Appendix G.1

Geotechnical Report
NMG Geotechnical, 2021

Travertine SPA
Draft EIR
SCH# 201811023
Technical Appendices

October 2023

NMG
Geotechnical, Inc.

August 27, 2021

Project No. 18186-01

To: Hofmann Management Company
c/o TRG Land Design
898 Production Place
Newport Beach, California 92663

Attention: Mr. Mark Rogers

Subject: Preliminary Geotechnical Evaluation and Planning Study, Proposed Residential Development at Travertine, City of La Quinta, California

In accordance with your authorization, NMG Geotechnical, Inc. (NMG) has performed a preliminary geotechnical evaluation and planning study for the proposed Travertine mixed-use development in the city of La Quinta, California. We have reviewed the grading plan prepared by ProActive Engineering Consultants, received by NMG on May 20, 2019, in light of the geotechnical conditions at the site in order to provide geotechnical recommendations for the proposed grading and development. This report will also be used for preparation of the project Environmental Impact Report (EIR).

Prior subsurface investigations have been performed at and adjacent to the site by various consultants (Appendix A). In addition, NMG conducted geophysical surveys at three locations, performed geologic mapping of the site, and completed an infiltration study for the two proposed water quality basins in the eastern portion of the site. The infiltration study included drilling of seven hollow-stem- auger borings to depths of 20 to 40 feet, percolation testing in five of the borings, laboratory testing, and evaluation of design infiltration rates. The collected data was compiled and are the basis for our findings, conclusions, and recommendations presented in this report. The 200-scale grading plan was used as the base map to present boring and test pit locations and geologic mapping for the site (Preliminary Geotechnical Map: Plates 1 and 2). The 200-scale grading and topographic maps and test pit data were also utilized to prepare an Approximate Rock Distribution Map (Plate 3).

This report presents our findings and provides preliminary remedial grading and foundation design recommendations for the proposed development concept. Based on our findings, we conclude that the proposed development is feasible provided it is designed, graded and constructed in accordance with the preliminary geotechnical recommendations in this report. Additional geotechnical exploration, review, and analysis may need to be performed during the future design phases and as rough grading plans become available. The recommendations provided herein will then be confirmed and/or updated as necessary based on our findings.

If you have any questions regarding this report, please contact our office. We appreciate the opportunity to provide our services.

Respectfully submitted,

NMG GEOTECHNICAL, INC.

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1.0 INTRODUCTION

1.1 Purpose and Scope of Work

NMG Geotechnical, Inc. (NMG) has prepared this report of geotechnical evaluation and planning-level study for the proposed Travertine mixed-use development in the city of La Quinta, California. We have reviewed the proposed grading and development in light of the geotechnical conditions at the site in order to provide preliminary geotechnical recommendations for the proposed grading and development. This report will also serve as the technical Appendix G for the EIR.

We have reviewed the grading plan prepared by ProActive Engineering, received by NMG on May 20, 2019. The grading plan was used as the base map for our Preliminary Geotechnical Map (Plates 1 and 2) to present the geologic mapping and locations of geotechnical borings, percolation test borings, seismic lines, and test pits at the site. The 200-scale grading and topographic maps and test pit data were also utilized to prepare an Approximate Rock Distribution Map (Plate 3).

Our scope of work was as follows:

- Acquisition, review and compilation of available geologic/geotechnical reports and maps for the subject site and surrounding area. A reference list and definitions of terms used in this report are included in Appendix A.
- The 200-scale Preliminary Geotechnical Map (Plates 1 and 2) provides a compilation of the boring and test pit locations at and adjacent to the site from this and previous geotechnical studies. Boring and test pit logs by NMG and others are included in Appendix B.
- Review of historic aerial photographs dating back to the late 1940s and historic topographic maps dating back to the early 1900s. A list of reviewed photographs is included in Appendix A.
- Geologic mapping of alluvial fans and exposures of bedrock in the mountains and hills adjacent to the proposed development. Geologic field mapping was performed on May 9 and 10, 2019. The geologic mapping is presented on the Preliminary Geotechnical Map (Plates 1 and 2).
- A geophysical study was performed on May 9, 2019 to evaluate the rippability potential of the onsite materials at the anticipated locations of the deepest cuts. The approximate locations of the seismic lines are provided on the Preliminary Geotechnical Map (Plates 1 and 2). The complete geophysical refraction study is included in Appendix E.
- An infiltration study was performed August 9 through 12, 2021, that included drilling and sampling of seven hollow-stem-auger borings at the two proposed water quality basins in the eastern portion of the site. Percolation testing was performed in five of the borings in general conformance with the Riverside County Design Handbook for Low Impact Development Best Management Practices. The boring logs are included in Appendix B. The percolation test data are presented in Appendix F.
- An Approximate Rock Distribution Map (Plate 3) was prepared based on the percentages of boulders (oversize) recorded in the test pits to show the amount of oversize that may be generated during grading.

- Laboratory testing by NMG included moisture density, grain size and collapse testing. We also reviewed laboratory test results by others, including grain size distribution, consolidation, maximum density, optimum moisture content, permeability, expansion index, and corrosion potential. Laboratory test results by NMG and others are included in Appendix C, the in-situ moisture and density test results are included on the boring logs in Appendix B.

- Evaluation of faulting and seismicity in accordance with the 2019 California Building Code (CBC) and the current standard of practice. Seismic design parameters are included in Section 3.16 and the data in Appendix D.

- Geotechnical evaluation and analysis of the compiled data with respect to the proposed development. Geologic analysis included preparation of the geotechnical map and review of prior data compiled for this report. Geotechnical analysis included evaluation of rippability, rock (oversize) quantification, groundwater, settlement, slope stability, infiltration rate calculation, and development of preliminary grading recommendations. This task also included review of the preliminary grading plan in light of the geotechnical conditions. Geotechnical grading recommendations are included in Sections 3.2 to 3.7, and the General Earthwork and Grading Specifications are provided in Appendix G.

- Preparation of this report with our findings, conclusions, and preliminary recommendations for the subject development.

1.2 Site Location and Description

The approximately 855-acre site is located in the southern most portion of the City of La Quinta. The property is accessed from the east, via a gate and dirt road over the levee from the western end of 62nd Avenue (Plate 2). The site consists of east-facing mountain-front alluvial fan, sloping gently at approximately 3 to 6 percent toward the east. Existing elevations vary from a high of 270 feet above mean sea level (msl) in the west, to a low of 30 feet above msl in the east near 62nd Avenue. Locally, where 62nd Avenue and Madison Avenue are proposed to cross the existing levee, elevations at the toes of the levee are below sea level (-10 feet msl). The highest elevation within the boundary of the grading is 455 feet msl in the southwest corner where two water tanks are proposed.

Site drainage sheet flows over the land surface toward existing washes and ultimately drains to the east. These flows historically made their way into the Whitewater River located 7 miles to the east of the site; however, a levee was constructed with infiltration ponds (Thomas E. Levy Groundwater Replenishment Facility) west of the levee. Surface flows are now impounded and infiltrate into the Coachella Valley groundwater basin.

An abandoned vineyard is present within the central portion of the site. Miscellaneous remnants of this operation are still present, consisting of trellises, root balls, irrigation-related pipelines and well pads, and scattered rock piles likely generated during grading of the vineyard. The remainder of the site is essentially in its native condition, with sparse vegetation and abundant cobbles and boulders at the surface.

There were limited utilities noted during our site reconnaissance, including overhead electric and remnants of water/irrigation, which previously supplied water for the vineyard. A water line is present along 62nd Avenue, crossing the existing levee, which supplies water to the Thomas E. Levy Groundwater Replenishment Facility east of the project area.

1.3 Proposed Conceptual Development and Grading

The proposed project covers an area of approximately 855 acres and will be comprised of a variety of land uses. Residential land uses will range from low to medium density (1.5 to 8.5 dwelling units per acre) and total up to 1,200 dwelling units of varying product types. A resort/spa facility is planned in the northern portion of the community to serve residents, tourists and recreational visitors. The facility features a 45,000 square foot boutique hotel with a 175-seat restaurant, 97,500 square feet of lodging to allow 100 villas, and an 8,700 square foot spa and wellness center.

A 4-hole golf practice facility with a clubhouse is planned in the southeast portion of the site and will include a driving range, tracking bays, putting course, pro-shop, restaurant and bar, banquet and restaurant facility to be shared with wedding garden facilities. Bike lanes, pedestrian walkways, and a Travertine community trail system is proposed throughout the community. Recreational open space uses include picnic tables, barbeques, tot lot playground, two community parks and staging facilities for the regional interpretive trail.

Proposed grading will consist of design cuts and fills up to 40 and 60 feet thick, respectively. The preliminary grading plan shows cut and fill slopes within the interior of the project at 3H:1V (horizontal to vertical) inclinations or flatter, up to 80 feet high. The perimeter slopes of the project are at inclinations of 2H:1V or flatter, up to 30 feet high. There will be perimeter flood protection along the western and southern boundaries, that consists of a raised edge condition (2H:1V slope) with armored lining to protect against scour and erosion.

There will be two paved public access roads and a paved emergency access road. Both 62nd Avenue and Madison Street extensions will include grading adjacent to and over the existing flood control levee, from the east and north, respectively. Jefferson Street will also be extended to the north (Plate 1), to connect to the Coral Canyon portion of Jefferson Street, ultimately connecting to 58th Avenue. Madison Street will be the emergency access, to connect to 60 Avenue and used by CVWD for access to their facilities. 62nd Avenue will be the main entrance to the site and the existing approach on the eastern side of the levee will be lengthened to soften grade with embankments likely supported with retaining structures. Additionally, culvert/arch crossings are anticipated to support the roadway extensions on the west side of the levee at 62nd Avenue and the south side of the levee for Madison Street. The alignment of Jefferson Street will cross over the Guadalupe dike at the northwest corner of the project, and may also include culvert/arch crossings.

1.4 Site History and Prior Investigations/Grading

Based on historic aerial photographs dating back to the 1940s and historic topographic maps dating back to the early 1900s, the following site history can be detailed:

- The earliest topographic map reviewed was from 1904. The natural drainages and dry creeks appear roughly in the same location as today. The map indicates very little development of structures and roadways within the Coachella Valley area.

- In 1949, the site appears to be in its natural condition and predates the flood control levee (Dike No. 4) to the east. Visible lineaments representing the shoreline of ancient Lake Cahuilla are evident in the photographs. Other geomorphic features, such as the Martinez Landslide and varying-age alluvial fans and desert varnish/pavement are visible. The site remained in this condition through the 1950s.
- By 1977, the flood control levee and associated control/conveyance levees were constructed. No infiltration ponds were yet constructed. The remainder of the project area appears to be in its native condition.
- By 1998, a portion of the site was being utilized for agriculture (vineyard) and appears to generally be in the present-day condition.
- Between 2006 and 2009, the Thomas E. Levy groundwater replenishment infiltration ponds were graded on the western side of the flood control levee.

We have compiled and reviewed the data from numerous geotechnical studies performed at and near the site. A summary of the reports obtained and the investigations performed is presented below. A complete reference list is provided in Appendix A. The boring and test pit logs by others are included in Appendix B and the laboratory test results by others in Appendix C.

- Sladden Engineering (2001) performed a geotechnical evaluation of the existing levee (Dike No. 4 Flood Control Levee) adjacent to the development. The evaluation included excavation of 10 hollow-stem-auger borings to depths of 11.5 to 46.5 feet.
- URS Corporation (2002) performed a geotechnical investigation near the site for the proposed recharge facility. Their investigation included 12 hollow-stem borings to depths of 26.5 to 28 feet, 8 test pits to depths of 11 to 15 feet, installation of two groundwater wells and geotechnical laboratory testing.
- Sladden Engineering (2005a) performed a geotechnical exploration for adjacent development immediately north of the subject site ("Coral Canyon" Development). This exploration included drilling of 12 hollow-stem-auger borings to depths of 8.0 to 30.5 feet.
- Earth Systems Southwest (2007b) performed a geotechnical exploration for the proposed extension of Madison Street. This study included excavation of four hollow-stem-auger borings, laboratory testing, and preparation of the report.
- Earth Systems Southwest (2007c) performed infiltration testing for storm water facilities proposed for the Travertine project. This study included excavation of seven hollow-stem-auger borings, in-situ infiltration testing, collection of surface samples, laboratory testing, and preparation of a report summarizing their findings.
- Earth Systems Southwest (2007d) later prepared a geotechnical engineering report for the Travertine project, which included a field exploration consisting of excavation of 49 test pits ranging in depth from 7 to 26 feet below existing grade, sample collection, and laboratory testing. This report includes the bulk of the data utilized during our review and development of the preliminary geotechnical recommendations provided herein.

1.5 Field Exploration

Our field exploration started with two days of site reconnaissance and geologic mapping performed on May 9 and 10, 2019. The geologic mapping is shown on the Preliminary Geotechnical Map (Plates 1 and 2) utilizing the existing topography and rough grading plan as the base map. The map represents a compilation of the regional geologic mapping, along with aerial photograph interpretation and site-specific mapping.

A seismic refraction survey was performed onsite within areas of the deepest planned cuts in order to review rippability and the potential presence of buried granitic rock. The survey consisted of three seismic lines ranging from 350 to 470 feet long with geophone spacing ranging from 7.5 to 10 feet apart. The locations of the seismic lines are shown on the Preliminary Geotechnical Map (Plates 1 and 2) and the complete seismic refraction survey report is included in Appendix E.

Additional field exploration was performed on August 9 and 10, 2021 in the southeast portion of the site, where two water quality basins are proposed near 62nd Avenue. This work included drilling, logging, and sampling of seven 8-inch-diameter hollow-stem borings (H-1, H-2, P-1 through P-5) to depths between 20 and 40 feet below ground surface with a truck-mounted drill rig. Samples were taken using the Standard Penetration Test (SPT) (1.38-inch inside-diameter) and modified California split-barrel ring sampler (2.5-inch inside-diameter). The samplers were driven into the soil with a 140-pound automatic safety hammer, free-falling 30 inches on the truck-mounted rig. The drive samples were also used to obtain a measure of resistance of the soil to penetration (recorded as blows-per-foot on our geotechnical boring log). Representative bulk samples of onsite soil were collected from the drill cuttings and SPT samples. Relatively undisturbed samples were also collected using the modified California split barrel ring sampler. The borings were backfilled with cuttings and tamped for compaction. The approximate locations of these and prior borings are shown on the Geotechnical Map (Plates 1 and 2). The boring logs are included in Appendix B.

Percolation testing was performed in five borings (P-1 through P-5) on August 10 and 12, 2021 in general conformance with the Riverside County Whitewater River Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development (2014). This method was approved by the city for use on the Travertine site prior to the work being performed. Two-inch-diameter slotted PVC pipe and granular sand (No. 3) backfill (annular space) was installed within the borings to prevent caving of the native sandy soils during testing. A 4,000-gallon heavy-duty water truck was used to supply water during testing. Percolation test results are discussed in Section 2.11 and presented in Appendix F.

1.6 Laboratory Testing

Due to the dry clean sandy nature of the alluvial soils at the site, undisturbed samples were difficult to collect. Therefore, the majority of laboratory testing was performed on selected bulk and disturbed soil samples. The testing performed included:

- Moisture content and dry density as possible;
- Grain size; and
- Collapse tests.

Laboratory tests were conducted in general conformance with applicable ASTM standards. Laboratory test results by NMG and others are presented in Appendix C. In-situ moisture and dry density results are included on the geotechnical boring logs (Appendix B).

2.0 GEOTECHNICAL FINDINGS

2.1 Geologic Setting and Soil Mapping

The site is situated on substantial alluvial fan deposits at the base of the Santa Rosa Mountains, located within the Peninsular Range geomorphic province of southern California. The project area lies along the west side of Coachella Valley, approximately 14 miles northwest of the Salton Sea. The site is situated west of ancient Lake Cahuilla that once inundated the Coachella Valley. Bedrock is exposed along the northern perimeter and southwest corner of the site and consists of Mesozoic-age plutonic (granitic) rocks. Bedrock units present in the adjacent Santa Rosa Mountains to the west include both Mesozoic-age granitic rock and Pre-Cenozoic-age granitic and metamorphic rocks. Surficial deposits include numerous generations of Quaternary-age alluvial fan deposits.

Soil mapping by the U.S. Department of Agriculture (USDA, 2020) only covers portions of the project area. We have used the existing available data and modified/extended the soil mapping to cover the project area based on the soil types presented in the USDA mapping and our field mapping. Figure 2 presents the combined soils mapping. The granitic bedrock outcrops and elevated older alluvial fan deposits largely composed of cobbles and boulders have been designated as Rock Outcrop and Rubble Land, respectively, in the USDA mapping. The lower-lying younger alluvial fans and active wash materials are also designated as the Carrizo stony sand and Carsitas gravelly sand. This material is generally granular and subject to erosion.

2.2 Earth Units

The site is generally underlain by young and old alluvial fan deposits. Locally along the project perimeter, granitic bedrock is mapped. Undocumented artificial fill associated with grading of flood control levees and the abandoned vineyard are present at the site. Mapped earth units within the development area are described below, in the order of oldest to youngest. The approximate limits of the earth units are shown on the Preliminary Geotechnical Map (Plates 1 and 2). The earth units were based on regional mapping by others (Figures 3 and 4; Dibblee, 2008 and CGS, 2012), and site-specific mapping by Earth Systems Southwest (2007d). NMG refined the units based on review of aerial photographs and field mapping.

Granitic Bedrock (gr): Exposed Mesozoic-age granitic bedrock is mapped within the adjacent mountains to the west-southwest and in the north-south trending ridgeline at the north end of the project area. The medium-grained, massive to foliated, granitic rock was found to be highly fractured and jointed near-surface with veins of feldspar and quartz. The Santa Rosa Mountains to the west expose granitic and metamorphic bedrock that are the source of the fan deposits that underlie the subject site.

Older Alluvial Fan Deposits (Qof) were predominately mapped along the central and southwestern portions of the project area within the elevated fans. This unit was assigned based on fan morphology, relative elevation, magnitude of channel incision, and strong desert pavement and varnish development (Christenson and Purcell, 1985). While many generations of older alluvial fans may be present across the project area, we have designated this unit to represent older fans outside of the active alluvial fan.

Based on test pits excavated and geotechnically logged by Earth Systems Southwest (2007d), TP-30 through TP-32 and TP-39 encountered this earth unit. The material was found to generally consist of light brown to white well-graded fine to coarse sands (SW) with trace to little gravel that were dry and medium dense. The percentage of larger rock (cobbles and boulders) was found to generally range from 20 to 30 percent with an abundance near-surface (80+ percent) at some locations, likely representing the desert pavement. Based on our review of the site-specific data, there is no distinct correlation between earth unit and presence/quantity of cobbles and boulders. This is likely more closely linked to mountain-front proximity. An Approximate Rock Distribution Map (Plate 3) was prepared to distinguish the limits and distribution of oversize material (boulders over 12 inches in the maximum diameter) based on the existing test pit logs and field descriptions.

Younger Alluvial Fan Deposits (Qyf) were mapped across the majority of the project area and is the most prevalent earth unit within the development area. The younger alluvial fans were generally found to have little to no desert pavement or varnish development, mild channel incision, and a braided channel drainage pattern. Based on our mapping, the fan deposits include rocks of both granitic and metamorphic composition that are very hard and not weathered. These rocks are primarily rounded to subangular, cobble to small boulder (12- to 24-inch) size over much of the site, and with boulders up to 2 to 4 feet in the fans to the west.

This unit was encountered in all exploratory trenches by Earth Systems Southwest, except TP-30 through TP-32 and TP-39. The material was found to generally consist of light brown to white well-graded fine to coarse sand (SW) with trace to some gravel, locally with trace to little fines (silts and clays). Additionally, some of the material was found to consist of fine to coarse sandy gravel (GW). The sands and gravels were dry to damp, medium dense to dense, and friable. The test pit logs indicate that the percentage of cobbles and boulders was found to generally range from 2 to 50 percent, with a number of locations as high as 60 to 80 percent. The amount and size of boulders generally decreased to the east, away from the mountains.

The younger alluvial fan deposits were found in our borings drilled in the eastern portion of the site near the future basins and the 62nd Avenue extension. Borings H-1 and H-2 were drilled to depths of 40 feet and encountered primarily gray to brownish-gray fine to coarse sands (SW, SP, SW-SM) with gravelly sand layers (SW/GW) that were between 5 and 10 feet thick. Continuous sampling performed to depths of 20 to 23 feet below the bottom of the basins did not encounter clayey or silty confining layers. Five borings P-1 through P-5 that were drilled to depths of 20 to 30 feet, also encountered similar younger alluvial fan deposits.

Undocumented Artificial Fills (Afu): There are several generations of artificial fill onsite, including undocumented fill associated with vineyard and flood control levee grading. No test pits or exploration was performed within vineyard artificial fill. The fill appears to be of relatively minor thickness and of similar composition to the alluvial fans. More significant grading appears to have been performed along the western and southern perimeters of the vineyard where the natural drainage courses were realigned. This portion of artificial fill appears to have a large concentration of cobbles and boulders, likely to protect the vineyard from scour and heavy flows during rain. Additional piles of undocumented artificial fills are present at the northwestern portion of the vineyard and appear to be composed largely of cobbles and boulders.

