soil encountered. This sampler consists of a 3-inch outside diameter (O.D.), 2.4-inch inside diameter (I.D.) split barrel shaft that was driven a total of 6-inches into the soil at the bottom of the boring by a safety hammer. The soil was retained in brass rings for laboratory testing. Additional soil from each drive remaining in the cutting shoe was usually discarded after visually classifying the soil.

Upon completion of the borings, the pits were backfilled with soil from the cuttings.

Project: **APN: 061220101 & -05**
 Project Location: **APN: 061220101 & -05, Twentynine Palms**
 Project Number: **23644**



Key to Log of Boring Sheet 1 of 1

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9

COLUMN DESCRIPTIONS

- | | |
|--|---|
| <p>1 Depth (feet): Depth in feet below the ground surface.</p> <p>2 Sample Type: Type of soil sample collected at the depth interval shown.</p> <p>3 Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.</p> <p>4 Material Type: Type of material encountered.</p> <p>5 Graphic Log: Graphic depiction of the subsurface material encountered.</p> | <p>6 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.</p> <p>7 Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.</p> <p>8 Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.</p> <p>9 REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.</p> |
|--|---|

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
 COMP: Compaction test
 CONS: One-dimensional consolidation test
 LL: Liquid Limit, percent

PI: Plasticity Index, percent
 SA: Sieve analysis
 DS: Direct Shear
 EI: Expansion Index
 WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS



Silty SAND (SM)



Poorly graded SAND (SP)



Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS



Auger sampler



Bulk Sample



3-inch-OD California w/ brass rings



CME Sampler



Grab Sample



2.5-inch-OD Modified California w/ brass liners



Pitcher Sample



2-inch-OD unlined split spoon (SPT)



Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

—▽ Water level (at time of drilling, ATD)

—▽ Water level (after waiting, AW)

Minor change in material properties within a stratum

— — Inferred/gradational contact between strata

—?— Queried contact between strata

GENERAL NOTES

- Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
- Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Figure A-1

Project: APN: 061220101 & -05		Log of Boring B-1 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 5.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SM		ALLUVIUM (Qa): SILTY SAND, some gravel, brown			
			SM		dry, medium dense	1.7	114.9	
5			SM		dry	1.8		
					Total Depth = 5.5 feet Groundwater not encountered Backfilled with native			
10								
15								

Figure A-2

Project: APN: 061220101 & -05 Project Location: APN: 061220101 & -05, Twentynine Palms Project Number: 23644		Log of Boring B-2 Sheet 1 of 1
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Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 5.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

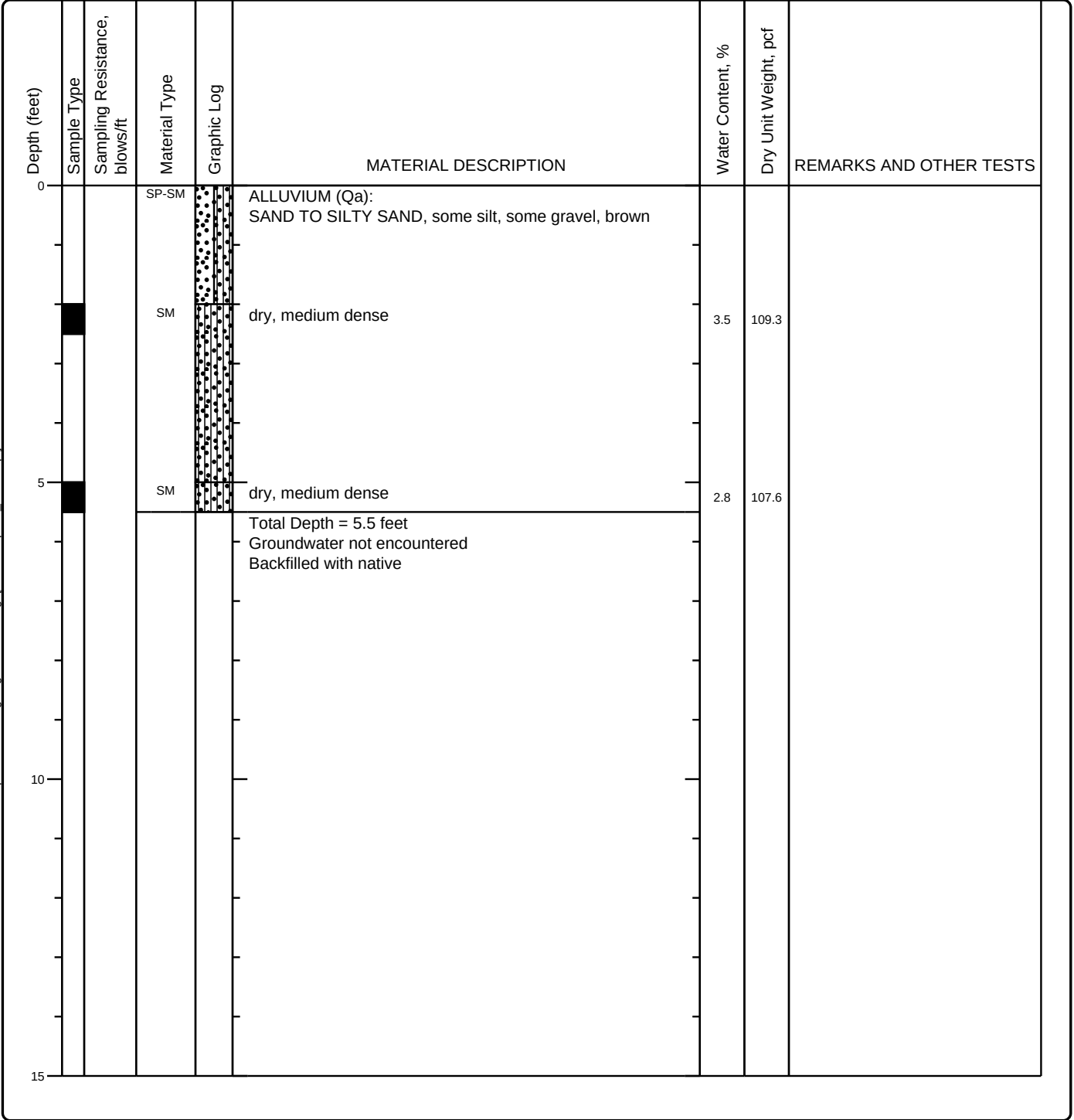


Figure A-3

Project: APN: 061220101 & -05 Project Location: APN: 061220101 & -05, Twentynine Palms Project Number: 23644		Log of Boring B-3 Sheet 1 of 1
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Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 5.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

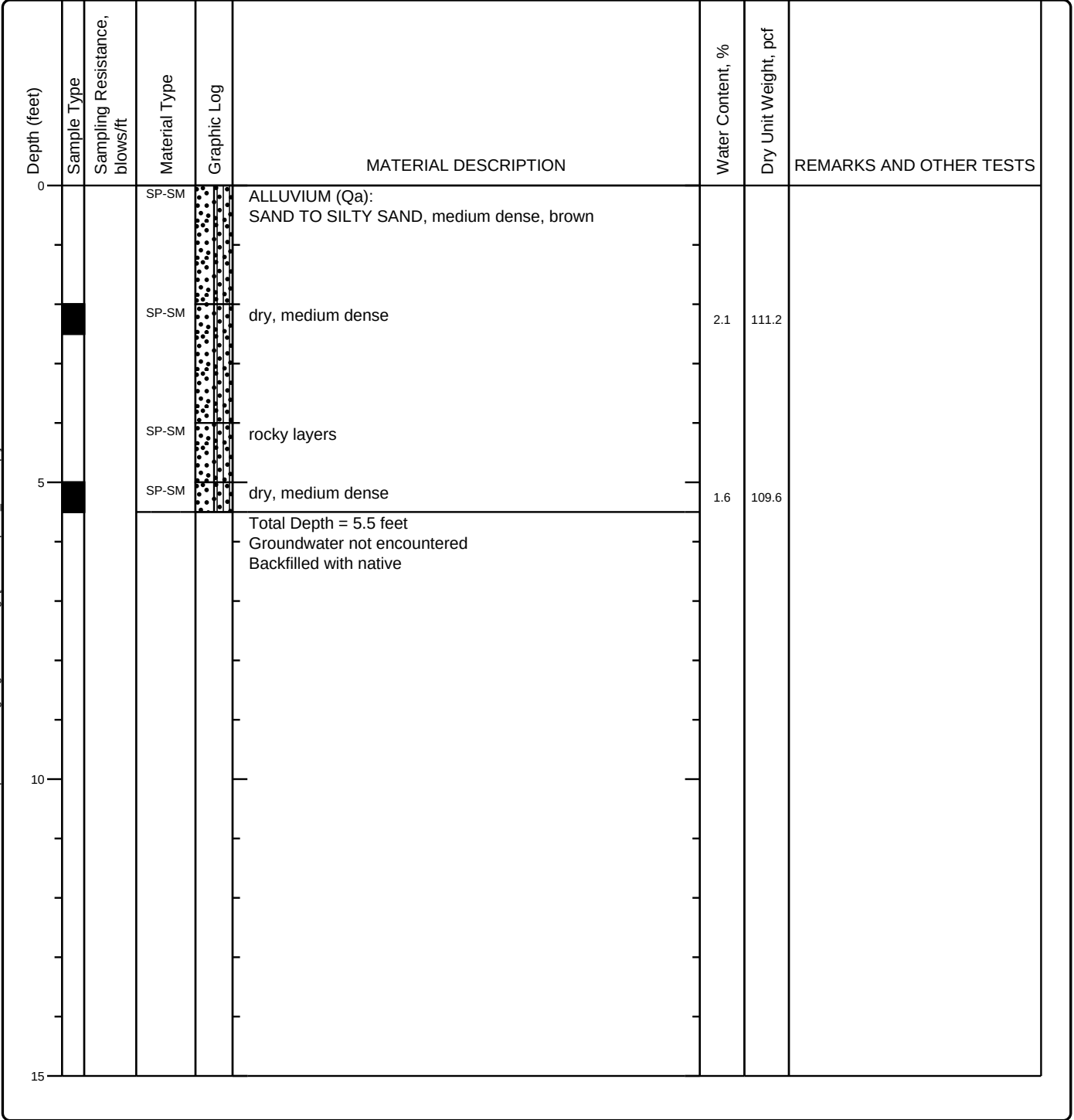


Figure A-4

Project: APN: 061220101 & -05		Log of Boring B-4 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 5.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		dry	0.9		
5			SP		SAND, some silt dry, medium dense, brown	1.3	114.6	
					Total Depth = 5.5 feet Groundwater not encountered Backfilled with native			
10								
15								

