APPENDIX E: Geotechnical Report

Available on the City of Twentynine Palms Website:

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GEOTECHNICAL INVESTIGATION
PROPOSED LUXURY OUTDOOR RESORT
APN 0614-121-15
TWENTYNINE PALMS HIGHWAY
TWENTYNINE PALMS, CALIFORNIA

-Prepared By-

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December 18, 2023

Project No. 544-23355
23-12-620

29 Palms Hotel, LLC
4605 Post Oak Place Drive, Suite 280
Houston, Texas 77027

Subject: Geotechnical Investigation

Project: Proposed Luxury Outdoor Resort
APN 0614-121-15
Twentynine Palms Highway
Twentynine Palms, California

Sladden Engineering is pleased to present the results of the geotechnical investigation performed for the luxury outdoor resort proposed for the subject site (APN 0614-121-15) located on the south side of Twentynine Palms Highway (SR 62) between Shoshone Valley Road and Lear Avenue in the City of Twentynine Palms, California. Our services were completed in accordance with our revised proposal for geotechnical engineering services dated October 25, 2023, and your authorization to proceed with the work. The purpose of our investigation was to explore the subsurface conditions at the site to provide recommendations for foundation design and the design of the various site improvements. Evaluation of environmental issues and hazardous wastes was not included within the scope of services provided.

The opinions, recommendations and design criteria presented in this report are based on our field exploration program, laboratory testing and engineering analyses. Based on the results of our investigation, it is our professional opinion that the proposed project should be feasible from a geotechnical perspective provided that the recommendations presented in this report are implemented in design and carried out through construction.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
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GEOTECHNICAL INVESTIGATION
PROPOSED LUXURY OUTDOOR RESORT
APN 0614-121-15
TWENTYNINE PALMS HIGHWAY
TWENTYNINE PALMS, CALIFORNIA

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INTRODUCTION

This report presents the results of the geotechnical investigation performed by Sladden Engineering (Sladden) for the luxury outdoor resort proposed for the subject site (APN 0614-121-15) located on the south side of Twentynine Palms Highway (SR 62) between Shoshone Valley Road and Lear Avenue in the City of Twentynine Palms, California. The site is located at approximately 34.1343 degrees north latitude and 116.1482 degrees west longitude. The approximate location of the site is indicated on the Site Location Map (Figure 1).

Our investigation was conducted to evaluate the engineering properties of the subsurface materials, to evaluate their *in-situ* characteristics, and to provide engineering recommendations and design criteria for site preparation, foundation design and the design of various site improvements. This study also includes a review of published and unpublished geotechnical and geological literature regarding seismicity at and near the subject site.

PROJECT DESCRIPTION

Based on the provided Site Plan (BW, 2023), it is our understanding that the project will consist of constructing an outdoor resort consisting of approximately 130 detached cabins, employee housing, two (2) lodges, a swimming pool, amenity spaces, and an outdoor native garden area. Concrete flatwork, landscape areas, and various associated site improvements are also anticipated. The new resort will be serviced by an on-site sewage disposal system consisting of septic tank(s), seepage pits and an advanced treatment package plant. For our analyses, we expect that the proposed structures will consist of relatively lightweight wood-frame or light gauge steel frame structures supported on conventional shallow spread footings and concrete slab-on-grade.

Grading plans and finished floor elevations were not available at the time of this report. Sladden expects that grading will consist of minor cuts and fills to attain the design pad elevations. This does not include the recommended over-excavation and re-compaction of the surface soil within the building areas. Upon completion of the project plans, Sladden should be retained to confirm that the recommendations presented within this report are incorporated into the design and construction of the proposed project.

Structural foundation loads were not available at the time of this report. Based on our experience with relatively lightweight wood-frame or light gauge steel frame structures, we expect that isolated column loads will be less than 20 kips and continuous wall loads will be less than 2.0 kips per linear foot. If these assumed loads vary significantly from the actual loads, we should be consulted to verify the applicability of the recommendations provided.

SCOPE OF SERVICES

The purpose of our investigation was to determine specific engineering characteristics of the surface and near-surface soil to develop foundation design criteria and recommendations for site preparation. Specifically, our site characterization consisted of the following tasks:

- Site reconnaissance to assess the existing surface conditions on and adjacent to the site.
- Excavating eighteen (18) exploratory bores/percolation test holes to depths between approximately 5 and 50 feet below the existing ground surface (bgs) to characterize the near-surface soil conditions. Representative samples of the soil were classified in the field and retained for laboratory testing and engineering analyses.
- Performing laboratory testing on selected samples to evaluate their engineering characteristics.
- Reviewing geologic literature and discussing geologic hazards.
- Performing engineering analyses to develop recommendations for foundation design and site preparation.
- The preparation of this report summarizing our work at the site.

SITE CONDITIONS

The sites are formally identified by the County of San Bernardino as APN 0614-121-15 and occupies approximately 151.53 acres. At the time of our investigation, the majority of the property was vacant and occupied by scattered low-growth native vegetation. The northeastern portion of the property was occupied by discontinuous curb and gutter concrete sections constructed during a previously proposed project. Two (2) water tanks are mapped adjacent to the southeastern property corner and a well site is mapped adjacent to the northeast property corner. The subject property is near the elevation of the adjacent properties and roadways and is generally bounded by an undeveloped parcel to the south, Lear Avenue (if projected) to the west, Twentynine Palms Highway (SR 62) to the north and Shoshone Valley Drive to the immediate east.

Based on our review of the Sunfair 7.5-Minute Quadrangle Maps (USGS, 2018), the site is situated at elevations ranging from approximately 2,600 to 2,500 feet above mean sea level (MSL). Surface gradients on the site descend to the north at inclinations of ten horizontal to one vertical (10H:1V) and less.

No natural ponding of water or surface seeps were observed at or near the site during our investigation conducted on December 6 and December 7, 2023. Site drainage appears to be controlled via sheet flow and surface infiltration. No significant drainage courses were identified on the site during our field investigation.

GEOLOGIC SETTING

The site is located within the Transverse Ranges Geomorphic province. The Transverse Ranges are characterized by roughly east-west trending, convergent (north-south compressional) deformational structural features. The convergent deformational features of the Transverse Ranges are a result of north-south crustal shorting due to plate tectonics, local folding and uplifting of the mountains, and lowering of the intervening valleys, along with propagation of thrust faults (including blind thrusts) and infilling of the valley basins with sediments. The Transverse Ranges are considered to be one of the most rapidly rising orogenic regions on Earth.

The site has been mapped by Dibblee (1968) to be immediately underlain by alluvium (Qa). The regional geologic setting for the site vicinity is presented on the Regional Geologic Map (Figure 2).

SUBSURFACE CONDITIONS

The subsurface conditions at the site were investigated by excavating eighteen (18) exploratory boreholes/percolation test holes to depths between approximately 5 and 50 feet bgs The approximate exploratory locations are illustrated on the Exploration Location Plan (Figure 3). The boreholes were advanced using a truck-mounted drill rig (Mobile B-61) equipped with 8-inch outside diameter hollow stem augers. A representative of Sladden was on-site to log the materials encountered and retrieve samples for laboratory testing and engineering analyses.

During our field investigation, native alluvium consisting of interbedded silty sand (SM) and sand (SW-SM) were encountered to the maximum explored depth of 50 feet bgs. Generally, the alluvial materials appeared light brown to strong brown, dry, loose to dense, and fine- to coarse-grained.

The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples. The final logs are included in Appendix A of this report. The stratification lines represent the approximate boundaries between soil types although the transitions may be gradual.

Groundwater was not encountered during our field investigation to the maximum explored depth of 50 feet bgs. Information regarding the approximate depth to groundwater provided by the California Department of Water Resources online database indicates that the depth to groundwater is in excess of 150 feet below the existing ground surface in the vicinity of the site. The following table provides a summary of the recorded groundwater depths in the project vicinity.

TABLE 1
GROUNDWATER DEPTHS

STATE WELL	LAT/LONG	DISTANCE (KM)	DATE	DEPTH (FT)
01N08E33J001S	34.1253/-116.1469	1.00	03/28/2008	417.94
01N08E34M001S	34.1252/-116.1413	1.19	09/20/2007	303.77
01N08E34N001S	34.1227/-116.1388	1.55	04/26/2006	242.69
01N08E30J001S	34.1416/-116.1793	2.99	02/07/2023	155.62
01N08E30N001S	34.1352/-116.1927	4.11	02/17/1994	307.67
01N08E36H002S	34.1281/-116.0939	5.05	08/31/1993	217.08

SEISMICITY AND FAULTING

The southwestern United States is a tectonically active and structurally complex region, dominated by northwest-trending dextral faults. The faults of the region are often part of complex fault systems, composed of numerous subparallel faults which splay or step from main fault traces. Strong seismic shaking could be produced by any of these faults during the design life of the proposed project.

We consider the most significant geologic hazard to the project to be the potential for moderate to strong seismic shaking that is likely to occur during the design life of the project. The proposed project is located in the highly seismic Southern California region within the influence of several fault systems. A Holocene-active active fault is defined by the State of California as a fault that has exhibited surface displacement within the Holocene time (about the last 11,700 years). A pre-Holocene fault is defined by the State as a fault whose recency of past movement is older than 11,700 years.

As previously stated, the site has been subjected to strong seismic shaking related to active faults that traverse through the region. Some of the more significant seismic events near the subject site within recent times include: M6.0 North Palm Springs (1986), M6.1 Joshua Tree (1992), M7.3 Landers (1992), M6.2 Big Bear (1992), M7.1 Hector Mine (1999) and 7.1 Ridgecrest (2019).

A search of historical earthquakes between 1932 and 2023 has been performed using the ANSS Comprehensive Earthquake Catalog (USGS, 2023a) for earthquakes within a 20-kilometer search radius of the site. The list of historical earthquakes is included within Appendix C.

Table 2 lists the closest known potentially active faults that were generated in part using the Quaternary Fault and Fold Database of the United States (USGS, 2023b), as modified using the fault parameters from The Revised 2002 California Probabilistic Seismic Hazard Maps (Cao et al, 2003), and the Southern Earthquake Data Center (SCEDC, 2023). This table does not identify the probability of reactivation or the on-site effects from earthquakes occurring on any of the other faults in the region.

TABLE 2
CLOSEST KNOWN ACTIVE FAULTS

Fault Name	Distance (Km)	Maximum Event
Pinto Mountain	0.8	7.3
Calico – Hidalgo	3.1	7.3
Camp Rock – Emerson – Copper Mountain	3.9	7.0
Mesquite Lake	11.1	7.3
Pisgah - Bullion	12.8	7.3
Johnson Valley Fault	25.2	7.3
Eureka Peak	21.1	6.4
Burnt Mountain	24.0	6.5
San Andreas Coachella	34.2	7.5

SITE SPECIFIC GROUND MOTION PARAMETERS

Sladden has reviewed the 2022 California Building Code (CBC) and ASCE7-16 and developed site-specific ground motion parameters for the subject site. The project site-specific ground motion parameters are summarized in the following table and included within Appendix D. The project Structural Engineer should verify that all design parameters provided are applicable for the subject project.

TABLE 3
GROUND MOTION PARAMETERS

Latitude / Longitude	34.1343/-116.1482
Risk Category	II
Site Class	D
Code Reference Documents	ASCE 7-16; Chapter 11 & 21

Description	Type	Map Based	Site-Specific
MCE$_R$ Ground Motion (0.2 second period)	S_S	1.861	---
MCE$_R$ Ground Motion (1.0 second period)	S_1	0.697	---
Site-Modified Spectral Acceleration Value	S_{MS}	1.861	**2.150**
Site-Modified Spectral Acceleration Value	S_{M1}	Null	**1.815**
Numeric Seismic Design Value at 0.2 second SA	S_{DS}	1.241	**1.433**
Numeric Seismic Design Value at 1.0 second SA	S_{D1}	Null	**1.210**
Site Amplification Factor at 0.2 second	F_a	1	**1**
Site Amplification Factor at 1.0 second	F_v	Null	**2.5**
Site Peak Ground Acceleration	PGA_M	0.903	**0.837**

GEOLOGIC HAZARDS

The subject site is located in an active seismic zone (Figure 4) and will likely experience strong seismic shaking during the design life of the proposed project. In general, the intensity of ground shaking will depend on several factors including: the distance to the earthquake focus, the earthquake magnitude, the response characteristics of the underlying materials, and the quality and type of construction. Geologic hazards and their relationship to the site are discussed below.

I. Surface Rupture. Surface rupture is expected to occur along preexisting, known active fault traces. However, surface rupture could potentially splay or step from known active faults or rupture along unidentified traces. Based on our review of Dibblee (1968), Jennings (1994), and CDMG (1988), known faults are not mapped on or projecting towards the site. The subject parcel is not located in a State of California delineated fault zone (Figure 4). In addition, no signs of active surface faulting were observed during our review of non-stereo digitized photographs of the site and site vicinity (Google Earth, 2023). Finally, no signs of active surface fault rupture or secondary seismic effects (lateral spreading, lurching etc.) were identified during our field investigation. Therefore, it is our opinion that risks associated with primary surface ground rupture should be considered "low".

II. Ground Shaking. The site has been subjected to past ground shaking by faults that traverse through the region. Strong seismic shaking from nearby active faults is expected to produce strong seismic shaking during the design life of the proposed project. The site-modified peak ground acceleration is estimated to be 0.837g.

III. Liquefaction. Liquefaction is the process in which loose, saturated granular soil loses strength as a result of cyclic loading. The strength loss is a result of a decrease in granular sand volume and a positive increase in pore pressures. Generally, liquefaction can occur if all of the following conditions apply; liquefaction susceptible soil, groundwater within a depth of 50 feet or less, and strong seismic shaking.

Based on the depth to groundwater in the project vicinity, and the relatively dense nature of the alluvial materials underlying the site, risks associated with liquefaction are considered "negligible".

IV. Tsunamis and Seiches. Because the site is situated at an inland location and is not immediately adjacent to any impounded bodies of water, risk associated with tsunamis and seiches is considered "negligible".

V. Slope Failure, Land Sliding, Rock Falls. No signs of slope instability in the form of landslides, rock falls, earthflows or slumps were observed at or near the subject site. The site is located on relatively level ground and not immediately adjacent to any hillsides. Based on our field observations of the site vicinity, risks associated with slope instability should be considered "negligible".

VI. Expansive Soil. Generally, the surface soil consists of sand (SM/SW). Based on the results of our laboratory testing (EI=0), the materials underlying the site are considered to have a "negligible" expansion potential.

VII. Static Settlement. Static settlement resulting from the anticipated foundation loads should be tolerable provided that the recommendations included in this report are considered in foundation design and construction. The ultimate static settlement is expected to be less than 1 inch when using the recommended allowable bearing pressures. As a practical matter, differential static settlement between footings can be assumed as one-half of the total settlement.

VIII. Subsidence. Land subsidence can occur in valleys where aquifer systems have been subjected to extensive groundwater pumping, such that groundwater pumping exceeds groundwater recharge. Generally, pore water reduction can result in a rearrangement of skeletal grains and could result in elastic (recoverable) or inelastic (unrecoverable) deformation of an aquifer system.

Locally, no fissures or other surficial evidence of subsidence were observed at or near the subject site. The potential for subsidence-related settlement is considered "negligible".

IX. Debris Flows. Debris flows are viscous flows consisting of poorly sorted mixtures of sediment and water and are generally initiated on slopes steeper than approximately six horizontal to one vertical (6H:1V) (Boggs, 2001). Based on the gently sloping nature of the site and the composition of the surface soil, we judge that the risks associated with debris flows should be considered "negligible".

X. Flooding and Erosion. No signs of flooding or erosion were observed during our field investigation. The project site is located within a "Zone X" flood designation (Figure 5) Risks associated with flooding and erosion should be evaluated and mitigated by the project design Civil Engineer.

CONCLUSIONS

Based on the results of our investigation, it is our professional opinion that the project should be feasible from a geotechnical perspective provided that the recommendations provided in this report are incorporated into design and carried out through construction. The main geotechnical concern is the presence of loose and potentially compressible near-surface soil throughout the subject site.

We recommend that remedial grading within the proposed building areas include over-excavation and re-compaction of all loose native soil encountered during grading. Specific recommendations for site preparation are presented in the Earthwork and Grading section of this report.

Caving did occur to varying degrees within each of our exploratory bores and the surface soil may be susceptible to caving within deeper excavations. All excavations should be constructed in accordance with the normal CalOSHA excavation criteria. On the basis of our observations of the materials encountered, we anticipate that the subsoil will conform to that described by CalOSHA as Type C. Soil conditions should be verified in the field by a "Competent person" employed by the Contractor.

The following recommendations present more detailed design criteria that have been developed on the basis of our field and laboratory investigation.

EARTHWORK AND GRADING

All earthwork including excavation, backfill and preparation of the primary foundation and/or slab bearing soil should be performed in accordance with the geotechnical recommendations presented in this report and portions of the local regulatory requirements, as applicable. All earthwork should be performed under the observation and testing of a qualified soil engineer. The following geotechnical engineering recommendations for the proposed project are based on observations from the field investigation program, laboratory testing and geotechnical engineering analyses.

a. Site Clearing: Areas to be graded should be cleared of any existing vegetation, root systems, underground utilities and debris. All areas scheduled to receive fill should be cleared of old fills and any irreducible matter. The unsuitable materials should be removed off site. Voids left by obstructions should be properly backfilled in accordance with the compaction recommendations of this report.

b. Preparation of Building Areas: To provide firm and uniform foundation bearing conditions, we recommend over-excavation and re-compaction throughout the proposed new building areas. All artificial fill soil and low-density near-surface native soil should be removed to a depth of approximately 3 feet below existing grade or 2 feet below the bottom of the footings, whichever is deeper. Remedial grading should extend laterally a minimum of five feet beyond the building perimeter. The native soil exposed by over-excavation should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction prior to fill placement. The previously removed soil may then be replaced as engineered fill as recommended below.

c. Compaction: Soil to be used as engineered fill should be free of organic material, debris, and other deleterious substances, and should not contain irreducible matter greater than three inches in maximum dimension. All fill materials should be placed in thin lifts, not exceeding six inches in a loose condition. If import fill is required, the material should be of a low to non-expansive nature and should meet the following criteria:

Plastic Index	Less than 12
Liquid Limit	Less than 35
Percent Soil Passing #200 Sieve	Between 15% and 35%
Maximum Aggregate Size	3 inches

The subgrade soil and all fill material should be compacted with acceptable compaction equipment to at least 90 percent relative compaction. The exposed subgrade soil should be observed by a representative of Sladden Engineering prior to fill placement. Compaction testing should be performed on all lifts in order to ensure proper placement of the fill materials. Table 4 provides a summary of the excavation and compaction recommendations.