Other artificial fills exist along the eastern perimeters of the site (future 62nd Avenue extension), where flood control levees were constructed under the jurisdiction of the Bureau of Reclamation. The levee is constructed with sloping sides, approximately 2H:1V, and 30 to 35 feet above the adjacent natural elevations. A geotechnical study that included field exploration and borings was performed to evaluate the soil conditions within the levee and underlying native soils to determine the adequacy of the levee (Sladden, 2001). The soils were reportedly found to be an inconsistent mixture of brown silty sand (SM) and sandy silt (ML) with scattered gravel. The fill materials were found to be generally very firm, dense, dry to moist and adequate for levee support (Sladden, 2001). The report also indicates that the core was typically siltier than the soils exposed on the embankment. No report documenting the original construction of levee was available for our review.

2.3 Laboratory Testing and Soil Properties

Based on our limited exploration, the matrix materials within the younger alluvial fan deposits encountered in the borings predominantly consisted of clean sands with gravel and varying amount of silt. The majority of the driven samples during our exploration were disturbed due to the presence of gravels and the dry nature of the sandy soils. The in-place moisture contents varied between 0.3 and 7.3 percent. Dry densities were obtained in eleven of the 63 samples and the densities varied between 116.7 and 126.5 pcf. In addition, blow counts generally varied between 20 and 80 blows per foot.

Moisture contents and dry densities for the flood control levee fill ranged from 0.5 to 8.7 percent and 95 to 129 pcf, respectively (Sladden, 2001). Blow counts reportedly ranged from 26 to 100+ blows per foot.

Grain Size Distribution: Grain-size distribution tests were conducted by NMG and others on bulk and/or ring samples. These samples were classified as poorly or well-graded sands with fines contents (passing Sieve No. 200) of 13 percent or less with a Unified Soil Classification System (USCS) of SW, SP or SW-SM. Note that it is likely most cobbles and boulders were screened out during sample collection and preparation. The grain size analysis represents the matrix materials (clay, silt, sand, and gravel) and should be reviewed with the associated test pit log for a more complete representation of the earth units.

Grain-size distribution tests for the flood control levee fill were conducted on 69 bulk and/or ring samples. Sixty-six of these samples were classified as silty or clayey sands with fines contents in the range of 13 to 49 percent (USCS classification of SM or SC). Three of the samples were classified as sandy silt (USCS classification of ML) with fines contents in the range of 52 to 56 percent.

Maximum Density and Optimum Moisture Content: The results of the maximum dry density testing by others indicate that the near-surface soils at depths of 0 to 5 feet have maximum dry densities ranging from 115.5 to 131.0 pcf with optimum moisture contents ranging from 3 to 12 percent.

Maximum dry density testing of the flood control levee fill indicated that the near-surface soils at depths of 0 to 5 feet have maximum dry densities ranging from 131 to 134 pcf with optimum moisture contents ranging from 7 to 8 percent.

Consolidation/Collapse: NMG performed hydro-consolidation tests on two relatively undisturbed ring samples collected at depths of 20 to 30 feet. Hydro-consolidation potential of the samples was estimated under the vertical load of 3.2 ksf, which is near or above the existing overburden pressures of the samples. The estimated hydro-consolidation potential of the samples ranged from 1.4 to 1.6 percent, which is considered to be moderate.

The consolidation test results for the flood control levee fill indicated a collapse potential of less than 3.1 percent and swell potential of less than 0.1 percent upon addition of water at 0.575 and 0.72 kips per square foot (ksf) (Sladden, 2001). The report concluded that the higher collapse potential in the samples may have been attributed to the sample disturbance resulting from very high blow counts during collection. Consolidation testing of onsite materials was not performed during prior studies. The results of the consolidation tests are included in Appendix C.

Corrosivity: Laboratory testing of the soil samples indicated that the onsite soils and those of the flood control levee are considered to be corrosive to severely corrosive to ferrous metals. Soluble sulfate exposure of levee soils is classified as "S0" per Table 19.3.1.1 of ACI-318-14. (Sladden, 2001).

2.4 Groundwater and Surface Water/Flood Potential

Groundwater: The subject site lies within the East Whitewater River sub-basin of the Colorado River groundwater basin. Groundwater has not been encountered in borings or test pits excavated during any of the prior exploratory work. Based on our review of Coachella Valley Water District (CVWD) engineering report, groundwater is at great depth, approximate elevation of -75 feet below msl (CVWD, 2019). Ongoing replenishment has substantially increased the groundwater table over the past decade. Due to the location and elevation of the existing replenishment facility immediately east of the project area, we do not expect groundwater elevations to rise within 50 feet of the planned development.

There are several known water wells onsite within the Thomas E. Levy Groundwater Replenishment Facility. These well locations and groundwater levels were obtained from CVWD and are shown on Plates 1 and 2. Based on data from CVWD, the groundwater in the wells near 62nd Avenue extension varied from 84 to 124.5 feet in depth (or elevations of -75 to -80 feet below msl) on December 16, 2019. The groundwater levels in wells near Madison Avenue were approximately 60 feet deep (or elevation of -80 feet below msl) on December 18, 2019.

Surface Water and Flood Potential: Currently, the U.S. Federal Emergency Management Agency (FEMA) mapping does not cover the project area west of Dike No. 4. We understand that the flooding potential and associated hazards are being reviewed by the project hydrologist and that the development elevations will be situated above anticipated flood elevations, and appropriate scour and erosion protection will provided on the project perimeter slopes.

2.5 Regional Faulting and Seismicity

Faulting: A bedrock fault is mapped within the project area in the northern portion of the site extending toward the south and buried under the alluvial fan (Rogers, 1965 and Earth Systems Southwest, 2007d). This fault was also shown on the Technical Background Report of the Safety Element of the La Quinta 2035 General Plan (Earth Consultants International, 2010) as an inactive fault. There are no faults mapped at the site by other published maps (Dibblee, 2008 and CGS, 2012). The site is not located within a fault-rupture hazard zone as defined by the Alquist-Priolo Special Studies Zones Act (CGS, 2018) or within an active or potentially active fault zone defined by Riverside County (2021).

There are several regionally active faults that could produce an earthquake that results in strong ground shaking at the site. The closest seismically active faults are the San Andreas Fault located 9.8 miles to the northeast, and the San Jacinto Fault located 14.8 miles southwest, as shown on Figure 5. The other regionally active, more distant faults that could produce ground shaking at the site include, but are not limited to, the Elsinore Fault and Brawley Seismic Zone.

Seismicity: Properties in southern California are subject to seismic hazards of varying degrees, depending upon the proximity, degree of activity, and capability of nearby faults. These hazards can be primary (i.e., directly related to the energy release of an earthquake such as surface rupture and ground shaking) or secondary (i.e., related to the effect of earthquake energy on the physical world, which can cause phenomena such as liquefaction and ground lurching). Since there are no active faults at the site, the potential for primary ground rupture is considered very low. The primary seismic hazard for this site is ground shaking due to a future earthquake on one of the major regional active faults listed above.

Using the USGS computer program (USGS, 2020) and the site coordinates of 33.60143 degrees north latitude and -116.26159 degrees west longitude, the controlling fault for the site is the San Andreas Fault, with the maximum moment magnitude of 7.7 M_W.

Based on the 2019 CBC and underlying site soil conditions, the site may be classified as Site Class D.

Secondary Seismic Hazards: Both the City of La Quinta Technical Background Report to the Safety Element of the 2035 General Plan (Earth Consultants International, 2010) and Riverside County (2021) provide mapping of potential secondary seismic hazards, such as liquefaction susceptibility and earthquake-induced slope instability. Zones of potentially liquefiable soil, as defined by the County of Riverside, are included on Figure 6 and indicate low to very low liquefaction susceptibility. Based on the depth to groundwater summarized in Section 2.4, the liquefaction potential at the site is considered very low. Mass movements and slope stability are discussed in detail in Section 2.6.

The potential for other secondary seismic hazards, such as tsunami and seiche, are considered very low as the site is located away from bodies of water and at elevation greater than 50 feet above msl.

2.6 Slope Stability and Mass Movements

Permanent Structural Slopes: There are planned 3H:1V cut and fill slopes up to 80 feet high that will be cut from and/or underlain by alluvial fan materials. The proposed slopes are anticipated to be globally stable and likely surficially unstable or subject to erosion due to the lack of fines and cohesion in the native soils. Detailed slope stability analysis will need to be performed at the design-level study. (See further discussions in Section 3.7.)

Temporary Slopes: Temporary excavations may expose varying earth materials, including both compacted and undocumented fills, and alluvial fan deposits. Temporary slopes in alluvial fans are anticipated to be subject to failure due to the sandy nature of the alluvium and lack of cohesion. A detailed slope stability analysis will need to be performed at the design-level study.

Mass Movements and Natural Slopes: The Martinez Rockslide is located south of the site. The rockslide spans over 4.5 miles in length and broke away from the mountainside at an elevation of 6,320 feet above msl, from the top of the Santa Rosa Mountains. It deposited and came to a stop onto the flatter desert floor. The toe area consists of a bouldery landslide material with a slope that is 200 to 300 feet above the adjacent alluvial fan. One study by Bock (1977) tentatively dated the rockslide as Holocene due to remnants of older alluvial fan material beneath the toe of the slide. It is hypothesized that the initiating force was a large seismic event located near Martinez Mountain. The development has been set back approximately 900 feet from the toe of the rockslide. Based on the setback distance and lack of potential energy and upslope materials, we do not anticipate the rockslide will have any impact to the project. However, due to the steep slope at the toe of the rockslide and presence of cobbles and boulders, rockfall hazard exists within the setback area.

The granitic bedrock ridge at the north end of the development was found to generally be fractured and jointed and has been mapped as a potential rockfall hazard (Earth Consultants International, 2010). In general, the plan set indicates 100-foot offset from this bedrock ridge.

Rockfall hazard review and/or analysis should be performed at a later date for both locations discussed above once plans are further developed to evaluate this hazard and provide mitigation recommendations (i.e., impact walls or berms/channels) if required.

2.7 Settlement

Based upon our review of the existing subsurface data and laboratory data, the near-surface soil at the site generally consists of weathered, low density and/or porous material and undocumented fill material. This unsuitable soil is prone to significant collapse and/or consolidation and has poor bearing properties. Below this zone, the native materials appear to be dense, as reported by the high blow counts on the boring logs from adjacent projects. The amount of potential settlement can vary significantly over the site due to variations in subsurface conditions and depths of planned cuts and fills. In conducting our preliminary settlement evaluation, we have assumed that remedial removals will be implemented to remove the undocumented fill materials and weathered alluvial fan deposits; that fill loading will be a maximum of 60 feet over existing ground; and structures will be of low-rise wood-framed construction (one to two stories).

We anticipate the total consolidation settlement at the completion of grading to be on the order of 1 to 1 ½ inches. The differential settlement is then expected to be on the order of ¾-inch over a 40-foot span.

2.8 Regional Subsidence

Regional land subsidence as a result of groundwater withdrawal in the Coachella Valley has been studied by the U.S. Geological Survey over the past 25 years (USGS, 2014). Since the 1900s, increasing agricultural, domestic, and municipal groundwater withdrawal has lowered the water table in Coachella Valley as much as 50 vertical feet, which in turn resulted in wide spread land subsidence. Water levels were measured between 1995 and 2010 and found that groundwater levels were the lowest recorded in 2010. The majority of this measured subsidence occurred in the central portions of the city of La Quinta, north of 60th Avenue, where up to 2 feet was recorded. Interferometric Synthetic Aperture Radar detection indicated that land-surface elevation changes within the project area ranged from 0 to approximately 1.3 inches. Additionally, the study has noted that groundwater levels within the La Quinta area have shown recovery coinciding with increased groundwater replenishment at the Thomas E. Levy Facility beginning in mid-2009. As CVWD continues to monitor and maintain groundwater replenishment and reduce reliance on groundwater resources through water-supply management, we anticipate that regional subsidence will continue to decline.

2.9 Erosion Potential and Scour Protection

The alluvial fan deposits onsite are sandy with generally less than 10 percent fines and are considered highly erodible when exposed to environmental elements without protection. Design cut and fill slopes will need to have surface protection and proper drainage devices. Please note that the design cut slopes are laid back to 3H:1V inclination or flatter to reduce the potential for slope instability and erosion. To reduce the erosion and surficial slumping potential of the graded slopes, permanent manufactured slopes should be protected from erosion by planting with appropriate ground cover or by placing suitable erosion protection (i.e., jute matting, polymer coating, etc.). These measures should be applied as soon as is practical.

The perimeter slopes are designed at 2H:1V and will require additional measures to reduce the erosion and scour potential in order to protect the slopes from flood waters. We understand that scour protection will be designed to depths on the order of 20 feet. Rip-rap or other surface protection will be provided on the slope face below the potential flood levels. These mitigation measures will be designed during future site-specific hydrological studies by others.

2.10 Rippability and Oversize Rocks

A seismic refraction study (Appendix E) was performed within the alluvial fan deposits at the locations of the deepest planned cuts, as shown on the Preliminary Geotechnical Maps (Plates 1 and 2). In general, the primary wave velocities recorded in the uppermost 20 feet of alluvial fan material ranged from 1,500 to 2,500 feet per second (fps) Below 20 feet, velocities were consistently higher, generally 2,500 to 3,500 fps to our total study depth of 80 feet. Additionally, test pits were previously performed across the site to total depths of up to 25 feet with a trackmounted Deere 370C excavator. This work encountered refusal in 6 of 49 total test pit excavations due to large boulders.

While the materials are generally considered rippable, considerable oversize rocks may be generated from the alluvial fan deposits. An Approximate Rock Distribution Map (Plate 3) was prepared to distinguish the limits and distribution of oversize material (boulders over 12 inches in the maximum diameter) that are anticipated to be encountered during grading in each of the cut or remedial removal areas. These percentages are based on the visual observations by Earth Systems Southwest (2007d) personnel while performing the excavator test pits onsite. Based on preliminary calculations, we anticipate that a significant amount of oversize rocks will need to be crushed to complete the proposed grading. With additional rock quality testing (hardness, durability, etc.), we anticipate that the crushed material should meet the Greenbook specifications for Crushed Aggregate Base (CAB). The rock may also be crushed to use as gravel or cobble sizes for use in erosion protection. It is unlikely the rock could be broken to use as rip-rap since the majority of the rock is smaller than the typical rip-rap material.

2.11 Infiltration Testing

There are two water quality basins planned at the site, a 2.5-acre basin north of 62nd Avenue and a 10-acre basin located south of 62nd Avenue. The basins have proposed finish grade elevations, which are 15 to 30 feet below existing grade. Two borings (H-1 and H-2) were drilled to 40 feet bgs, or approximately 20 to 23 feet below the bottom of the proposed basins. Samples below the bottom of the proposed basin elevation were taken continuously with alternating ring samples and SPTs in order to verify that there were no fine-grained confining layers within the effective depths of the basins, per City of La Quinta Engineering Bulletin #06-16.

Five additional borings (P-1 through P-5) were drilled to depths of 20 to 30 feet bgs (or 3 to 7 feet below the bottom of the future basins) for percolation testing. Two-inch diameter slotted PVC pipe and granular sand (No. 3) backfill (annular space) was installed within the borings to prevent caving of the native sandy soils during percolation testing.

The Boring Percolation Tests were performed in P-1 through P-5 on August 10 and 12, 2021 in general conformance with the Riverside County Whitewater River Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development (2014). Per discussion with the City, they have allowed for preliminary testing and infiltration rate determination to be performed using the established County of Riverside methods.

Initial testing was performed to confirm the "sandy soil criteria," after the pre-soaking period. The final measurements at the end of testing were used to convert percolation rates to infiltration rates using the equations presented in the County design handbook. The field test data sheets that include percolation rates are provided in Appendix F.

The calculated infiltration rates are tabulated below and include rates with a factor-of-safety of 3, as required. The infiltration test results are representative of the location and depth the tests were performed. Due to the inherent variation of subsurface conditions, infiltration rates could vary substantially across the site.

Boring No.	***Tested Depth (ft.)***	***Infiltration Rate (in./hr.)***	***Infiltration Rate (in./hr.) with Factor of Safety***
P-1	21 to 23.5	18.0	6.0
P-2	19 to 23.5	26.7	8.9
P-3	18.5 to 20	26.6	8.9
P-4	21.5 to 24.5	43.7	14.6
P-5	26.5 to 29.5	19.3	6.4

2.12 Earthwork Bulking/Shrinking and Subsidence

The loss or gain of volume (shrink/bulk) of excavated natural materials and recompaction as fill varies according to earth material type and location. This volume change is represented as percent shrinkage (volume loss) and as percent bulking (volume gain) after recompaction of a unit volume of cut in this same material in its natural state. The onsite materials will have varying shrinkage or bulking characteristics. We anticipate that mass excavation and remedial removals will result in a 10 and 15 percent shrinkage, respectively. Note that the onsite materials have little to abundant cobbles and boulders. Crushing will be required to generate fill materials, as discussed in Section 2.10. Crushing rock may result in bulking on the order of 15 percent.

Ground subsidence at the site is estimated to be on the order of 0.2 foot.

3.0 CONCLUSION AND PRELIMINARY RECOMMENDATIONS

3.1 General Conclusion and Recommendation

Based on our study, the site is considered geotechnically suitable for the proposed residential development provided the preliminary geotechnical recommendations in this report are implemented during design, grading and construction. This report should also serve as the geotechnical appendix for the project EIR.

Geotechnical observation/testing and mapping during grading is essential to verify the anticipated conditions and evaluate the recommended remedial design measures. The recommendations in this report are considered minimum and may be superseded by more restrictive requirements of others. These preliminary recommendations will need to be confirmed and updated as necessary during the design phase and through additional geotechnical investigation, testing and analysis.

3.2 Earthwork and Grading Specifications

Grading and excavations should be performed in accordance with the City of La Quinta Code and regulations and the General Earthwork and Grading Specifications in Appendix G. Clearing and grubbing of the site should include removal of any pavement or concrete, turf, landscaping, miscellaneous trash and debris, and disposal of deleterious material offsite. After removals and/or overexcavation, the bottoms should be scarified and moisture-conditioned prior to placement of fill. Fill should be placed in nearly horizontal loose lifts less than 8 inches in thickness, moisture-conditioned and compacted to a minimum relative compaction of 90 percent (per ASTM D1557). Fills placed against ground sloping more than 5H:1V should be keyed and benched into competent material as the new fill is placed.

Onsite soil materials are generally considered suitable to be used as fill materials. As noted, the onsite materials have little to abundant cobbles and boulders. Crushing may be required to generate fill material, as discussed in Section 3.5.

The soil engineering properties of imported soil (if any) should be evaluated to determine if any of the recommendations provided herein will need modification.

3.3 Remedial Grading and Overexcavation

Remedial Removals: Unsuitable earth materials should be removed prior to placement of compacted fill. Unsuitable materials at the site include undocumented fills and weathered alluvial fan deposits. Removal depths in native soils across the site should extend 4 feet below existing grade. Locally, where thicker undocumented fills are located, remedial removals should extend deeper to remove the fill and unsuitable native soils. Removal bottoms should expose competent native material and should be reviewed and accepted by the geotechnical consultant prior to placement of fill.

Grading over the levee for the proposed 62nd Avenue extension should bench into competent existing fills on the sides with minimal removals on the top (1 to 2 feet). Grading on the levee fill should be performed under the direction of the Bureau of Reclamation representatives.

Overexcavation: The proposed grading is anticipated to expose cut and fill transitions at finish grade. Shallow fill areas and cut portions of lots should be overexcavated and replaced with compacted fill to provide a minimum of 4 feet of uniform fill cap over each lot. Streets should be overexcavated 2 feet below subgrade to provide uniform fill below the pavement section. Alternatively, streets may be overexcavated 2 feet below the deepest utility to reduce the amount of oversize materials encountered and facilitate utility excavation/installation.

3.4 Rippability

Based on the geophysical studies and prior excavation work performed onsite, the alluvial fan earth units are anticipated to be rippable/excavatable with conventional earthmoving equipment (i.e., scrapers, excavators and backhoes). Seismic refraction surveys indicate the primary wave velocities vary from 1,200 fps near-surface to 3,500 fps at depth. Excavation difficulty due to the abundancy of cobbles and boulders should be expected. The geophysical results are provided in Appendix E.

Buried hard granitic rock out-crops were not encountered at the location of the seismic surveys. However, small exposures of granitic bedrock may be encountered locally along the northern perimeter of the site, adjacent to the southernmost proposed tank site. This rock may not be rippable with conventional earth-moving equipment; requiring larger bulldozers, excavators and rock breaking equipment.

3.5 Oversize Rock Crushing

We anticipate there will be more oversize rocks generated during grading than can be placed in the onsite fills. The Approximate Rock Distribution Map (Plate 3) shows the approximate percentages of oversize rocks/boulders by area that will be generated from different areas at the site during mass excavation and remedial grading. Therefore, we anticipate that rock crushing may be needed during the grading operations. For crushing purposes, we anticipate that the planned operations should be to break the oversize boulders of 1 to 4 feet in maximum dimension down to make fill materials with the crushed product. We understand that larger boulders may need to be pre-broken, down to 2.5 to 3 feet in diameter prior to crushing. We anticipate the rocks could be crushed to make aggregate base materials or other rock products, but would need laboratory testing to confirm.