Figure A-5

Project: APN: 061220101 & -05		Log of Boring B-5 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	1.8	112.3	
10			SP-SM		dry, medium dense	1.5	113.6	
15					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			

Figure A-6

Project: APN: 061220101 & -05		Log of Boring B-6 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	2.1	110.5	
10			SP-SM		dry, medium dense	1.8	112.7	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-7

Project: APN: 061220101 & -05		Log of Boring B-7 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	2.7	114.7	
10			SP		SAND, some gravel, dry, medium dense, brown	2.0	110.3	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

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Figure A-8

Project: APN: 061220101 & -05		Log of Boring B-8 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP		ALLUVIUM (Qa): SAND, some silt, some gravel, brown			
			SP		silty layer, gravel layer			
5			SP		dry, medium dense	1.9	113.1	
10			SP-SM		SAND TO SILTY SAND, dry, medium dense, brown	2.3	114.8	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-9

Project: APN: 061220101 & -05		Log of Boring B-9 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP		ALLUVIUM (Qa): SAND, some silt, some gravel, brown			
			SP		cobble			
			SP		gravel layer			
5			SP		dry	1.2		
10			SP-SM		SAND TO SILTY SAND, dry, medium dense, brown	1.9	107.7	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-10

Project: **APN: 061220101 & -05**
 Project Location: **APN: 061220101 & -05, Twentynine Palms**
 Project Number: **23644**



Log of Boring B-10
Sheet 1 of 1

Date(s) Drilled 11/24/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	2.0	116.3	
10			SP-SM		dry, medium dense	1.6	110.6	
15					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			

Figure A-11

Project: APN: 061220101 & -05		Log of Boring B-11 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry	2.1		
10			SP		SAND, some gravel, dry, medium dense, brown	1.3	114.8	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-12

Project: APN: 061220101 & -05		Log of Boring B-12 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

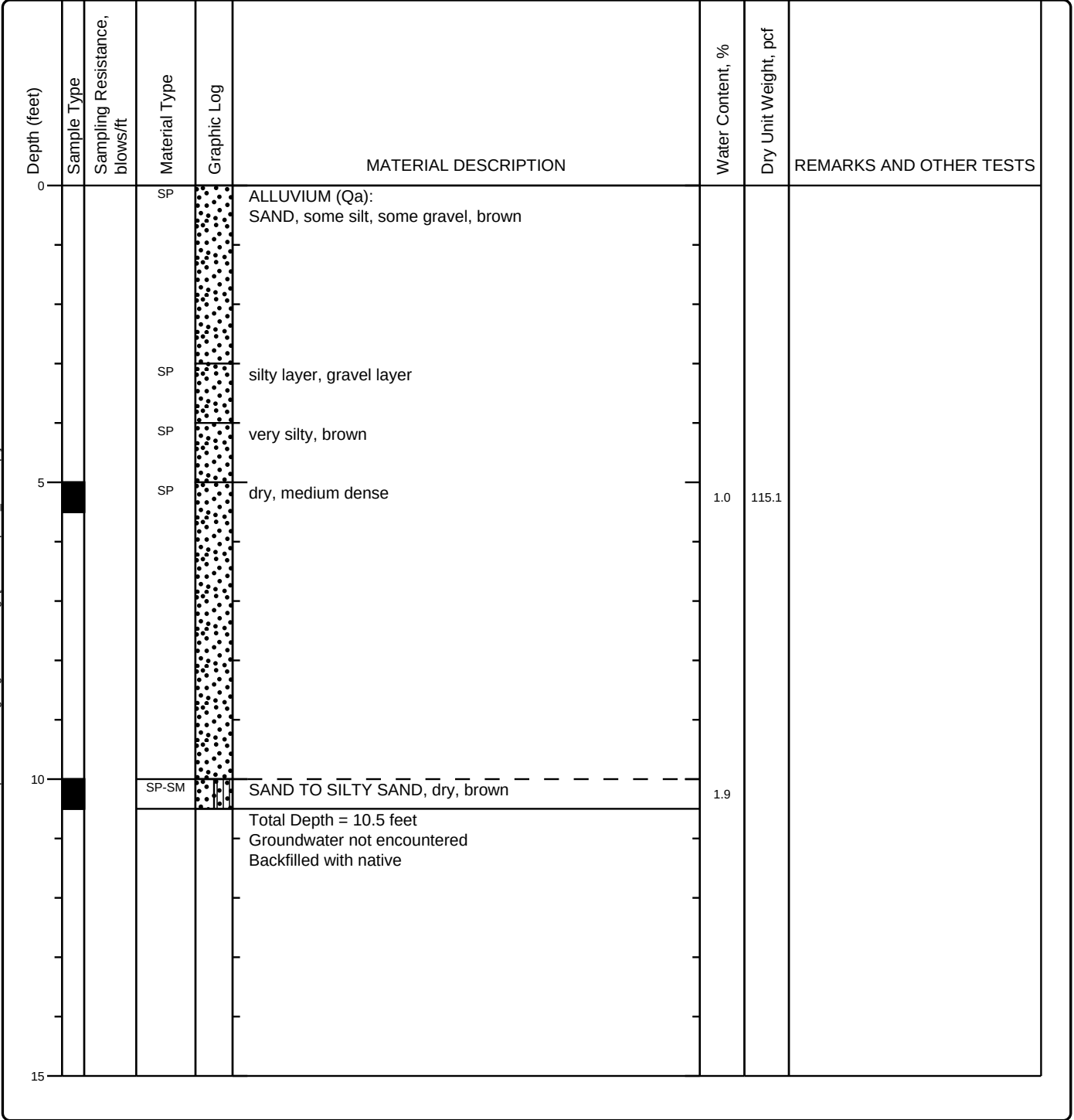


Figure A-13

Project: **APN: 061220101 & -05**
 Project Location: **APN: 061220101 & -05, Twentynine Palms**
 Project Number: **23644**



Log of Boring B-13
Sheet 1 of 1

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer			
5			SP-SM		dry, medium dense	1.8	113.2	
			SP-SM		gravel layer			
10			SP-SM		dry	1.2		
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

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Figure A-14

Project: APN: 061220101 & -05		Log of Boring B-14 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	1.9	113.3	
10			SP-SM		dry, medium dense	1.9	109.2	
15					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			

Figure A-15

Project: **APN: 061220101 & -05**
 Project Location: **APN: 061220101 & -05, Twentynine Palms**
 Project Number: **23644**



Log of Boring B-15

Sheet 1 of 1

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	1.7	107.8	
10			SP-SM		dry, medium dense	1.7	110.6	
15					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			

Figure A-16

Project: APN: 061220101 & -05		Log of Boring B-16 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry	1.6		
10			SP-SM		dry, medium dense	1.6	110.4	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-17

Project: APN: 061220101 & -05		Log of Boring B-17 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SM		ALLUVIUM (Qa): SILTY SAND, some silt, some gravel, brown			
			SM		gravel layer			
5			SM		dry, medium dense	1.8	113.8	
10			SP-SM		SAND TO SILTY SAND, dry, brown	1.9		
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-18

Project: APN: 061220101 & -05		Log of Boring B-18 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	1.8	121.8	
10			SP-SM		dry	1.5		
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-19

Project: **APN: 061220101 & -05**
 Project Location: **APN: 061220101 & -05, Twentynine Palms**
 Project Number: **23644**



Log of Boring B-19
Sheet 1 of 1

Date(s) Drilled 11/25/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry	1.4		
10			SP-SM		dry, medium dense	2.2	107.8	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

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Figure A-20

Project: APN: 061220101 & -05		Log of Boring B-20 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/26/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