TABLE 4
SUMMARY OF RECOMMENDATIONS

*Remedial Grading	Over-excavation and re-compaction within the building envelope and extending laterally 5 feet beyond the building limits and to a minimum depth of 3 feet below existing grade or 2 feet below the bottom of the footings, whichever is deeper.
Native / Import Engineered Fill	Place in thin lifts not exceeding 6 inches in a loose condition, compact to a minimum of 90 percent relative compaction within 2 percent of the optimum moisture content.

*Actual depth may vary and should be determined by a representative of Sladden Engineering in the field during construction.

d. Shrinkage and Subsidence: Volumetric shrinkage of the material that is excavated and replaced as controlled compacted fill should be anticipated. We expect that this shrinkage should be between 10 and 20 percent. Subsidence of the surfaces that are scarified and compacted is expected to be between 1 tenth and 2 tenths of a foot. This will vary depending upon the type of equipment used, the moisture content of the soil at the time of grading and the actual degree of compaction attained.

CONVENTIONAL SHALLOW SPREAD FOOTINGS

Conventional shallow spread footings are expected to provide adequate support for the proposed structures. All footings should be founded upon properly compacted engineered fill soil and should have a minimum embedment depth of 12 inches measured from the lowest adjacent finished grade. Continuous and isolated pad footings should have minimum widths of 12 inches and 24 inches, respectively. Continuous and isolated pad footings supported upon properly compacted engineered fill soil may be designed using allowable bearing pressures of 1800 and 2000 pounds per square foot (psf), respectively. Allowable increases of 200 psf for each additional 1 foot of width and 250 psf for each additional 6 inches of depth may be used if desired. The maximum allowable bearing pressure should be 3,000 psf. The allowable bearing pressures apply to combined dead and sustained live loads. The allowable bearing pressures may be increased by one-third when considering transient live loads, including seismic and wind forces.

Based on the recommended allowable bearing pressures, the total static settlement of the conventional shallow spread footings is anticipated to be less than one-inch provided that foundation area preparation conforms to the recommendations included in this report. Static differential settlement is anticipated to be approximately one-half of the total static settlement for similarly loaded footings spaced up to approximately 50 feet apart.

Lateral load resistance for the shallow spread footings will be developed by passive pressure against the sides of the footings below grade and by friction acting at the base of the footings. An allowable passive pressure of 250 psf per foot of depth may be used for design purposes. An allowable coefficient of friction 0.45 may be used for dead and sustained live loads to compute the frictional resistance of the footing placed directly on compacted fill. Under seismic and wind loading conditions, the passive pressure and frictional resistance may be increased by one-third.

All footing excavations should be observed by a representative of the project geotechnical consultant to verify adequate embedment depths prior to placement of forms, steel reinforcement or concrete. The excavations should be trimmed neat, level and square. All loose, disturbed, sloughed or moisture-softened soils and/or any construction debris should be removed prior to concrete placement. Excavated soil generated from footing and/or utility trenches should not be stockpiled within the building envelope or in areas of exterior concrete flatwork. All footings should be reinforced in accordance with the project Structural Engineer's recommendations.

SLABS-ON-GRADE

To provide uniform and adequate support, concrete slabs-on-grade should be placed on properly compacted engineered fill soil as outlined in the previous sections of this report. The slab subgrade should remain near optimum moisture content and should not be permitted to dry prior to concrete placement. Slab subgrades should be firm and unyielding. Disturbed soil should be removed and replaced with engineered fill soil compacted to a minimum of 90 percent relative compaction.

Slab thickness and reinforcement should be determined by the Structural Engineer. We recommend a minimum slab thickness of 4.0 inches and minimum reinforcement of #3 bars at 24 inches on center in both directions. All slab reinforcement should be supported on concrete chairs to ensure that reinforcement is placed at slab mid-height. Final floor slab design and reinforcement should be determined by the Structural Engineer.

Slabs with moisture sensitive surfaces should be underlain with a moisture vapor retarder consisting of a polyvinyl chloride membrane such as 10-mil visqueen, or equivalent. All laps within the membrane should be sealed and at least 2 inches of clean sand should be placed over the membrane to promote uniform curing of the concrete. To reduce the potential for punctures, the membrane should be placed on a pad surface that has been graded smooth without any sharp protrusions. If a smooth surface can not be achieved by grading, consideration should be given to placing a thin leveling course of sand across the pad surface prior to placement of the membrane.

PRELIMINARY PAVEMENT DESIGN

Asphalt concrete pavements should be designed in accordance with Caltrans Highway Design Manual based on R-Value and Traffic Index. An R-Value of 50 was assumed to develop the following preliminary pavement design sections. For Pavement design, a Traffic Index (TI) of 5.5 was used for the on-site pavement limited to automobile traffic and 6.5 was used when considering heavy duty pavement. We assumed Asphalt Concrete (AC) over Class II Aggregate Base (AB). The preliminary flexible pavement design is as follows:

ON-SITE ASPHALT PAVEMENT SECTION LAYER THICKNESS

Pavement Material	**Recommended Thickness**	
	TI = 5.5 (Light Duty)	**TI = 6.5 (Heavy Duty)**
Asphalt Concrete Surface Course	3.0 inches	3.0 inches
Class II Aggregate Base Course	4.0 inches	6.0 inches
Compacted Subgrade Soil	12.0 inches	12.0 inches

Asphalt concrete should conform with the Standard Specifications for Public Works Construction ("Greenbook") or CalTrans. Class II aggregate base should conform to Greenbook or Caltrans Standard Specifications. The aggregate base material should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557.

RETAINING WALLS

Minor retaining walls may be required to accomplish the proposed construction. Cantilever retaining walls may be designed using "active" pressures. Active pressures may be estimated using an equivalent fluid weight of 35 pcf for gently sloping (less than 3H:1V) native backfill soil acting in a triangular pressure distribution with drained backfill conditions. For steeper slopes, an active equivalent fluid pressure of 55 pcf should be used. "At Rest" pressures should be utilized for restrained walls. At rest pressures may be estimated using an equivalent fluid weight of 55 pcf for native backfill soil with level drained backfill conditions. At rest pressures should be increased to 75 pcf for sloped backfill conditions.

We recommend that a back drain system be provided behind all retaining walls or that the walls be designed for full hydrostatic pressures. The back drains should consist of a heavy walled, four inch diameter, perforated pipe sloped to drain to outlets by gravity, and of clean, free-draining, three-quarter to one and one-half inch crushed rock or gravel. The crushed rock or gravel should extend to within one foot of the surface. The upper one foot should be backfilled with compacted, fine-grained soil to exclude surface water. A Mirafi 140N (or equivalent) filter cloth should be placed between the on-site native material and the drain rock.

We recommend that the ground surface behind retaining walls be sloped to drain. Under no circumstances should the surface water be diverted into back drains. Where migration of moisture through walls would be detrimental, the walls should be waterproofed.

CORROSION SERIES

The soluble sulfate concentrations of the surface soil were determined to be 40 parts per million (ppm). The native soil falls within the "negligible – S0" sulfate exposure category. The use of Type V cement and special sulfate resistant concrete mixes should not be necessary.

The pH levels of the surface soil was determined to be 7.3 and 8.0. Based on soluble chloride concentration testing (30 ppm) the soil falls within the "negligible – C0" chloride exposure category. The minimum resistivity of the surface soil was found to be 7,000 and 4,600 ohm-cm, which suggests the site soil is considered to have a "low" corrosion potential with respect to ferrous metal installations. A corrosion expert should be consulted regarding appropriate corrosion protection measures for corrosion-sensitive installations.

UTILITY TRENCH BACKFILL

All utility trench backfill should be compacted to a minimum of 90 percent relative compaction. Trench backfill materials should be placed in lifts no greater than six inches in a loose condition, moisture conditioned (or air-dried) as necessary to achieve near optimum moisture content, and mechanically compacted in place to a minimum of 90 percent relative compaction. A representative of the project soil engineer should test the backfill to verify adequate compaction.

EXTERIOR CONCRETE FLATWORK

To minimize cracking of concrete flatwork, the subgrade soil below concrete flatwork areas should first be compacted to a minimum of 90 percent relative compaction. A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soil prior to concrete placement.

DRAINAGE

All final grades should be provided with positive gradients away from foundations to provide rapid removal of surface water runoff to an adequate discharge point. No water should be allowed to be pond on or immediately adjacent to foundation elements. To reduce water infiltration into the subgrade soil, surface water should be directed away from building foundations to an adequate discharge point. Subgrade drainage should be evaluated upon completion of the precise grading plans and in the field during grading.

LIMITATIONS

The findings and recommendations presented in this report are based upon an interpolation of the soil conditions between the exploratory locations and extrapolation of these conditions throughout the proposed building areas. Should conditions encountered during grading appear different than those indicated in this report, this office should be notified.

The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the grading operation by a representative of Sladden Engineering. All recommendations are considered to be tentative pending our review of the grading operation and additional testing, if indicated. If others are employed to perform any soil testing, this office should be notified prior to such testing in order to coordinate any required site visits by our representative and to assure indemnification of Sladden Engineering.

We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

ADDITIONAL SERVICES

Once completed, final project plans and specifications should be reviewed by use prior to construction to confirm that the full intent of the recommendations presented herein have been applied to design and construction. Following the review of plans and specifications, observation should be performed by the Soil Engineer during construction to document that foundation elements are founded on/or extend into the properly compacted soil, and that suitable backfill soil is placed upon competent materials and properly compacted at the recommended moisture content.

Tests and observations should be performed during grading by the Soil Engineer or his representative in order to verify that the grading is being performed in accordance with the project specifications. Field density testing shall be performed in accordance with acceptable ASTM test methods. The minimum acceptable degree of compaction should be 90 percent for engineered fill soil and 95 percent for Class II aggregate base as obtained by ASTM Test Method D1557. Where testing indicates insufficient density, additional compactive effort shall be applied until retesting indicates satisfactory compaction.

REFERENCES

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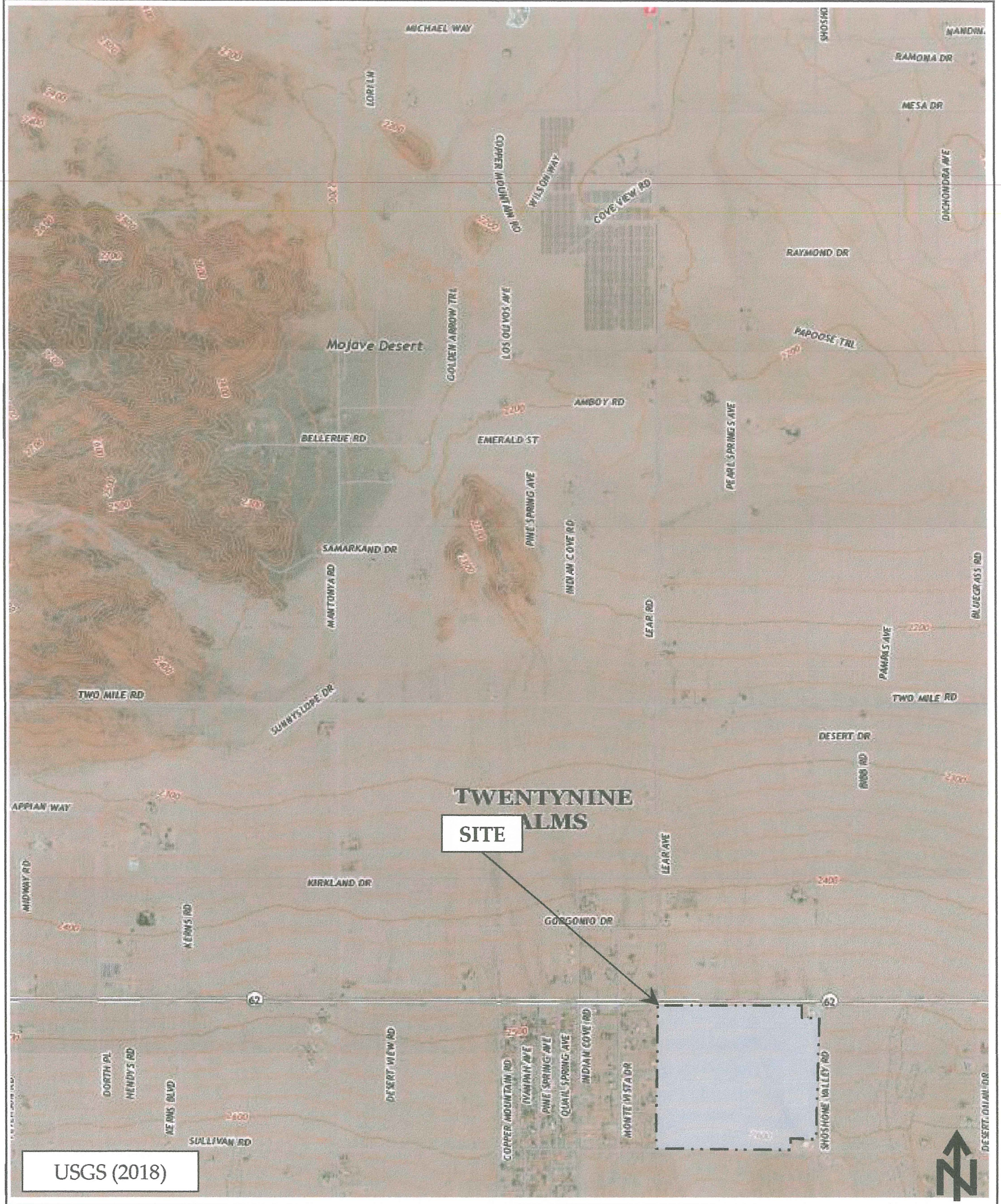
FIGURES



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SITE LOCATION MAP

Project Number: 544-23355

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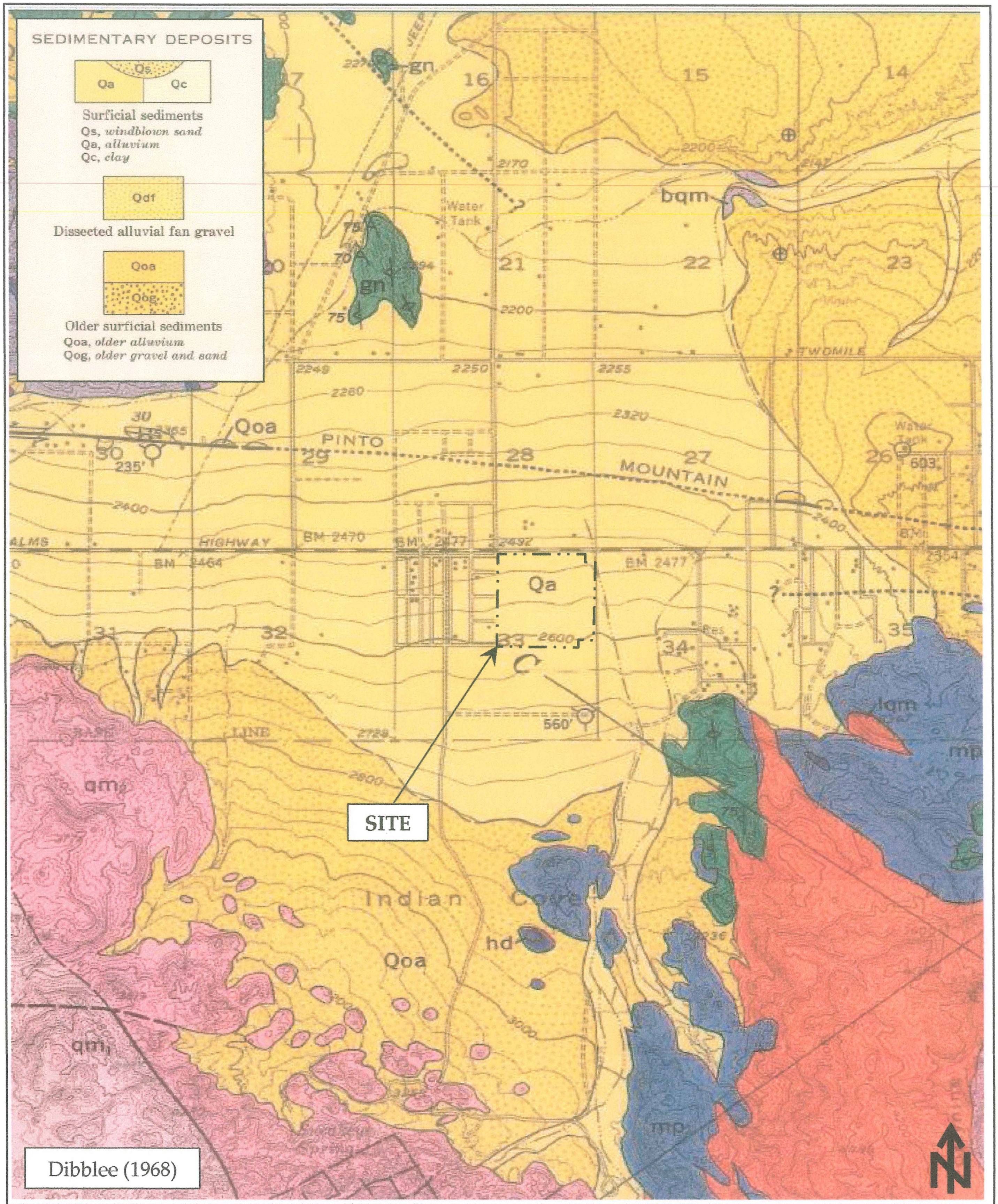
FIGURE

1



Dibblee (1968)