3.6 Placement of Oversize Material

Oversize rocks larger than 12 inches in the maximum diameter should not be placed in the upper 10 feet of design fills or within 2 feet below the deepest utility in the streets. Oversized rocks greater than 24 inches in the maximum diameter will need to be placed in windrows in the deeper fills. Rocks that have a maximum diameter greater than approximately 4 feet should either be broken with pneumatic hammers and/or crushers prior to placement in windrows, or they should be handled by special placement as individual rocks in deep fill areas. The Grading and Earthwork Specifications in Appendix G include a detail for placement of oversize rocks.

3.7 Slope Stabilization

General Slope Stability: As discussed previously, the proposed slopes, as shown on the preliminary grading plan, are anticipated to be grossly stable under static and pseudo-static loading conditions, provided the remedial removals recommended in this report are performed and the slopes are adequately compacted.

The onsite native materials consist of highly erodible, cohesionless materials that contain oversize material. In order to reduce the potential rockfall hazard, and to help with surficial stability, stabilization fills are recommended for cut slopes at the site. Preliminary sizing of stabilization fill keys are a minimum depth of 4 feet and 15 feet wide for slopes up to 40 feet high, with the width increasing to 20 feet for those greater than 40 feet in height.

During grading, slope excavations and any backcuts or keyway excavations should be mapped and evaluated by the geotechnical consultant to verify the anticipated conditions. If the conditions are different than anticipated, geotechnical analysis should be performed and the remedial grading measures modified as necessary. The excavations should be evaluated and accepted by the geotechnical consultant prior to placement of compacted fill.

The reworked onsite soils are anticipated to provide adequate strength for the gross stability of the proposed fill slopes at the proposed slope inclination of 2H:1V and flatter. A base fill key should be provided for these fill slopes. The depth of the key should be a minimum of 2 feet into competent material, at least 15 feet wide, and have a one-foot tilt back into the slope. Fill slopes are anticipated to be stable as designed provided they are constructed in accordance with the details provided in our General Grading and Earthwork Specifications (Appendix G). Fill slopes and stabilization fills should be overbuilt approximately 3 feet thick and trimmed back to the proposed slope face in order to provide a uniform compacted slope face. Slopes will be subject to surficial erosion and should be planted as soon as practical.

Temporary Slope Stability: Temporary slopes will be created as a result of the backcuts for recommended stabilization fill keys. The actual stability of the backcuts will depend on many factors, including the geologic conditions and the amount of time the excavation remains exposed. Excavations should not be left open for long periods of time and should be backfilled as soon as practical (i.e., backfilled prior to the weekend or holiday, if possible). Extra care and attention should be provided while grading next to adjacent properties.

The backcut should be "slope-boarded" on a routine basis so that the geotechnical consultant can map the slope carefully during excavation and help to notify the project team of critically unstable areas. This will also allow those working below the excavation to observe any potential failures.

Mass Movements and Natural Slopes: The development has been set back approximately 900 feet from the toe of the Martinez Rockslide. Based on the setback distance and lack of potential energy and upslope materials, we do not anticipate the rockslide to have any adverse impact on the project. However, due to the steep slope at the toe of the rockslide and presence of cobbles and boulders, a rockfall hazard exists within the setback area.

The granitic bedrock ridge at the north end of the development, was found to generally be fractured and jointed and has been mapped as a potential rockfall hazard (Earth Consultants International, 2010).

Rockfall hazard analysis should be performed at a later date for both locations discussed above once plans are further developed in order to evaluate this hazard and provide mitigation recommendations (i.e., impact walls or berms/channels) if required.

3.8 Groundwater Conditions

Based on review of the existing groundwater data, we anticipate groundwater to remain deep below the site, in excess of 50 feet. Groundwater is not anticipated to be encountered during grading or construction at the site.

3.9 Settlement

As discussed in Section 2.7, the total settlement as a result of fill placement in the areas underlain by native alluvial fan deposits, is estimated to be on the order of 1 to 1½ inches. The differential settlement is anticipated to be on the order of ¾-inch over a span of 40 feet.

The amount of anticipated settlement will also depend on the type of foundation(s) selected. Additional evaluation will need to be performed once the actual design grades, foundation type, foundation loads and layouts are known.

3.10 Foundation Design

The design of foundation and slabs is the purview of the project structural engineer. Following completion of grading operations, the onsite soils at the site are anticipated to have "very low" to "low" expansion potential.

An allowable bearing pressure of 1,800 psf may be assumed for foundations in compacted fill soils having a minimum depth of 12 inches below the lowest adjacent grade with a minimum width of 12 inches. The allowable bearing pressure may be increased for each additional foot of width and/or depth by 300 psf up to a maximum of 3,000 psf.

The allowable bearing pressure may be increased by one-third for wind and seismic loading. The allowable bearing pressure may also be applied to post-tensioned and mat slabs, if needed for design. The footings of freestanding structures (including walls and pilasters) should have a minimum embedment depth of 24 inches into approved soils.

For lateral resistance against sliding, a friction coefficient of 0.38 may be used at the soil-foundation interface. This value may be increase by one-third for wind and seismic loading.

For non-post-tensioned slabs-on-grade and foundations, in accordance with Wire Reinforcement Institute (WRI) method (per the 2019 California Building Code), an effective Plasticity Index of 15 is considered appropriate for the upper 15 feet of soil. For such slabs, we recommend a minimum embedment of 18 inches below the lowest adjacent grade for the perimeter footings.

The slabs should also be designed to satisfy the settlement criteria presented in Section 3.9 of these recommendations.

3.11 Storm Water Infiltration Feasibility

Based on our evaluation and analysis as described herein, we conclude that onsite storm water infiltration is geotechnically feasible. As discussed in Section 2.11, a minimum factor-of-safety of 3 has been applied to the results for preliminary design purposes. Per City of La Quinta Engineering Bulletin #06-16, the maximum allowable rate for retention basin design is two inches per hour. The infiltration rates obtained from testing exceed the maximum allowable rate dictated by the City; varying between 6.0 and 14.6 inches per hour. In addition, the two borings (H-1 and H-2) drilled with continuous sampling to a depth of 20 to 23 feet below the bottom of the proposed basins encountered sandy and gravelly alluvium without a confining layer.

Infiltration systems should be constructed per the recommendations outlined in the Riverside County Whitewater River Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development (2014. Special care should be taken so as to limit disturbance to native soils utilized as the infiltration surface in a manner that may affect infiltration performance. Proper and routine maintenance should be provided for the infiltration systems.

3.12 Trench Excavations and Backfill

Excavations should conform to all applicable safety requirements. Trench excavations are anticipated to expose varying earth units, including fill and native alluvial fan deposits. Excavations should be considered Type C soils per Cal/OSHA regulations and should be excavated at 1.5H:1V or flatter, with no vertical excavation near the bottom. If the excavations cannot be made within the subject site, temporary shoring would be needed. The shoring would likely require shields or lagging for potential caving sands. Clean sands were encountered through the project, with caving conditions noted in some exploratory test pits.

Native soils should be suitable for use as trench backfill. The cobbly materials may be difficult to use without mixing with cleaner sands and/or screening the rock. Cobbles larger than 3 inches in size should not be placed within the pipe zone. Trenches, including interior utility lines, should be either backfilled with native soil and compacted to 90 percent relative compaction, or backfilled with clean sand (SE 30 or better), which can be densified with water jetting and flooding. Trenches excavated next to structures and foundations should also be properly backfilled and compacted to provide full lateral support and reduce settlement potential.

3.13 Lateral Earth Pressures

The recommended lateral earth pressures for the drained onsite materials are as follows:

Equivalent Fluid Pressure (psf/ft)		
Conditions	***Level***	***2:1 Sloping***
Active	35	50
At-Rest	55	--
Passive	400	230 sloping down

These parameters are based on a soil internal friction angle of 33 degrees and soil unit weight of 120 pcf. The above parameters do not apply for backfill that is highly expansive.

To design an unrestrained retaining wall, such as a cantilever wall, the active earth pressure may be used. For a restrained retaining wall, such as a vault, basement or at restrained wall corners, the at-rest pressure should be used. Passive pressure is used to compute lateral soils resistance developed against lateral structural movement. Passive pressure may be increased by one-third for wind and seismic loading. Future landscaping/planting and improvements adjacent to retaining walls should also be taken into account in the design of the retaining walls. Excessive soil disturbance, trenches (excavation and backfill), future landscaping adjacent to footings, and over-saturation can adversely impact retaining structures and result in reduced lateral resistance.

For sliding resistance, the friction coefficient of 0.40 may be used at the concrete and soil interface. This value may be increased by one-third for wind and seismic loading. The passive resistance is taken into account only if it is ensured that the soil against embedded structure will remain intact with time. The retaining walls will also need to be designed for additional lateral loads if other structures or walls are planned within a 1H:1V projection.

The seismic lateral earth pressure for walls retaining more than 6 feet of soil may be estimated to be an additional 15 pcf for active and at-rest conditions. The earthquake soil pressure has a triangular distribution and is added to the static pressures. For the active and at-rest conditions, the additional earthquake loading is zero at the top and maximum at the base. The seismic lateral earth pressure does not apply to walls retaining less than 6 feet of soil (2016 CBC Section 1803.5.12).

Retaining structures should be waterproofed and provided with suitable backdrain systems to reduce the potential hydrostatic pressure on the walls. Figure 7 presents alternatives for wall-backdrain systems. Specific drainage connections, outlets and avoiding open joints should be considered for the retaining wall design.

3.14 Preliminary Pavement Design

A preliminary pavement section based on assumed R-value of 40 and Traffic Index (TI) of 7 for the main drive areas and roadways and TI of 4 for residential streets and parking lots, consists of 4 inches of asphalt concrete over 7 inches of aggregate base and 3 inches of asphalt concrete over 4 inches of aggregate base, respectively. The final pavement section recommendations should be based on the anticipated Traffic Index (TI) of the roadways and the R-value of the subgrade soils. Pavement design and construction should be performed in accordance with the requirements of the City of La Quinta and the Greenbook.

3.15 Structural Setbacks

The footings of structures (including retaining walls) located above descending slopes should be setback from the slope face. The setback distance is measured from the outside edge of the footing bottom along a horizontal line to the face of the slope. The table below summarizes the minimum setback criteria for structures above descending slopes.

Structural Setback Requirements for Footings Above Descending Slopes

Slope Height [H] (feet)	Minimum Setback from Slope Face (feet)
Less than 10	5
10 to 20	½ * H
20 to 30	10
30 to 120	⅓ * H
More than 120	40

3.16 Seismic Design Guidelines

The following table summarizes the seismic design criteria for the subject site. The seismic design parameters are developed in accordance with ASCE 7-16 and 2019 CBC (Appendix D). Please note that considering the proposed structures and the anticipated structural periods, site-specific ground hazard analysis was not performed for the site. The seismic design coefficient, C_s, should be determined per the parameters provided below and using equation 12.8-2 of ASCE 7-16.

Selected Seismic Design Parameters from 2019 CBC/ASCE 7-16	*Seismic Design Values*	*Reference*
Latitude	33.60143 North	
Longitude	-116.26159 West	
Controlling Seismic Source	San Andreas Fault	USGS, 2020
Distance to Controlling Seismic Source	9.8 mi	USGS, 2020
Site Class per Table 20.3-1 of ASCE 7-16	D	
Spectral Acceleration for Short Periods (Ss)	1.5 g	SEA/OSHPD, 2020
Spectral Accelerations for 1-Second Periods (S1)	0.58 g	SEA/OSHPD, 2020
Site Coefficient F_a, Table 11.4-1 of ASCE 7-16	1.0	SEA/OSHPD, 2020
Site Coefficient F_v, Table 11.4-2 of ASCE 7-16	1.72	
Design Spectral Response Acceleration at Short Periods (S_{DS}) from Equation 11.4-3 of ASCE 7-16	1.0 g	SEA/OSHPD, 2020
Design Spectral Response Acceleration at 1-Second Period (S_{D1}) from Equation 11.4-4 of ASCE 7-16	0.67 g	
T_S, S_{D1}/ S_{DS}, Section 11.4.6 of ASCE 7-16	0.67 sec	
T_L, Long-Period Transition Period	8 sec	SEA/OSHPD, 2020
Peak Ground Acceleration (PGA_M) Corrected for Site Class Effects from Equation 11.8-1 of ASCE 7-16	0.58 g	SEA/OSHPD, 2020
Seismic Design Category, Section 11.6 of ASCE 7-16	D	

3.17 Subdrains

Backdrains should be provided for stabilization fills at 30-foot-vertical intervals with outlets every 100 feet through the slope face. Backdrains should consist of 4-inch perforated Schedule 40 PVC pipe inserted into a minimum of 3 cubic feet per linear foot of ¾-inch gravel wrapped in geotextile filter fabric (Mirafi 140N or equivalent). Backdrain details are included in the General Earthwork and Grading Specifications (Appendix G). During grading, additional subdrains may be necessary for areas where seepage is encountered.

Proper surface drainage, such as a concrete V-ditch, should also be provided along the top of walls. Downdrains (outlets) for surface drainage should not be tied into the subdrain system for walls. (They should be outlet separately.)

Protection of Subdrain Outlets: The outlet pipe should be protected by installation of devices per exhibit labeled "Subdrain Outlet Marker Detail" in the Grading and Earthwork Specifications (Appendix G). This will allow the pipe outlets to be protected in the future during landscaping and make them easier to find, if necessary.

3.18 Expansion Potential

Based on the onsite soil properties, the expansion potential is anticipated to generally range from "Very Low" to "Low." Additional laboratory testing should be performed following completion of grading operations to determine the expansion potential of the near-surface soils.

3.19 Cement Type and Corrosivity

Based on prior laboratory testing on adjacent projects, the soluble sulfates exposure in the onsite soils are anticipated to be classified as "S0" to "S1" per Table 19.3.1.1 of ACI-318-14. Structural concrete elements in contact with soil include footings and building slabs-on-grade. Concrete mix for these elements may be preliminarily based on the "**S1**" soluble sulfate exposure class of Table 19.3.2.1 in ACI-318-14. Other American Concrete Institute (ACI) guidelines for structural concrete are recommended.

Also, the site soils are anticipated to be corrosive to very corrosive to ferrous metals and may also be deleterious to copper. Where metals will be in contact with onsite soils for a long period of time (such as buried iron or steel pipe), corrosion-control measures should be taken to prolong their life.

Additional laboratory testing should be performed following completion of grading operations to determine the corrosion potential of onsite soils and to provide recommendations for corrosion protection.

3.20 Exterior Concrete

Exterior concrete elements, such as curb and gutter, driveways, sidewalks and patios, are susceptible to lifting and cracking when constructed over expansive soil. Please also note that reducing concrete problems is often a function of proper slab design, concrete mix design, placement, and curing/finishing practices. Adherence to guidelines of the ACI is recommended.

Also, the amount of post-construction watering, or lack thereof, can have a very significant impact on the adjacent concrete flatwork.

For reducing the potential effects of expansive soils, we recommend a combination of presaturation of subgrade soils; reinforcement; moisture barriers/drains; and a sublayer of granular material. Though these types of measures may not completely eliminate adverse impacts, application of these measures can significantly reduce the impacts from post-construction expansion of soil. The degrees and combinations of these measures will depend upon the expansion potential of the subgrade soil, moisture migration potential, feasibility of the measures, and the economics of the measures versus the benefits. These factors should be weighed by the project owner determining the measures to be applied on a project-by-project basis, subject to the requirements of the local building/grading department.

The following table provides our recommendations for varying expansion characteristics of subgrade soils. Additional considerations are also provided after the table. We recommend that the "**Low**" category be preliminarily used during design of the project.

TYPICAL RECOMMENDATIONS FOR CONCRETE FLATWORK/HARDSCAPE

	Expansion Potential (Index)				
Recommendations	*Very Low* *(< 20)*	***Low*** ***(20 – 50)***	*Medium* *(51 – 90)*	*High* *(91 – 130)*	*Very High* *(> 130)*
Slab Thickness (Min.)*:* Nominal thickness except where noted.	4"	**4"**	4"	4"	4" Full
Subbase: Thickness of sand or gravel layer below concrete	N/A	**N/A**	Optional	2" – 4"	2" – 4"
Presaturation: Degree of optimum moisture content (opt.) and depth of saturation	Pre-wet Only	**1.1 x opt. to 6"**	1.2 x opt. to 12"	1.3 x opt. to 18"	1.4 x opt. to 24"
Joints: Maximum spacing of control joints. Joint should be ¼ of total thickness	10'	**10'**	8'	6'	6'
Reinforcement**:** Rebar or equivalent welded wire mesh placed near mid-height of slab	N/A	**N/A**	Optional (WWF 6 x 6 – W1.4xW1.4)	No. 3 rebar, 24" O.C. both ways or equivalent wire mesh	No. 3 rebar, 24" O.C. both ways
Restraint**:** Slip dowels across cold joints; between sidewalk and curb	N/A	**N/A**	Optional	Across cold joints	Across cold joints (and into curb)

The procedure and timing of presaturation should be carefully planned in advance of construction.

Design and maintenance of proper surface drainage is also very important. If the concrete will be subject to heavy loading from cars/trucks or other heavy objects, thicker slabs should be used. The above recommendations typically are not applied to curb and gutter.

3.21 Slope Maintenance and Protection

To reduce the erosion and surficial slumping potential of the graded slopes, permanent manufactured slopes should be protected from erosion by planting with appropriate ground cover or by placing suitable erosion protection (i.e., jute matting, polymer coating, etc.). These measures should be applied as soon as is practical. Proper drainage should be designed and maintained to collect surface waters and direct them away from slopes. A rodent-control program should be established and maintained as well, in order to reduce the potential for damage related to burrowing. In addition, the design and construction of improvements and landscaping should also provide appropriate drainage measures.

3.22 Surface Drainage

Surface drainage should be carefully taken into consideration during all grading, landscaping, and building construction. Positive surface drainage should be provided to direct surface water away from structures and slopes and toward the street or suitable drainage devices. Ponding of water adjacent to the structures or tops of slopes should not be allowed. Paved areas should be provided with adequate drainage devices, gradients, and curbing to reduce run-off flowing from paved areas onto adjacent unpaved areas.

3.23 Additional Geotechnical Investigation and Plan Reviews

Additional geotechnical evaluation and investigation are recommended during the design phase of work. This additional analysis and investigation would occur after entitlement, when grading and building plans are in progress or finalized, and before obtaining grading permits. NMG has solely relied upon the observations and laboratory testing of others, we recommend additional exploratory borings and test pits to verify the findings of others. Additionally, percolation testing conforming with current city/county standards may need to be performed.

Also, additional borings will be needed along the proposed extension of 62nd Avenue in order to evaluate the underlying native soils within the vicinity of the proposed improvements.

NMG should also review the project plans during the design phase, including but not limited to, rough and precise grading, foundation, retaining walls (if any), and street and utility plans.

Geotechnical review reports will be prepared for these plan reviews, which will be submitted to the City for review and approval (if required).

3.24 Geotechnical Observation and Testing During Grading and Construction

Geotechnical observation and testing should be performed by the geotechnical consultant during the following phases of grading and construction:

- During site preparation and clearing;

- During earthwork operations, including remedial removals and pad overexcavation;
- During all fill placement;
- During temporary excavations and slope stabilization measures;
- During installation of subdrains;
- Upon completion of any excavation for buildings or retaining walls, prior to pouring concrete;
- During slab and pavement subgrade preparation, prior to pouring of concrete;
- During and after installation of subdrains for retaining walls;
- During placement of backfill for utility trenches and retaining walls; and
- When any unusual soil conditions are encountered.

4.0 LIMITATIONS

This report has been prepared for the exclusive use of our client, Hofmann Management Company, within the specific scope of services requested by our client for the planning study discussed in this report. This report or its contents should not be used or relied upon for other projects or purposes or by other parties without the written consent of NMG. Our methodology for this study is based on local geotechnical standards of practice, care, and requirements of governing agencies. No warranty or guarantee, express or implied is given.

The findings, conclusions, and recommendations are professional opinions based on interpretations and inferences made from geologic and engineering data from specific locations and depths, observed or collected at a given time. By nature, geologic conditions can be very different in between points, and can also change over time. Our conclusions and recommendations are subject to verification and/or modification with more exploration and/or during grading and construction when more subsurface conditions are exposed.

NMG's expertise and scope of services did not include assessment of potential subsurface environmental contaminants or environmental health hazards.