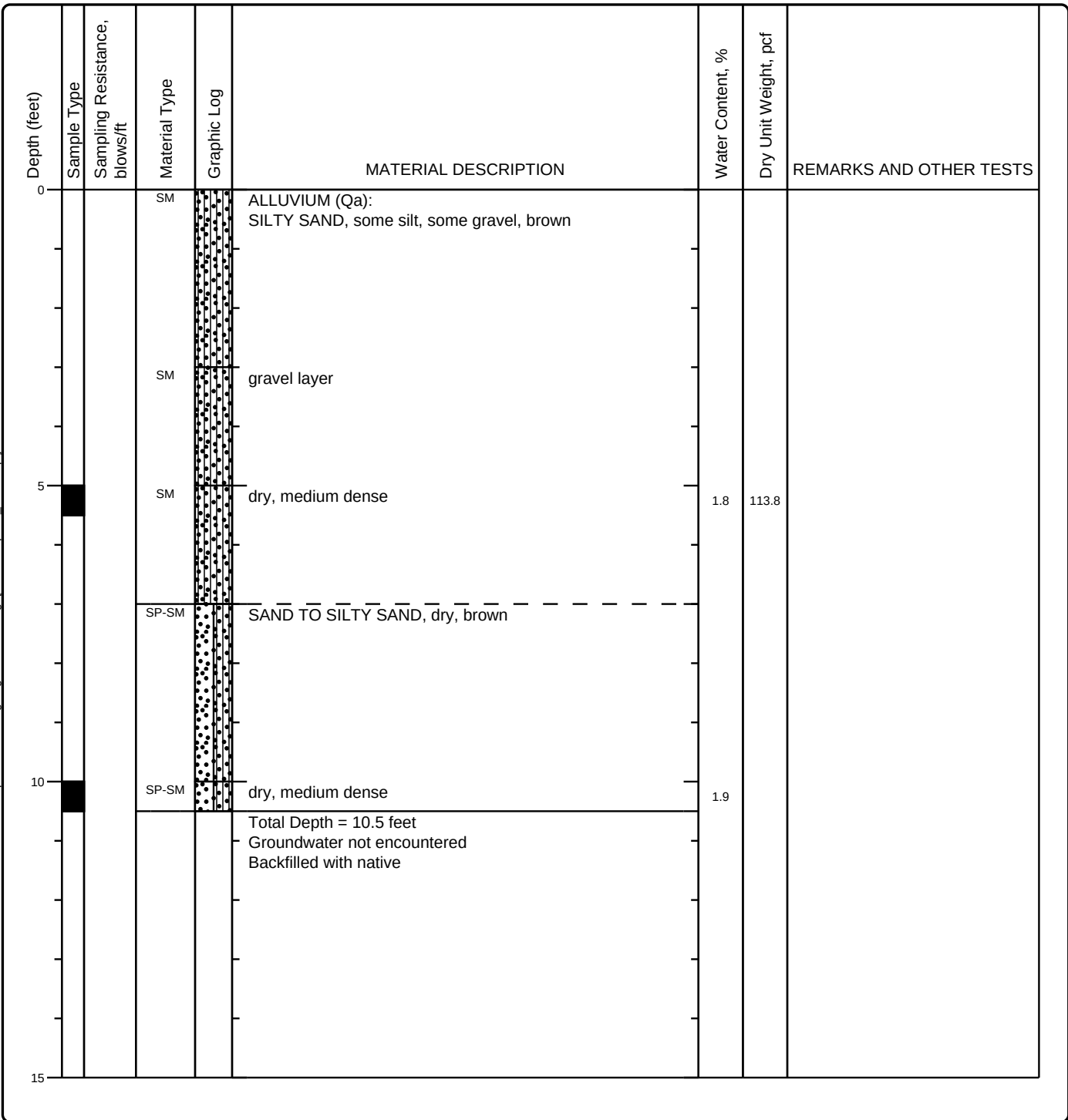


Figure A-21

Project: **APN: 061220101 & -05**
 Project Location: **APN: 061220101 & -05, Twentynine Palms**
 Project Number: **23644**



Log of Boring B-21
Sheet 1 of 1

Date(s) Drilled 11/26/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	1.4	109.2	
			SP-SM		some gravel			
10			SP-SM		dry	1.2		
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

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Figure A-22

Project: APN: 061220101 & -05		Log of Boring B-22 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/26/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, some gravel brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	1.8	114.4	
			SP-SM		some gravel			
10			SP-SM		dry, medium dense	2.0	107.8	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

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Figure A-23

Project: APN: 061220101 & -05		Log of Boring B-23 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/26/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry	1.5		
			SP-SM		some gravel			
10			SP-SM		dry, medium dense	1.4	115.1	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-24

Project: APN: 061220101 & -05		Log of Boring B-24 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/26/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

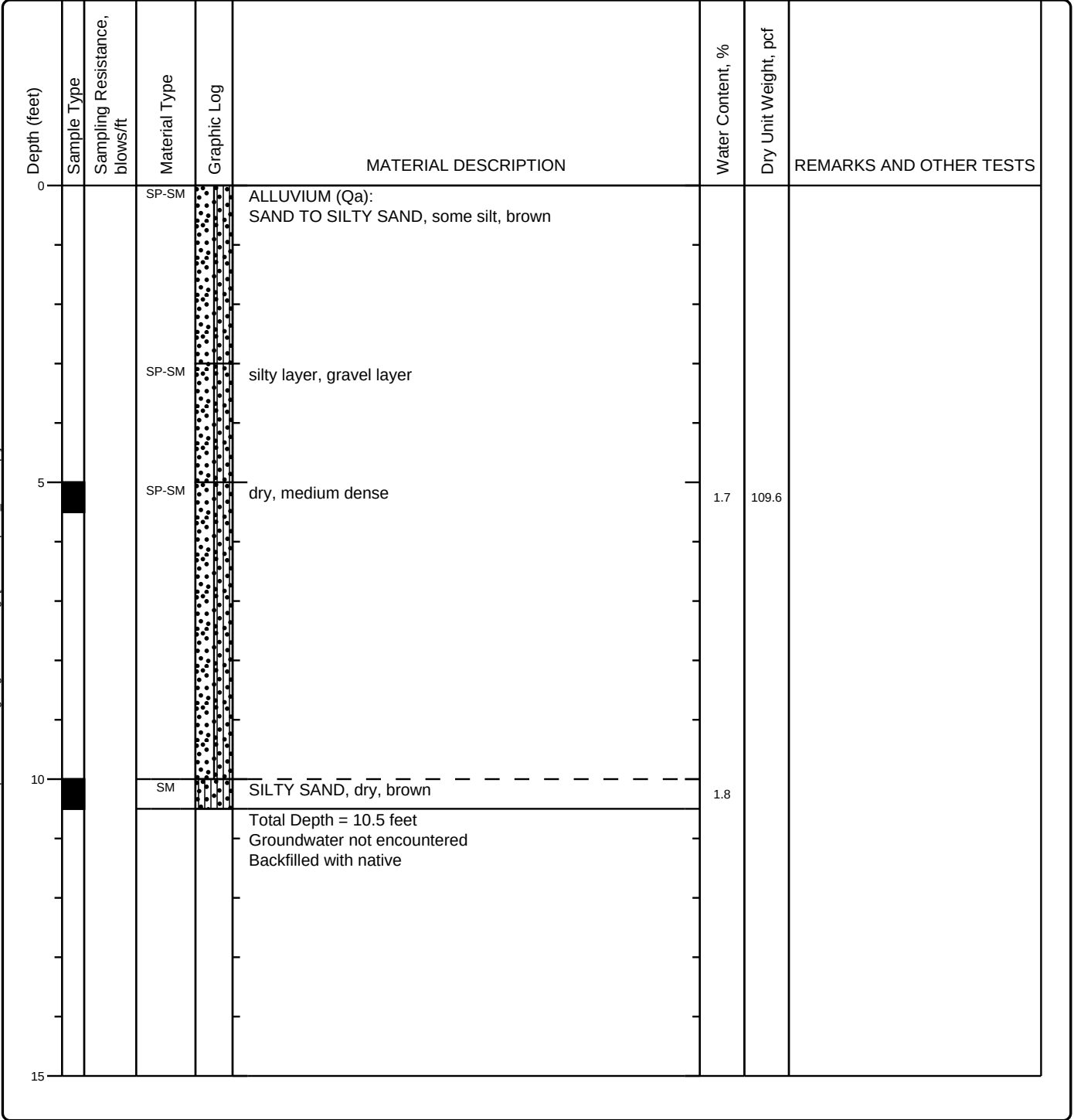


Figure A-25

Project: **APN: 061220101 & -05**
 Project Location: **APN: 061220101 & -05, Twentynine Palms**
 Project Number: **23644**



Log of Boring B-25 Sheet 1 of 1

Date(s) Drilled 11/26/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP		ALLUVIUM (Qa): SAND, some silt, brown			
			SP		silty layer, gravel layer			
5			SP		dry, medium dense	1.3	110.2	
10			SP-SM		SAND TO SILTY SAND, dry, medium dense, brown	1.8	114.2	
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-26

Project: APN: 061220101 & -05		Log of Boring B-26 Sheet 1 of 1
Project Location: APN: 061220101 & -05, Twentynine Palms		
Project Number: 23644		

Date(s) Drilled 11/26/2023	Logged By LB	Checked By NS
Drilling Method Hand Tools	Drill Bit Size/Type 4"	Total Depth of Borehole 10.5 feet
Drill Rig Type Hand Tools	Drilling Contractor Juan Garcia	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California	Hammer Data N/A
Borehole Backfill Native	Location APN: 061220101 & -05, Twentynine Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP-SM		ALLUVIUM (Qa): SAND TO SILTY SAND, some silt, brown			
			SP-SM		silty layer, gravel layer			
5			SP-SM		dry, medium dense	1.6	112.1	
10			SP-SM		dry	2.8		
					Total Depth = 10.5 feet Groundwater not encountered Backfilled with native			
15								

Figure A-27

APPENDIX B

Laboratory Testing Data

Appendix B Geotechnical Laboratory Testing

Laboratory Moisture Content and Density Tests

The moisture content and dry densities of selected driven samples obtained from the exploratory boring was evaluated in general accordance with the latest version of ASTM D 2937. The test results are presented on the log of the exploratory boring in Appendix A.