REGIONAL GEOLOGIC MAP

FIGURE

2

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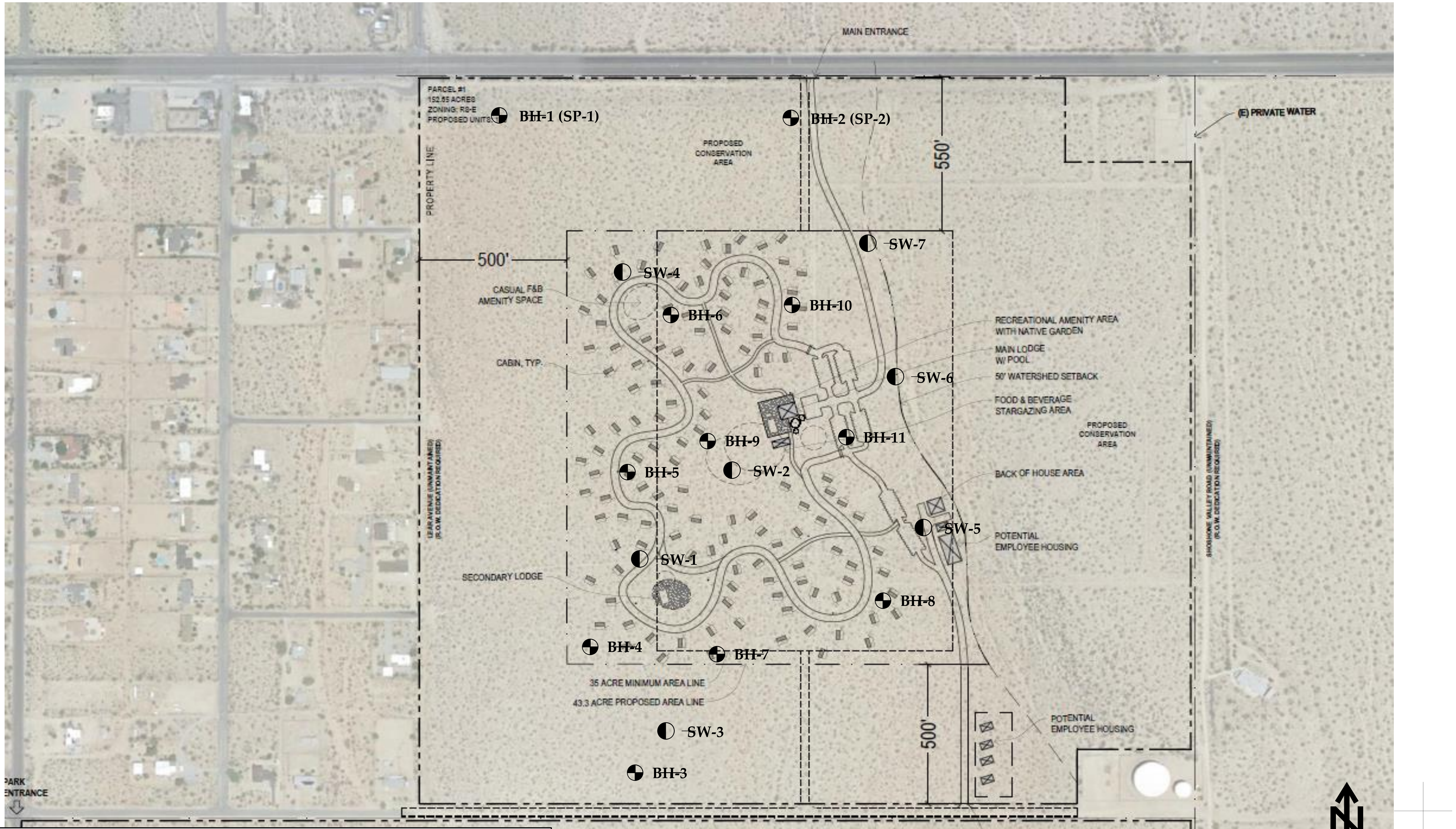

LEGEND

◒ BH-11 (SP-2)	Borehole Location (Seepage Pit Percolation Test Location)
◐ SW-7	Stormwater Percolation Test Location

Sladden Engineering

EXPLORATION LOCATION PLAN

Project Number:	544-23355
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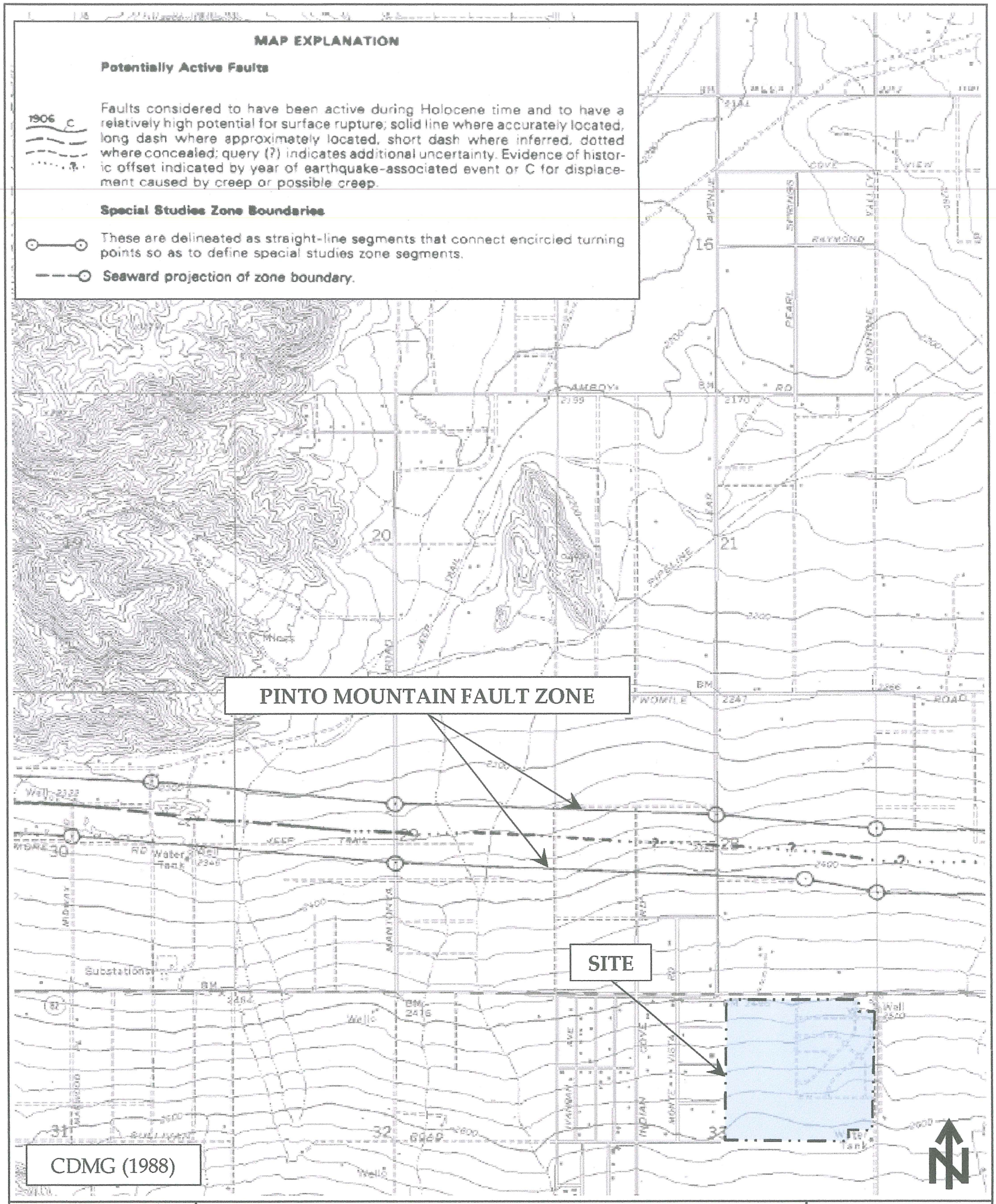
FIGURE

3



MAP EXPLANATION

Potentially Active Faults

Faults considered to have been active during Holocene time and to have a relatively high potential for surface rupture; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep.

Special Studies Zone Boundaries

These are delineated as straight-line segments that connect encircled turning points so as to define special studies zone segments.

Seaward projection of zone boundary.

PINTO MOUNTAIN FAULT ZONE

SITE

CDMG (1988)

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FAULT ZONE MAP

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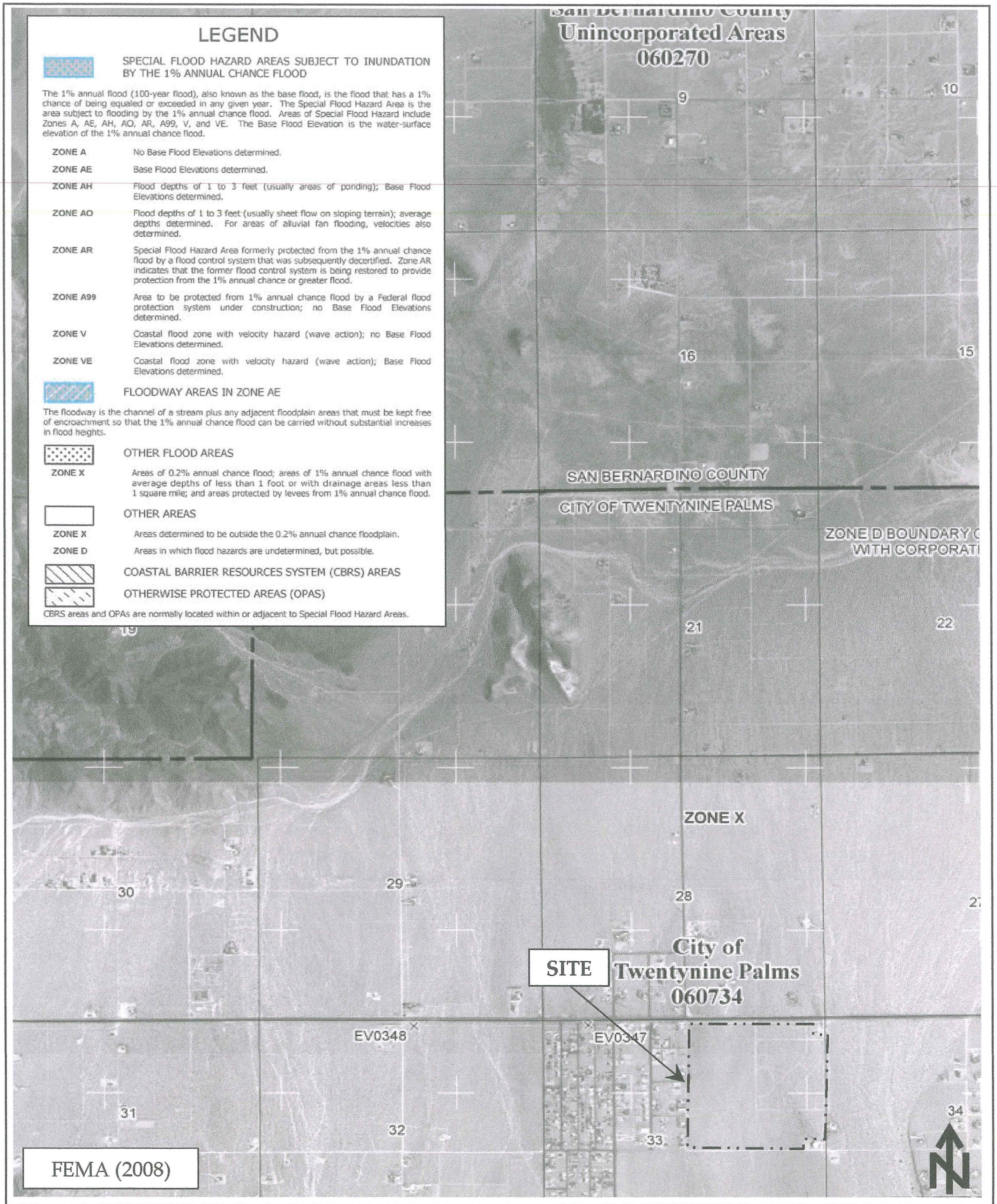
FIGURE

4



LEGEND

▨ SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

▨ OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

☐ OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

▨ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▨ OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

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FLOOD INSURANCE RATE MAP (FIRM)

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FIGURE

5

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

For our field investigation eighteen (18) exploratory bores/percolation test holes were excavated onsite. Continuous logs of the materials encountered were made by a representative of Sladden Engineering. Materials encountered in the test pits and test holes were classified in accordance with the Unified Soil Classification System.

Representative undisturbed samples were obtained within our borings by driving a thin-walled steel penetration sampler (California split spoon sampler) or a Standard Penetration Test (SPT) sampler with a 140 pound automatic-trip hammer dropping approximately 30 inches (ASTM D1586). The number of blows required to drive the samplers 18 inches was recorded in 6-inch increments and blowcounts are indicated on the boring logs.

The California samplers are 3.0 inches in diameter, carrying brass sample rings having inner diameters of 2.5 inches. The standard penetration samplers are 2.0 inches in diameter with an inner diameter of 1.5 inches. Undisturbed samples were removed from the sampler and placed in moisture sealed containers in order to preserve the natural soil moisture content. Bulk samples were obtained from the excavation spoils and samples were then transported to our laboratory for further observations and testing.

Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/6/2023
Elevation:	2505 Ft. MSL	Boring No:	BH-1 (SP-1)

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
■	7 8 10	1	0	11.6	1.8	111.4	2 4		Silty Sand (SM); strong brown, dry, medium dense, fine- to coarse-grained (Qa).
■	6 14 21			12.6	1.6		6 8		Sand (SW-SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
▣	11 13 14			12.6	1.6		10 12 14		Silty Sand (SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
■	15 24 35			11.2	1.4	120.1	16 18		Sand (SW-SM); strong brown, dry, dense, fine- to coarse-grained (Qa).
▣	14 19 19			8.9	2.0		20 22 24		Sand (SW-SM); strong brown, dry, dense, fine- to coarse-grained (Qa).
							26 28 30 32 34 36 38 40 42 44 46 48 50		Silty Sand (SM); strong brown, dry, fine- to coarse-grained (Qa).

Completion Notes:
Terminated at ~50 Feet bgs.
Backfilled to 40 Feet for Percolation Testing
No Bedrock/Groundwater/Seepage Encountered.

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

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Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/6/2023
Elevation:	2505 Ft. MSL	Boring No:	BH-2 (SP-2)

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4		Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
▣	4 5 9			3.9	0.7		6 8		Sand (SW); light brown, dry, medium dense, fine- to coarse-grained (Qa).
■	20 24 27			5.2	0.9	111.9	10 12 14		Sand (SW-SM); light brown, dry, dense, fine- to coarse-grained (Qa).
▣	11 13 17			7.9	1.4		16 18		Sand (SW-SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
■	19 25 34			4.7	0.8	109.5	20 22 24		Sand (SW-SM); light brown, dry, dense, fine- to coarse-grained (Qa).
							26 28 30 32 34 36 38 40 42 44 46 48 50		Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).

Completion Notes:
Terminated at ~50 Feet bgs.
Backfilled to 40 Feet for Percolation Testing
No Bedrock/Groundwater/Seepage Encountered.

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

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Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/6/2023
Elevation:	2,610 Ft. MSL	Boring No:	BH-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4		Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
■	10 15 16			1.4	1.1		6 8		Sand (SP); light brown, dry, medium dense, fine- to coarse-grained (Qa).
◫	7 12 14			6.3	1.1		10 12 14		Sand (SW-SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
■	15 17 23			3.2	0.5		16 18		Sand (SW); light brown, dry, medium dense, fine- to coarse-grained (Qa).
◫	9 12 12			4.5	1.0		20 22		Sand (SW); light brown, dry, medium dense, fine- to coarse-grained (Qa).
							24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~21.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

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Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/6/2023
Elevation:	2,595 Ft. MSL	Boring No:	BH-4

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4	▨	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
■	7 10 10			5.4	1.0		6 8	▨	Sand (SW-SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
■	14 19 23			4.4	0.7		10 12 14	▨	Sand (SW); light brown, dry, medium dense, fine- to coarse-grained (Qa).
■	19 25 26			22.5	2.5		16 18	▨	Silty Sand (SM); light brown, dry, very dense, fine- to coarse-grained (Qa).
■	19 31 36			7.1	1.1	121.6	20	▨	Sand (SW-SM); light brown, dry, very dense, fine - to coarse-grained (Qa).
							22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~21.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

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BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/6/2023
Elevation:	2,565 Ft. MSL	Boring No:	BH-5

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4	░	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
■	13 16 18			6.3	0.9	117.3	6 8	░	Sand (SW-SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
◫	9 12 13			12.4	1.3		10	░	Silty Sand (SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
							12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~11.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED OUTDOOR RESORT
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BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/6/2023
Elevation:	2,540 Ft. MSL	Boring No:	BH-6

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
		2	0				2 4	░	Sand (SW-SM); strong brown, dry, fine- to coarse-grained (Qa).
▮	9 10 11			12.7	1.4		6 8	▒	Silty Sand (SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
■	14 17 10			13.6	1.7	118.7	10 12	▒	Silty Sand (SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
							14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~11.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

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Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/6/2023
Elevation:	2,595 Ft. MSL	Boring No:	BH-7

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2	░	Sand (SW-SM); strong brown, dry, fine- to coarse-grained (Qa).
							4	░	
▣	3 3 4			13.1	1.6		6	░	Silty Sand (SM); strong brown, dry, loose, fine- to coarse-grained (Qa).
							8	░	
■	13 24 25						10	░	No Recovery.
							12	░	
							14		Terminated at ~11.5 Feet bgs. No Bedrock Encountered.
							16		No Groundwater or Seepage Encountered.
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

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BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,580 Ft. MSL	Boring No:	BH-8

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4		Sand (SW-SM); strong brown, dry, fine- to coarse-grained (Qa).
■	12 14 17			8.2	1.0	115.1	6 8		Sand (SW-SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
▣	8 12 19			4.9	0.8		10 12 14		Sand (SW); light brown, dry, dense, fine- to coarse-grained (Qa).
■	12 27 30			10.1	0.8	112.3	16 18		Sand (SW-SM); light brown, dry, dense, fine- to coarse-grained (Qa).
▣	11 15 16			5.7	0.9		20 22		Sand (SW-SM); light brown, dry, dense, fine- to coarse-grained (Qa).
							24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~21.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED OUTDOOR RESORT
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BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,565 Ft. MSL	Boring No:	BH-9

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4	░	Sand (SW-SM); strong brown, dry, fine- to coarse-grained (Qa).
◫	3 6 10			18.7	1.8		6 8	▒	Silty Sand (SM); strong brown, dry, medium dense, fine- to coarse-grained (Qa).
■	15 19 28			8.4	1.1	114.7	10 12 14	░	Sand (SW-SM); light brown, dry, dense, fine- to coarse-grained (Qa).
◫	12 15 17			6.6	1.1		16 18	░	Sand (SW-SM); light brown, dry, dense, fine- to coarse-grained (Qa).
■	20 32 37			6.6	1.1	118.1	20 22	░	Sand (SW-SM); light brown, dry, dense, fine- to coarse-grained (Qa).
							24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~21.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED OUTDOOR RESORT
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BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,535 Ft. MSL	Boring No:	BH-10