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Esri, HERE, Garmin, (c) OpenStreetMap contributors

SITE LOCATION MAP

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
RIVERSIDE COUNTY, CALIFORNIA

Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann/Travertine
Date: 8/27/2021 Figure 1

NMG

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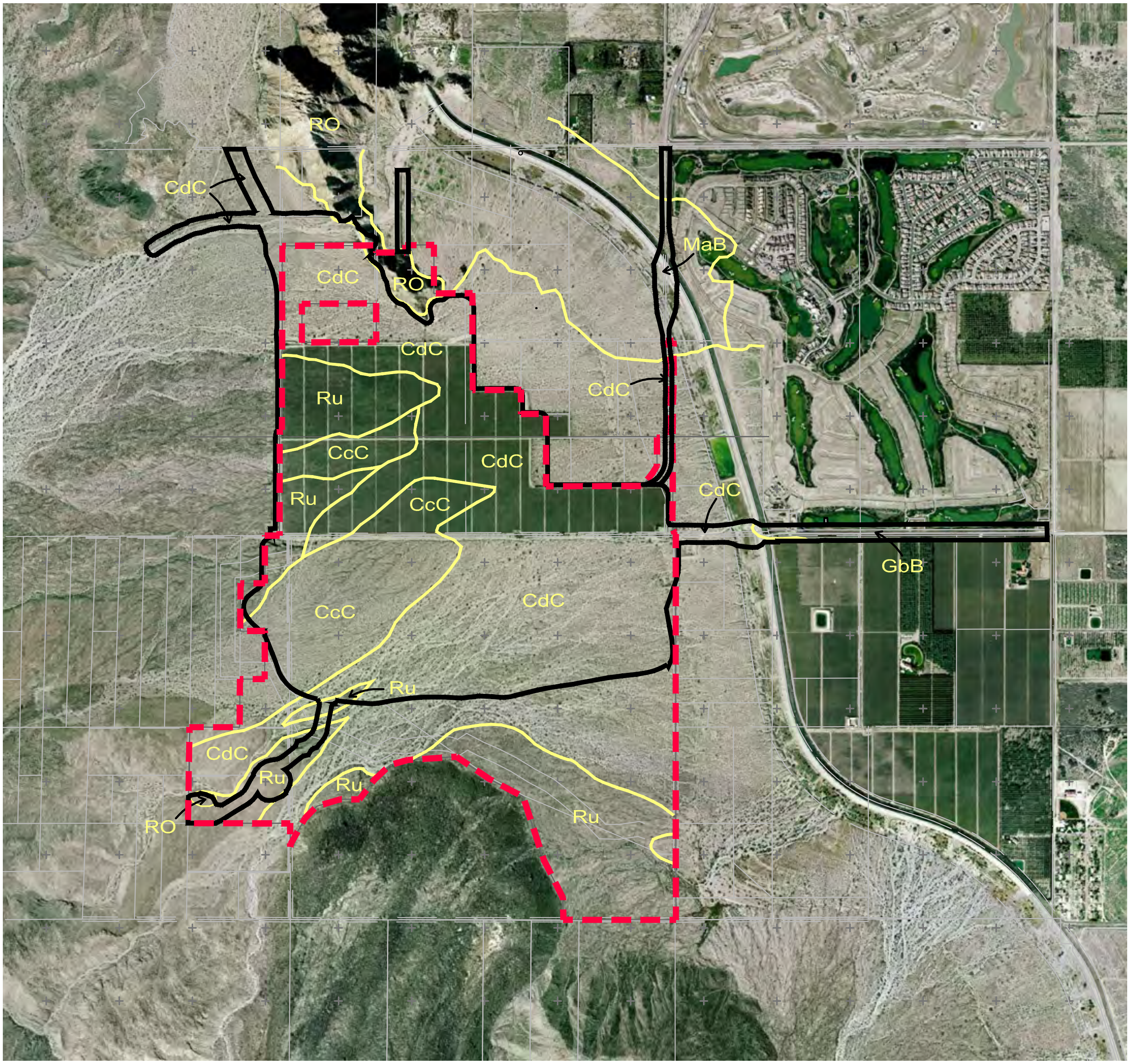


LEGEND

CcC	CARRIZO STONY SAND, 2-9% SLOPES
CdC	CARSITAS GRAVELLY SAND, 0-9% SLOPE
GbB	GILMAN FINE SANDY LOAM
MaB	MYOMA FINE SAND
RO	ROCK OUTCROP
Ru	RUBBLE LAND

━━	SOIL SURVEY INFORMATION FROM NATURAL RESOURCES CONSERVATION SERVICE
━━	IMPACT LINE
╍╍	LIMIT LINE

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
COUNTY OF RIVERSIDE, CALIFORNIA

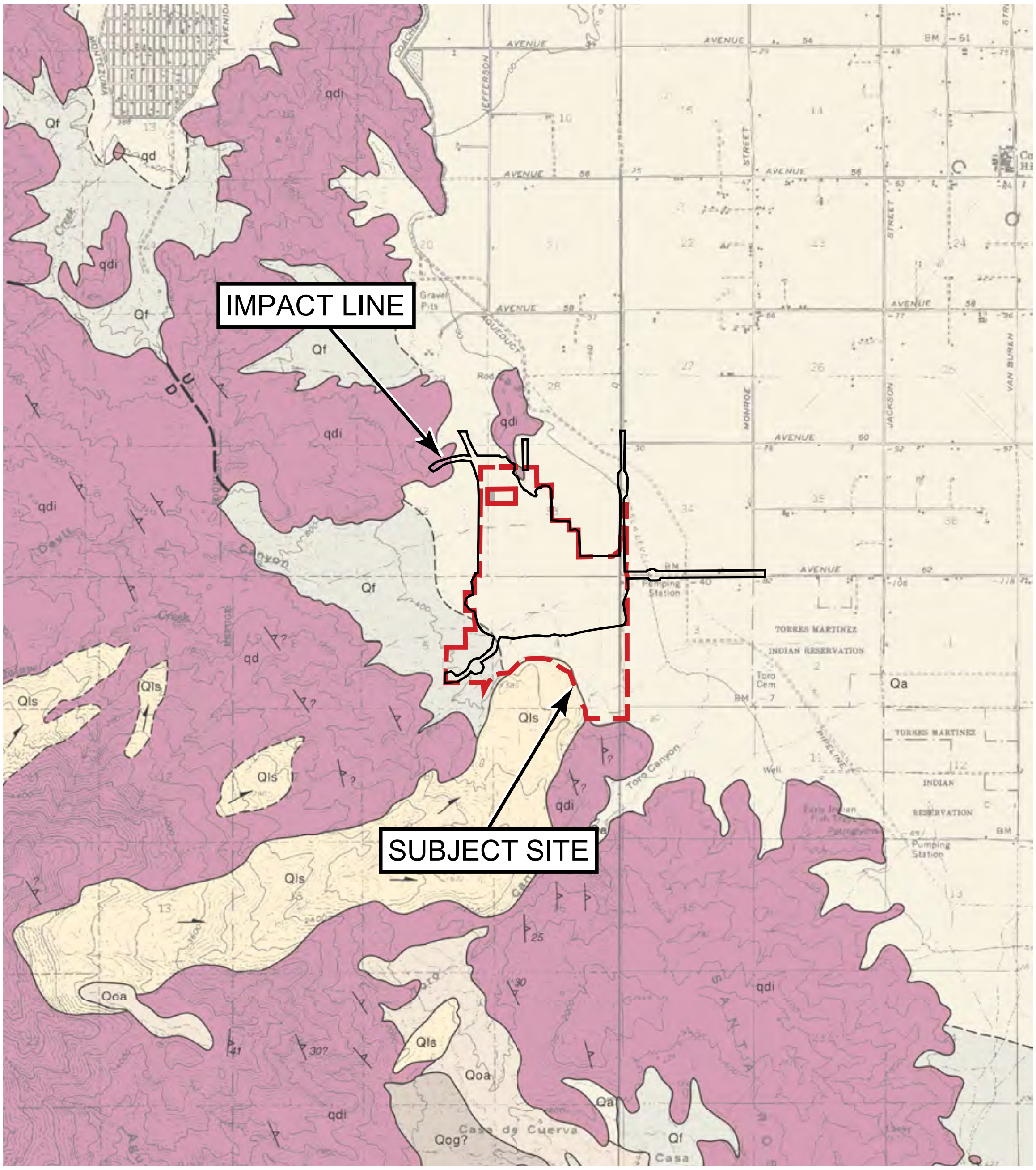
Project No.: 18186-01

Project Name: Jofmann / Travertine

Date: 8/27/21

Figure No. 2

NMG
Geotechnical, Inc.



LEGEND

LOCATIONS ARE APPROXIMATE

Qa	Alluvium	Qls	Landslide
Qf	Alluvial Fan	qdi	Quartz Diorite

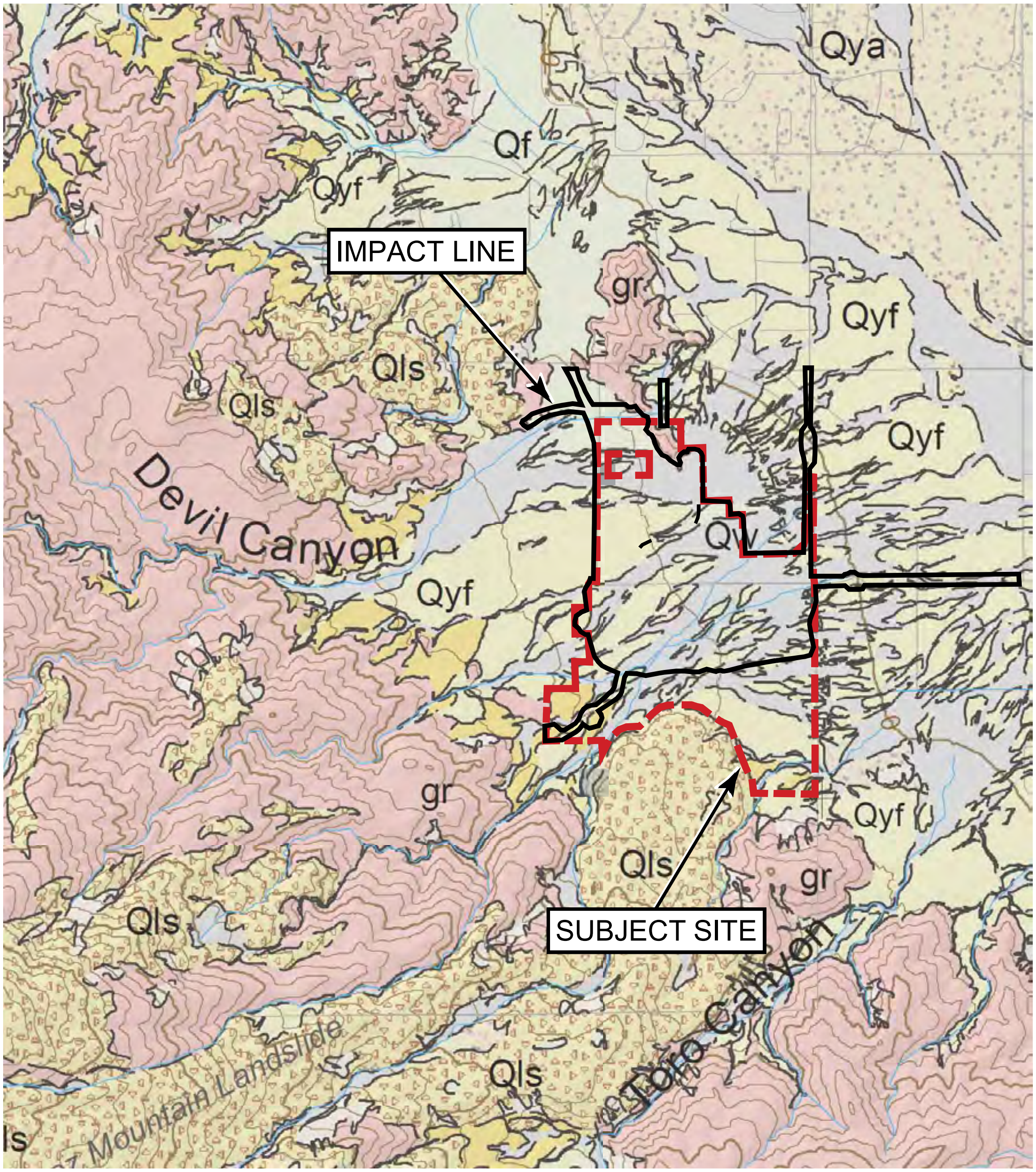
REGIONAL GEOLOGY MAP
(DIBBLEE, 2008)

N

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
COUNTY OF RIVERSIDE, CALIFORNIA

Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann / Travertine
Date: 8/27/2021 Figure 3

NMG



LEGEND

LOCATIONS ARE APPROXIMATE

Qls	Landslide Deposits	Qyf	Young Alluvial Fan Deposits
Qw	Alluvial Wash Deposits	gr	Granitic and other Intrusive Crystalline Rocks of all ages

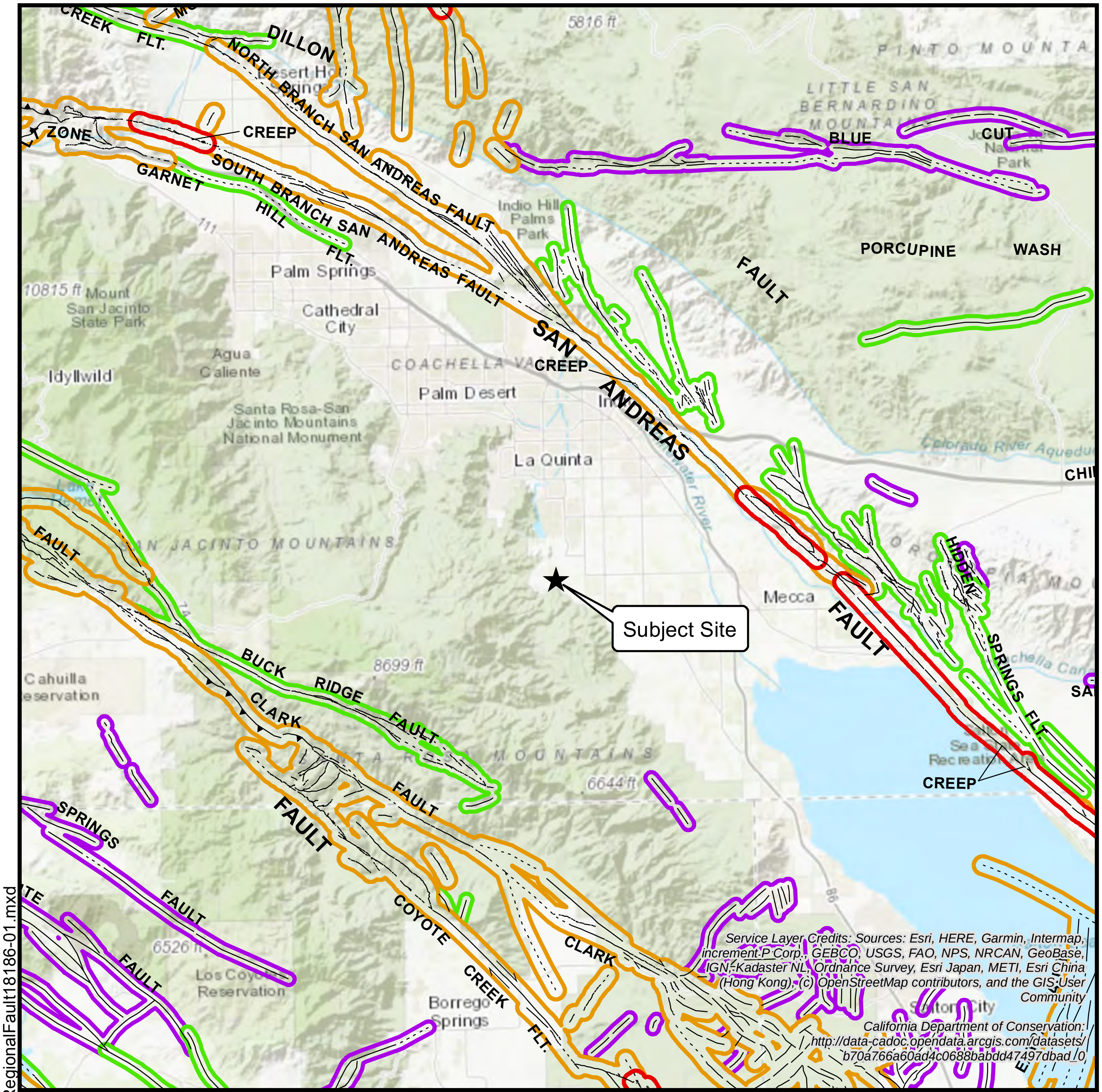
REGIONAL GEOLOGY MAP
(CGS, 2012)

N

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
COUNTY OF RIVERSIDE, CALIFORNIA

Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann / Travertine
Date: 8/27/2021 Figure 4

NMG



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

California Department of Conservation: http://data-cadoc.opendata.arcgis.com/datasets/b70a766a60ad4c0688babdd47497dbad_0

Legend

Faults

—— Certain

– – Approximately Located

····· Concealed

Recency of Movement

🟥 Historic

🟧 Holocene

🟩 Late Quaternary

🟪 Quaternary

0 4 8 Miles

1 inch = 8 miles

N

REGIONAL FAULT MAP

Base: California Geological Survey, Fault Activity Map of California, 2010

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
RIVERSIDE COUNTY, CALIFORNIA

Project Number: 18186-01 By: TW/SBK

Project Name: Hofmann/Travertine

Date: 8/27/2021 Figure 5

NMG

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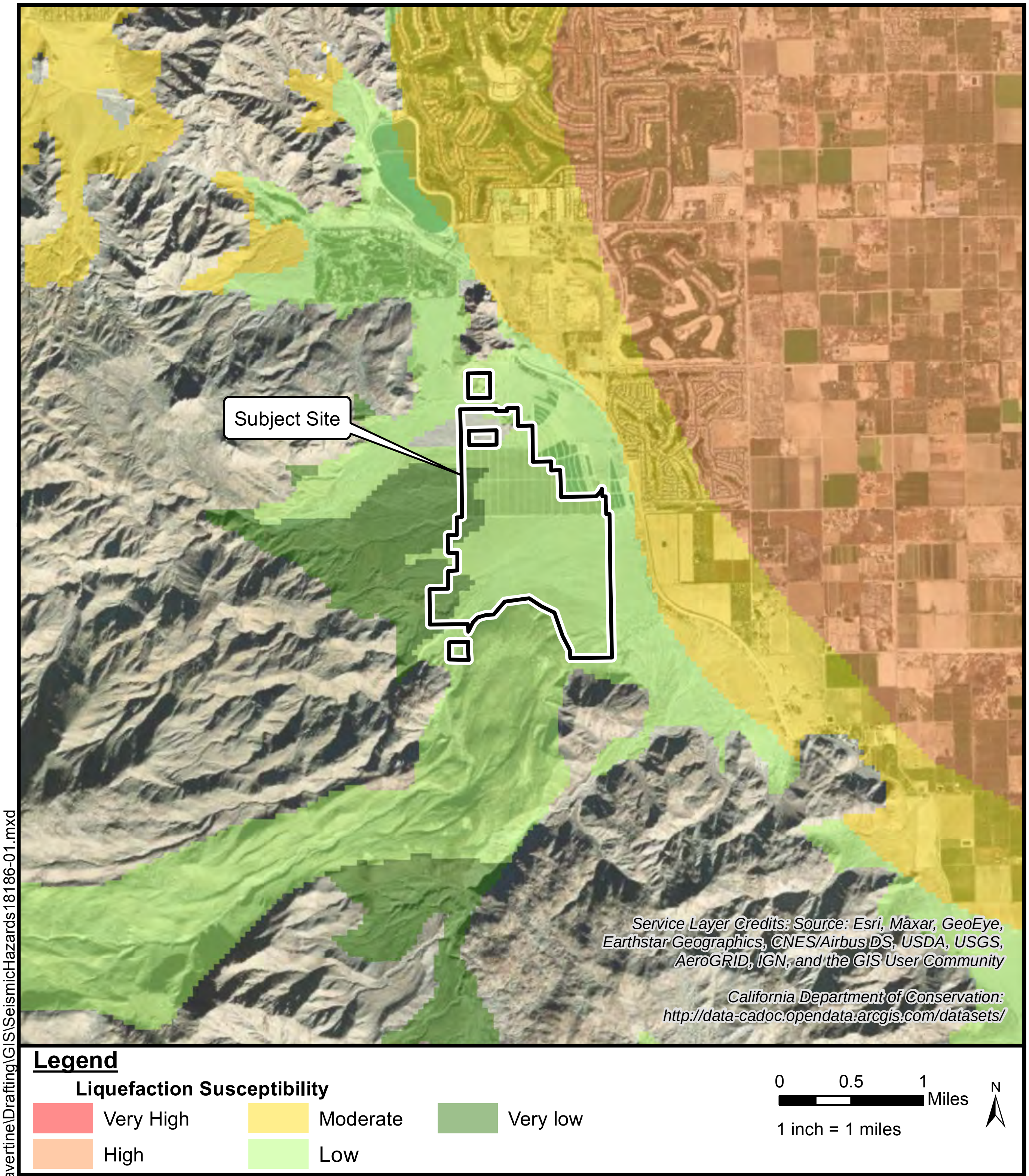

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

California Department of Conservation: http://data-cadoc.opendata.arcgis.com/datasets/

SEISMIC HAZARD ZONES MAP

Base: Riverside County General Plan

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
RIVERSIDE COUNTY, CALIFORNIA

Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann/Travertine
Date: 8/27/2021 Figure 6