No. 200 Wash Sieve

The number of fines passing the No. 200 sieve was evaluated by the wash sieve. The test procedure was in general accordance with ASTM D 1140. The results are attached to this Appendix B.

Boring No.	Depth (ft)	Fines Passing No. 200, %
B-1	2	13.9
B-1	5	17.7
B-2	2	8.7
B-2	5	15.2
B-3	2	9.3
B-3	5	7.9
B-4	2	8.8
B-4	5	5.8
B-5	5	8.5
B-5	10	6.5
B-6	5	8.0
B-6	10	9.2
B-7	5	7.0
B-7	10	5.3
B-8	5	5.4
B-8	10	9.5
B-9	5	5.0
B-9	10	9.2
B-10	5	7.0
B-10	10	7.5
B-11	5	8.2
B-11	10	5.7
B-12	5	3.4
B-12	10	7.0

B-13	5	9.2
B-13	10	7.3
B-14	5	8.8
B-14	10	7.7
B-15	5	7.8
B-15	10	8.5
B-16	5	11.0
B-16	10	7.8
B-17	5	15.0
B-17	10	11.5
B-18	5	6.3
B-18	10	8.0
B-19	5	10.2
B-19	10	10.0
B-20	5	14.9
B-20	10	7.6
B-21	5	8.7
B-21	10	6.3
B-22	5	6.2
B-22	10	9.8
B-23	5	7.9
B-23	10	8.7
B-24	5	10.7
B-24	10	14.2
B-25	5	5.1
B-25	10	9.5
B-26	5	6.6
B-26	10	8.8

Consolidation Test

Consolidation tests was performed on a selected driven soil sample in general accordance with the latest version of ASTM D2435. The sample was inundated during testing to represent adverse field conditions. The percent consolidation for each load cycle was recorded as a ratio of the amount of vertical compression to the original height of the sample. Consolidation testing results are attached to this Appendix B.

Direct Shear Tests

Direct shear tests were performed on selected remolded and relatively undisturbed soil samples in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of the materials. The samples were inundated during shearing to represent adverse field conditions. Direct shear test results are attached to Appendix B.

R-Value Test

A bulk sample representative of the underlying on-site materials was tested to measure the response of a compacted sample to a vertically applied pressure under specific conditions. The R-value of a material is determined when the material is in a state of saturation such that water will be exuded from the compacted test specimen when a 16.8 kN load (2.07 MPa) is applied. The result of this test is presented in the table below.

Boring No.	Depth (ft)	R-Value
B-1	5	61
B-4	2	59

Corrosion Suite

The corrosion potential of typical on-site materials under long-term contact with both metal and concrete was determined by chemical and electrical resistance tests. The soluble sulfate test for potential concrete corrosion was performed in general accordance with California Test Method 417, the minimum resistivity test for potential metal corrosion was performed in general accordance with California Test Method 643, and the concentration of soluble chlorides was determined in general accordance with California Test Method 422. Test results are attached to this Appendix B.

Date Tested	11/30/2023			
Boring No.	B-5			
Depth, ft.	10			
Sample Description	Brown Gravely Sand w/ Silt			
Soil Condition	Before	After		
Weight Wet Sample and Ring, g	180.2	200.2		
Weight Dry Sample and Ring	177.8	177.8		
Weight Ring, g	41.7	41.7		
Weight Dry Sample	136.1	136.1		
Moisture Content, %	1.8	16.5		
Wet Density, lbs/cu. ft.	114.7	132.4		
Dry Density, lbs/cu. ft.	112.7	113.7		
Void Ratio	0.47	0.45		
Saturation, %	10.0	96.0		
Consolidation Data				
Load, psf	1000	1000		
Initial Height, in.	1.0000			
Final Height, in.		0.9913		
Consolidation % of Sample Height	0.9			



Tech: LB
Project No. 23644

Consolidation Test

**APN: 061220101 & -05,
Twentynine Palms**

FIGURE

B-1

Date Tested	11/29/2023			
Boring No.	B-10			
Depth, ft.	5			
Sample Description	Brown Sand w/ Silt			
Soil Condition	Before	After		
Weight Wet Sample and Ring, g	183.5	203.4		
Weight Dry Sample and Ring	181.9	181.9		
Weight Ring, g	43.5	43.5		
Weight Dry Sample	138.4	138.4		
Moisture Content, %	1.2	15.5		
Wet Density, lbs/cu. ft.	116.0	134.3		
Dry Density, lbs/cu. ft.	114.6	116.3		
Void Ratio	0.44	0.42		
Saturation, %	6.9	97.5		
Consolidation Data				
Load, psf	1000	1000		
Initial Height, in.	1.0000			
Final Height, in.		0.9858		
Consolidation % of Sample Height	1.4			



Tech: LB
Project No. 23644

Consolidation Test

**APN: 061220101 & -05,
Twentynine Palms**

FIGURE

B-2

Date Tested	12/2/2023			
Boring No.	B-15			
Depth, ft.	5			
Sample Description	Brown Sand w/ Silt			
Soil Condition	Before	After		
Weight Wet Sample and Ring, g	172.9	195.6		
Weight Dry Sample and Ring	170.6	170.6		
Weight Ring, g	42.1	42.1		
Weight Dry Sample	128.5	128.5		
Moisture Content, %	1.8	19.5		
Wet Density, lbs/cu. ft.	108.3	129.3		
Dry Density, lbs/cu. ft.	106.4	108.2		
Void Ratio	0.55	0.53		
Saturation, %	8.6	97.6		
Consolidation Data				
Load, psf	1000	1000		
Initial Height, in.	1.0000			
Final Height, in.		0.9835		
Consolidation % of Sample Height	1.7			



Tech: LB
Project No. 23644

Consolidation Test

**APN: 061220101 & -05,
Twentynine Palms**

FIGURE

B-3

Date Tested	12/9/2023			
Boring No.	B-17			
Depth, ft.	5			
Sample Description	Brown Silty Sand			
Soil Condition	Before	After		
Weight Wet Sample and Ring, g	184.7	204.3		
Weight Dry Sample and Ring	182.1	182.1		
Weight Ring, g	42.2	42.2		
Weight Dry Sample	139.9	139.9		
Moisture Content, %	1.9	15.9		
Wet Density, lbs/cu. ft.	118.0	136.5		
Dry Density, lbs/cu. ft.	115.9	117.8		
Void Ratio	0.43	0.40		
Saturation, %	11.5	104.1		
Consolidation Data				
Load, psf	1000	1000		
Initial Height, in.	1.0000			
Final Height, in.		0.9839		
Consolidation % of Sample Height	1.6			



Tech: LB
Project No. 23644

Consolidation Test

**APN: 061220101 & -05,
Twentynine Palms**

FIGURE

B-4

Date Tested	12/2/2023			
Boring No.	B-20			
Depth, ft.	10			
Sample Description	Brown Sand w/ Silt			
Soil Condition	Before	After		
Weight Wet Sample and Ring, g	180.2	200.7		
Weight Dry Sample and Ring	177.3	177.3		
Weight Ring, g	43.7	43.7		
Weight Dry Sample	133.6	133.6		
Moisture Content, %	2.2	17.5		
Wet Density, lbs/cu. ft.	113.1	131.4		
Dry Density, lbs/cu. ft.	110.7	111.8		
Void Ratio	0.49	0.48		
Saturation, %	11.6	97.0		
Consolidation Data				
Load, psf	1000	1000		
Initial Height, in.	1.0000			
Final Height, in.		0.9894		
Consolidation % of Sample Height	1.1			