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
								░	Sand (SW-SM); strong brown, dry, fine- to coarse-grained (Qa).
							2	░	
							4	░	
■	5 6 8			3.3	0.8			░	Sand (SW); light brown, dry, loose, fine- to coarse-grained (Qa).
							6	░	
							8	░	
							10	░	
◫	7 8 10			3.7	0.8			░	Sand (SW); light brown, dry, medium dense, fine- to coarse-grained (Qa).
							12	░	
							14	░	
■	17 20 25			6.0	1.0	115.0		░	Sand (SW-SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
							16	░	
							18	░	
							20	░	
◫	17 17 17			10.5	1.4			░	Sand (SW-SM); light brown, dry, dense, fine- to coarse-grained (Qa).
							22		
									Terminated at ~21.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

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BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,555 Ft. MSL	Boring No:	BH-11

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
								▨	Sand (SW-SM); strong brown, dry, fine- to coarse-grained (Qa).
							2	▨	
							4	▨	
■	9 10 11			9.3	0.3		6	▨	Sand (SW-SM); light brown, dry, medium dense, fine- to coarse-grained (Qa).
							8		Terminated at ~6.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

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BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/6/2023
Elevation:	2,580 Ft. MSL	Boring No:	SW-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2	░	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
							4	░	
							6		Terminated at ~5.0 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED OUTDOOR RESORT
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BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,570 Ft. MSL	Boring No:	SW-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2	░	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
							4	░	
							6		Terminated at ~5.0 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
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							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

Project No: 544-23355
Report No: 23-12-620

Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,605 Ft. MSL	Boring No:	SW-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2	░	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
							4	░	
							6	░	
							8	░	
							10		
							12		Terminated at ~10.0 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

Project No: 544-23355
Report No: 23-12-620

Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,530 Ft. MSL	Boring No:	SW-4

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4	░	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
							6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~5.0 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

Project No: 544-23355
Report No: 23-12-620

Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,570 Ft. MSL	Boring No:	SW-5

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4	░	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
							6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~5.0 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

Project No:	544-23355	Page	16
Report No:	23-12-620		

Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,545 Ft. MSL	Boring No:	SW-6

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2	░	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
							4	░	
							6		Terminated at ~5.0 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

Project No:	544-23355	Page	17
Report No:	23-12-620		

Sladden Engineering

BORE LOG

Equipment:	Mobile B-61	Date Drilled:	12/7/2023
Elevation:	2,525 Ft. MSL	Boring No:	SW-7

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2 4 6 8 10	░	Silty Sand (SM); light brown, dry, fine- to coarse-grained (Qa).
							12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~10.0 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED OUTDOOR RESORT
TWENTYNINE PALMS HIGHWAY; APN 0614-121-15

Project No: 544-23355
Report No: 23-12-620

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative bulk soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soils underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557, Test Method A. Graphic representations of the results of this testing are presented in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses. This provides information for developing classifications for the soil in accordance with the Unified Soil Classification System which is presented in the preceding appendix. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing is very useful in detecting variations in the soil and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Expansion Testing: Two (2) bulk samples were selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Direct Shear Testing: Two (2) bulk samples were selected for Direct Shear testing. This test measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation design and lateral design. Tests were performed using a recompacted test specimen that was saturated prior to tests. Tests were performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Corrosion Series Testing: The soluble sulfate concentrations of the surface soil were determined in accordance with California Test Method Number (CA) 417. The pH and Minimum Resistivity were determined in accordance with CA 643. The soluble chloride concentrations were determined in accordance with CA 422.

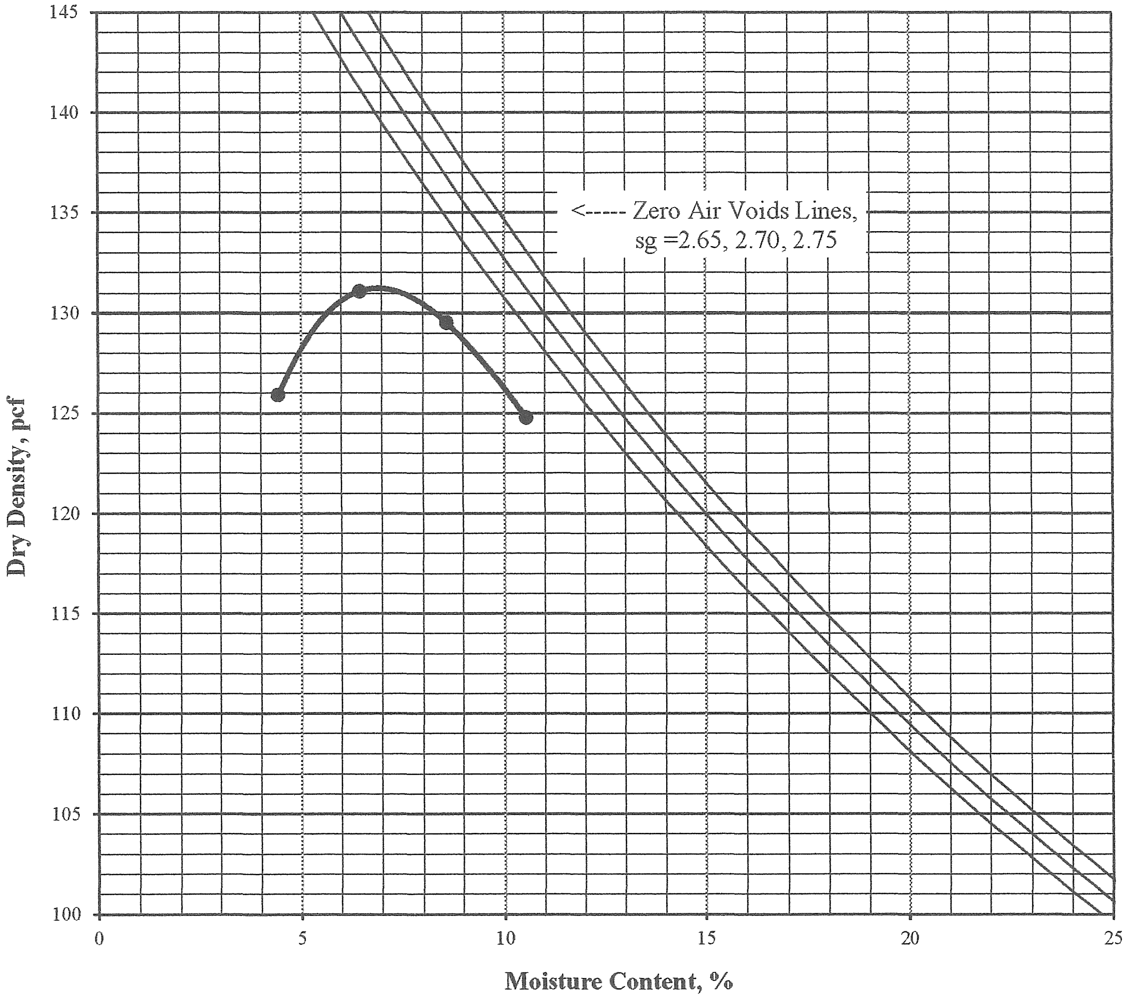
Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number:	544-23355	December 18, 2023
Project Name:	Twentynine Palms Highway	
Lab ID Number:	LN6-23487	ASTM D-1557 A
Sample Location:	BH-1 Bulk 1 @ 0-5'	Rammer Type: Machine
Description:	Red Brown Clayey Sand (SC)	

Maximum Density: **133 pcf**
Optimum Moisture: **7%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	
3/8"	
#4	5.5



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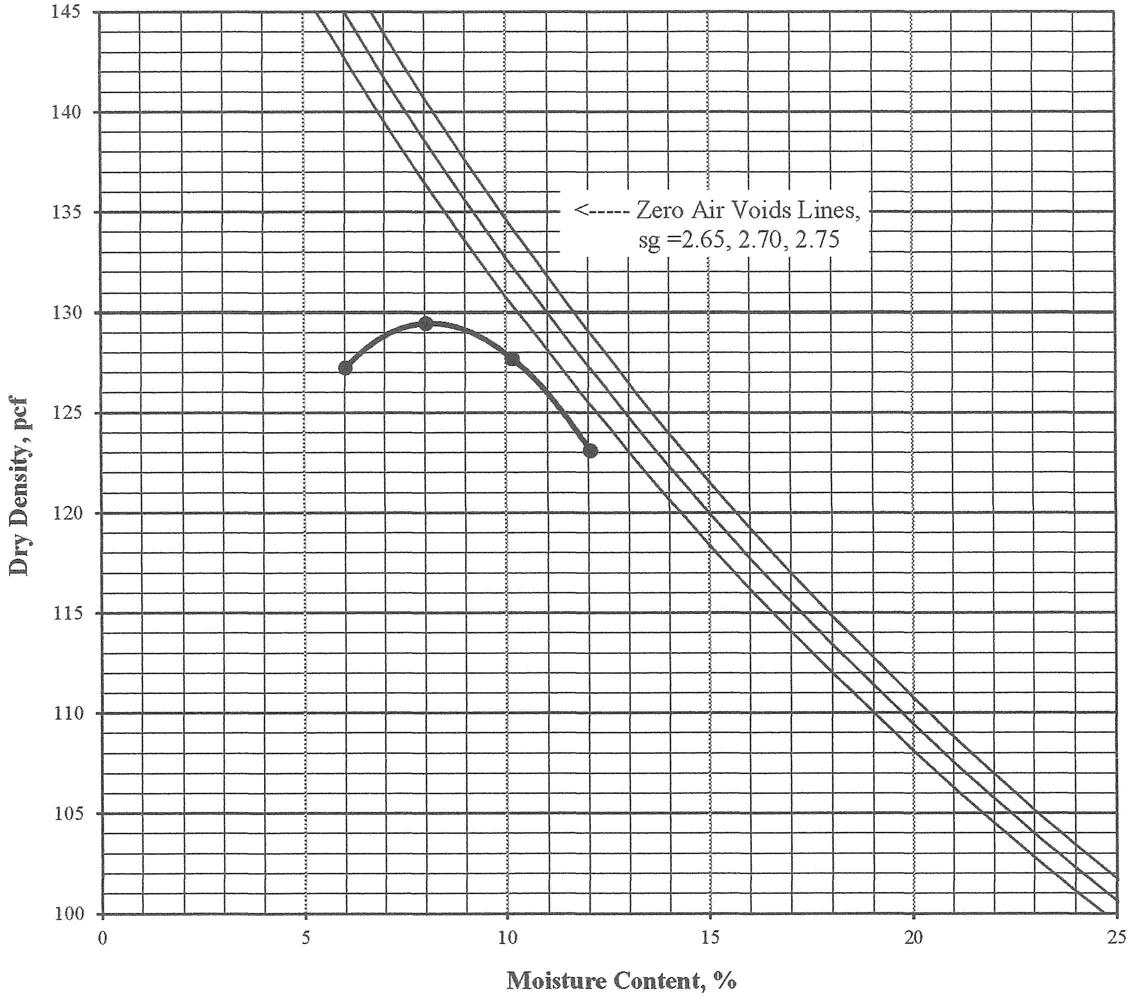
Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number:	544-23355	December 18, 2023
Project Name:	Twentynine Palms Highway	
Lab ID Number:	LN6-23487	ASTM D-1557 A
Sample Location:	BH-6 Bulk 2 @ 0-5'	Rammer Type: Machine
Description:	Light Brown Sand w/Silt (SW-SM)	

Maximum Density: **131 pcf**
Optimum Moisture: **8%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	
3/8"	
#4	5.4



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Expansion Index

ASTM D 4829

Job Number:	544-23355	December 18, 2023
Job Name:	Twentynine Palms Highway	
Lab ID Number:	LN6-23487	
Sample ID:	BH-1 Bulk 1 @ 0-5'	
Soil Description:	Red Brown Clayey Sand (SC)	

Wt of Soil + Ring:	605.5
Weight of Ring:	194.7
Wt of Wet Soil:	410.8
Percent Moisture:	6.5%
Sample Height, in	0.95
Wet Density, pcf:	131.5
Dry Denstiy, pcf:	123.4

% Saturation:	48.1

Expansion **Rack # 2**

Date/Time	12/12/2023	10:40 AM
Initial Reading	0.0000	
Final Reading	0.0000	

Expansion Index **0**

(Final - Initial) x 1000

Expansion Index

ASTM D 4829

Job Number: 544-23355

December 18, 2023

Job Name: Twentynine Palms Highway

Lab ID Number: LN6-23487

Sample ID: BH-6 Bulk 2 @ 0-5'

Soil Description: Light Brown Sand w/Silt (SW-SM)

Wt of Soil + Ring:	592.9
Weight of Ring:	188.5
Wt of Wet Soil:	404.4
Percent Moisture:	7.3%
Sample Height, in	0.95
Wet Density, pcf:	129.4
Dry Denstiy, pcf:	120.6

% Saturation:	49.6

Expansion **Rack # 2**

Date/Time	12/14/2023	2:20 PM
Initial Reading	0.0000	
Final Reading	0.0000	

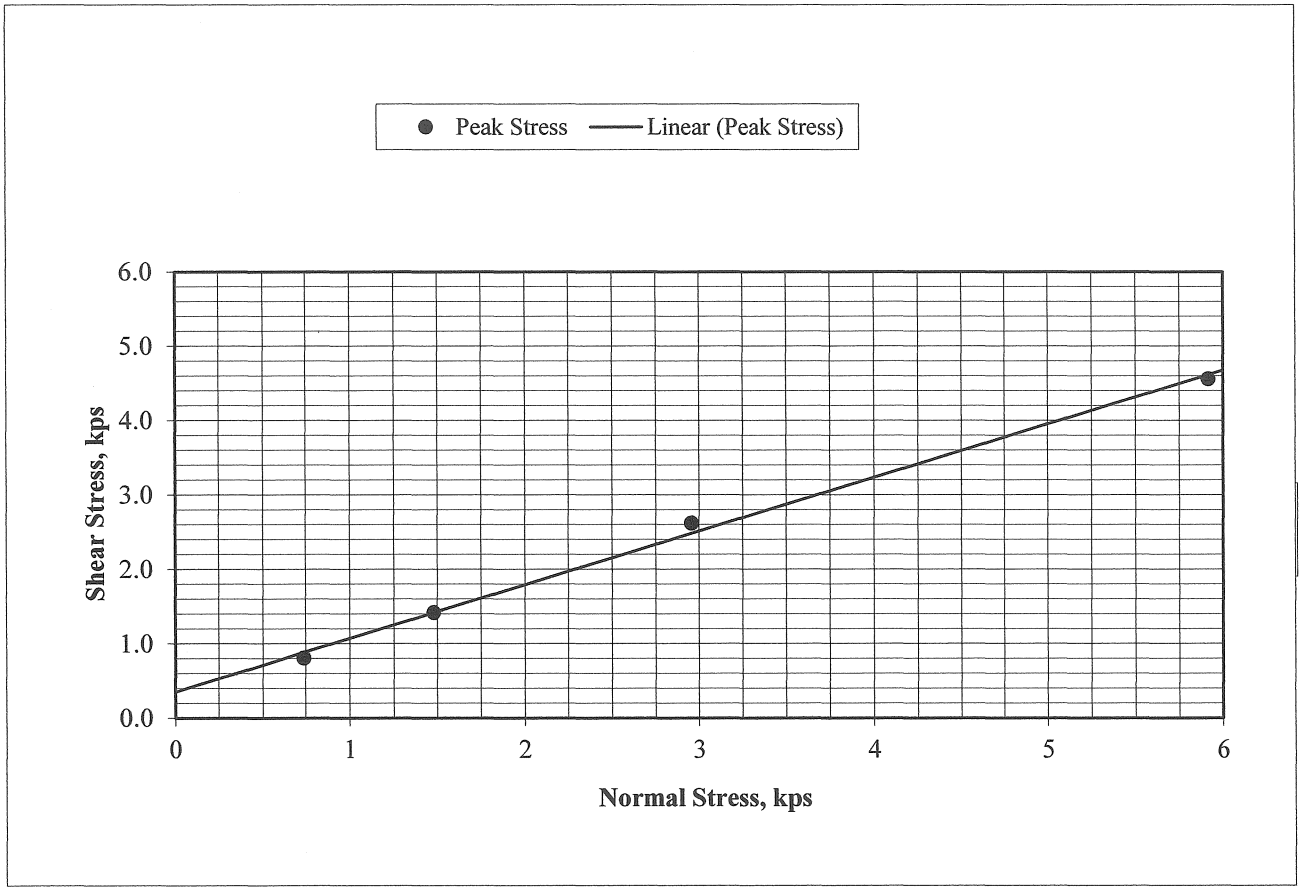
Expansion Index **0**

(Final - Initial) x 1000

Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	544-23355		December 18, 2023
Job Name	Twentynine Palms Highway	Initial Dry Density:	119.2 pcf
Lab ID No.	LN6-23487	Initial Mosture Content:	7.4 %
Sample ID	BH-1 Bulk 1 @ 0-5'	Peak Friction Angle (Ø):	36°
Classification	Red Brown Clayey Sand (SC)	Cohesion (c):	350 psf
Sample Type	Remolded @ 90% of Maximum Density		