NMG

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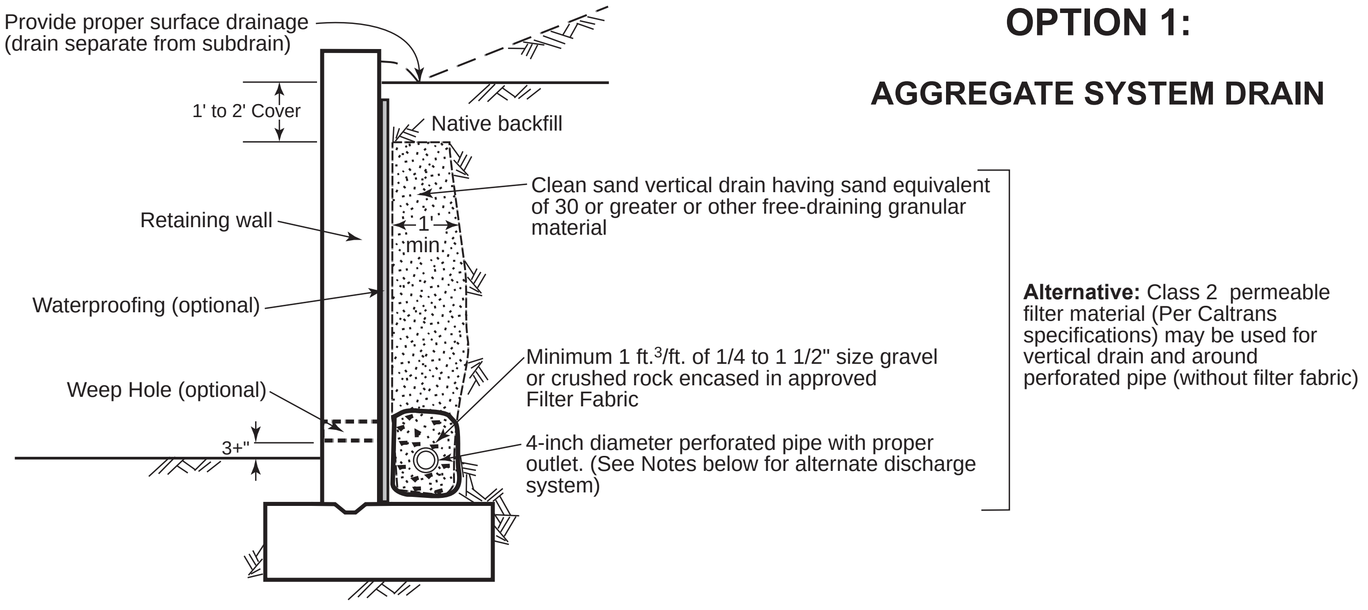
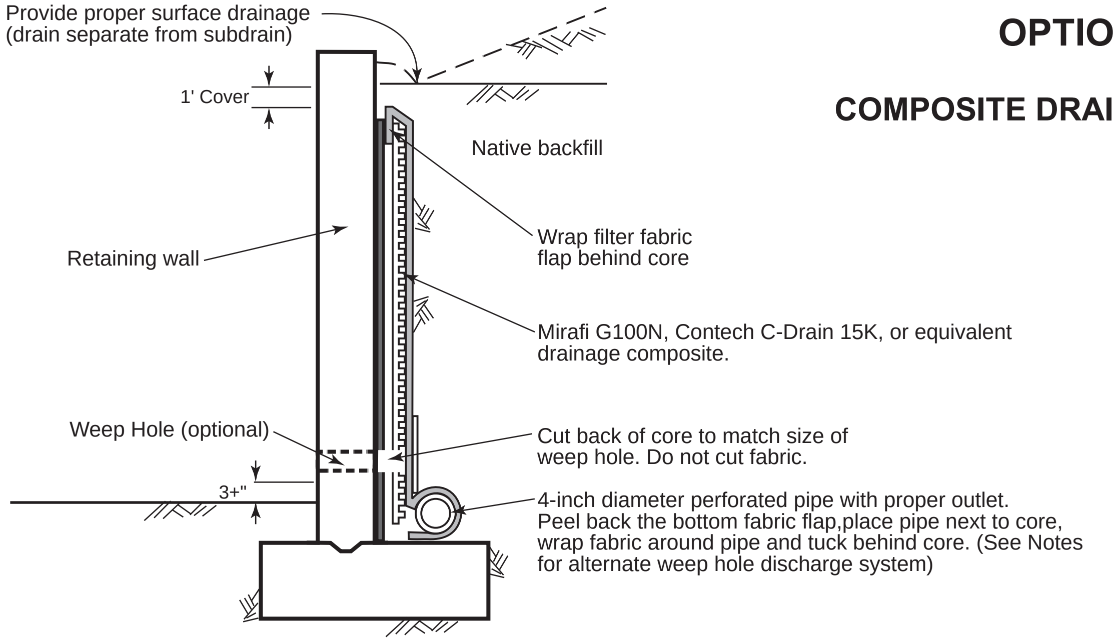
OPTION 1:

AGGREGATE SYSTEM DRAIN



OPTION 2:

COMPOSITE DRAINAGE SYSTEM



NOTES:

1. PIPE TYPE SHOULD BE PVC OR ABS, SCHEDULE 40 OR SDR35 SATISFYING THE REQUIREMENTS OF ASTM TEST STANDARD D1527, D1785, D2751 , OR D3034.
2. FILTER FABRIC SHALL BE APPROVED PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL.
3. DRAIN PIPE SHOULD HAVE A GRADIENT OF 1 PERCENT MINIMUM.
4. WATERPROOFING MEMBRANE MAY BE REQUIRED FOR A SPECIFIC RETAINING WALL (SUCH AS A STUCCO OR BASEMENT WALL).
5. WEEP HOLES MAY BE PROVIDED FOR LOW RETAINING WALLS (LESS THAN 3 FEET IN HEIGHT) IN LIEU OF A VERTICAL DRAIN AND PIPE AND WHERE POTENTIAL WATER FROM BEHIND THE RETAINING WALL WILL NOT CREATE A NUISANCE WATER CONDITION. IF EXPOSURE IS NOT PERMITTED, A PROPER SUBDRAIN OUTLET SYSTEM SHOULD BE PROVIDED.
6. IF EXPOSURE IS PERMITTED, WEEP HOLES SHOULD BE 2-INCH MINIMUM DIAMETER AND PROVIDED AT 25-FOOT MAXIMUM SPACING ALONG WALL. WEEP HOLES SHOULD BE LOCATED 3+ INCHES ABOVE FINISHED GRADE.
7. SCREENING SUCH AS WITH A FILTER FABRIC SHOULD BE PROVIDED FOR WEEP HOLES/OPEN JOINTS TO PREVENT EARTH MATERIALS FROM ENTERING THE HOLES/JOINTS.
8. OPEN VERTICAL MASONRY JOINTS (I.E., OMIT MORTAR FROM JOINTS OF FIRST COURSE ABOVE FINISHED GRADE) AT 32-INCH MAXIMUM INTERVALS MAY BE SUBSTITUTED FOR WEEP HOLES.
9 THE GEOTECHNICAL CONSULTANT MAY PROVIDE ADDITIONAL RECOMMENDATIONS FOR RETAINING WALLS DESIGNED FOR SELECT SAND BACKFILL.

RETAINING WALL DRAINAGE DETAIL

NMG
Geotechnical, Inc.

FIGURE 7

APPENDIX A

APPENDIX A

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AERIAL PHOTOGRAPHS REVEIWED

Date	*Flight*	*Photos*	*Scale*	*Source*
2/15/49	AXM-1F	20, 21, 22	1"=1,667'	Continental Aerial
9/20/53	AXM-3K	146, 147		UCSB
11/10/59	AXM-10W	170, 171		UCSB
2/15/77	RIV 8	6, 7, 8		Continental Aerial
8/5/98	C-122-48	7, 8, 9	1"=2,000'	Continental Aerial
8/5/98	C-122-49	57, 58, 59, 60	1"=2,000'	Continental Aerial
5/28/02	NAPP 12478	116		UCSB

APPENDIX A

DEFINITIONS

Active (Fault): A fault that is likely to have another earthquake sometime in the future. Faults are commonly considered active if they have moved one or more times in the last 11,700 years.

Alluvial Fan: A conical, depositional landform found along mountain fronts of arid and semiarid regions.

Artificial Fill: Earth material used to fill in a depression or hole, create mounds or otherwise man-made fills to change natural grades.

Backcut: An inclined temporary excavation associated with the construction of a stabilization fill key. A backcut typically begins at the top of a natural and/or design slope and extends down to the toe of slope, terminating at the back of design keyway.

Bedrock: Relatively hard, solid rock that commonly underlies soft rock, sediment, or soil. May also be exposed at the earth's surface, known as an outcrop.

Blow Count: Number of blows by a 140-pound hammer, free-falling a distance of 30 inches, required to drive a sampler 12 inches into the ground. Also, a measure of soil resistance to penetration.

Boring: A circular excavation utilizing revolving tooling.

Boulder: A rock or rock fragment with size greater than 12 inches (considered oversize material for use in this report).

Braided Channel: A stream/channel consisting of numerous intertwining channels.

Cenozoic: A time span on the geologic time scale beginning about 66 million years ago, following the Mesozoic era.

Cobble: A rock or rock fragment with size larger than 2.5 inches and up to boulder size.

Desert Pavement: A layer of coarse pebbles and cobbles created by the removal of finer material through wind erosion.

Desert Varnish: An orange to black coating found on rock surfaces exposed to the sun in arid environments. The varnish collects on the exposed surface rocks over time and indicates relatively older alluvial deposits.

Erosion: The processes of weathering and transport of sediment. The process of abrasion or wearing away by wind, water, or other natural agents.

Expansion Potential: A measure to define the severity of risk of soil or sedimentary rock movement to foundation/slab due to shrink or swell. Expansive soils typically swell when wet or shrink when dry.

Fault: A fracture or discontinuity within blocks of the earth's crust on which displacement or movement on either side has occurred relative to one another.

Fault-Rupture Hazard Zone: A regulatory zone surrounding the surface traces of active faults. Wherever an active fault exists that has potential for surface rupture, a structure for human occupancy cannot be placed over the fault and must be set back a minimum distance from the fault.

Front Cut: An inclined temporary excavation associated with the construction of a stabilization fill key. A front cut typically begins near the toe of the design slope and extends down to the front of the design key. Similar to a backcut but occurs on the toe side of a slope.

fps: Feet per second is a unit/measurement of both speed and velocity.

Geomorphology: The study of the character and origin of landforms, such as mountains, valleys, etc., on the surface of the earth.

Geophysical Survey: Surveys using various earth sensing instrumentation to collect data below the earth's surface.

Granitic Bedrock: Crystalline bedrock that largely consists of light-colored silicates (quartz) and feldspars; an intrusive igneous rock.

Groundwater Basin: An area or region underlain by permeable earth materials capable of furnishing a supply of groundwater to wells.

Hollow-Stem Auger: An auger-type drill rig typically used during geotechnical explorations and groundwater monitoring well construction. Auger flights consist of a hollow stem that acts as a temporary casing, allowing for collection of samples through the stem or for setting a groundwater monitoring device.

Hydraulic Conductivity: A factor relating to groundwater flow; it is a coefficient that takes into account the permeability of soil and viscosity of a fluid (water).

Inactive (Fault): California Geological Survey (CGS) indicates that a fault may be presumed seismically inactive (or pre-Holocene) if it does not break Holocene-age formations. CGS also suggests a fault that lacks evidence for surface displacement within Holocene time (the past 11,700 years) should not necessarily be considered inactive.

Infiltration Rate: Calculated rate from the percolation test results, usually in accordance with an agency's technical guidance document.

ksf: Kips per square foot is a unit/measurement of pressure. A kip is a unit of force (1,000-pound force) used by engineers to measure loads.

Liquefaction: A process by which saturated sediments (i.e., alluvium, alluvial fan) temporarily lose strength and act as a fluid. This effect can be caused by earthquake shaking in saturated, unconsolidated, sandy alluvium.

Mass Movement: Also called mass wasting, is the downslope movement of rock or soil under the direct influence of gravity.

Mesozoic: A time span on the geologic time scale – from between approximately 252 to 66 million years ago.

Metamorphic (rock): Rock formed by the alteration of preexisting rock deep within the earth (remaining in solid state) by heat, pressure, and/or chemically active fluids.

Moment Magnitude (Mw): Magnitude characterizes the relative size of an earthquake based on measurement of the maximum motion recorded by a seismograph. This measures earthquake magnitude based on the total energy released by an earthquake. The Moment Magnitude scale, based on the concept of seismic moment, is uniformly applicable to all sizes of earthquakes but is more difficult to compute than other types.

Overexcavation: Soil or bedrock excavated below finish-grade elevations in design cut areas.

Percolation Testing: A field test used to determine the soil-water absorption rate to assist in the design of septic drain field or stormwater infiltration devices. Testing involves measurement of known water volume dissipation over time.

pcf: Pounds per cubic foot is a measurement of the density of materials.

Primary Ground Rupture: Offset of the ground surface associated with a main/major fault when earthquake rupture occurs along the fault.

Primary Wave (P-wave): The fastest seismic wave in the earth, which travel by compression and expansion ("push-pull") of the medium.

Quaternary: The latest period of geologic time up to and including the present. The Quaternary includes the Pleistocene and Holocene Epochs, and ranges from approximately 2.58 million years ago to the present.

Refraction (Geophysics): A geophysical survey that uses seismographs and geophones on the ground surface to record seismic waves through layers of rock/soil in order to characterize the subsurface geology.

Remedial Removal: Grading necessary to remove and/or mitigate unsuitable soils prior to placement of compacted fill and/or construction of foundations or structures.

Rockslide: The rapid slide of a mass of rock downslope along planes of weakness.

Seiche: The sloshing of a closed body of water (i.e., lakes, ponds, reservoirs) from earthquake shaking.

Seismic Line: A series of geophones on the ground surface used to collect geophysical data.

Slope Stability Analysis: The mathematical measure of the relative factor-of-safety against both global and surficial failure of slope material. Global failure involves either rotational or translational failure along planes/surfaces of weakness. Surficial failure includes the outer surface of the slope soil (generally 3 to 4 feet measured perpendicular to slope face) that may be affected by erosion, weathering, and gravity.

Stabilization Fill Key/Keyway: A design excavation into competent material at the toe of slope, in which compacted fill is placed to resist lateral pressure and replace slope materials with uniform compacted fill.

Subsidence: Down-warping or settlement of an area of the earth's surface. Regional subsidence can occur due to oil and/or groundwater withdrawal.

Test Pit/Trench: A mechanical excavation (backhoe, excavator) used to conduct subsurface geotechnical exploration. Typically consists of an open-pit or trench used for geologic/geotechnical evaluation and sample collection.

Tsunami: A great sea wave produced especially by a submarine earth movement, earthquake, or volcanic eruption.

USCS: Unified Soil Classification System is a system used in engineering and geology to describe the texture and grain-size of soil and is represented by a two-letter symbol (i.e. CL, ML, SC, etc.).

APPENDIX B

BORING LOGS BY

NMG

Date(s) Drilled	**8/9/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**10"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H-1

Sheet 1 of 2

Total Depth Drilled (ft)	**40.0**
Approximate Ground Surface Elevation (ft)	**45.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SW-SM	**Young Alluvial Fan Deposits (Qyf)**			
40	5	■	D-1	30			@ 5': Gray fine to coarse SAND with silt, damp, medium dense, highly friable, trace fine gravel.	1.3	119.1	B-1 @ 5-10'
		▨	B-1							
	10	■	D-2	40			@ 10': Gray fine to coarse SAND with silt, damp, medium dense, highly friable, trace fine gravel, some gravel in upper rings.	1.1		
30	15	■	D-3	41		SM	@ 15': Gray silty fine to coarse SAND, damp, dense, friable, slighly more silt than above.	1.7	115.3	
	20	■	D-4	45			@ 20': Gray silty fine to coarse SAND, damp, dense, friable.	1.3	116.4	
		◩	SPT-1	32			@ 21.5': Brownish gray silty fine to coarse SAND, damp, dense, rock in tip.	1.4		GS
		■	D-5	40		SW-SM	@ 23': Gray fine to coarse SAND with silt, damp, very dense, friable, trace to few fine to coarse gravel.	0.9		
		◩					@ 24.5': Grayish brown fine to coarse SAND with silt, damp, dense, friable.	1.9		
20	25									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

Elevation (ft)	Depth (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per foot						
20	25		SPT-2	21		SW-SM				
			D-6	30			@ 26': Gray fine to coarse SAND with silt, damp, medium dense, friable, trace rootlets, trace to few fine to coarse gravel.	2.5		
			SPT-3	15			@ 27.5': Gray fine to coarse SAND with silt, damp, dense, friable.	1.1		
	30		D-7	50			@ 29': Gray fine to coarse SAND with silt, damp, dense, rootlets concentrated in silty lenses, trace to few fine to coarse gravel.	2.1	123.9	
			SPT-4	32			@ 30.5': Gray fine to coarse SAND with silt, damp, dense, friable.	1.8		GS
			D-8	70			@ 32': Gray fine to coarse SAND with silt, damp, dense, friable.	1.4		
			SPT-5	22			@ 33.5': Gray fine to coarse SAND with silt, damp, dense, friable.	2.0		
10	35		D-9	57			@ 35': Gray fine to coarse SAND with silt, damp, dense, friable, trace to few fine to coarse gravel.	1.8		GS
			SPT-6	32			@ 36.5': Gray fine to coarse SAND with silt, damp, dense, friable, trace gravel.	1.6		
			D-10 SB-1	85			@ 38': Gray fine to coarse SAND with silt, damp, dense, highly friable, trace to few fine to coarse gravel. No ring sample recovery.	1.2		SB-1 @ 38'-39'
	40									
0	45									
	50									
-10	55									

Notes:
Total Depth: 40 Feet.
No Groundwater Encountered.
Backfilled with Cuttings and Tamped.

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA

PROJECT NO. 18186-01

Date(s) Drilled	**8/10/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**10"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H-2

Sheet 1 of 2

Total Depth Drilled (ft)	**40.0**
Approximate Ground Surface Elevation (ft)	**50.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per foot						
50	0					SW/GM	**Young Alluvial Fan Deposits (Qyf)**			
	5	■	D-1	24			@ 5': Gray fine to coarse SAND/GRAVEL, damp, medium dense, highly friable.	0.5		
							@ 7.5': Driller noted gravel.			
40	10	■	D-2	43		SW	@ 10': Gray fine to coarse SAND, damp, dense, highly friable.	0.5		
		▨	B-1							
	15	■	D-3	40			@ 15': Gray fine to coarse SAND, damp, dense, highly friable.	0.7		
		■	D-4	50			@ 17': Gray fine to coarse SAND, damp, dense, highly friable.	0.6		
		◩	SPT-1	24			@ 18.5': Gray fine to coarse SAND, damp, dense, highly friable, trace to few gravel.	0.6		
30	20	■	D-5	43			@ 20': Gray fine to coarse SAND, damp, dense, highly friable, some lenses of cleaner sand.	0.7		GS
		◩	SPT-2	31			@ 21.5': Gray fine to coarse SAND, damp, dense, highly friable.	0.7		
		■	D-6	60			@ 23': Gray fine to coarse SAND, damp, dense, highly friable, trace to few gravel.	1.0		
	25	◩					@ 24.5': Gray fine to coarse SAND, damp, dense, highly friable, trace gravel.	0.8		

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		SPT-3	48		SW				
			D-7	82/9"			@ 26': Gray fine to coarse SAND, damp, dense, highly friable, trace gravel, rock in tip.	0.9		
			SPT-4	50/1"			@ 27': No Recovery, rock.			
			D-8	89			@ 29': Gray fine to coarse SAND, damp, very dense, highly friable.	0.5		GS
20	30									
			SPT-5	28			@ 30.5': Gray fine to coarse SAND, damp, very dense, highly friable.	0.8		
			D-9	70			@ 32': Gray fine to coarse SAND, damp, very dense, some fine gravel, highly friable.	0.8	117.5	CN
			SPT-6	27			@ 33.5': Gray fine SAND, damp, dense, friable, more silt than above.	0.8		
	35									
			D-10	58			@ 35': Gray fine to coarse SAND, damp, very dense, trace to few gravel.	1.0		
			SPT-7	28			@ 36.5': Gray fine to coarse SAND, damp, very dense, friable, trace fine gravel.	0.8		
			D-11	55			@ 38': Gray fine to coarse SAND, damp, very dense, friable, trace fine gravel.	1.0		
10	40						Notes: Total Depth: 40 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	45									
0	50									
	55									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA

PROJECT NO. 18186-01

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Date(s) Drilled	**8/9/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-1

Sheet 1 of 1

Total Depth Drilled (ft)	**23.0**
Approximate Ground Surface Elevation (ft)	**45.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SW	Surface: Access Road. **Young Alluvial Fan Deposits (Qyf)**			B-1 @ 0-5'
40	5	■	D-1	42			@ 5': Gray fine to coarse SAND, damp, dense, friable, trace to few gravel.	1.2	120.5	
	10	■	D-2	26		SW-SM	@ 10': Gray fine to coarse SAND with silt, damp, medium dense, friable.	3.8	112.5	
30	15	■	D-3	36			@ 15': Gray fine to coarse SAND with silt, damp, dense, friable, trace gravel, upper rings have olive brown silty sand.	7.3	112.3	GS
	20	■	D-4	50/6"			@ 20': No ring sample recovery.			
		■	D-5	64			@ 21.5': Olive gray fine to coarse SAND with silt, damp, very dense, interlayered silt lenses.	3.7	118.3	CN
20	25						Notes: Total Depth: 23 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/10/21.			
	30									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
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NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Date(s) Drilled	**8/9/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-2