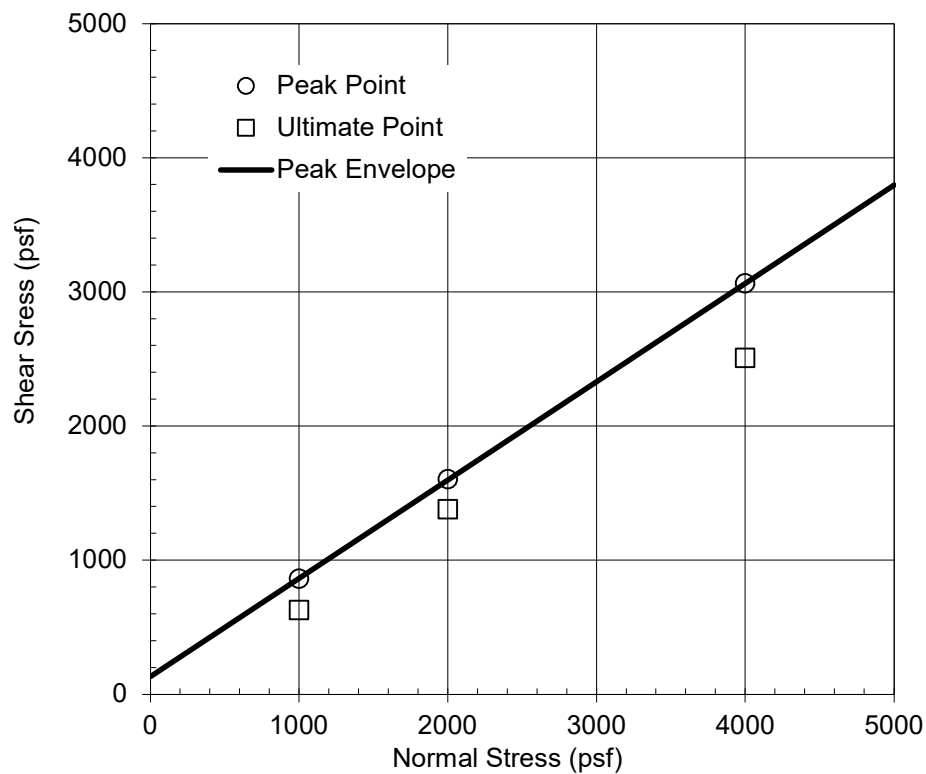
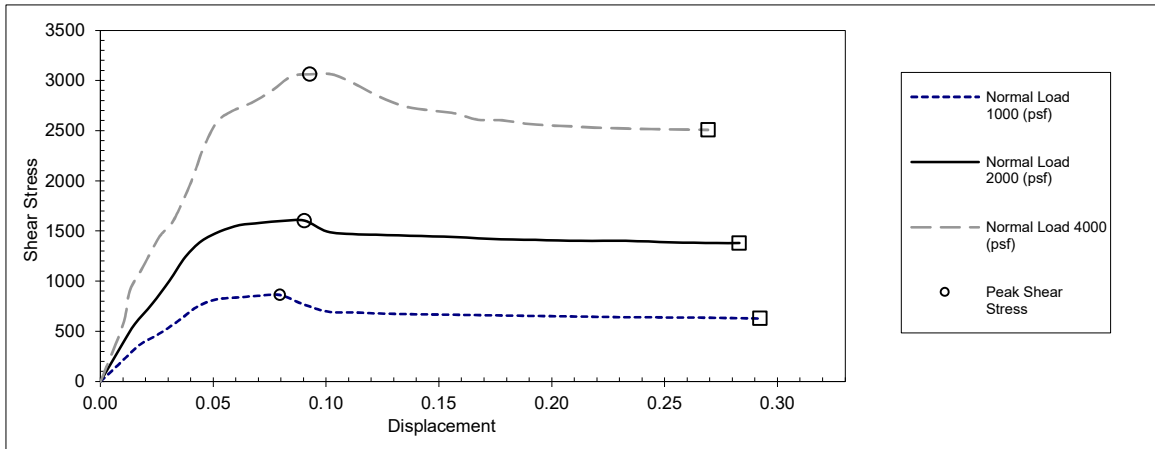
Tech: LB
Project No. 23644

Consolidation Test

**APN: 061220101 & -05,
Twentynine Palms**

FIGURE

B-5



Strain Rate = 0.0118 inch/min				Interpreted Shear Strength			
Date Tested: 11/30/2023				Peak		Ultimate	
Boring No.	Sample No.	Depth	UCSC	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-5	1	5	SM	133	36.2	64	31.7
Sample description:				Brown Sand w/ Silt			



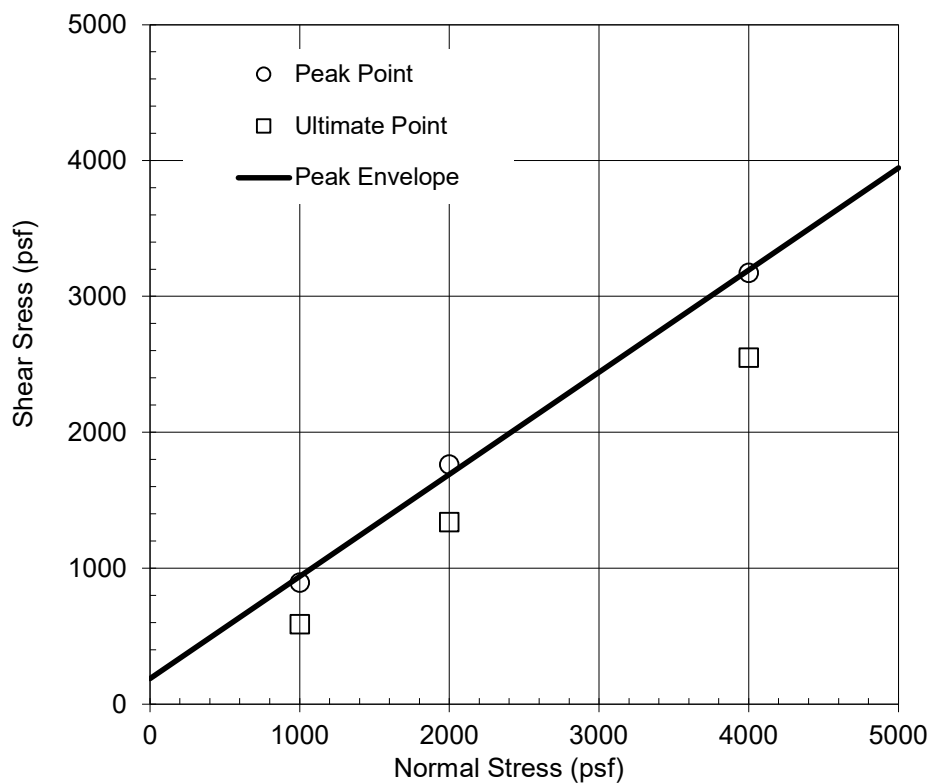
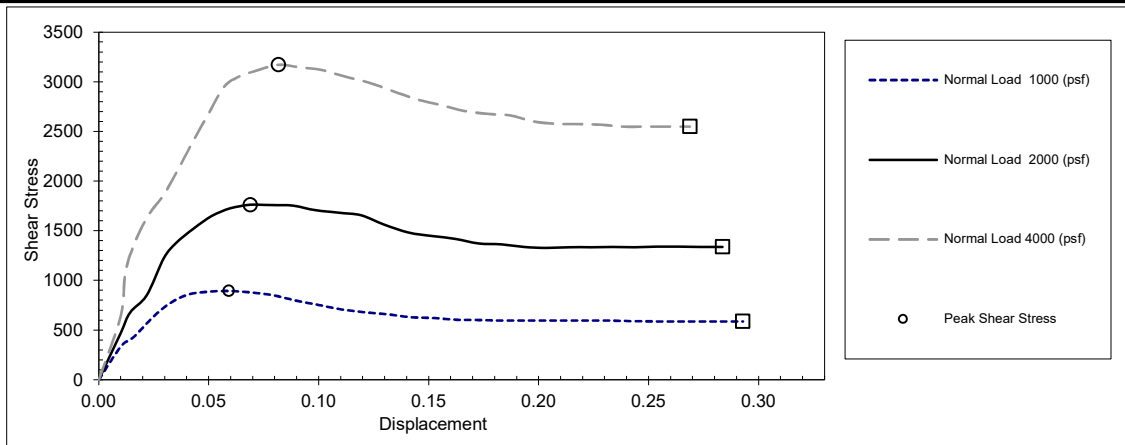
Tech: LB
Project No. 23644

Direct Shear Test Results

APN: 061220101 & -05,
Twentynine Palms

Figure

B-6



Strain Rate = 0.0118 inch/min				Interpreted Shear Strength			
Date Tested: 12/3/2023				Peak		Ultimate	
Boring No.	Sample No.	Depth	UCSC	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-7	1	5	SM	189	36.9	0	32.9
Sample description:				Brown Sand w/ Silt			