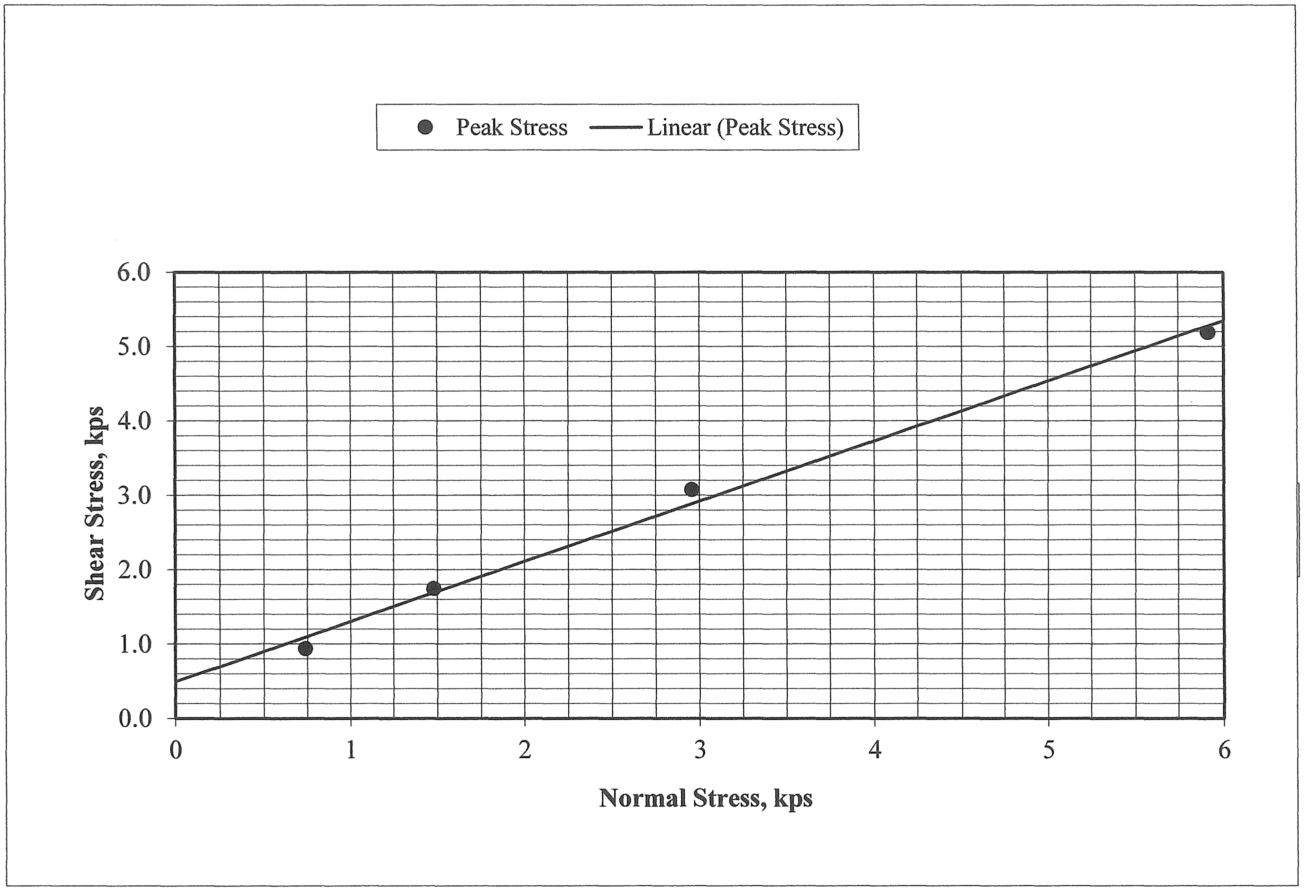
Test Results	1	2	3	4	**Average**
Moisture Content, %	11.9	11.9	11.9	11.9	11.9
Saturation, %	77.4	77.4	77.4	77.4	77.4
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.807	1.417	2.616	4.556	



Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	544-23355		December 18, 2023
Job Name	Twentynine Palms Highway	Initial Dry Density:	117.3 pcf
Lab ID No.	LN6-23487	Initial Mosture Content:	8.4 %
Sample ID	BH-6 Bulk 2 @ 0-5'	Peak Friction Angle (Ø):	39°
Classification	Light Brown Sand w/Silt (SW-SM)	Cohesion (c):	490 psf
Sample Type	Remolded @ 90% of Maximum Density		

Test Results	**1**	**2**	**3**	**4**	**Average**
Moisture Content, %	12.6	12.6	12.6	12.6	12.6
Saturation, %	77.9	77.9	77.9	77.9	77.9
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.937	1.744	3.074	5.188	



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Gradation

ASTM C117 & C136

Project Number: 544-23355

December 18, 2023

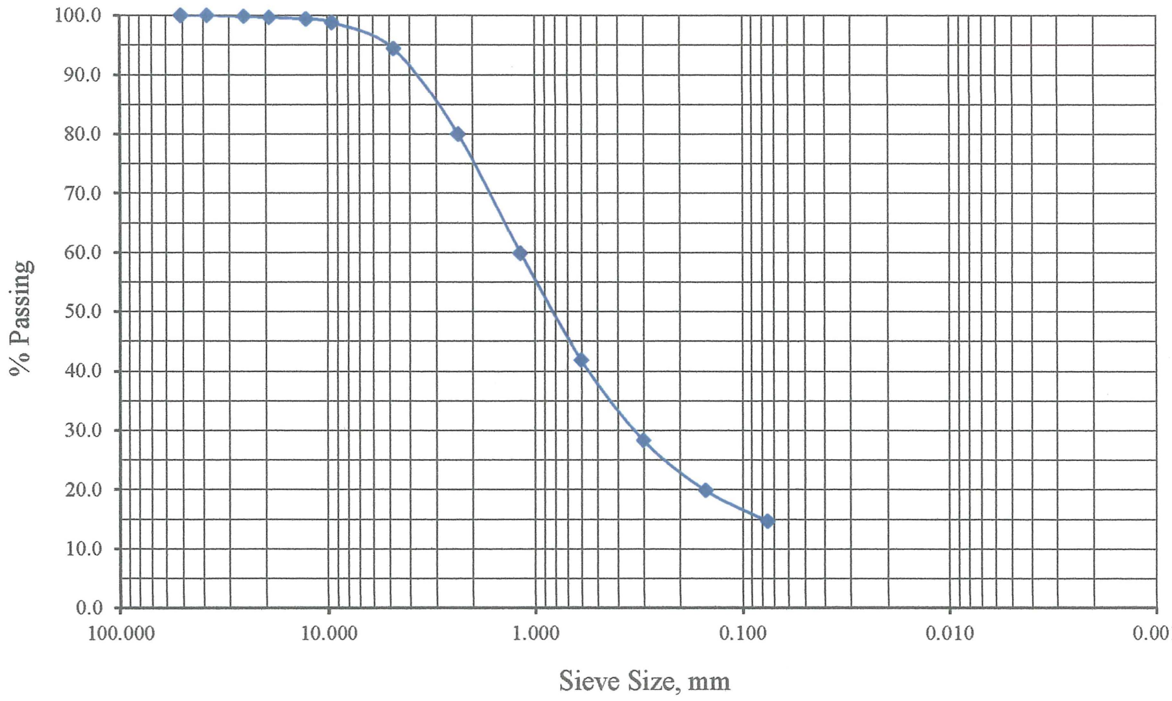
Project Name: Twentynine Palms Highway

Lab ID Number: LN6-23487

Sample ID: BH-1 Bulk 1 @ 0-5'

Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	99.8
3/4"	19.1	99.7
1/2"	12.7	99.4
3/8"	9.53	98.8
#4	4.75	94.4
#8	2.36	80.0
#16	1.18	59.8
#30	0.60	41.8
#50	0.30	28.3
#100	0.15	19.9
#200	0.075	14.6



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Gradation

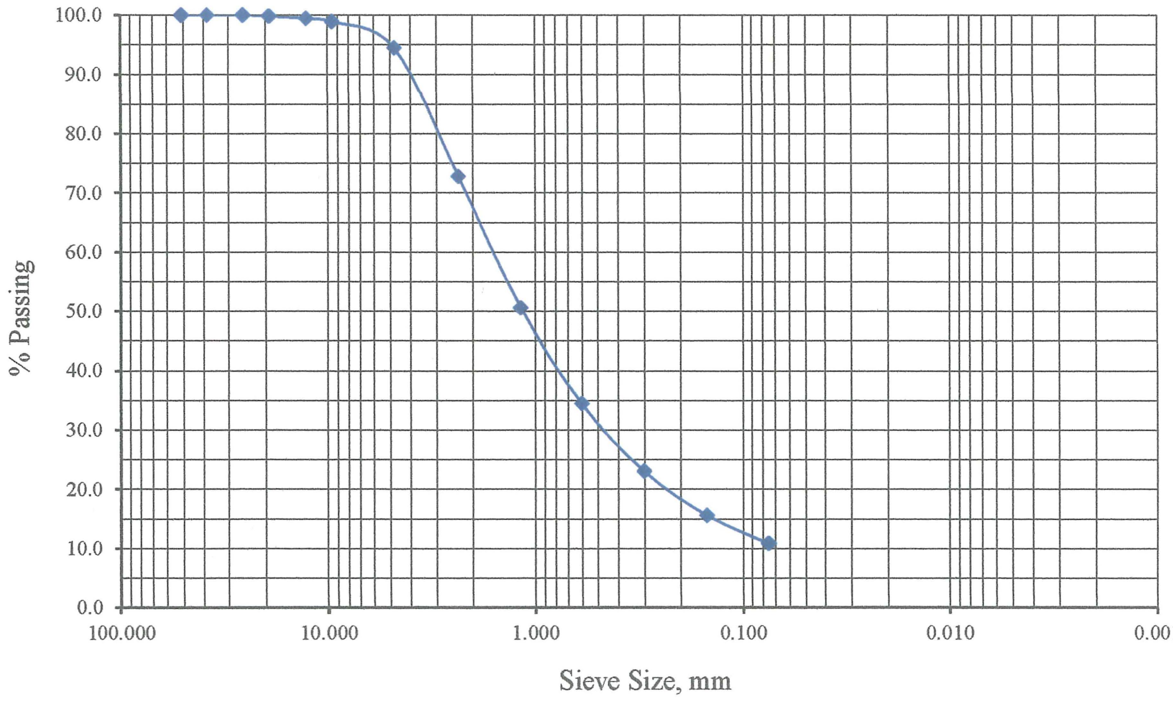
ASTM C117 & C136

Project Number: 544-23355
Project Name: Twentynine Palms Highway
Lab ID Number: LN6-23487
Sample ID: BH-6 Bulk 2 @ 0-5'

December 18, 2023

Soil Classification: SW-SM

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.8
1/2"	12.7	99.4
3/8"	9.53	98.9
#4	4.75	94.5
#8	2.36	72.8
#16	1.18	50.6
#30	0.60	34.5
#50	0.30	23.0
#100	0.15	15.6
#200	0.075	10.9



Gradation

ASTM C117 & C136

Project Number: 544-23355

December 18, 2023

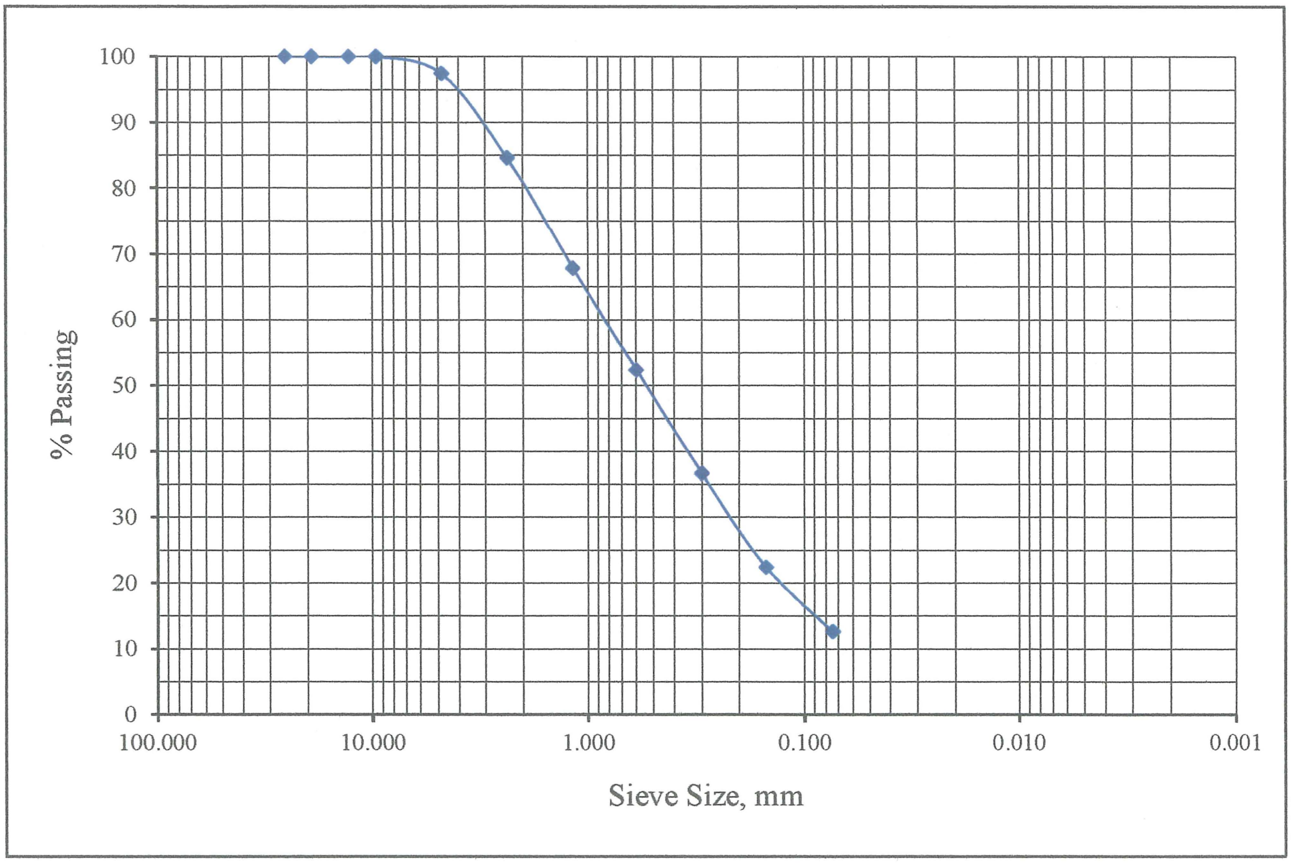
Project Name: Twentynine Palms Highway

Lab ID Number: LN6-23487

Sample ID: BH-1 S-3 @ 10'

Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	97.4
#8	2.36	84.6
#16	1.18	67.8
#30	0.60	52.4
#50	0.30	36.7
#100	0.15	22.4
#200	0.074	12.6



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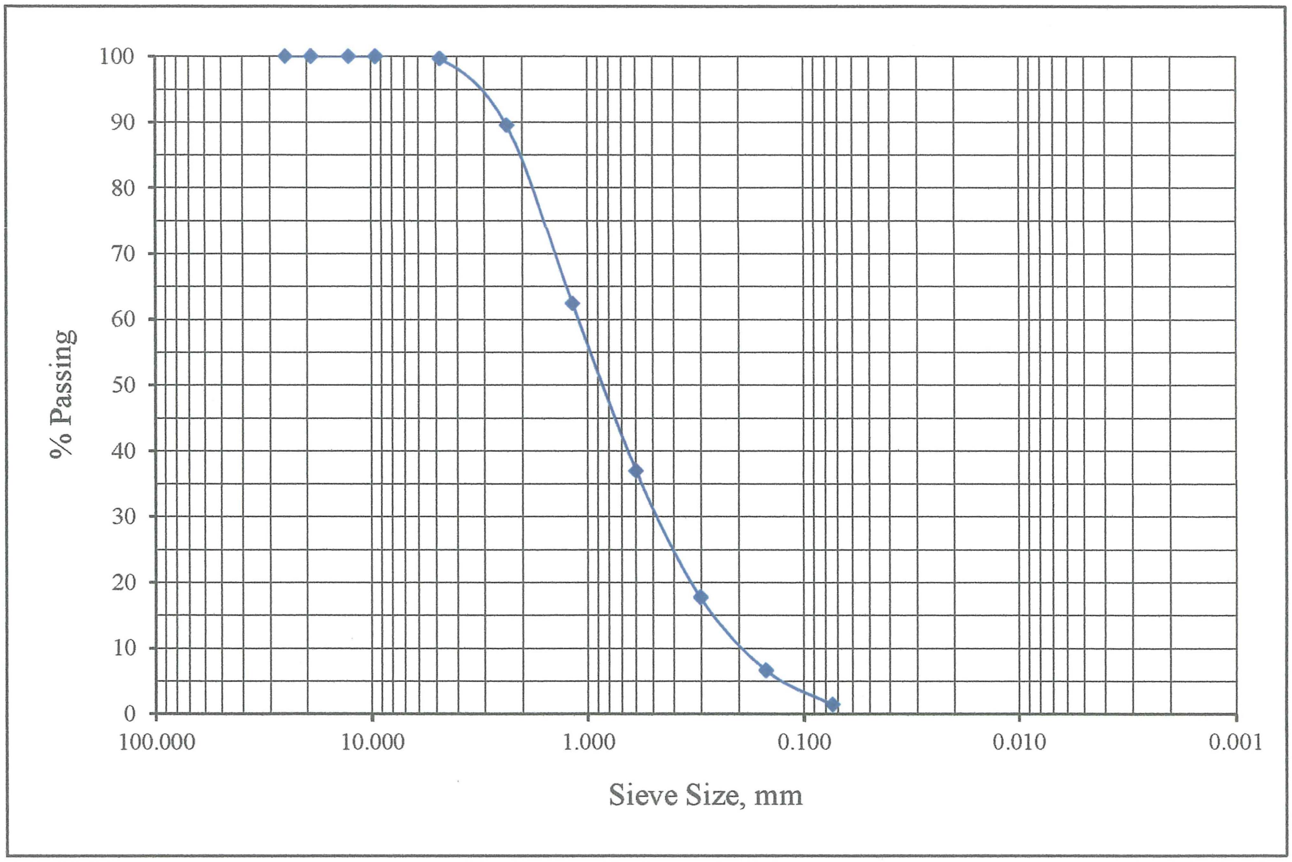
Gradation

ASTM C117 & C136

Project Number: 544-23355 December 18, 2023
Project Name: Twentynine Palms Highway
Lab ID Number: LN6-23487
Sample ID: BH-3 R-1 @ 5' Soil Classification: SP

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	99.7
#8	2.36	89.5
#16	1.18	62.4
#30	0.60	36.9
#50	0.30	17.7
#100	0.15	6.6
#200	0.074	1.4