Sheet 1 of 1

Total Depth Drilled (ft)	**24.0**
Approximate Ground Surface Elevation (ft)	**43.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SP	Surface: Access Road. **Young Alluvial Fan Deposits (Qyf)**			B-1 @ 0-5'
40										
	5	■	D-1	56			@ 5': Gray fine to coarse SAND, damp, very dense, highly friable, trace to few fine to coarse gravel.	1.1		
	10	■	D-2	46			@ 10': No ring sample recovery.			
30										
	15	■	D-3	31			@ 15': Gray fine to coarse SAND, damp, medium dense, highly friable, trace to few fine to coarse gravel.	1.6		
	20	■	D-4	46			@ 20': Gray fine to coarse SAND, damp, dense, highly friable, trace to few fine to coarse gravel.	1.4	120.6	
20		■	D-5	77			@ 22.5': Gray fine to coarse SAND, damp, medium dense, highly friable, some fine to coarse subangular gravel.	1.9		GS
	25						Notes: Total Depth: 24 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/10/21.			
	30									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Date(s) Drilled	**8/10/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-3

Sheet 1 of 1

Total Depth Drilled (ft)	**20.0**
Approximate Ground Surface Elevation (ft)	**46.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SW	**Young Alluvial Fan Deposits (Qyf)**			B-1 @ 0-5'
	5	■	D-1	18			@ 5': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	0.8		
40										
	10	■	D-2	20			@ 10': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	1.1		
		■	D-3	45			@ 13.5': Gray fine to coarse SAND, damp, dense, friable, trace fine gravel.	0.8		
	15	■	D-4	44			@ 15': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	0.9		
30										
		■	D-5	37			@ 16.5': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	0.7		GS
		■	D-6	31			@ 18.5': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	0.7		
	20						Notes: Total Depth: 20 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed in Bottom 10 Feet. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/12/21.			
	25									
20										
	30									

LOG OF BORING

Hofmann / La Quinta - Travertine
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Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Date(s) Drilled	8/10/21	Logged By	ZKH
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME75 Hollow Stem	Hammer Data	140 lbs. @ 30 inch drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered.		
Comments			

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Sheet 1 of 1

Total Depth Drilled (ft)	25.0
Approximate Ground Surface Elevation (ft)	55.0 msl

Elevation (ft)	Depth (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per foot						
	0					SW	**Young Alluvial Fan Deposits (Qyf)**			B-1 @ 0-5'
50	5	■	D-1	29			@ 5': Gray fine to coarse SAND, damp, medium dense, highly friable.	0.8		
	10	■	D-2	28			@ 10': Gray fine to coarse SAND, damp, medium dense, highly friable.	0.8		
40	15	■	D-3	48		SW-GW	@ 15': Gray fine to coarse SAND/GRAVEL, damp, medium dense, highly friable.	1.0		
	20	■	D-4	39			@ 20': No ring sample recovery.			
		■	D-5	46		SW	@ 22': Gray fine to coarse SAND, damp, dense, highly friable.	0.7		
		■	D-6	44			@ 23.5': Gray fine to coarse SAND, damp, dense, highly friable.	0.7		
30	25						Notes: Total Depth: 25 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/12/21.			
	30									

LOG OF BORING

Hofmann / La Quinta - Travertine

La Quinta, CA

PROJECT NO. 18186-01

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Date(s) Drilled	**8/10/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-5

Sheet 1 of 2

Total Depth Drilled (ft)	**30.0**
Approximate Ground Surface Elevation (ft)	**60.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
60	0					SW	**Young Alluvial Fan Deposits (Qyf)**			
	5	■	D-1	27			@ 5': Gray fine to coarse SAND, damp, medium dense, highly friable, trace fine gravel.	0.7		
		▨	B-1							
50	10	■	D-2	50/6"		SW/GW	@ 10': Gray fine to coarse SAND/GRAVEL, damp, very dense, highly friable.	0.7		
							@ 10'-15': Driller noted gravel.			
	15	■	D-3	45			@ 15': No ring sample recovery.			
40	20	■	D-4	80		SW	@ 20': Gray fine to coarse SAND, damp, very dense, highly friable, trace fine gravel.	0.5		
	25									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per foot						
	25	■	D-5	55	⁘	SW	@ 25': Gray fine to coarse SAND, damp, very dense, friable.	0.3	120.7	
		■	D-6	51	⁘		@ 27': Gray fine to coarse SAND, damp, very dense, friable.	0.7		GS
		■	D-7	72	⁘		@ 28.5': Gray fine to coarse SAND, damp, very dense, friable.	0.6		
30	30						Notes: Total Depth: 30 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed in Bottom 10 Feet. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/12/21.			
	35									
20	40									
	45									
10	50									
	55									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA

PROJECT NO. 18186-01

NMG

BORING AND TEST PIT LOGS

BY OTHERS

BORINGS BY

SLADDEN (2001)

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-23-01 **Boring No. 1** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Sandy Silt: Brown, very sandy	ML				
5		■	50-5"	" "	"	105	3.6	---	52% passing #200
10		☒	50-5"	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	---	2.6	---	32% passing #200
15		■	50-5"	" "	"	114	3.6	87	34% passing #200
20		■	37/50-3"	Sandy Silt: Brown, clayey with coarse grained sand	ML	113	8.7	---	56% passing #200
25		■	18/50-5"	" "	"	95	7.5	---	56% passing #200 Native
30		■	50-6"	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	109	5.3	---	31% passing #200
35		■	38/50-5"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	108	4.2	---	28% passing #200
40		■	18/50-6"	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	111	7.0	85	35% passing #200
45				■ Recovered Sample ☒ Disturbed Sample					Total Depth = 41.5' No Bedrock No Groundwater
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-23-01 | **Boring No. 2** | Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained	SM				
5		■	50-6"	" "	"	111	1.5	---	22% passing #200
10		■	50-4"	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	118	4.7	90	35% passing #200
15		■	26/50-6"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	112	3.0	---	25% passing #200
20		■	30/50-6"	" "	"	117	2.6	87	18% passing #200
25		■	29/35/50	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	113	3.1	---	32% passing #200
30		■	21/25/50	" "	"	111	3.6	---	28% passing #200
35		■	29/50-5"	Silty Sand: Brown, fine to medium grained, slightly clayey	SM	111	3.1	---	20% passing #200
40		■	22/25/30	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	112	5.2	---	35% passing #200
				■ Recovered Sample					Total Depth = 41.5' No Bedrock No Groundwater
45									
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-24-01 **Boring No. 3** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained	SM				
5		■	31/50-5"	" "	"	122	3.6	---	24% passing #200
10		■	36/50-5"	" "	"	129	3.1	96	17% passing #200
15		■	20/50-5"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	125	5.8	---	32% passing #200
20		■	22/40/43	" "	"	120	4.2	---	24% passing #200
25		◫	14/21/28	" "	"	---	4.7	---	31% passing #200
30		■	7/19/32	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	117	4.2	---	23% passing #200
35		◫	15/25/30	" "	"	---	5.3	---	38% passing #200
40		■	12/20/22	Silty Sand: Brown, fine to coarse grained	SM	110	1.5	82	15% passing #200
45				■ Recovered Sample ◫ Standard Penetration Sample					Boulder Refusal @ 43' No Bedrock No Groundwater
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-23-01 **Boring No. 4** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained, slightly clayey	SM				
5		■	18/50-6"	" "	"	117	3.6	---	26% passing #200
10		◫	12/20/25	" "	"	---	4.2	---	28% passing #200
15		■	24/50-6"	Silty Sand: Brown, fine to coarse grained, clayey	SM	112	5.8	---	26% passing #200
20		◫	24/31/40	" "	"	---	4.2	---	22% passing #200
25		■	50-6"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	118	2.6	88	15% passing #200
30		◫	12/14/24	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	---	4.2	---	31% passing #200
35		■	10/10/30	" "	"	120	4.7	92	35% passing #200
40		◫	13/15/15	" "	"	---	5.8	---	37% passing #200
45		☒	26/36/50	Sand: Brown, slightly silty, fine to coarse grained with gravel	SP/SM	---	1.5	---	15% passing #200
50									
55									

■ Recovered Sample

◫ Standard Penetration Sample

☒ Disturbed Sample

Total Depth = 46.5'
No Bedrock
No Groundwater

Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-23-01 **Boring No. 5** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained, slightly clayey	SM				
5		▮	13/16/25	" "	"	---	4.2	---	28% passing #200 Scattered gravel
10		■	24/50-5"	Silty Sand: Brown, fine to coarse grained, clayey	SM	123	4.7	---	24% passing #200
15		▮	18/23/33	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	---	4.2	---	18% passing #200 Scattered gravel
20		■	23/31/50	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	118	7.5	---	27% passing #200 Trace gravel
25		▮	12/19/31	" "	"	---	5.3	---	29% passing #200 Trace gravel
30		■	26/50-6"	" "	"	116	6.4	---	29% passing #200 Trace gravel
35		▮	13/13/13	" "	"	---	4.2	---	30% passing #200
40		■	20/27/30	Silty Sand: Brown, fine to coarse grained, clayey	SM	112	4.2	---	23% passing #200
45				■ Recovered Sample ▮ Standard Penetration Sample					Total Depth = 41.5' No Bedrock No Groundwater
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-24-01 **Boring No. 6** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained, slightly clayey	SM				
5		■	41/50-5"	" "	"	122	3.0	---	28% passing #200
10		▣	25/28/36	Silty Sand: Brown, fine to coarse grained, clayey	SM	---	0.5	---	26% passing #200
15		■	50/50-4"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	129	4.5	---	27% passing #200
20		▣	25/28/28	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	---	2.5	---	36% passing #200
25		■	43/50-5"	" "	"	112	5.0	---	40% passing #200
30		▣	12/15/21	Clayey Sand: Reddish brown, fine to coarse grained, silty	SC	---	7.0	---	45% passing #200
35		■	30/30/40	" "	"	129	8.0	---	49% passing #200
40		▣	14/18/25	" "	"	---	8.1	---	33% passing #200
45		■	25/30/33	Silty Sand: Brown, fine to coarse grained	SM	118	5.2	---	20% passing #200
50				■ Recovered Sample ▣ Standard Penetration Sample					Total Depth = 46.5' No Bedrock No Groundwater
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-24-01 **Boring No. 10** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0	▨			Silty Sand: Brown, fine to coarse grained	SM				
5	▨	☒	21/22/30	" "	"	---	0.5	---	13% passing #200
10	▨	▮	31/50-5"	" "	"	---	0.5	---	13% passing #200
				☒ Disturbed Sample ▮ Standard Penetration Sample					Total Depth = 11.5' No Bedrock No Groundwater
15									
20									
25									
30									
35									
40									
45									
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

BORING AND TRENCH LOGS BY

URS CORPORATION

(2002)

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Key to Log of Boring

Sheet 1 of 1

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
		Type	Number	Sampling Resistance					
1	2	3	4	5	6	7	8	9	10

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL) or site datum.

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number. "NR" indicates no sample recovery.

5 **Sampling Resistance:** Number of blows to advance driven sampler 12 inches beyond first 6-inch (seating) interval, or distance noted, using a 140-lb hammer with a 30-inch drop.

6 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

7 **Material Description:** Description of material encountered; may include relative density/consistency, moisture, color, particle size; texture, weathering, and strength of formation material.

8 **Water Content:** Water content of soil sample measured in laboratory, expressed as percentage of dry weight of specimen.

9 **Dry Unit Weight:** Dry weight per unit volume of soil sample measured in laboratory, expressed in pounds per cubic foot (pcf).

10 **Remarks and Other Tests:** Comments and observations regarding drilling or sampling made by driller or field personnel. Other field and laboratory test results, using the following abbreviations:

COMP	Compaction test by modified effort
LL	Liquid Limit from Atterberg Limits test
NP	Non-plastic result for Atterberg Limits test
PI	Plasticity Index from Atterberg Limits test
SA	Sieve analysis, percent passing #200 sieve
SE	Sand equivalent test, average sand equivalent
WA	Wash sieve, percent passing #200 sieve

TYPICAL MATERIAL GRAPHIC SYMBOLS

- ░ Poorly graded SAND (SP)
- ░ Well-graded SAND (SW)
- ░ SAND with SILT (SP-SM)
- ▥ SILT (ML)
- ▨ SILTY CLAY (CL-ML)
- ▒ SILTY SAND (SM)
- ▨ Lean CLAY (CL)
- ▨ Fat CLAY (CH)
- ▨ CLAYEY SAND (SC)
- ▓ GRAVEL (GP/GW)
- ▓ SILTY GRAVEL (GM)
- ▓ CLAYEY GRAVEL (GC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- ■ Modified California (2.5-inch OD)
- ▧ Standard Penetration Test (SPT) split spoon
- ▩ Bulk sample
- ◪ California (3-inch OD)
- ▯ Shelby Tube
- ☒ Grab sample

OTHER GRAPHIC SYMBOLS

- ▽ First water encountered at time of drilling and sampling (ATD)
- ▼ Static water level measured in borehole at specified time after drilling
- ▾ Change in material properties within a lithologic stratum
- --- Inferred contact between soil strata or gradational lithologic change

GENERAL NOTES

1. Elevations for borings are estimated from topographic maps provided by The Keith Companies.
2. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
3. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Report: GEO_10_SNA_KEY; File: DIKE4COA.GPJ; 1/9/2003 keybor

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Figure A-1

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-1

Sheet 1 of 1

Date(s) Drilled	11/18/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	20 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
20	0					Medium dense, damp, gray, poorly graded SAND with GRAVEL (SP), trace silt; near-surface cobbles and boulders up to 12 inches			
		▨	1	16					SA: 4.9%<#200
15	5	■	2	26			1.5		SE=79
						Dense, damp to moist, gray, poorly graded SAND with SILT and GRAVEL (SP-SM)			
10	10	▨	3	44			1.8		WA: 10%<#200 Gravel up to 1 inch in sample.
5	15	■	4	56		Becomes dry to damp; decrease in silt content			
0	20	▨	5	44					
-5	25	■	6	36		Becomes medium dense			
						Bottom of boring at 26.5 feet			
-10	30								

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-2

Sheet 1 of 1

Date(s) Drilled	11/18/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	36 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
		Type	Number	Sampling Resistance, blows / foot					
	0					Dense, dry, gray, poorly graded SAND (SP), few gravel, trace silt			
35		▒	SK-1				0.4		SA: 4.3%<#200 COMP
		▧	1	34			0.4		
	5								
30		■	2 [NR]	28		Medium dense, dry, gray, poorly graded SAND with SILT (SP-SM)			No sample recovery.
		▧	3	39		Becomes dense	0.6		WA: 6.7%<#200
	10								
25		■	4	44					Poor recovery.
						Dense, dry, gray, well-graded SAND with SILT (SW-SM), few gravel			
	15								
20		▧	5	32					SA: 6.7%<#200
	20					Becomes medium dense			
15		▧	6	23					
	25					Becomes dense			
10		▧	7	50					
						Bottom of boring at 26.5 feet			
	30								

Report: GEO_10_SNA; File: DIKE4COA.GPJ; 1/13/2003 B-02

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-3

Sheet 1 of 1

Date(s) Drilled	11/18/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	20 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
20	0					Medium dense, dry, gray, well-graded SAND with GRAVEL (SW), trace silt			
		▒	SK-1				0.6		SA: 4.5%<#200
		▨	1	19		Medium dense, dry, gray, well-graded SAND with SILT and GRAVEL (SW-SM)	0.5		WA: 8.7%<#200
15	5	■	2	34					Gravel up to 1 inch in sample.
10	10					Becomes dense			
		▨	3	38			0.6		
5	15	■	4 [NR]	50/5"					Hammer bouncing on gravel; no recovery.
						Becomes very dense			
		▨	5	62					
0	20	■	6 [NR]	50					No sample recovery.
-5	25	▨	7	62					
						Bottom of boring at 26.5 feet			
-10	30								

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-4

Sheet 1 of 1

Date(s) Drilled	11/18/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	27.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	4 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0				Medium dense, dry, gray, well-graded SAND with SILT (SW-SM), few gravel			
		▒	SK-1			0.7		SA: 6.4%<#200
		▨	1	22		0.5		
0								
	5	■	2	29				
-5								
	10				Becomes dense			
		▨	3	37		0.8		
					Medium dense, dry, gray, poorly graded SAND with SILT (SP-SM)			
-10								
	15	■	4	36				
					Very dense, dry, gray, SILTY SAND (SM)			
-15								
	20	▨	5	58				
-20					Becomes dense			
	25	■	6 [NR]	47				No sample recovery.
					Trace gravel			
		▨	7	44				
					Bottom of boring at 27.5 feet			
-25								
	30							

Report: GEO_10_SNA; File: DIKE4COA.GPJ; 1/13/2003 B-04

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Project: Dike No. 4 Recharge Facility **Project Location:** Coachella, California **Project Number:** 29864604.00001	**Log of Boring B-5** Sheet 1 of 1

Date(s) Drilled	**11/18/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**26.5 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**14 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**Modified California, SPT, bulk**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0					Medium dense, dry, gray, well-graded SAND with GRAVEL (SW), trace silt			
			SK-1				0.4		SA: 4.6%<#200
									Auger grinding on a rock.
			1	26			0.3		
10									
	5								
			2	30					
						Medium dense, dry, gray, well-graded SAND with SILT and GRAVEL (SW-SM)			
			3	22			0.5		WA: 6.3%<#200
5									
	10		4 [NR]	50/6"		Becomes very dense			No sample recovery.
0									
	15					Becomes dense			
			5	47					
						Dense, dry, gray, SILTY SAND (SM)			
-5									
	20								
			6	34					
-10									
	25					Becomes medium dense			
			7	36					
						Bottom of boring at 26.5 feet			
-15									
	30								

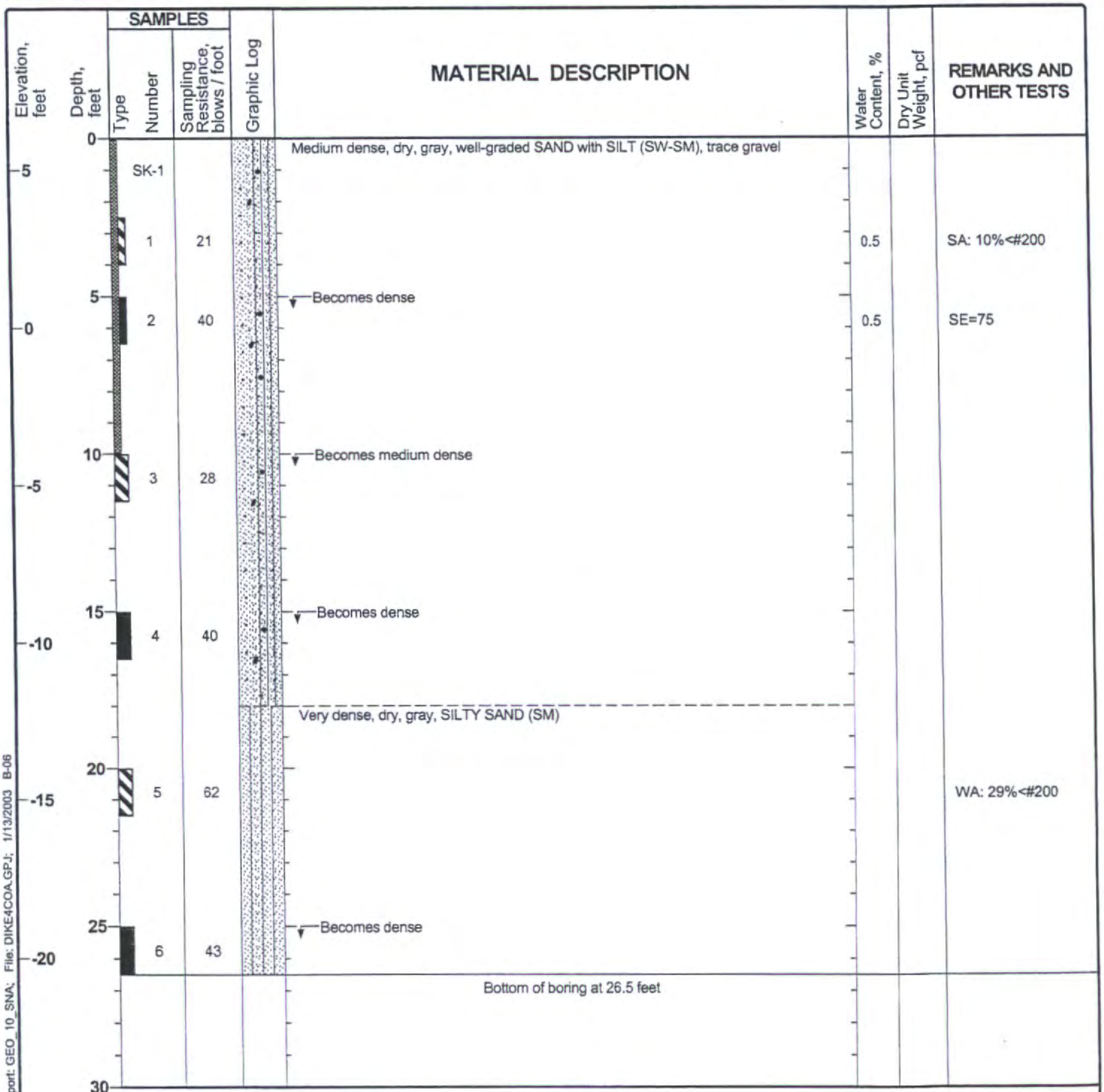
URS

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-6

Sheet 1 of 1

Date(s) Drilled	11/18/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	6 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		



Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resistance, blows / foot	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0				Medium dense, dry, gray, well-graded SAND with SILT (SW-SM), trace gravel			
5		▒	SK-1					
		▨	1	21		0.5		SA: 10%<#200
0	5	■	2	40	Becomes dense	0.5		SE=75
-5	10	▨	3	28	Becomes medium dense			
-10	15	■	4	40	Becomes dense			
					Very dense, dry, gray, SILTY SAND (SM)			
-15	20	▨	5	62				WA: 29%<#200
-20	25	■	6	43	Becomes dense			
					Bottom of boring at 26.5 feet			
	30							

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-7

Sheet 1 of 1

Date(s) Drilled	**11/19/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**26.5 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**12 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**Modified California, SPT, bulk**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0	▒			Medium dense, dry, gray, poorly graded SAND (SP), few gravel, trace silt			
			SK-1			0.4		SA: 3.5%<#200
10								
		▨	1	28				Poor recovery.
	5	■	2	20		1.2		
5								
	10	▨	3	24		0.8		
0								
	15	■	4	40	Becomes dense			
-5								
					Dense, dry, gray, SILTY SAND (SM)			
	20	▨	5	38				WA: 31%<#200
-10								
	25	■	6	42				
					Bottom of boring at 26.5 feet			
-15								
	30							

URS

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-8

Sheet 1 of 1

Date(s) Drilled	11/19/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	28.0 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	66 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0				Medium dense, dry, gray, SILTY SAND (SM), few gravel			
65								
		▨	1	23		0.9		2-inch rock fragment in sampler shoe.
60	5	■	2	25				Gravel up to 1/2 inch in sample.
55	10	▨	3	27		0.1		
					Dense, dry, gray, well-graded SAND with SILT and GRAVEL (SW-SM)			
50	15	■	4	42				SA: 7.9%<#200
45	20	▨	5	43				
					Becomes medium dense			
40	25	■	6 [NR]	28				No sample recovery.
					Becomes dense			
		▨	7	32				WA: 9.8%<#200
					Bottom of boring at 28.0 feet			
	30							

Report: GEO_10_SNA; File: DIKE4COA.GPJ; 1/13/2003 B-08

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Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-9

Sheet 1 of 1

Date(s) Drilled	11/19/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	28.0 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	85 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
85	0					Medium dense, dry, gray, poorly graded SAND with SILT and GRAVEL (SP-SM)			
		▨	1	23			0.5		WA: 5.8%<#200
80	5	■	2 [NR]	14		Medium dense, dry, gray, SILTY SAND (SM)			No sample recovery.
		▨	3	20			1.0		WA: 12%<#200
75	10								
		▨	4	21					SE=69
70	15					Becomes dense			
		■	5 [NR]	40					No sample recovery.
						Becomes medium dense			
		▨	6	26			0.9		
						Dense, dry, gray, poorly graded SAND with SILT (SP-SM)			
65	20								
		▨	7	37					WA: 7.0%<#200
60	25								
		■	8	46					
						Becomes medium dense			
		▨	9	26					
						Bottom of boring at 28.0 feet			
55	30								

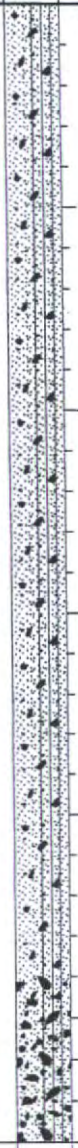
URS

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-10

Sheet 1 of 1

Date(s) Drilled	11/19/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	28.0 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	50 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		



Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
50	0				Medium dense, dry, gray, well-graded SAND with SILT and GRAVEL (SW-SM)			
		░	SK-1			0.5		SA: 6.4%<#200
		▨	1	10		0.4		
45	5	■	2	50/5"				Auger grinding on a rock.
40	10				Becomes dense			
		▨	3	35		0.9		
35	15	■	4 [NR]	50/6"	Becomes very dense			No sample recovery.
		▨	5 [NR]	66				No sample recovery.
30	20	▨	6 [NR]	50				No sample recovery.
		▨	7	61		0.7		WA: 9.3%<#200
					Becomes dense; increase in gravel content, clasts up to 1 inch			
25	25	■	8 [NR]	44				No sample recovery.
		▨	9	35				
					Bottom of boring at 28.0 feet			
20	30							

Report: GEO_10_SNA; File: DIKE4COA.GPJ; 1/13/2003 B-10

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-11

Sheet 1 of 1

Date(s) Drilled	**11/19/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**28.0 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**8 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**Modified California, SPT, bulk**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
		Type	Number	Sampling Resistance, blows / foot					
	0					Medium dense, dry, gray, poorly graded SAND (SP), few gravel, trace silt			
		▒	SK-1				0.8		SA: 4.6%<#200
5									
		▨	1	16			0.7		
									Auger grinding on a rock.
	5								
		■	2 [NR]	26					No sample recovery.
		▨	3	28			0.7		
0									
	10								
		▨	4	22					
-5									
	15								
		■	5	27					
-10						Dense, dry, gray, poorly graded SAND with SILT (SP-SM)			
	20								
		▨	6	42			0.5		
-15									
	25								
		■	7	40					
		▨	8	40					WA: 11%<#200
-20						Bottom of boring at 28.0 feet			
	30								

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-12

Sheet 1 of 1

Date(s) Drilled	11/19/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	13 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	 Number	 Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0					Medium dense, dry, gray, well-graded SAND (SW), few gravel, trace silt			
			SK-1				0.5		SA: 3.8%<#200
10			1	28			0.5		
	5		2	34		Becomes dense	0.4		
5									
	10		3	22		Becomes medium dense			SE=69
0						Dense, dry, gray, SILTY SAND (SM)			
	15		4	32					WA: 18%<#200
-5									
	20		5	27		Becomes medium dense	1.0		
-10									
	25		6	41		Becomes dense			
						Bottom of boring at 26.5 feet			
-15									
	30								

URS

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Key to Log of Test Pit

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL).

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number.

5 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

6 **Material Description:** Description of material encountered; may include color, moisture, grain size, and density/consistency.

7 **Water Content:** Water content of soil sample measured in laboratory, expressed as percentage of dry weight of the designated specimen.

8 **Remarks and Other Tests:** Comments and observations regarding excavation or sampling made by driller or field personnel. Field and laboratory test results (other than water content), using abbreviations explained below.

TYPICAL MATERIAL GRAPHIC SYMBOLS

- ░ Poorly graded SAND (SP)
- ░ Well-graded SAND (SW)
- ▥ SAND with SILT (SP-SM)
- ▥ SILT (ML)
- ▥ Elastic SILT (MH)
- ▥ SILTY SAND (SM)
- ▨ Lean CLAY (CL)
- ▨ Fat CLAY (CH)
- ▨ CLAYEY SAND (SC)
- ● GRAVEL (GP/GW)
- ● SILTY GRAVEL (GM)
- ● CLAYEY GRAVEL (GC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- ▓ Bulk sample
- ☒ Grab sample

OTHER GRAPHIC SYMBOLS

- ∇ First water encountered at time of drilling and sampling (ATD)
- ↱ Minor change in material properties within a lithologic stratum
- --- Inferred contact between soil strata or gradational lithologic change

GENERAL NOTES

1. Elevations for test pits are estimated from topographic maps provided by The Keith Companies.
2. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
3. Descriptions on these logs apply only at the specific test pit locations and at the time the pits were excavated. They are not warranted to be representative of subsurface conditions at other locations or times.

TYPICAL LABORATORY TEST ABBREVIATIONS

COMP	Compaction test by modified effort
LL	Liquid Limit from Atterberg Limits test
NP	Non-plastic result for Atterberg Limits test
PI	Plasticity Index from Atterberg Limits test
SA	Sieve analysis, percent passing #200 sieve
WA	Wash sieve, percent passing #200 sieve

Report: GEO_5D_TEST_PIT_KEY; File: DIKE4COA.GPJ; 1/7/2003 keypit

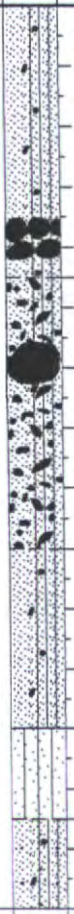
URS

Figure B-1

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-1

Date(s) Excavated	11/18/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	15.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	6 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				

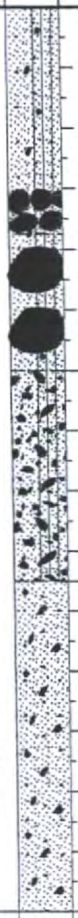


Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
6	0				Damp, gray, poorly graded SAND with SILT (SP-SM), ~10% gravel up to 1-1/2 inches		
	1						
4	2		SK-1			0.8	SA: 6.3%<#200
	3						
2	4				Cobble layer, cobbles up to 10 inches		
	5				Damp, gray, poorly graded SAND with SILT and GRAVEL (SP-SM), ~30% gravel up to 3 inches		
0	6				Boulder up to 2 feet		
	7				Decrease in coarse gravel content, trace cobbles up to 10 inches		
-2	8						
	9				Damp, gray, poorly graded SAND with SILT (SP-SM), few gravel up to 1/2 inch, trace gravel up to 3 inches		Easier excavating.
-4	10						
	11				Trace gravel up to 1/2 inch, no coarse gravel or cobbles		
-6	12		PB-3		Damp, gray, SILT with SAND (ML)	2.8	LL=32, PI=2 WA: 71%<#200
	13		SK-2		Damp, gray, well-graded SAND with SILT (SW-SM), ~10% gravel up to 1 inch	0.9	SA: 10%<#200
-8	14						
	15				Bottom of excavation at 15.0 feet		
-10	16						
	17						
-12	18						
	19						
-14	20						

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-2

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	15.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	23 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				



Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
	0	▨			Damp, gray, well-graded SAND with SILT (SW-SM), few gravel up to 3/4 inch		
22	1	▨					
	2	▨	SK-1			0.7	SA: 6.9%<#200 COMP
20	3	▨			Cobble layer, cobbles up to 7 inches		
	4	▨			Boulder up to 2 feet		
18	5				Boulder up to 2 feet		
	6				Damp, gray, well-graded SAND with SILT and GRAVEL (SW-SM), ~15% gravel up to 1/2 inch, few cobbles up to 10 inches		
16	7				Increase in cobble content, cobbles up to 5 inches, occasional boulder up to 2 feet		
	8						
14	9				Damp, gray, well-graded SAND with GRAVEL (SW), ~20% gravel up to 1-1/2 inches, few cobbles up to 5 inches, trace silt		
	10	▨					
12	11	▨					
	12	▨	SK-2			0.8	SA: 4.6%<#200
10	13	▨					
	14	▨					
8	15				Bottom of excavation at 15.0 feet		
	16						
6	17						
	18						
4	19						
	20						

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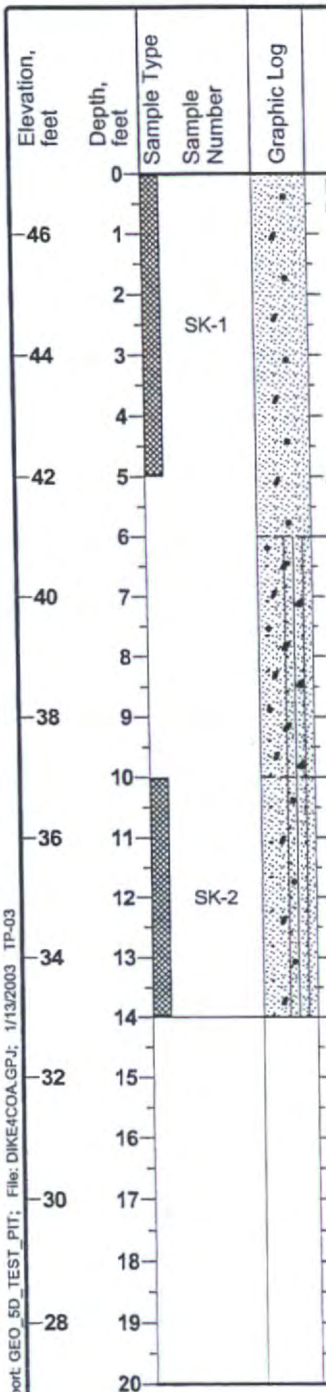
Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-3

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	14.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	47 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				



Depth, feet	Sample Number	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
0		Damp, gray, poorly graded SAND (SP), ~10% gravel up to 1 inch, few cobbles up to 5 inches, trace silt		
2.5	SK-1		0.5	SA: 2.8%<#200 COMP
5		Slight increase in cobble content		
6		Damp, brownish gray, well-graded SAND with SILT and GRAVEL (SW-SM), ~15% gravel up to 3 inches		
10		Damp, brownish gray, well-graded SAND with SILT (SW-SM), ~10% gravel up to 1 inch		
12	SK-2		1.2	SA: 7.3%<#200
14		Bottom of excavation at 14.0 feet		

Report: GEO_5D_TEST_PIT; File: DIKE4COA.GPJ; 1/13/2003 TP-03

URS

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-4

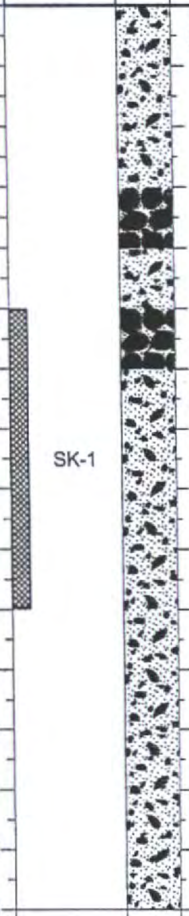
Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	14.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	64 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				

Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
64	0	▨			Dry to damp, brownish gray, poorly graded SAND (SP), ~10% gravel up to 1 inch, few cobbles up to 5 inches, roots to 6-foot depth		
	1	▨					
62	2	▨	SK-1			0.4	SA: 3.1%<#200
	3	▨					
60	4	▨					
	5				Boulders up to 3 feet (~10%), cobbles up to 8 inches (~10%), gravel up to 1 inch (~15-20%)		
58	6						
	7				Occasional boulders up to 1-1/2 feet		
56	8						
	9				Dry to damp, brownish gray, poorly graded SAND with GRAVEL (SP), ~35% gravel up to 2 inches, few cobbles up to 12 inches, no boulders		
54	10	▨					
	11	▨					
52	12	▨	SK-2				
	13	▨					
50	14				Bottom of excavation at 14.0 feet		
	15						
48	16						
	17						
46	18						
	19						
44	20						

Report: GEO_5D_TEST_PIT; File: DIKE4COA.GPJ; 1/13/2003 TP-04

Project: Dike No. 4 Recharge Facility **Project Location:** Coachella, California **Project Number:** 29864604.00001	**Log of Test Pit TP-5**

Date(s) Excavated	**11/21/02**	Logged By	**V. Glisic**	Reviewed By	**B. Gookin**
Length of Excavation	**10 feet**	Width of Excavation	**4 feet**	Depth of Excavation	**15.0 feet**
Excavation Equipment	**John Deere 410 Backhoe**	Excavation Contractor	**Demo Unlimited**	Approximate Surface Elevation	**35 feet MSL**
Water Observations	**Not observed during excavation**			Approximate Pit Trend	**Not recorded**
Comments	**Refer to site plan for excavation location**				

Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
	0				Dry to damp, gray, poorly graded SAND with GRAVEL (SP), ~20% gravel up to 2 inches, ~15% cobbles up to 6 inches, few cobbles up to 10 inches		
34	1						
	2						
32	3				Cobble layer, cobbles up to 10 inches		
	4						
30	5				Cobble layer, cobbles up to 8 inches		
	6				Decrease in gravel content (~15% up to 1-1/2 inches), decrease in cobble content and size (~10% up to 5 inches)		
28	7		SK-1			0.7	SA: 4.1%<#200
	8						
26	9						
	10						
24	11						
	12						
22	13				Increase in cobble content and size (~20% up to 6 inches, occasionally up to 12 inches)		
	14						
20	15				Bottom of excavation at 15.0 feet		
	16						
18	17						
	18						
16	19						
	20						

URS

Figure B-6

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-6

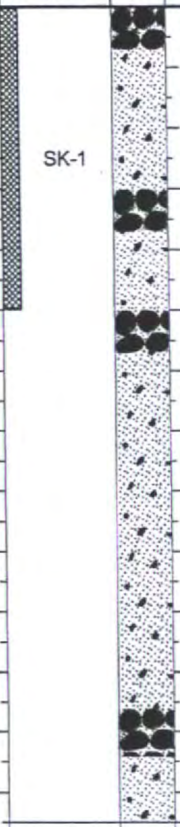
Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	13.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	18 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				

Elevation, feet	Depth, feet	Sample Type	Sample Number	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
18	0	▨		Dry to damp, light brownish gray, poorly graded SAND with SILT and GRAVEL (SP-SM), ~15% gravel up to 1-1/2 inches, ~30% cobbles up to 7 inches, occasional boulders up to 1-1/2 feet		
	1					
16	2					
	3		SK-1		0.8	SA: 5.4%<#200 COMP
14	4			Cobble layer, most up to 8 inches, few up to 12 inches		
	5					
12	6					
	7			Sea shell fragments		
10	8					
	9			Increase in gravel content (~30% up to 1/2 inch), decrease in cobble content and size (~15% up to 5 inches)		
8	10	☒				
	11		PB-2			
6	12					
	13			Bottom of excavation at 13.0 feet		
4	14					
	15					
2	16					
	17					
0	18					
	19					
-2	20					

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-7

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	13.5 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	10 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				



Elevation, feet	Depth, feet	Sample Number	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
10	0		Dry to damp, gray to yellowish brown, poorly graded SAND (SP), ~10% gravel up to 1-1/2 inches, few cobbles up to 8 inches, roots to 5-foot depth		
	1				
8	2				
		SK-1		0.7	SA: 4.5%<#200
	3		Cobble layer, ~10% cobbles up to 6 inches		
6	4				
	5		Cobble layer, cobbles up to 5 inches, occasional boulders		
4	6				
	7		Becomes gray		
2	8				
	9		Increase in cobble content (~20% up to 8 inches), few boulders up to 2 feet		
0	10				
	11				
-2	12		Cobble layer, cobbles up to 10 inches, boulders up to 1-1/2 feet		
	13				
			Bottom of excavation at 13.5 feet		
-4	14				
	15				
-6	16				
	17				
-8	18				
	19				
-10	20				

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-8

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	11.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	16 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				

Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
16	0	▩			Dry to damp, light brownish gray, poorly graded SAND with GRAVEL (SP), ~20% gravel up to 1-1/2 inches, ~10% cobbles up to 6 inches, trace silt		
	5	▩	SK-1			0.8	SA: 3.3%<#200
10	6	▩			Cobble layer, cobbles up to 10 inches		
	9	▩			Cobble layer, cobbles up to 7 inches		
6	10				Decrease in gravel content and size (up to 1 inch)		
	11				Bottom of excavation at 11.0 feet		

Figure B-9

LOGS BY

SLADDEN (2005a)

176-Lot Green Property
SWC Quarry Ranch Road & Jefferson Street

Date: 12/3/2004 **Boring No. 8** **Job Number:** 544-4769

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0	▨								Native Soil
5	▨	■	13/17/23	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	6	Brown in color
10	▨	■	15/20/29	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	5	Brown in color
	▨								Refusal @ ~14 Feet
15									
20									Total Depth =~14' Bedrock not encountered Groundwater not encountered
25									
30									
35									
40									
45									
50									

█ California Split-spoon Sample

☒ Unrecovered Sample

■ Standard Penetration Test Sample

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

176-Lot Green Property
SWC Quarry Ranch Road & Jefferson Street

Date: 12/3/2004 **Boring No. 9** **Job Number:** 544-4769

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0	▨								Native Soil
5	▨	■	17/25/33	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	7	Brown in color
10	▨	■	17/24/32	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	6	Brown in color
15	▨	■	28/28/35	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	5	Brown in color

■ California Split-spoon Sample

☒ Unrecovered Sample

▨ Standard Penetration Test Sample

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

Total Depth =~15.5'
Bedrock not encountered
Groundwater not encountered

176-Lot Green Property
SWC Quarry Ranch Road & Jefferson Street

Date: 12/3/2004 **Boring No. 11** **Job Number:** 544-4769

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0	▨								Native Soil
5	▨	■	5/47/28	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	7	Brown in color
10	▨	■	13/17/19	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		0	6	Brown in color
15	▨	■	50-5"	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	10	Brown in color
18	▨	■	33/44/50	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	10	Brown in color
20	▨								
25									
30									
35									
40									
45									
50									

▬ California Split-spoon Sample

☒ Unrecovered Sample

■ Standard Penetration Test Sample

Total Depth =~20'
Bedrock not encountered
Groundwater not encountered

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

176-Lot Green Property
SWC Quarry Ranch Road & Jefferson Street

Date: 12/3/2004 **Boring No. 12** **Job Number:** 544-4769

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0	▒								Native Soil
5	▒	▮	16/23/37	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	8	
10	▒	▮	50-5"	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	9	Refusal @ ~11 Feet

■ California Split-spoon Sample

☒ Unrecovered Sample

▮ Standard Penetration Test Sample

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

Total Depth = ~ 11'
Bedrock not encountered
Groundwater not encountered

BORING LOGS BY

CONSTRUCTION TESTING & ENGINEERING, INC.