NTS
GEOTECHNICAL

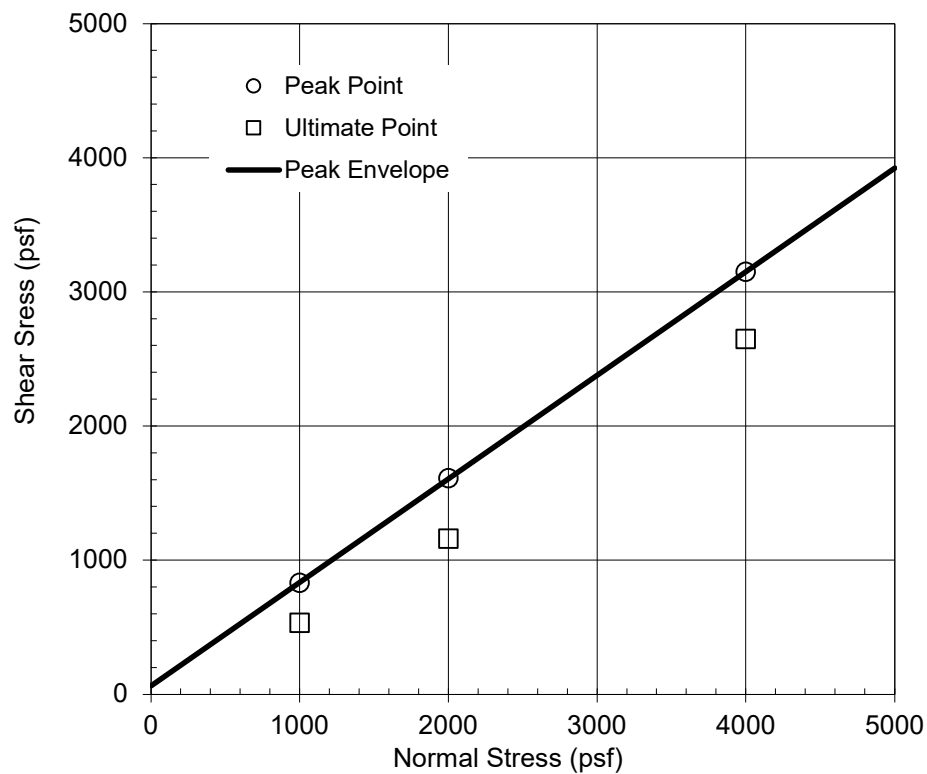
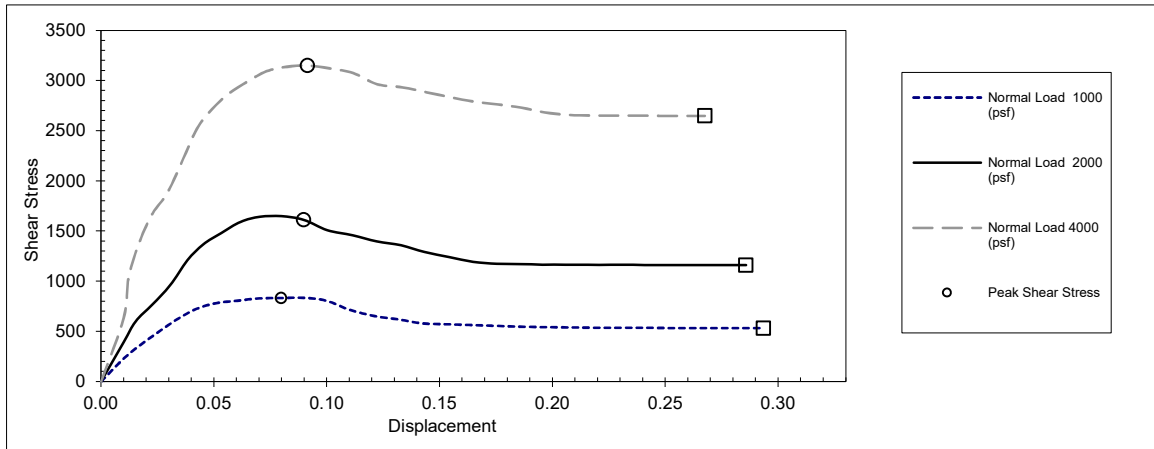
Tech: LB
Project No. 23644

Direct Shear Test Results

**APN: 061220101 & -05,
Twentynine Palms**

Figure

B-7



Strain Rate = 0.0118 inch/min				Interpreted Shear Strength			
Date Tested: 12/1/2023				Peak		Ultimate	
Boring No.	Sample No.	Depth	UCSC	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-10	2	10	SM	63	37.7	0	35.4
Sample description:				Brown Sand w/ Silt			

NTS
GEOTECHNICAL

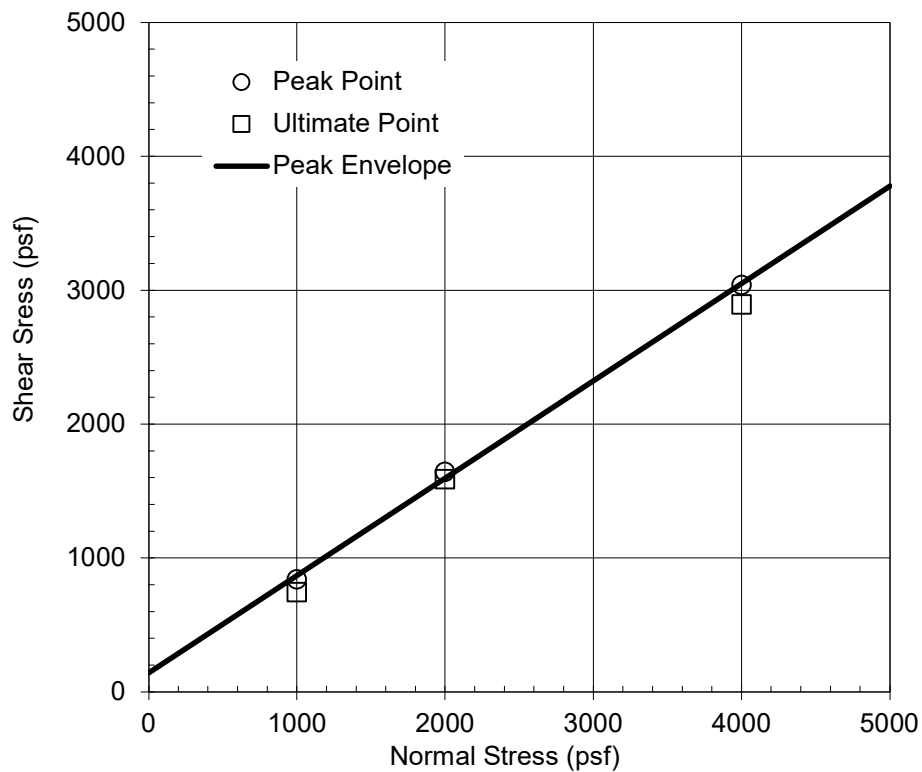
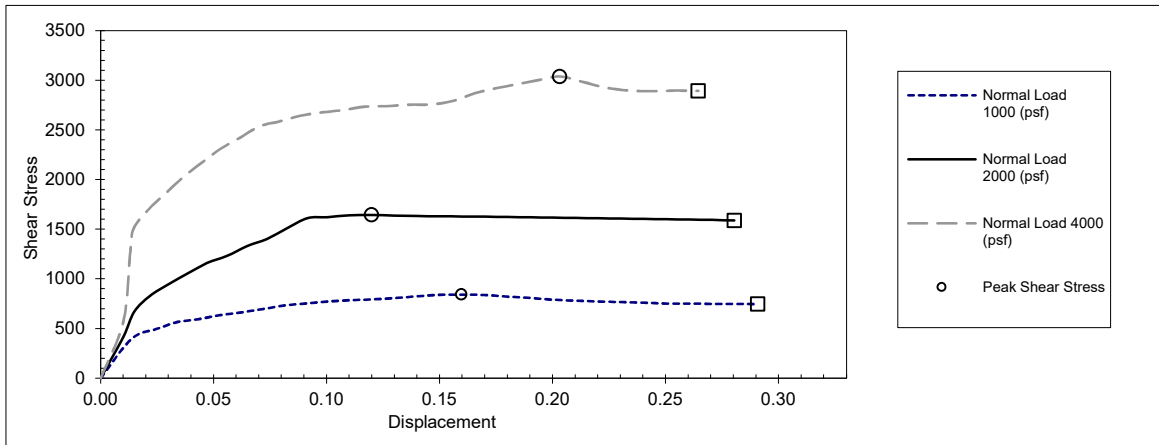
Tech: LB
Project No. 23644

Shear Test Results

**APN: 061220101 & -05,
Twentynine Palms**

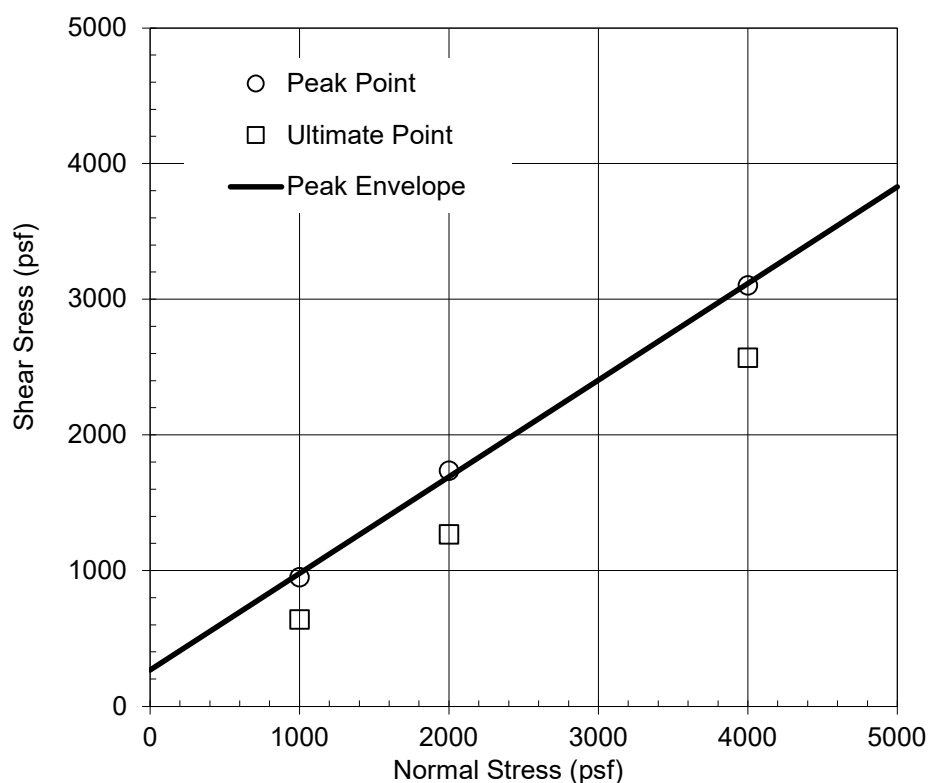
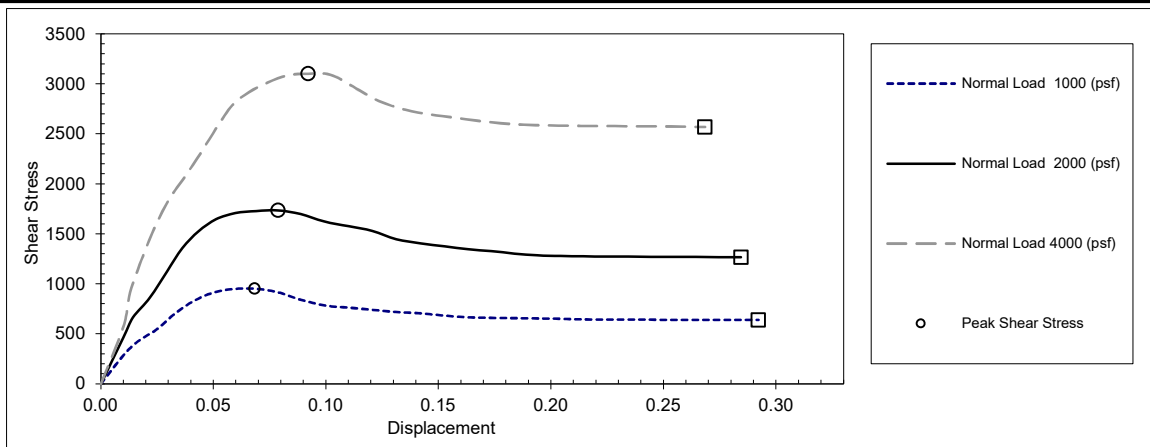
Figure