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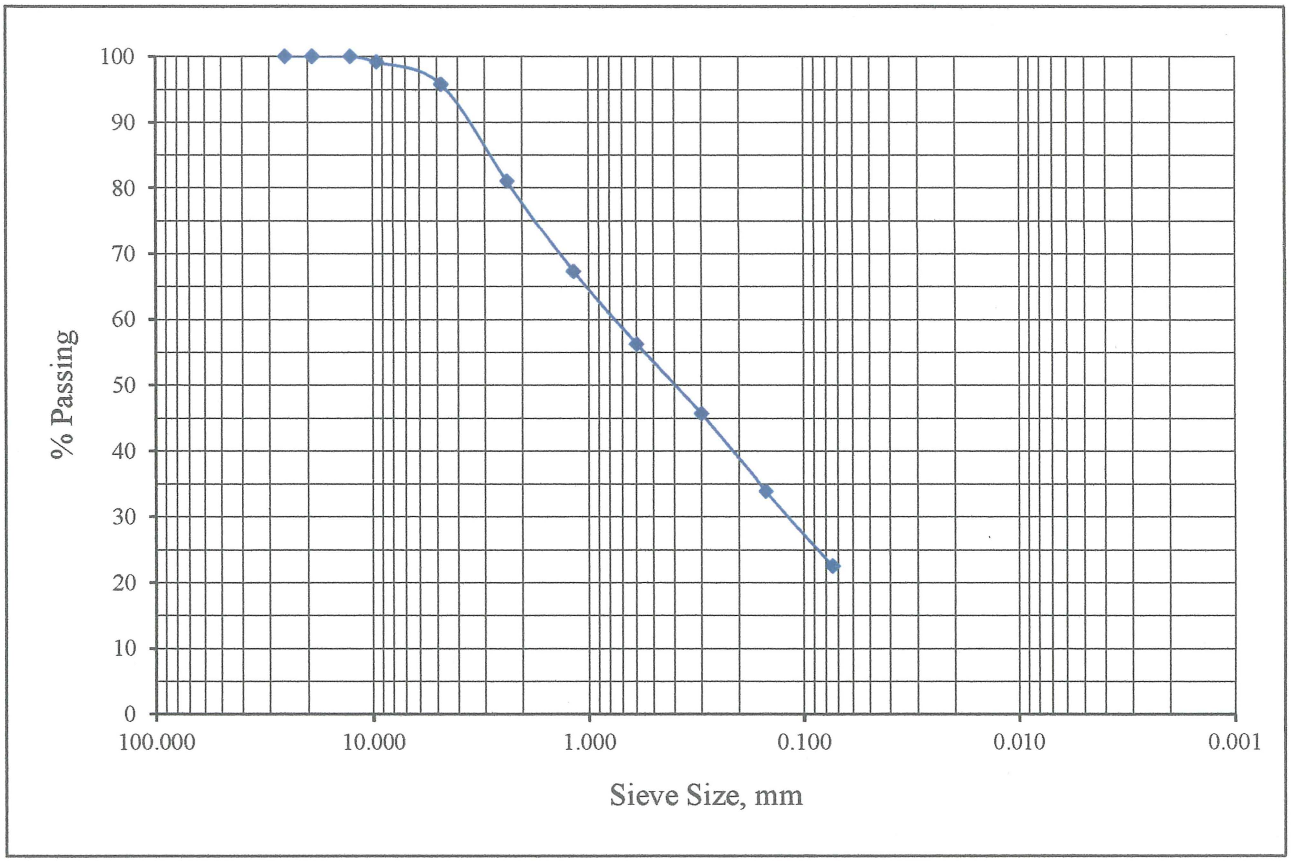
Gradation

ASTM C117 & C136

Project Number:	544-23355	December 18, 2023
Project Name:	Twentynine Palms Highway	
Lab ID Number:	LN6-23487	
Sample ID:	BH-4 S-3 @ 15'	Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	99.2
#4	4.75	95.8
#8	2.36	81.0
#16	1.18	67.3
#30	0.60	56.2
#50	0.30	45.7
#100	0.15	33.9
#200	0.074	22.5



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Gradation

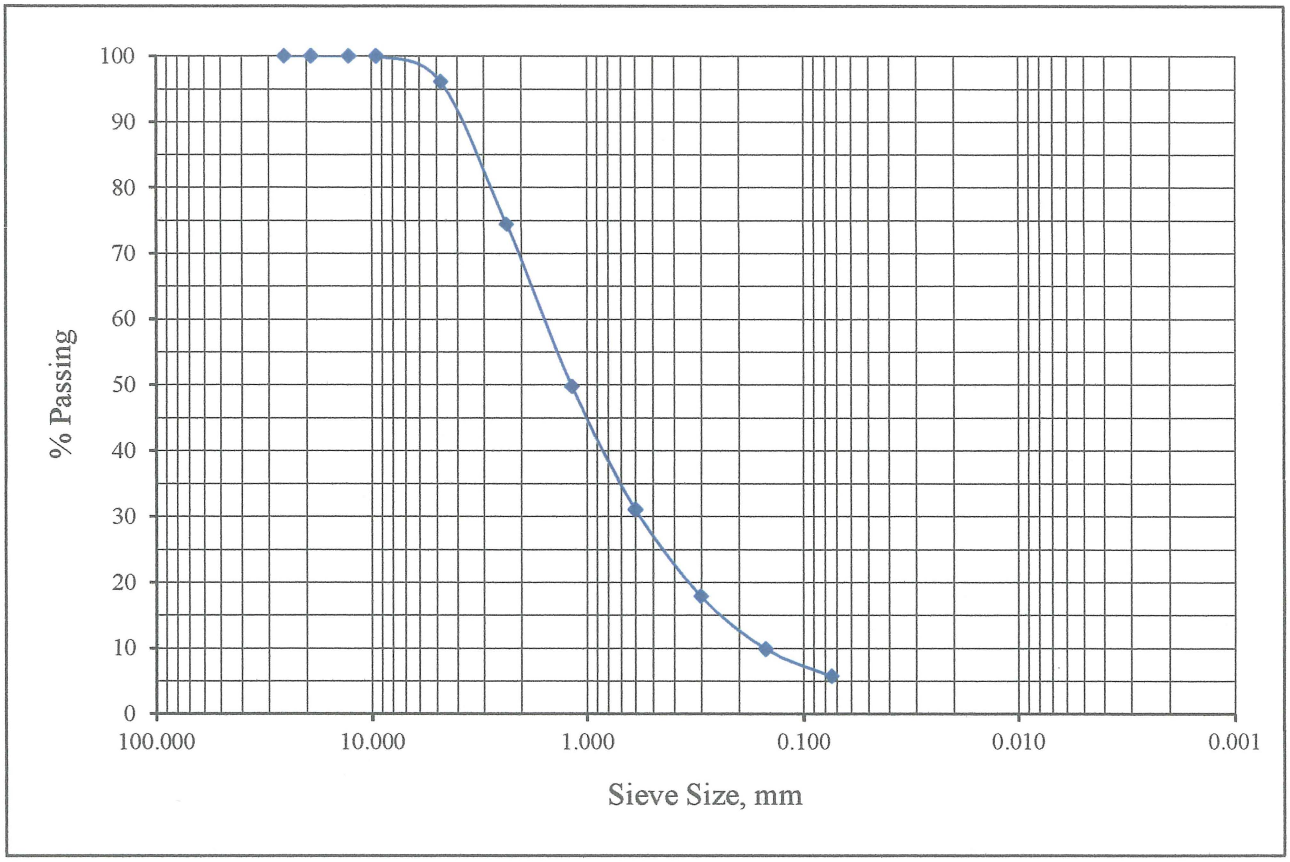
ASTM C117 & C136

Project Number: 544-23355
Project Name: Twentynine Palms Highway
Lab ID Number: LN6-23487
Sample ID: BH-8 S-4 @ 20

December 18, 2023

Soil Classification: SW-SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	96.1
#8	2.36	74.4
#16	1.18	49.7
#30	0.60	31.0
#50	0.30	17.9
#100	0.15	9.8
#200	0.074	5.7



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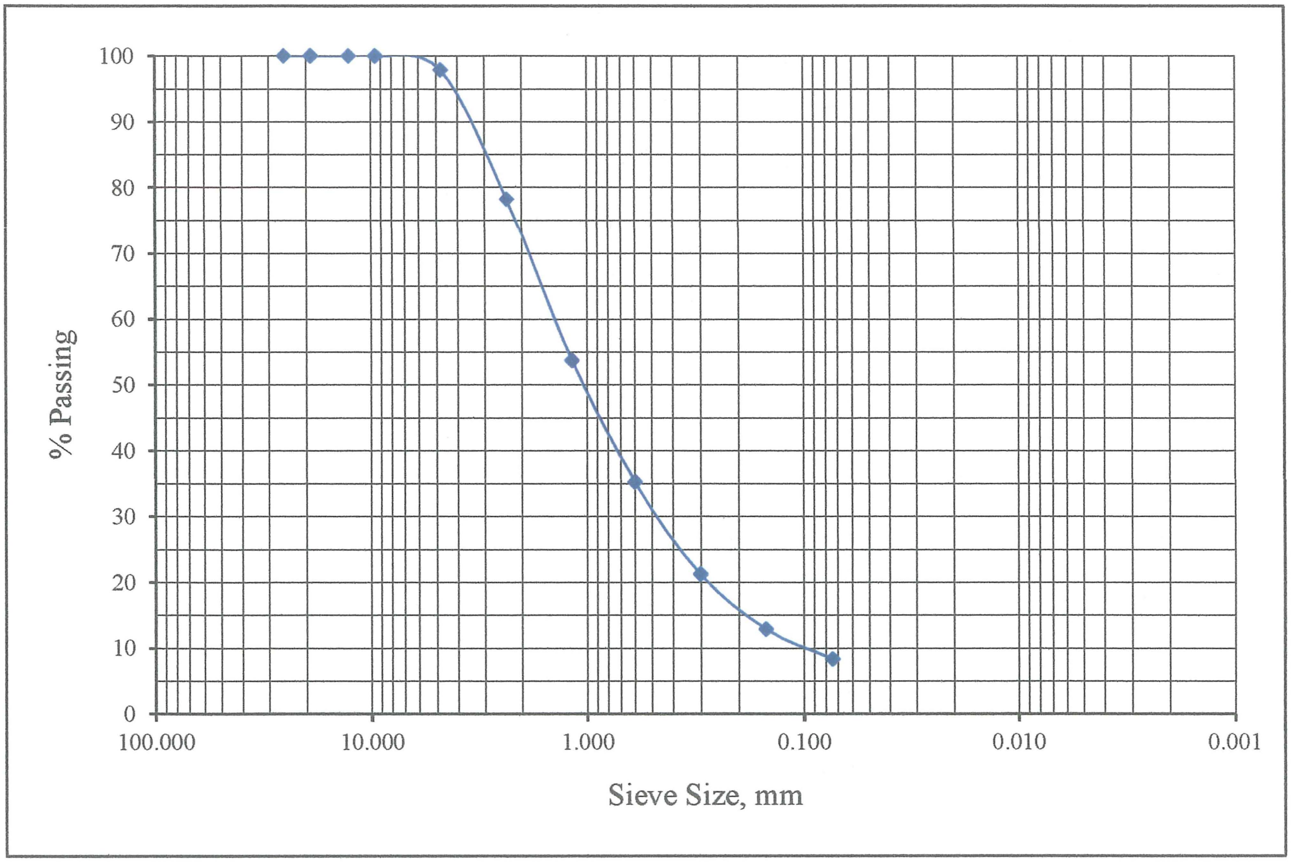
Gradation

ASTM C117 & C136

Project Number: 544-23355 December 18, 2023
Project Name: Twentynine Palms Highway
Lab ID Number: LN6-23487
Sample ID: BH-9 R-2 @ 10' Soil Classification: SW-SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	97.8
#8	2.36	78.2
#16	1.18	53.7
#30	0.60	35.2
#50	0.30	21.3
#100	0.15	12.9
#200	0.074	8.4



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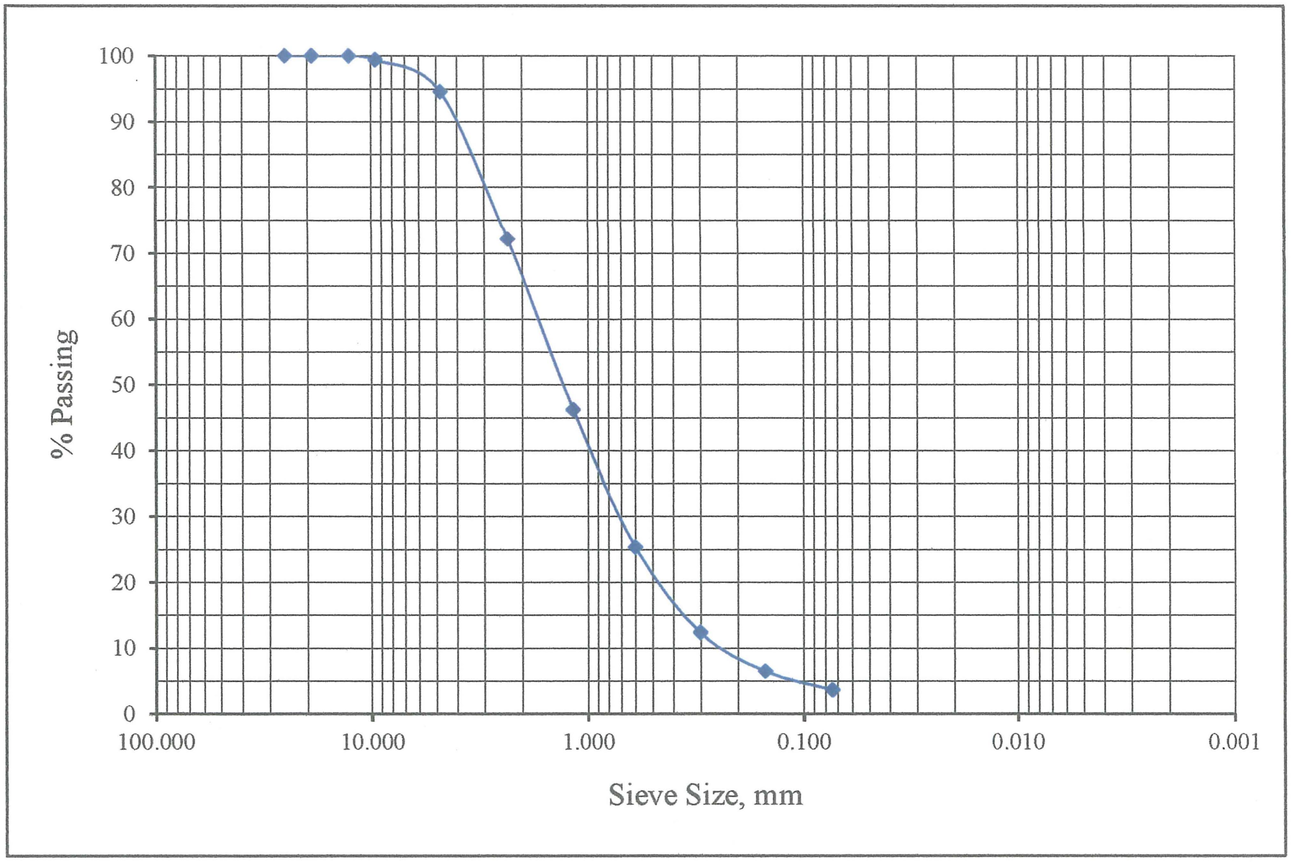
Gradation

ASTM C117 & C136

Project Number: 544-23355 December 18, 2023
Project Name: Twentynine Palms Highway
Lab ID Number: LN6-23487
Sample ID: BH-10 S-2 @ 10' Soil Classification: SW

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	99.4
#4	4.75	94.5
#8	2.36	72.2
#16	1.18	46.2
#30	0.60	25.3
#50	0.30	12.4
#100	0.15	6.5
#200	0.074	3.7



Sladden Engineering

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45090 Golf Center Pkwy, Suite F, Indio, CA 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Date: December 18, 2023

Account No.: 544-23355

Customer: 29 Palms Hotel, LLC

Location: APN 0614-121-15, Twentynine Palms Highway, Twentynine Palms Area

Analytical Report

Corrosion Series

	pH per CA 643	Soluble Sulfates per CA 417 ppm	Soluble Chloride per CA 422 ppm	Min. Resistivity per CA 643 ohm-cm
BH-1 @ 0-5’	8.0	40	30	4,600
BH-6 @ 0-5’	7.3	40	30	7,000

APPENDIX C

HISTORICAL EARTHQUAKES

HISTORICAL EARTHQUAKES 1932 TO PRESENT
MAGNITUDE > 3.0 (20 KILOMETER SEARCH RADIUS)
UNITED STATES GEOLOGICAL SURVEY (2023)