B-8



Strain Rate = 0.0118 inch/min				Interpreted Shear Strength			
Date Tested: 12/5/2023				Peak		Ultimate	
Boring No.	Sample No.	Depth	UCSC	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-14	1	5'	SM	144	36.0	94	35.3
Sample description:				Brown Sand w/ Silt			

 Tech: LB Project No. 23644	Shear Test Results	Figure
	APN: 061220101 & -05, Twentynine Palms	B-9



Strain Rate = 0.0118 inch/min				Interpreted Shear Strength			
Date Tested: 12/3/2023				Peak		Ultimate	
Boring No.	Sample No.	Depth	UCSC	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-14	2	10	SM	268	35.5	0	32.8
Sample description:				Brown Sand w/ Silt			



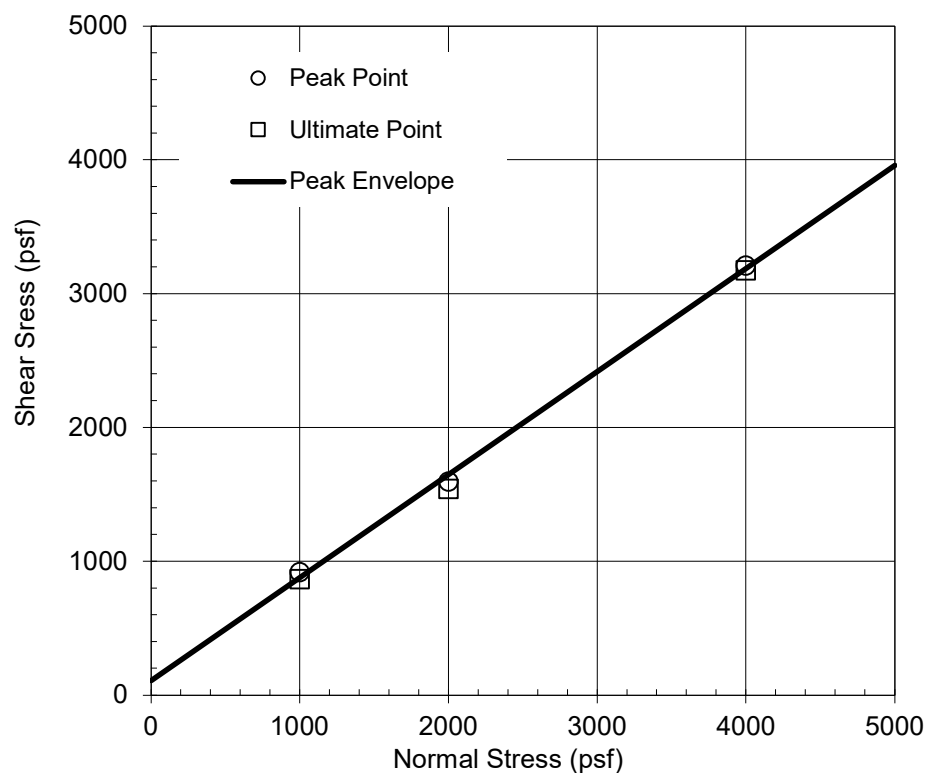
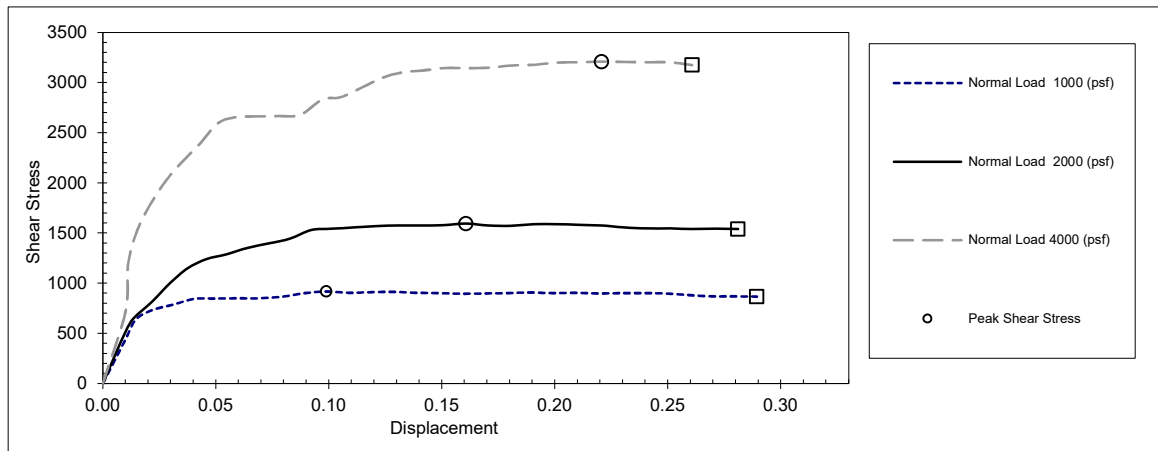
Tech: LB
Project No. 23644

Shear Test Results

APN: 061220101 & -05,
Twentynine Palms

Figure

B-10



Strain Rate = 0.0118 inch/min				Interpreted Shear Strength			
Date Tested: 12/10/2023				Peak		Ultimate	
Boring No.	Sample No.	Depth	UCSC	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-18	1	5'	SM	110	37.6	50	37.8
Sample description:				Brown Sand w/ Silt, Gravel			



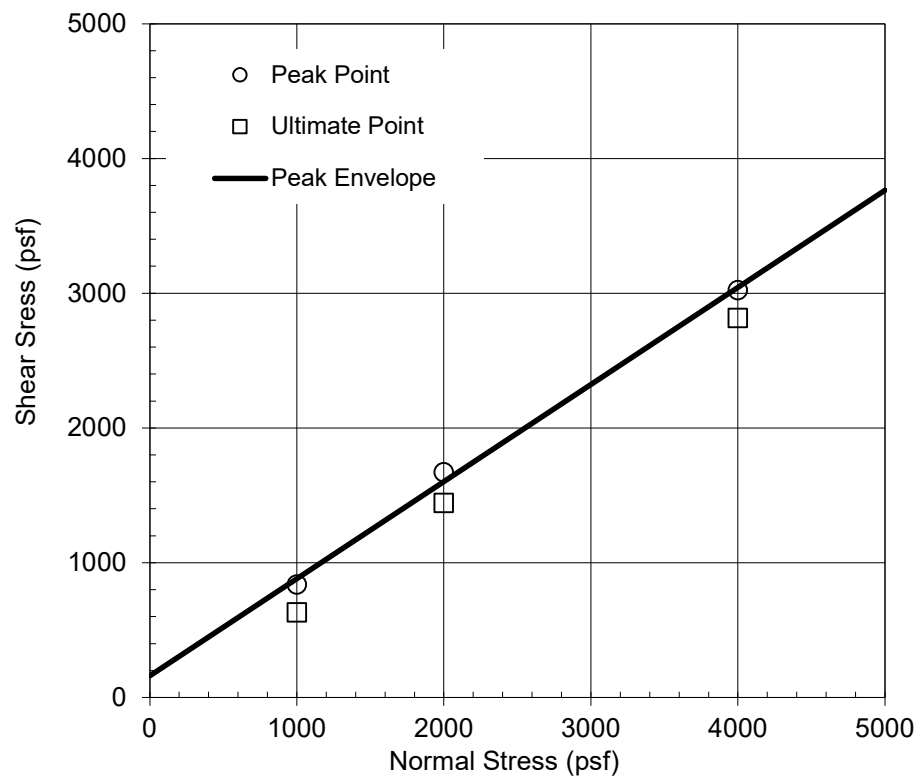
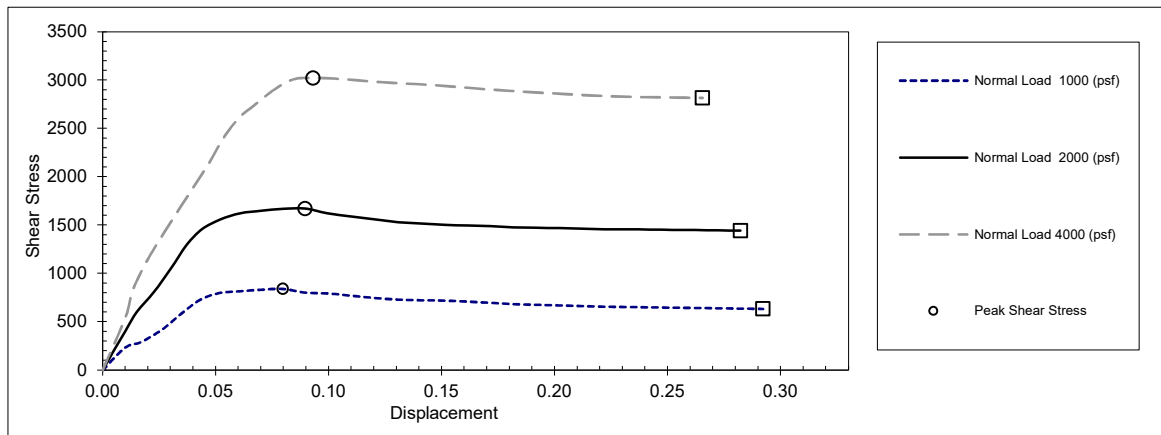
Tech: LB
Project No. 23644