DATE/TIME	LATITUDE	LONGITUDE	MAGNITUDE	PLACE	ID
2019-07-22T16:26:56.070Z	33.99667	-116.045	4.2	16km S of Twentynine Palms, CA	ci38624623
2014-10-12T20:16:04.340Z	34.03317	-116.3168333	3.3	11km S of Joshua Tree, CA	ci37278432
2012-07-08T10:50:03.130Z	33.96133	-116.1321667	3.27	20km SSW of Twentynine Palms, CA	ci11133514
2002-09-15T21:15:50.920Z	34.05433	-116.3201667	3.31	9km S of Joshua Tree, CA	ci13813192
1999-10-17T10:37:39.420Z	34.31	-116.124	3.27	20km NNW of Twentynine Palms, CA	ci3323954
1999-10-17T00:36:17.540Z	34.294	-116.058	3.41	17km N of Twentynine Palms, CA	ci9109752
1996-07-28T09:46:13.590Z	33.98933	-116.2761667	3.36	16km SSE of Joshua Tree, CA	ci3271840
1995-04-09T23:01:08.490Z	34.04	-116.322	3.29	11km S of Joshua Tree, California	ci3209441
1994-08-07T23:43:32.880Z	33.992	-116.274	3.6	16km SSE of Joshua Tree, California	ci3179575
1994-08-07T15:10:25.960Z	33.992	-116.274	3.95	16km SSE of Joshua Tree, California	ci3179522
1993-08-21T01:46:38.400Z	34.029	-116.321	5	12km S of Joshua Tree, California	ci3118441
1993-06-26T12:48:02.460Z	34.076	-116.348	3.62	7km SSW of Joshua Tree, California	ci3111385
1993-06-19T07:20:26.400Z	34.078	-116.349	3.24	7km SSW of Joshua Tree, California	ci3110524
1992-06-28T13:50:16.340Z	34.084	-116.3566667	4.22	7km SW of Joshua Tree, CA	ci2056998
1992-06-28T12:02:58.610Z	34.15117	-116.3546667	4.5	4km WNW of Joshua Tree, California	ci12178459
1992-06-28T12:01:16.190Z	34.12	-116.323	5.7	2km SSW of Joshua Tree, California	ci3043630
1992-06-26T14:16:31.060Z	34.039	-116.316	3.34	11km S of Joshua Tree, California	ci2056787
1992-06-18T08:06:13.040Z	34.052	-116.329	3.01	9km S of Joshua Tree, California	ci2056062
1992-06-11T02:41:00.940Z	34.178	-116.352	3.32	6km NW of Joshua Tree, California	ci2055360
1992-06-11T00:24:19.180Z	34.174	-116.35	4.34	6km NW of Joshua Tree, California	ci2055346
1992-06-04T05:22:22.280Z	33.983	-116.262	3.01	18km SSE of Joshua Tree, California	ci2054570
1992-05-18T20:39:41.440Z	34.041	-116.292	3.02	11km S of Joshua Tree, California	ci2052769
1992-05-12T02:59:21.840Z	33.979	-116.258	3.36	18km SSE of Joshua Tree, California	ci2051868
1992-05-12T02:32:52.540Z	33.985	-116.258	3.9	17km SSE of Joshua Tree, California	ci3024923
1992-05-12T02:31:11.010Z	33.981	-116.26	4.38	18km SSE of Joshua Tree, California	ci2051863
1992-05-08T15:10:59.060Z	34.043	-116.329	3.03	10km S of Joshua Tree, California	ci2051341
1992-05-07T02:34:54.120Z	34.028	-116.309	3.42	12km S of Joshua Tree, California	ci2051110
1992-05-06T01:40:21.380Z	34.032	-116.314	3.25	11km S of Joshua Tree, California	ci2050929
1992-05-04T07:24:14.090Z	34.062	-116.319	3.18	8km S of Joshua Tree, California	ci2050583
1992-05-02T13:41:59.370Z	33.995	-116.28	3.23	16km S of Joshua Tree, California	ci2050248
1992-05-02T13:29:54.500Z	33.995	-116.283	3.1	16km S of Joshua Tree, California	ci2050247
1992-05-02T12:46:53.290Z	33.99433	-116.277	4.1	16km SSE of Joshua Tree, California	ci12178263
1992-05-02T07:04:32.810Z	33.998	-116.093	3.01	16km S of Twentynine Palms, California	ci2050194
1992-05-01T06:03:27.420Z	34.035	-116.321	3.41	11km S of Joshua Tree, California	ci2049987
1992-04-30T22:43:04.420Z	34.034	-116.318	3.02	11km S of Joshua Tree, California	ci2049922
1992-04-30T01:50:43.460Z	34.021	-116.093	3.96	13km S of Twentynine Palms, California	ci2049720
1992-04-29T18:32:40.560Z	33.985	-116.263	3.07	17km SSE of Joshua Tree, California	ci2049642
1992-04-28T11:32:14.360Z	34.034	-116.298	3.17	11km S of Joshua Tree, California	ci2049292
1992-04-27T08:13:35.570Z	34.073	-116.326	3.29	7km S of Joshua Tree, California	ci3019752
1992-04-26T18:04:18.900Z	34.051	-116.339	3.41	10km SSW of Joshua Tree, California	ci2048839
1992-04-26T17:21:38.010Z	34.049	-116.335	4.42	10km SSW of Joshua Tree, California	ci2048832
1992-04-25T11:56:05.170Z	34.03533	-116.3068333	3.01	11km S of Joshua Tree, CA	ci3101040
1992-04-25T08:31:02.930Z	34.04033	-116.3146667	3	10km S of Joshua Tree, California	ci12177711
1992-04-25T04:40:52.650Z	34.05017	-116.2996667	3.15	10km S of Joshua Tree, CA	ci2048385
1992-04-24T16:01:05.560Z	34.122	-116.27	3.16	4km ESE of Joshua Tree, California	ci2048228
1992-04-24T06:19:12.010Z	34.027	-116.316	3.07	12km S of Joshua Tree, California	ci3097588
1992-04-24T01:15:51.220Z	34.047	-116.335	3.11	10km SSW of Joshua Tree, California	ci2048033
1992-04-24T01:03:29.930Z	34.02	-116.295	3.2	12 km S of Joshua Tree, California	usp00056a2
1992-04-23T19:33:40.000Z	34.137	-116.338	3.4	2 km W of Joshua Tree, California	usp000569b
1992-04-23T18:06:40.720Z	33.98467	-116.2505	3.72	18km SSE of Joshua Tree, CA	ci3017773
1992-04-23T14:53:44.230Z	33.985	-116.225	3.48	18km SSE of Joshua Tree, California	ci3122328
1992-04-23T14:53:09.840Z	33.978	-116.235	3.45	19km SSE of Joshua Tree, California	ci3122327
1992-04-23T14:49:22.080Z	33.983	-116.229	3.3	19km SSE of Joshua Tree, California	ci3131024

HISTORICAL EARTHQUAKES 1932 TO PRESENT
MAGNITUDE > 3.0 (20 KILOMETER SEARCH RADIUS)
UNITED STATES GEOLOGICAL SURVEY (2023)

DATE/TIME	LATITUDE	LONGITUDE	MAGNITUDE	PLACE	ID
1992-04-23T11:12:06.790Z	33.983	-116.229	3.56	19km SSE of Joshua Tree, California	ci3120428
1992-04-23T10:56:28.930Z	33.986	-116.225	3.15	18km SSE of Joshua Tree, California	ci3120196
1992-04-23T10:18:08.020Z	33.987	-116.228	3.23	18km SSE of Joshua Tree, California	ci2047793
1992-04-23T09:58:09.540Z	34.033	-116.323	3.78	11km S of Joshua Tree, California	ci3120177
1992-04-23T08:47:20.370Z	34.042	-116.332	3.64	10km S of Joshua Tree, California	ci3119895
1992-04-23T08:47:04.220Z	34.033	-116.31	3.37	11km S of Joshua Tree, California	ci3119894
1992-04-23T07:40:24.090Z	34.034	-116.234	3.07	13km SSE of Joshua Tree, California	ci2047744
1992-04-23T06:36:28.840Z	34.05083	-116.3358333	3.56	10km SSW of Joshua Tree, CA	ci3017753
1992-04-23T06:12:31.030Z	34.034	-116.311	3	11km S of Joshua Tree, CA	ci3017430
1992-04-23T06:11:55.340Z	34.028	-116.321	3.58	12km S of Joshua Tree, California	ci2047731
1992-04-23T05:58:07.900Z	33.977	-116.233	3.5	19km SSE of Joshua Tree, California	ci2047728
1992-04-23T05:22:18.550Z	34.062	-116.325	3.83	8km S of Joshua Tree, California	ci2047722
1990-04-22T01:10:36.410Z	34.034	-116.024	3.13	12km SSE of Twentynine Palms, CA	ci1057566
1989-01-05T21:32:13.850Z	34.264	-116.004	3.11	15km NNE of Twentynine Palms, CA	ci1017186
1988-02-29T15:25:06.900Z	34.032	-116.246	3.25	13km SSE of Joshua Tree, CA	ci135912
1986-02-17T02:12:33.480Z	34.116	-116.03	3.94	5km ESE of Twentynine Palms, CA	ci116008
1985-06-03T02:05:30.480Z	34	-116.098	3.21	16km S of Twentynine Palms, CA	ci67587
1984-07-27T19:42:07.760Z	34.262	-116.15	3.5	16km NNW of Twentynine Palms, CA	ci46108
1981-10-13T20:14:03.000Z	34.03167	-116.1346667	3.48	13km SSW of Twentynine Palms, CA	ci525470
1978-10-20T08:38:29.020Z	34.22117	-116.1823333	3.16	14km NW of Twentynine Palms, CA	ci3343077
1973-05-08T12:41:25.810Z	34.23	-116.3108333	3.38	11km N of Joshua Tree, CA	ci3319914
1973-05-03T10:09:46.850Z	34.23833	-116.1303333	3.54	12km NNW of Twentynine Palms, CA	ci3319904
1973-02-09T07:41:03.590Z	34.29783	-116.1226667	3.28	18km NNW of Twentynine Palms, CA	ci3320312
1972-12-19T22:32:21.830Z	33.95917	-116.1073333	3.53	20km S of Twentynine Palms, CA	ci3320595
1972-01-28T17:00:21.830Z	34.29333	-116.138	3.78	18km NNW of Twentynine Palms, CA	ci3321554
1970-08-14T07:39:56.960Z	34.037	-115.9903333	3.37	14km SE of Twentynine Palms, CA	ci3323819
1970-04-02T09:29:54.200Z	34.13067	-116.1236667	3.37	5km W of Twentynine Palms, CA	ci3324267
1969-06-11T14:03:53.660Z	34.2215	-116.2851667	3.56	10km NNE of Joshua Tree, CA	ci3327320
1969-02-05T06:01:46.580Z	33.98917	-116.2458333	3.24	17km SSE of Joshua Tree, CA	ci3327816
1968-03-28T21:21:33.000Z	34.04617	-116.0803333	4.13	10km S of Twentynine Palms, CA	ci3329115
1967-04-03T13:57:27.480Z	34.17033	-116.2071667	3.12	10km ENE of Joshua Tree, CA	ci3329738
1964-07-22T23:40:29.090Z	34.15483	-116.1778333	3.37	10km W of Twentynine Palms, CA	ci3330878
1963-12-20T10:27:58.460Z	34.17633	-116.1935	3.52	12km WNW of Twentynine Palms, CA	ci3331069
1963-08-30T11:21:04.270Z	34.14867	-116.2108333	3.03	10km E of Joshua Tree, CA	ci3331207
1963-08-22T04:33:56.190Z	34.14483	-116.192	4.15	11km W of Twentynine Palms, CA	ci3331259
1963-08-03T15:15:49.740Z	34.13333	-116.1605	3.15	8km W of Twentynine Palms, CA	ci3331247
1963-07-30T22:45:57.410Z	34.15433	-116.1826667	3.45	10km W of Twentynine Palms, CA	ci3331243
1963-07-30T17:47:42.750Z	34.14533	-116.1858333	3.15	10km W of Twentynine Palms, CA	ci3331241
1963-07-30T17:28:26.030Z	34.13667	-116.1258333	3.07	5km W of Twentynine Palms, CA	ci3331262
1963-07-30T10:25:24.890Z	34.16883	-116.1631667	3.17	9km WNW of Twentynine Palms, CA	ci3331239
1963-07-30T06:34:56.850Z	34.16133	-116.189	4.64	11km WNW of Twentynine Palms, CA	ci3331237
1963-07-24T11:41:52.960Z	34.17883	-116.1595	3.14	9km WNW of Twentynine Palms, CA	ci3331305
1963-07-19T15:54:56.680Z	34.15567	-116.2053333	3.77	10km ENE of Joshua Tree, CA	ci3331300
1963-07-19T08:33:54.030Z	34.16933	-116.1921667	3.25	12km WNW of Twentynine Palms, CA	ci3331299
1963-07-18T19:37:44.980Z	34.165	-116.1376667	3.99	7km WNW of Twentynine Palms, CA	ci3331297
1963-07-18T10:40:31.430Z	34.17617	-116.13	3.48	7km NW of Twentynine Palms, CA	ci3331295
1963-07-17T23:11:07.100Z	34.149	-116.1876667	3.61	11km W of Twentynine Palms, CA	ci3331291
1963-07-17T23:05:42.750Z	34.15767	-116.067	3.49	2km NNE of Twentynine Palms, CA	ci3331290
1963-07-17T20:44:34.660Z	34.12433	-116.15	3.07	7km WSW of Twentynine Palms, CA	ci3331289
1963-07-05T08:27:11.980Z	34.188	-116.1868333	3.22	12km WNW of Twentynine Palms, CA	ci3331275
1961-11-18T04:04:54.470Z	34.00233	-116.2176667	3.54	17km SSE of Joshua Tree, CA	ci3344606
1959-10-04T05:06:14.870Z	34.1045	-116.1363333	3.02	7km WSW of Twentynine Palms, CA	ci3297223
1959-08-08T07:18:09.830Z	34.20917	-116.1328333	3.04	10km NW of Twentynine Palms, CA	ci3297165

HISTORICAL EARTHQUAKES 1932 TO PRESENT
MAGNITUDE > 3.0 (20 KILOMETER SEARCH RADIUS)
UNITED STATES GEOLOGICAL SURVEY (2023)

DATE/TIME	LATITUDE	LONGITUDE	MAGNITUDE	PLACE	ID
1958-03-01T09:07:31.470Z	34.30133	-116.1868333	3.19	21km NNW of Twentynine Palms, CA	ci3296518
1957-12-12T08:00:05.980Z	34.24383	-116.1935	4.34	16km NW of Twentynine Palms, CA	ci3296325
1956-09-26T11:36:26.560Z	33.98717	-116.0793333	3.03	17km S of Twentynine Palms, CA	ci3295491
1956-09-20T06:23:51.180Z	33.964	-116.1776667	3.17	22km SSW of Twentynine Palms, CA	ci3295470
1956-09-17T00:58:00.430Z	33.97883	-116.209	3.58	20km SSE of Joshua Tree, CA	ci3295465
1956-09-17T00:03:36.310Z	33.96583	-116.2106667	3.6	21km SSE of Joshua Tree, CA	ci3295464
1955-05-30T19:15:32.780Z	34.21817	-116.2063333	3.56	14km NE of Joshua Tree, CA	ci3297820
1954-08-29T22:50:05.680Z	34.1315	-116.1015	3.16	3km WSW of Twentynine Palms, CA	ci3298431
1949-05-06T02:48:37.650Z	34.0105	-115.9983333	3.01	16km SSE of Twentynine Palms, CA	ci3355979
1948-12-27T11:19:06.830Z	34.0595	-116.1935	3.85	14km SE of Joshua Tree, CA	ci3356437
1948-12-06T02:51:23.820Z	34.10467	-116.3553333	3.14	5km SW of Joshua Tree, CA	ci3356911
1948-02-28T17:24:44.620Z	34.0705	-116.2091667	3.44	12km SE of Joshua Tree, CA	ci3357809
1947-08-12T21:05:17.740Z	34.026	-116.3173333	3.22	12km S of Joshua Tree, CA	ci3358105
1947-07-24T18:30:20.140Z	33.98583	-116.2681667	3.41	17km SSE of Joshua Tree, CA	ci3358688
1947-05-11T05:06:20.940Z	34.30633	-116.1921667	4.66	22km NNW of Twentynine Palms, CA	ci3358488
1947-05-06T08:45:51.200Z	34.28383	-116.2665	3.11	17km NNE of Joshua Tree, CA	ci3358467
1946-07-03T00:16:45.230Z	34.217	-116.303	3.36	9km N of Joshua Tree, CA	ci3359664
1946-05-12T04:42:12.200Z	33.99967	-116.1203333	3.08	16km SSW of Twentynine Palms, CA	ci3360099
1946-05-12T02:46:50.010Z	34.01083	-116.1608333	3.17	16km SSW of Twentynine Palms, CA	ci3360098
1945-03-29T04:04:20.680Z	34.151	-116.233	4.14	8km ENE of Joshua Tree, CA	ci3360905
1945-03-20T21:55:08.220Z	34.23817	-116.1415	4.87	13km NNW of Twentynine Palms, CA	ci3360727
1944-07-26T09:11:53.020Z	33.99517	-116.2725	3.6	16km SSE of Joshua Tree, CA	ci3366601
1942-12-04T21:25:09.510Z	34.245	-116.285	3.1	12km NNE of Joshua Tree, CA	ci3366170
1942-01-21T05:25:01.130Z	34.10083	-116.2601667	3.53	6km SE of Joshua Tree, CA	ci3365874
1941-12-23T11:16:10.230Z	34.00183	-116.0833333	3.12	15km S of Twentynine Palms, CA	ci3365837
1940-06-23T07:07:08.410Z	34.08817	-116.1713333	3.7	11km WSW of Twentynine Palms, CA	ci3365378
1940-06-19T03:09:51.310Z	33.999	-116.244	3.21	16km SSE of Joshua Tree, CA	ci3365373
1940-06-18T06:14:32.710Z	34.09633	-116.2073333	3.89	11km ESE of Joshua Tree, CA	ci3365372
1940-06-14T21:58:51.190Z	34.08983	-116.3405	3.78	6km SSW of Joshua Tree, CA	ci3365367
1940-06-01T06:54:28.090Z	34.15233	-116.216	4.37	9km ENE of Joshua Tree, CA	ci3365323
1940-06-01T05:56:46.360Z	34.1395	-116.2311667	3.95	8km E of Joshua Tree, CA	ci3365322
1940-06-01T05:27:01.920Z	34.1055	-116.2716667	4.56	5km SE of Joshua Tree, CA	ci3365321
1940-05-22T14:10:08.580Z	34.10367	-116.3601667	3.92	6km SW of Joshua Tree, CA	ci3365310
1940-05-22T06:03:56.760Z	34.03517	-116.3281667	3.26	11km S of Joshua Tree, CA	ci3365307
1940-05-19T19:39:43.080Z	34.0875	-116.307	4.25	5km S of Joshua Tree, CA	ci3365298
1940-05-19T02:26:03.120Z	34.05183	-116.2788333	4.32	10km SSE of Joshua Tree, CA	ci3365276
1940-05-18T07:21:34.470Z	34.02583	-116.3145	4.96	12km S of Joshua Tree, CA	ci3365272
1940-05-18T06:04:31.790Z	34.042	-116.2618333	4.52	11km SSE of Joshua Tree, CA	ci3365271
1940-05-18T05:51:21.940Z	34.037	-116.3065	5.2	11km S of Joshua Tree, CA	ci3365270
1940-05-18T05:03:59.660Z	34.089	-116.2818333	5.31	6km SSE of Joshua Tree, CA	ci3365269
1939-09-10T17:45:58.190Z	34.04383	-116.2945	3.3	10km S of Joshua Tree, CA	ci3365097
1938-02-15T07:56:15.110Z	34.13867	-116.1981667	3.42	11km E of Joshua Tree, CA	ci3364544
1938-02-15T07:45:38.130Z	34.21633	-116.1655	4.27	12km NW of Twentynine Palms, CA	ci3364543
1938-02-08T07:39:25.120Z	34.15967	-116.1143333	4.05	4km WNW of Twentynine Palms, CA	ci3364538
1934-06-26T01:22:43.390Z	34.038	-116.068	3.09	11km S of Twentynine Palms, CA	ci3362263

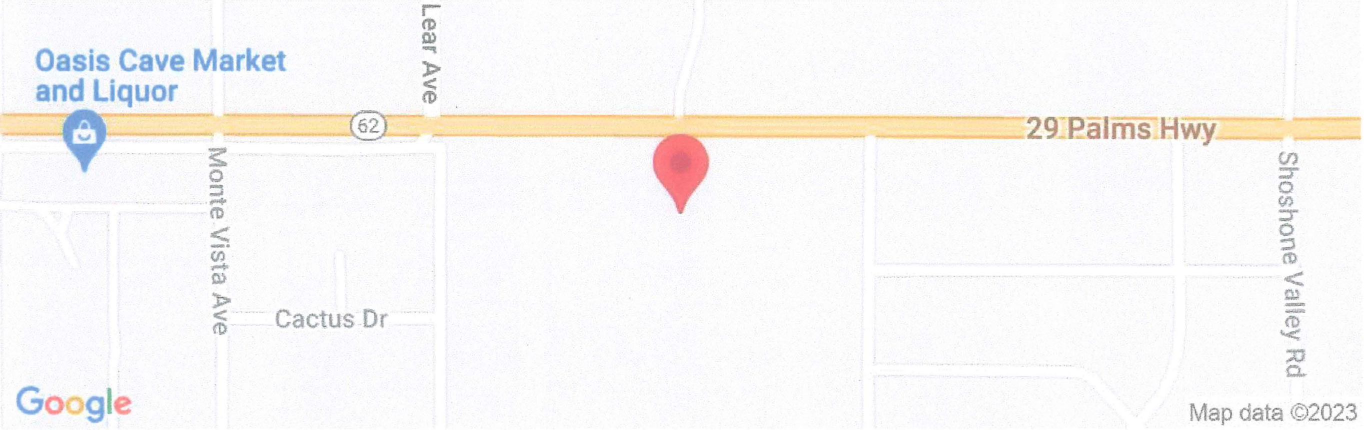
APPENDIX D

SEISMIC DESIGN MAP AND REPORT
SITE-SPECIFIC GROUND MOTION PARAMETERS

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
USGS web services are now operational so this tool should work as expected.