Shear Test Results

**APN: 061220101 & -05,
Twentynine Palms**

Figure

B-11



Strain Rate = 0.0118 inch/min				Interpreted Shear Strength			
Date Tested: 12/7/2023				Peak		Ultimate	
Boring No.	Sample No.	Depth	UCSC	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-20	1	5	SM	163	35.8	0	35.8
Sample description: Brown Silty Sand							



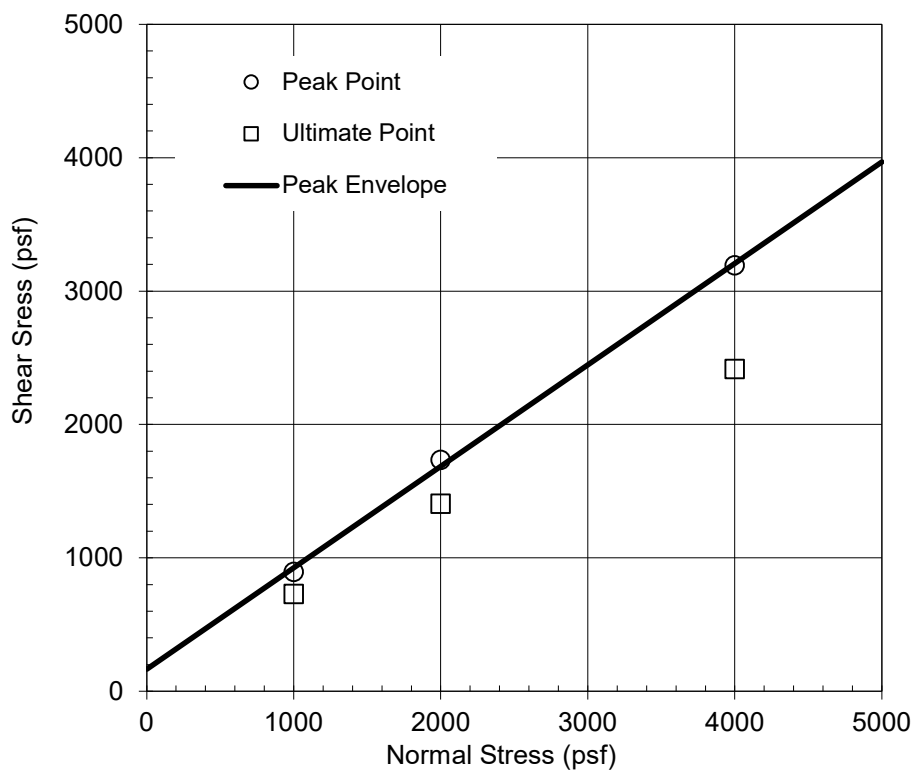
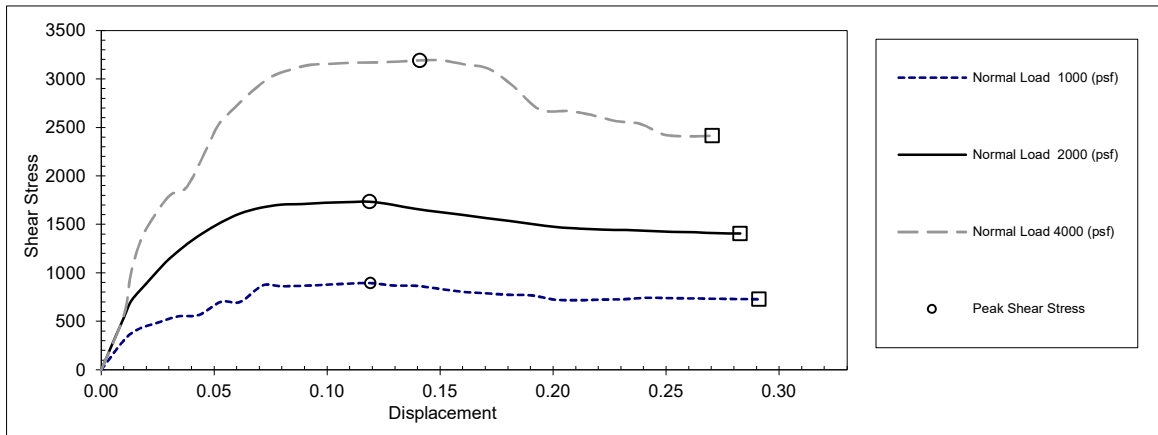
Tech: LB
Project No. 23644

Shear Test Results

**APN: 061220101 & -05,
Twentynine Palms**

Figure

B-12



Strain Rate = 0.0118 inch/min				Interpreted Shear Strength			
Date Tested: 12/9/2023				Peak		Ultimate	
Boring No.	Sample No.	Depth	UCSC	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-22	1	5	SM	167	37.2	223	29.0
Sample description:				Brown Sand w/ Silt, Gravel			



Tech: LB
Project No. 23644

Shear Test Results

APN: 061220101 & -05,
Twentynine Palms

Figure

B-13



Soil Analysis Lab Results

Client: NTS Geotechnical
 Job Name: 29 Palms Solar Panel Plant
 Client Job Number: x
 Project X Job Number: S231201C
 December 8, 2023

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	Depth	Sulfates SO ₄ ²⁻		Chlorides Cl ⁻		Resistivity As Rec'd Minimum		pH	Redox	Sulfide S ²⁻	Nitrate NO ₃ ⁻	Ammonium NH ₄ ⁺	Lithium Li ⁺	Sodium Na ⁺	Potassium K ⁺	Magnesium Mg ²⁺	Calcium Ca ²⁺	Fluoride F ₂ ⁻	Phosphate PO ₄ ³⁻
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
B-6 Brown Rocky Silty Sand	5.0	10.5	0.0011	8.3	0.0008	234,500	5,427	8.4	155	6.8	9.2	0.1	ND	38.5	4.6	12.6	46.0	ND	2.3
B-8 Brown Silty Sand	5.0	94.3	0.0094	60.5	0.0060	629,800	10,050	8.4	159	1.2	0.4	3.4	ND	72.1	7.3	19.6	80.3	0.1	4.9
B-10 Brown Rocky Silty Sand	5.0	24.0	0.0024	47.3	0.0047	462,300	5,628	8.0	158	0.8	13.0	0.1	ND	43.8	5.4	13.4	60.8	3.3	8.2
B-12 Brown Silty Sand	5.0	5.4	0.0005	10.7	0.0011	368,500	10,050	8.5	155	0.5	1.9	0.6	ND	30.6	4.4	12.6	66.8	0.1	1.2
B-16 Brown Silty Fine Sand	5.0	14.5	0.0015	13.0	0.0013	415,400	5,762	8.2	159	0.2	15.6	1.7	ND	28.9	6.1	9.9	60.8	0.3	3.8
B-19 Brown Silty Sand	5.0	6.2	0.0006	17.4	0.0017	281,400	10,050	8.1	157	0.2	3.1	1.8	ND	25.8	4.6	8.7	60.5	0.6	ND
B-23 Brown Silty Fine Sand	5.0	3.4	0.0003	11.2	0.0011	388,600	10,720	8.2	155	1.8	2.5	0.8	ND	20.7	3.4	8.5	67.7	0.1	1.0
B-25 Brown Silty Fine Sand	5.0	55.1	0.0055	36.2	0.0036	509,200	10,720	8.1	154	0.6	2.7	3.3	ND	49.0	5.0	11.1	97.1	1.0	1.3

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
 mg/kg = milligrams per kilogram (parts per million) of dry soil weight
 ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
 Chemical Analysis performed on 1:3 Soil-To-Water extract
 PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops which is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.