APN 0614-121-15

Latitude, Longitude: 34.1343, -116.1482



Date	12/18/2023, 8:44:19 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.861	MCE_R ground motion. (for 0.2 second period)
S_1	0.697	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.861	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.241	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.821	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.903	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.861	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.085	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.275	Factored deterministic acceleration value. (0.2 second)
S1RT	0.697	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.785	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.

Type	Value	Description
S1D	0.837	Factored deterministic acceleration value. (1.0 second)
PGAd	0.945	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.821	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.892	Mapped value of the risk coefficient at short periods
C_{R1}	0.888	Mapped value of the risk coefficient at a period of 1 s
C_V	1.472	Vertical coefficient

DISCLAIMER

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SITE-SPECIFIC GROUND MOTION ANALYSIS
(ASCE 7-16)

Project: PROPOSED LUXURY OUTDOOR RESORT
Project Number: 544-23355
Client: 29 PALMS HOTEL, LLC
Site Lat/Long: 34.1343/-116.1482
Controlling Seismic Source: Pinto Mountain

REFERENCE	NOTATION	VALUE
Site Class	C, D, D default, or E	D measured
Site Class D - Table 11.4-1	F_a	1.0
Site Class D - 21.3(ii)	F_v	2.5
$0.2*(S_{D1}/S_{DS})$	T_0	0.187
S_{D1}/S_{DS}	T_S	0.936
Fundamental Period (12.8.2)	T	Period
Seismic Design Maps or Fig 22-14	T_L	8
Equation 11.4-4 - $2/3*S_{M1}$	S_{D1}	1.1617
Equation 11.4-2 - F_V*S_1 [1]	S_{M1}	1.7425

[1] - F_V as determined by Section 21.3

REFERENCE	NOTATION	VALUE
Fv (Table 11.4-2)[Used for General Spectrum]	F_v	1.7
Design Maps	S_s	1.861
Design Maps	S_1	0.697
Equation 11.4-1 - F_A*S_S	S_{MS}	1.861*
Equation 11.4-3 - $2/3*S_{MS}$	S_{DS}	1.241*
Design Maps	PGA	0.821
Table 11.8-1	F_{PGA}	1.1
Equation 11.8-1 - $F_{PGA}*PGA$	PGA_M	0.903*
Section 21.5.3	80% of PGA_M	0.722
Design Maps	C_{RS}	0.892
Design Maps	C_{R1}	0.888

REFERENCE	NOTATION	VALUE
$0.2*(S_{D1}/S_{DS})$	T_0	0.127*
S_{D1}/S_{DS}	T_S	0.637*
Equation 11.4-4 - $2/3*S_{M1}$	S_{D1}	0.7899*
Equation 11.4-2 - F_V*S_1	S_{M1}	1.1849*

RISK COEFFICIENT

Cr - At Perods <=0.2, Cr=C_{RS}	C_{RS}	0.892
Cr - At Periods >=1.0, Cr=C_{R1}	C_{R1}	0.888

Cr - At Periods between 0.2 and 1.0 use trendline formula to complete

Period	Cr
0.200	0.892
0.300	0.892
0.400	0.891
0.500	0.891
0.600	0.890
0.680	0.890
1.000	0.888

* **Code based design value**. See accompanying data for Site Specific Design values.

Mapped values from https://hazards.atcouncil.org/
https://www.seismicmaps.org/

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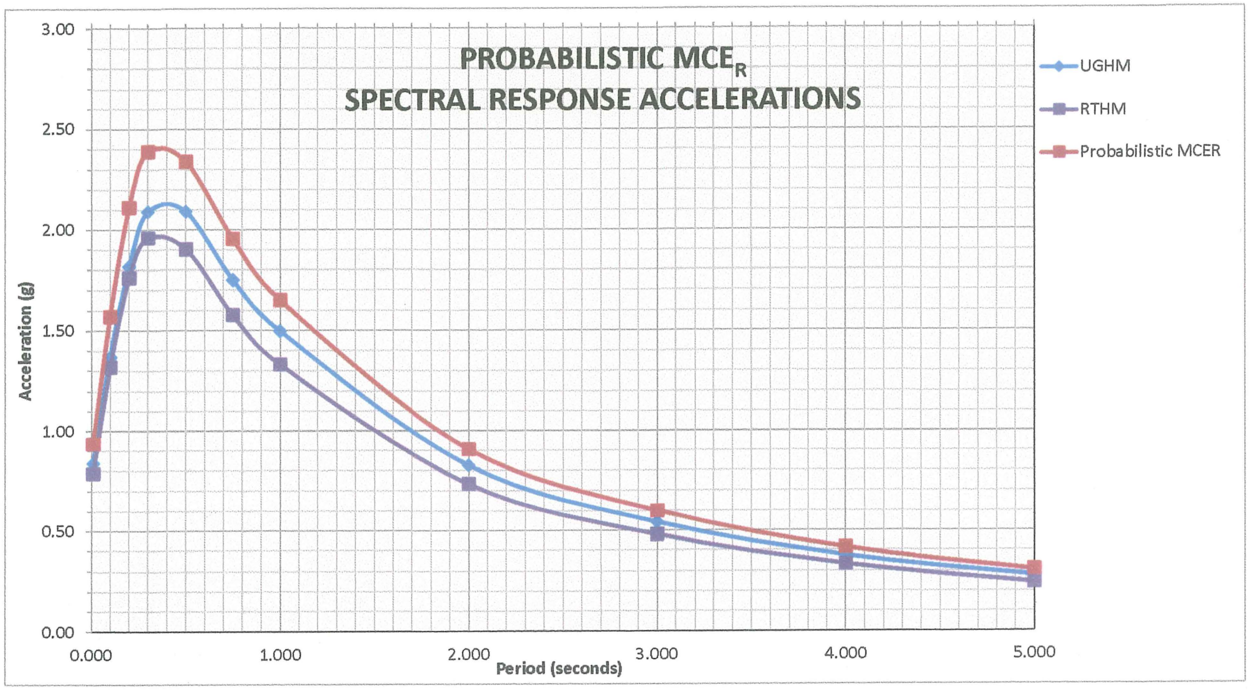
PROBABILISTIC SPECTRA[1]
2% in 50 year Exceedence

Project No: 544-23355

Period	UGHM	RTGM	Max Directional Scale Factor[2]	Probabilistic MCE
0.010	0.837	0.787	1.19	0.937
0.100	1.369	1.320	1.19	1.571
0.200	1.814	1.759	1.20	2.111
0.300	2.089	1.958	1.22	2.389
0.500	2.089	1.901	1.23	2.338
0.750	1.747	1.575	1.24	1.953
1.000	1.496	1.329	1.24	1.648
2.000	0.825	0.732	1.24	0.908
3.000	0.541	0.479	1.25	0.599
4.000	0.374	0.331	1.25	0.414
5.000	0.277	0.243	1.26	0.306

Probabilistic PGA:	0.837
Is Probabilistic $Sa_{(max)}<1.2F_a$?	NO



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[1] Data Sources:
https://earthquake.usgs.gov/hazards/interactive/
https://earthquake.usgs.gov/designmaps/rtgm/

[2] Shahi-Baker RotD100/RotD50 Factors (2014)

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DETERMINISTIC SPECTRUM

Largest Amplitudes of Ground Motions Considering All Sources Calculated using Weighted Mean of Attenuation Equations[1]

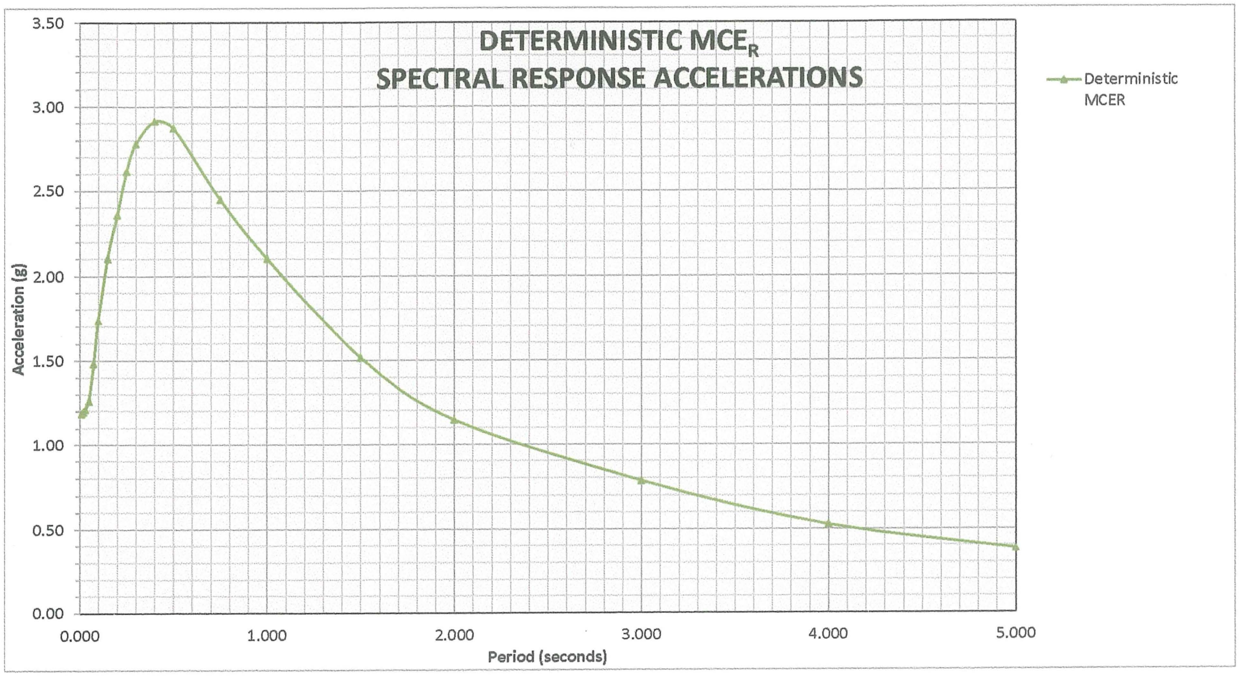
Controlling Source: Pinto Mountain

Is Probabilistic $Sa_{(max)}$<1.2Fa? NO

Project No: 544-23355

Period	Deterministic PSa Median + 1.σ for 5% Damping	Max Directional Scale Factor[2]	Deterministic MCE	Section 21.2.2 Scaling Factor Applied
0.010	0.997	1.19	1.187	1.187
0.020	1.006	1.19	1.197	1.197
0.030	1.017	1.19	1.211	1.211
0.050	1.059	1.19	1.260	1.260
0.075	1.243	1.19	1.480	1.480
0.100	1.456	1.19	1.732	1.732
0.150	1.752	1.20	2.103	2.103
0.200	1.964	1.20	2.357	2.357
0.250	2.161	1.21	2.615	2.615
0.300	2.278	1.22	2.779	2.779
0.400	2.369	1.23	2.914	2.914
0.500	2.335	1.23	2.872	2.872
0.750	1.974	1.24	2.448	2.448
1.000	1.696	1.24	2.103	2.103
1.500	1.223	1.24	1.517	1.517
2.000	0.925	1.24	1.147	1.147
3.000	0.627	1.25	0.784	0.784
4.000	0.421	1.25	0.527	0.527
5.000	0.304	1.26	0.383	0.383

Is Determinstic $Sa_{(max)}$<1.5*Fa?	NO
Section 21.2.2 Scaling Factor:	N/A
Deterministic PGA:	0.997
Is Deterministic PGA >=F_{PGA}*0.5?	YES



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[1] NGAWest 2 GMPE worksheet and Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) - Time Dependent Model

[2] Shahi-Baker RotD100/RotD50 Factors (2014)

SITE SPECIFIC SPECTRA

Period	Probabilistic MCE	Deterministic MCE	Site-Specific MCE	Design Response Spectrum (Sa)
0.010	0.937	1.187	0.937	0.624
0.100	1.571	1.732	1.571	1.047
0.200	2.111	2.357	2.111	1.407
0.300	2.389	2.779	2.389	1.593
0.500	2.338	2.872	2.338	1.559
0.750	1.953	2.448	1.953	1.302
1.000	1.648	2.103	1.648	1.099
2.000	0.908	1.147	0.908	0.605
3.000	0.599	0.784	0.599	0.399
4.000	0.414	0.527	0.414	0.276
5.000	0.306	0.383	0.306	0.204

Period	ASCE 7 SECTION 21.3 General Spectrum	80% General Response Spectrum
0.005	0.516	0.413
0.010	0.536	0.429
0.020	0.576	0.461
0.030	0.616	0.492
0.050	0.695	0.556
0.060	0.735	0.588
0.075	0.794	0.636
0.090	0.854	0.683
0.100	0.894	0.715
0.110	0.934	0.747
0.120	0.973	0.779
0.136	1.037	0.830
0.150	1.093	0.874
0.160	1.132	0.906
0.170	1.172	0.938
0.180	1.212	0.969
0.200	1.241	0.993
0.250	1.241	0.993
0.300	1.241	0.993
0.400	1.241	0.993
0.500	1.241	0.993
0.600	1.241	0.993
0.640	1.241	0.993
0.750	1.241	0.993
0.850	1.241	0.993
0.900	1.241	0.993
0.930	1.241	0.993
1.000	1.162	0.929
1.500	0.774	0.620
2.000	0.581	0.465
3.000	0.387	0.310
4.000	0.290	0.232
5.000	0.232	0.186

ASCE 7-16: Section 21.4

Site Specific

	Calculated Value	Design Value
SDS:	1.433	1.433
SD1:	1.210	1.210
SMS:	2.150	2.150
SM1:	1.815	1.815
Site Specific PGAm:	0.837	0.837
Site Class:	D measured	

Seismic Design Category - Short*	D
Seismic Design Category - 1s*	D

* Risk Categories I, II, or III

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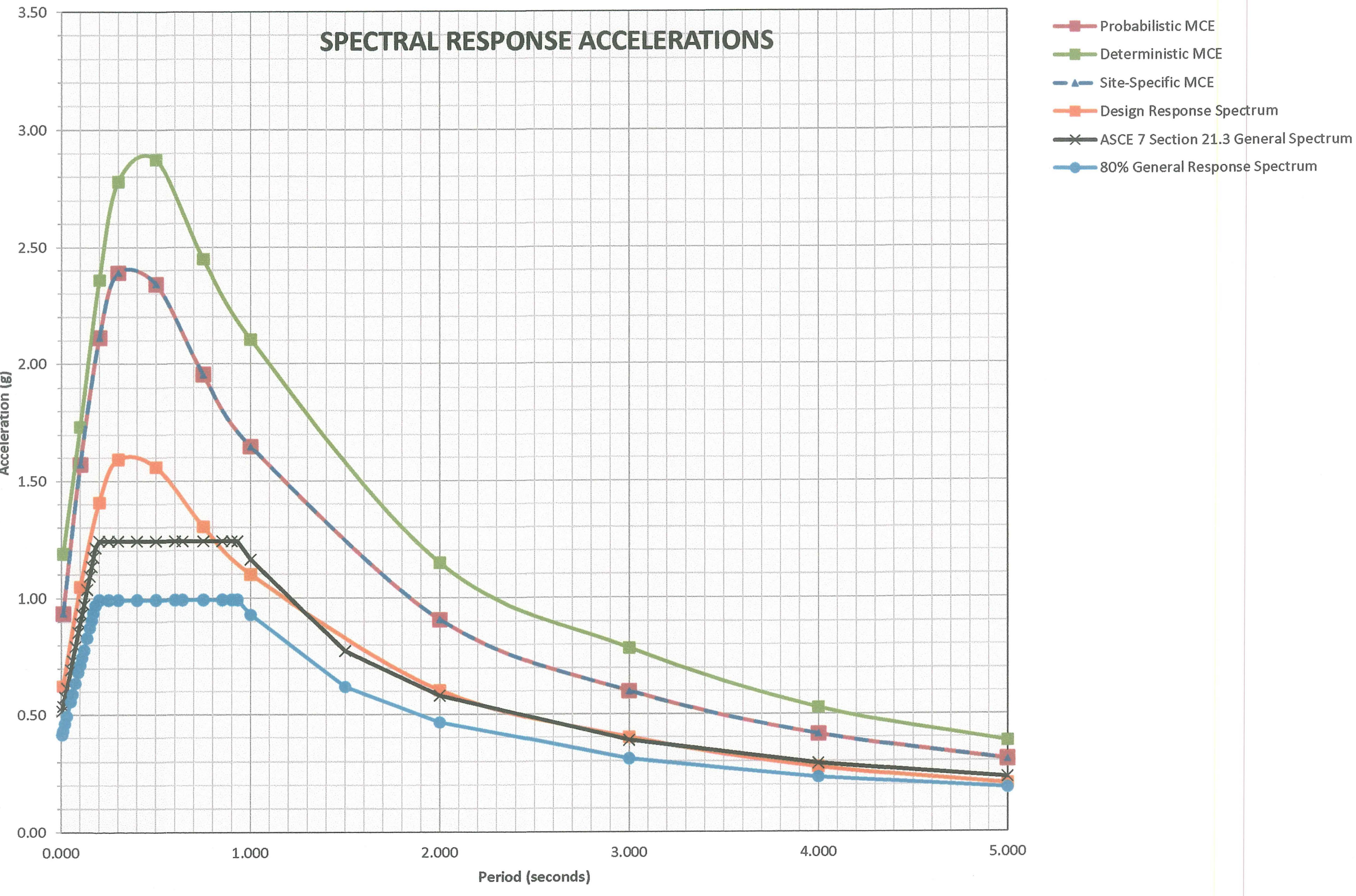
SPECTRAL RESPONSE ACCELERATIONS
Acceleration (g)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.000
1.000
2.000
3.000
4.000
5.000
Period (seconds)
Probabilistic MCE
Deterministic MCE
Site-Specific MCE
Design Response Spectrum
ASCE 7 Section 21.3 General Spectrum
80% General Response Spectrum