(2007)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	DRILLER:	SHEET: of
CTE JOB NO:	DRILL METHOD:	DRILLING DATE:
LOGGED BY:	SAMPLE METHOD:	ELEVATION:

BORING LEGEND

Depth (Feet)	Bulk Sample	Driven Type	Blows/Foot	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0									
	◪							Block or Chunk Sample	
	☒							Bulk Sample	
5									
		◫						Standard Penetration Test	
10									
		⧄						Modified Split-Barrel Drive Sampler (Cal Sampler)	
		⊞						Thin Walled Army Corp. of Engineers Sample	
15									
					▼			Groundwater Table	
							- - - - - -	- - - - - - - - - - - - Soil Type or Classification Change	
20							——	? —— ? —— ? —— ? —— ? —— ? —— ? — Formation Change [(Approximate boundaries queried (?)]	
						"SM"		Quotes are placed around classifications where the soils exist in situ as bedrock	
25									

FIGURE: BL2

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT: CVWD Dike 4 Percolation Ponds
CTE JOB NO: 40-2251
LOGGED BY: R. Ellerbusch
DRILLER: 2R Drilling (CME Track Rig)
DRILL METHOD: 8" Hollow stem auger
SAMPLE METHOD: 140 lb/30" autohammer
SHEET: 1 of 1
DRILLING DATE: 6/25/2007
ELEVATION: basin floor

BORING: B-1

Depth (Feet)	Sample Bulk	Sample Driven	Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0				13			SM		Silty SAND - dry, gray, fine, traces of gravel.	GS (20.4% pass #200) HA
				14						
				14						
				13						
				9						
2.5				15						
				10			SP-SM		Poorly-graded SAND with Silt - damp, light gray, medium to coarse, traces of gravel.	GS (7.6% pass #200) HA
				12						
				6						
				4			ML		at 57" - 3" lens of silt.	
5				8			SP-SM		Poorly-graded SAND with Silt becomes moist, gray-brown, with occasional gravel.	
				14						
									Boring terminated at 6 ft. below surface.	
7.5										
10										
12.5										

Boring B-1

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-2

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			2			SP-SM		Poorly-graded SAND with Silt - dry, light gray, fine to medium, traces of gravel.	GS (10.1% pass #200)
			2						
			2						
			2						
			2						GS (8.6% pass #200)
2.5			5						
			4			ML		SILT with little Sand and Clay - moist, light gray	GS (81.5% pass #200) HA
			7						
			4						
			5						
5			8						
			10			SP-SM		Poorly-graded SAND with Silt - damp, gray, medium to coarse, occasional gravel.	
								Boring terminated at 6 ft. below surface.	
7.5									
10									
12.5									

Boring B-2

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-3

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			5			ML		Sandy SILT - dry to damp, light gray, traces of gravel.	
			6						GS (54.1% pass #200) HA
			8						
			10						GS (64.0% pass #200)
			8					becomes moist at 2 ft.	
2.5			13						
			12			SP-SM		Poorly-graded SAND with Silt and Gravel - damp, light gray, fine.	
			18						WA (5.0% pass #200)
			10						
			11			SW-SM		Well graded SAND with Silt and Gravel - damp, dark gray-brown.	
5								Boring terminated at 5 ft. below surface.	
7.5									
10									
12.5									

Boring B-3

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT: CVWD Dike 4 Percolation Ponds
CTE JOB NO: 40-2251
LOGGED BY: R. Ellerbusch
DRILLER: 2R Drilling (CME Track Rig)
DRILL METHOD: 8" Hollow stem auger
SAMPLE METHOD: 140 lb/30" autohammer
SHEET: 1 of 1
DRILLING DATE: 6/25/2007
ELEVATION: basin floor

BORING: B-4

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			3			SM		Silty Sand - dry to damp, light gray, fine.	GS (29.4% pass #200) HA
			3						
			4						
			4						
			3					at 24" becomes medium to coarse with less fines, trace gravel.	GS (13.2% pass #200)
2.5			6			ML		at 30" - 3" lens of silt.	
						SW-SM		Well graded SAND with Silt and Gravel - damp, dark gray-brown.	
			7						
			13						
			6						GS (8.7% pass #200)
			4						
5								Boring terminated at 5 ft. below surface.	
7.5									
10									
12.5									

CONSTRUCTION TESTING & ENGINEERING, INC.
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PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-5

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			5			SM		Silty SAND with Gravel - dry, light gray, fine.	GS (29.4% pass #200)
			5						
			8					becomes damp, decrease in gravel	GS (28.4% pass #200) HA
			8						
			10						
2.5			12						GS (14.8% pass #200)
			7			SP-SM		Poorly-graded SAND with Silt - damp, gray, coarse, occasional gravel.	
			9						
			14			SW-SM		Well graded SAND with Silt and Gravel - damp, dark gray-brown.	
			10						
5								Boring terminated at 5 ft. below surface.	
7.5									
10									
12.5									

Boring B-5

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-6

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			2			SM		Very Silty SAND - damp, light gray, traces of gravel.	GS (41.5% pass #200) HA
			3						
			4						
			4						
			5						
2.5			6						
			6			SP-SM		Poorly-graded SAND with Silt and Gravel - damp, gray, medium to coarse.	GS (6.1% pass #200)
			8						
			7						
			8			SW-SM		Well-graded SAND with Silt and Gravel - damp, dark gray-brown.	GS (4.6% pass #200)
5								Boring terminated at 5 ft. below surface.	
7.5									
10									
12.5									

Boring B-6

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-7

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			2			SM		Silty SAND - damp to damp, gray, fine, occasional gravel.	GS (19.3% pass #200) HA
			3						
			3						GS (25.6% pass #200)
			4						
			5						
2.5			5						
			4					at 36" - becomes dark gray and medium grain with traces of gravel.	GS (33.6% pass #200)
			9						
			6						
			6			SW-SM		Well-graded SAND with Silt and Gravel - damp, dark gray-brown.	
5			6						
			8						
								Boring terminated at 6 ft. below surface.	
7.5									
10									
12.5									

Boring B-7

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4180

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-8

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			4			SM		Silty SAND - dry, light gray, very fine, traces of gravel.	
			5					becomes damp	GS (32.9% pass #200) HA
			6					increase in gravel	
			5						GS (24.0% pass #200)
			6						
2.5			6			SP-SM		Poorly-graded SAND with Silt - gray, damp, medium to coarse, occasional gravel	
			5						
			8						
			7						
			14			SW-SM		Well-graded SAND with Silt and Gravel - damp, dark gray-brown.	
5			12					at 58" - 1" silt lens	
			16						
								Boring terminated at 6 ft. below surface.	
7.5									
10									
12.5									

B-8

Boring B-8

BORINGS BY

EARTH SYSTEMS SOUTHWEST
(2007b)

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

12" 3" 3/4" 4 10 40 200

BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		

305 76.2 19.1 4.76 2.00 0.42 0.074 0.002

SOIL GRAIN SIZE IN MILLIMETERS

RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	*N=0-4	RD=0-30	Easily push a 1/2-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a 1/2-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a 1/2-inch reinforcing rod with hammer
Dense	N=31-50	RD=70-90	Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer
Very Dense	N>50	RD=90-100	Drive a 1/2-inch reinforcing rod a few inches with hammer

*N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler, 140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	*N=0-1	*C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very Stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000	Dented slightly by a pencil point or thumbnail

MOISTURE DENSITY

Moisture Condition:	An observational term; dry, damp, moist, wet, saturated.
Moisture Content:	The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.
Dry Density:	The pounds of dry soil in a cubic foot.

MOISTURE CONDITION

Dry.....................Absence of moisture, dusty, dry to the touch
Damp................Slight indication of moisture
Moist.................Color change with short period of air exposure (granular soil)
Below optimum moisture content (cohesive soil)
Wet....................High degree of saturation by visual and touch (granular soil)
Above optimum moisture content (cohesive soil)
Saturated..........Free surface water

PLASTICITY

DESCRIPTION	FIELD TEST
Nonplastic	A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.
Low	The thread can barely be rolled.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit.
High	The thread can be rerolled several times after reaching the plastic limit.

GROUNDWATER LEVEL

▼	Water Level (measured or after drilling)
▽	Water Level (during drilling)

RELATIVE PROPORTIONS

Trace............minor amount (<5%)
with/some......significant amount
modifier/and...sufficient amount to influence material behavior (Typically >30%)

LOG KEY SYMBOLS

▮	Bulk, Bag or Grab Sample
▯	Standard Penetration Split Spoon Sampler (2" outside diameter)
▮	Modified California Sampler (3" outside diameter)
⧄	No Recovery

Terms and Symbols used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is larger than No. 200 sieve size	GRAVEL AND GRAVELLY SOILS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS < 5% FINES	▨	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			▨	GP	Poorly-graded gravels, gravel-sand mixtures. Little or no fines
		GRAVELS WITH FINES > 12% FINES	▨	GM	Silty gravels, gravel-sand-silt mixtures
			▨	GC	Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS More than 50% of coarse fraction passing No. 4 sieve	CLEAN SAND (Little or no fines) < 5%	▨	SW	Well-graded sands, gravelly sands, little or no fines
			▨	SP	Poorly-graded sands, gravelly sands, little or no fines
		SAND WITH FINES (appreciable amount of fines) > 12%	▨	SM	Silty sands, sand-silt mixtures
			▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more of material is smaller than No. 200 sieve size	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▨	ML	Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity
			▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			▨	OL	Organic silts and organic silty clays of low plasticity
		LIQUID LIMIT GREATER THAN 50	▨	MH	Inorganic silty, micaceous, or diatomaceous fine sand or silty soils
			▨	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			▨	PT	Peat, humus, swamp soils with high organic contents
VARIOUS SOILS AND MAN MADE MATERIALS			▦		Fill Materials
MAN MADE MATERIALS			■		Asphalt and concrete

Soil Classification System

Earth Systems
Southwest

Earth Systems
Southwest

79811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-1
Project Name: Travertine Project, Madison Street, La Quita, CA
File Number: 11112-02
Boring Location: See Figure 2

Drilling Date: July 31, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.	Graphic Trend Blow Count	Graphic Trend Dry Density
0					░	SP-SM			SAND WITH SILT: pale yellowish brown to white, medium dense, dry, fine to coarse grained		
	■	□		4,5,5	░					●	
5		□		4,5,5	░				trace fine to coarse gravels	●	
10		□		6,7,7	░					●	
15									Total Depth 11.5 feet No Groundwater Encountered Cobbles and boulders encountered throughout		
20											

Earth Systems
Southwest

79811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-2

Project Name: Travertine Project, Madison Street, La Quita, CA
File Number: 11112-02
Boring Location: See Figure 2

Drilling Date: July 31, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk SPT MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.	Graphic Trend Blow Count Dry Density
0				SP-SM			SAND WITH SILT: pale yellowish brown to white, loose to medium dense, dry, fine to coarse grained	
		1,2,2						
		4,5,4						
5		4,5,5					trace fine to coarse gravels	
10		4,4,4						
							Total Depth 11.5 feet No Groundwater Encountered Cobbles and boulders encountered throughout	
15								
20								

Earth Systems
Southwest

79811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-3

Project Name: Travertine Project, Madison Street, La Quita, CA
File Number: 11112-02
Boring Location: See Figure 2

Drilling Date: July 31, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units	Graphic Trend Blow Count	Graphic Trend Dry Density
0				SP-SM			SAND WITH SILT: pale yellowish brown to white, loose to medium dense, dry, fine to coarse grained, cobbles throughout, trace fine gravels		
	SPT	---							
	SPT	4,5,5						●	
5	SPT	3,5,5						●	
10	SPT	3,6,7						●	
15	SPT	5,7,10						●	
20							Total Depth 16.5 feet No Groundwater Encountered Cobbles and boulders encountered throughout		

Earth Systems
Southwest

79811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-4

Project Name: Travertine Project, Madison Street, La Quita, CA
File Number: 11112-02
Boring Location: See Figure 2

Drilling Date: July 31, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 Auto Hammer
Logged By: Dirk Wiggins

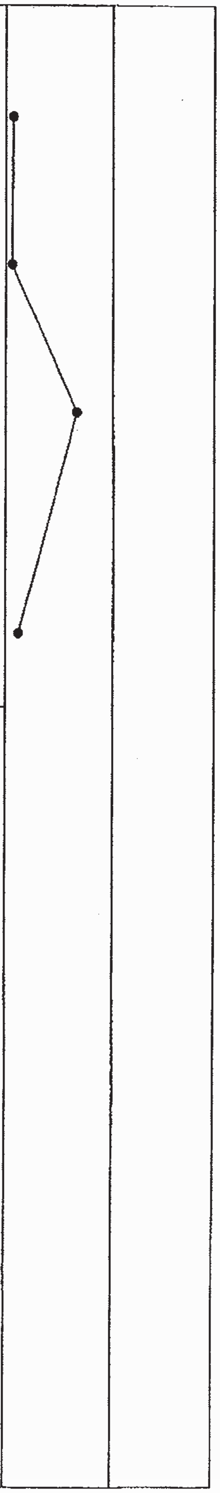
Description of Units

Page 1 of 1

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0						SM			SILTY SAND: moderate yellowish brown, medium dense to loose, damp to dry, fine to coarse grained, trace fine gravels
		■		1,2,5					
		■		2,2,4					
5		■		LOST					
		■		3,4,8					pale to moderate yellowish brown
10									Total Depth 9.5 feet No Groundwater Encountered
15									
20									

Graphic Trend
Blow Count Dry Density



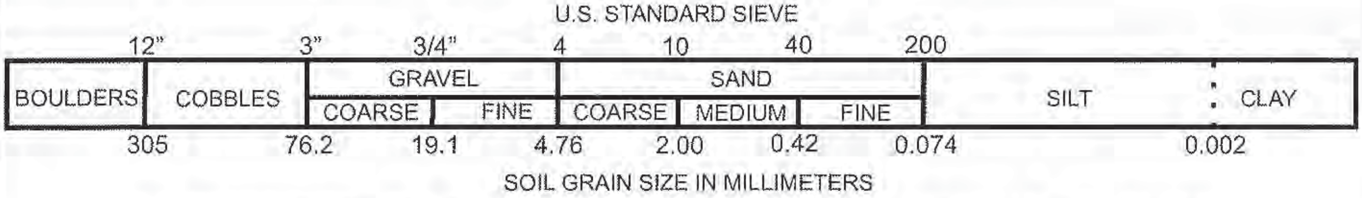
BORINGS BY

EARTH SYSTEMS SOUTHWEST
(2007c)

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE



RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	*N=0-4	RD=0-30	Easily push a 1/2-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a 1/2-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a 1/2-inch reinforcing rod with hammer
Dense	N=31-50	RD=70-90	Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer
Very Dense	N>50	RD=90-100	Drive a 1/2-inch reinforcing rod a few inches with hammer

*N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler, 140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	*N=0-1	*C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very Stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000	Dented slightly by a pencil point or thumbnail

MOISTURE DENSITY

Moisture Condition:	An observational term; dry, damp, moist, wet, saturated.
Moisture Content:	The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.
Dry Density:	The pounds of dry soil in a cubic foot.

MOISTURE CONDITION

Dry	Absence of moisture, dusty, dry to the touch
Damp	Slight indication of moisture
Moist	Color change with short period of air exposure (granular soil) Below optimum moisture content (cohesive soil)
Wet	High degree of saturation by visual and touch (granular soil) Above optimum moisture content (cohesive soil)
Saturated	Free surface water

RELATIVE PROPORTIONS

Trace	minor amount (<5%)
with/some	significant amount
modifier/and	sufficient amount to influence material behavior (Typically >30%)

PLASTICITY

DESCRIPTION	FIELD TEST
Nonplastic	A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.
Low	The thread can barely be rolled.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit.
High	The thread can be rerolled several times after reaching the plastic limit.

LOG KEY SYMBOLS

▮	Bulk, Bag or Grab Sample
▯	Standard Penetration Split Spoon Sampler (2" outside diameter)
▮	Modified California Sampler (3" outside diameter)
⊠	No Recovery

GROUNDWATER LEVEL

▼	Water Level (measured or after drilling)
▽	Water Level (during drilling)

Terms and Symbols used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is larger than No. 200 sieve size	GRAVEL AND GRAVELLY SOILS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS < 5% FINES	░	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			▩	GP	Poorly-graded gravels, gravel-sand mixtures. Little or no fines
		GRAVELS WITH FINES > 12% FINES	▥	GM	Silty gravels, gravel-sand-silt mixtures
			▩	GC	Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS More than 50% of coarse fraction passing No. 4 sieve	CLEAN SAND (Little or no fines) < 5%	░	SW	Well-graded sands, gravelly sands, little or no fines
			░	SP	Poorly-graded sands, gravelly sands, little or no fines
		SAND WITH FINES (appreciable amount of fines) > 12%	▥	SM	Silty sands, sand-silt mixtures
			▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more of material is smaller than No. 200 sieve size	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	ML	Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity
			▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			▥	OL	Organic silts and organic silty clays of low plasticity
		LIQUID LIMIT GREATER THAN 50	▥	MH	Inorganic silty, micaceous, or diatomaceous fine sand or silty soils
			▨	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			▩	PT	Peat, humus, swamp soils with high organic contents
VARIOUS SOILS AND MAN MADE MATERIALS			▦		Fill Materials
MAN MADE MATERIALS			■		Asphalt and concrete

Soil Classification System

Earth Systems
Southwest

Boring No: I-1	Drilling Date: August 17, 2007
Project Name: Proposed Travertine Project, La Quinta, CA	Drilling Method: 8" Hollow Stem Auger
File Number: 11112-04	Drill Type: Simco 2800 w/ Auto Hammer
Boring Location: See Figure 2	Logged By: Dirk Wiggins

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units	Graphic Trend Blow Count	Dry Density
0					▨	SM			SILTY SAND: moderate yellowish brown, medium dense, dry, fine grained, few medium to coarse grained		
		■		6,6,7	▨					●	
5					▨						
		■		6,7,8	▨				pale yellowish brown, fine to medium grained	●	
10					▨						
		■			▨	SP-SM			SAND WITH SILT: pale yellowish brown, medium dense, dry, fine to medium grained, grab sample		
15											
20											
25											
30											

Total Depth 13 feet

No Groundwater Encountered

Cobbles/Boulders Encountered Throughout

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: I-2

Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

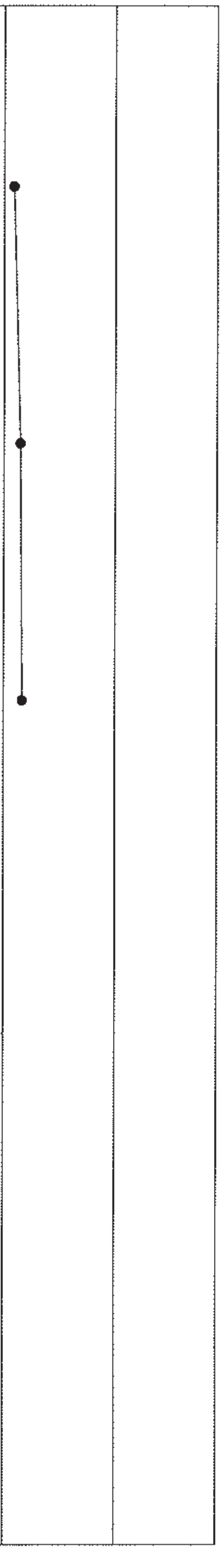
Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					░	SP-SM			SAND WITH SILT: pale yellowish brown to white, loose, dry, fine to coarse grained
		■		3,4,5	░				medium dense
5					░				
		■		6,7,8	░				pale to moderate yellowish brown
10					░				
		■		6,8,9	░				
15					░				
	■				░				
	■				░				pale yellowish brown to white, few fine gravel, grab sample
20									Total Depth 20 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout
25									
30									

Graphic Trend
Blow Count Dry Density



Boring No: I-3
Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units	Graphic Trend Blow Count	Graphic Trend Dry Density
0						SP-SM			SAND WITH SILT: pale yellowish brown to white, medium dense, dry, fine to coarse grained, trace fine gravel		
	■	■		6,8,10						●	
5											
		■		7,10,11					white minerals, cobbles	●	
10									Auger Refusal at 10 feet Total Depth 10 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout		
15											
20											
25											
30											

Boring No: I-4

Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					⁙	SP-SM			SAND WITH SILT: pale yellowish brown to white, medium dense, dry, fine to coarse grained
		◧		10,11,14	⁙				
		◧		8,12,14	⁙				
5					⁙				
		◧		50/6"	⁙				cobbles
									Auger Refusal at 7 feet
									Total Depth 7 feet
10									No Groundwater Encountered
									Cobbles/Boulders Encountered Throughout
15									
20									
25									
30									

Graphic Trend
Blow Count Dry Density

Boring No: I-5

Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

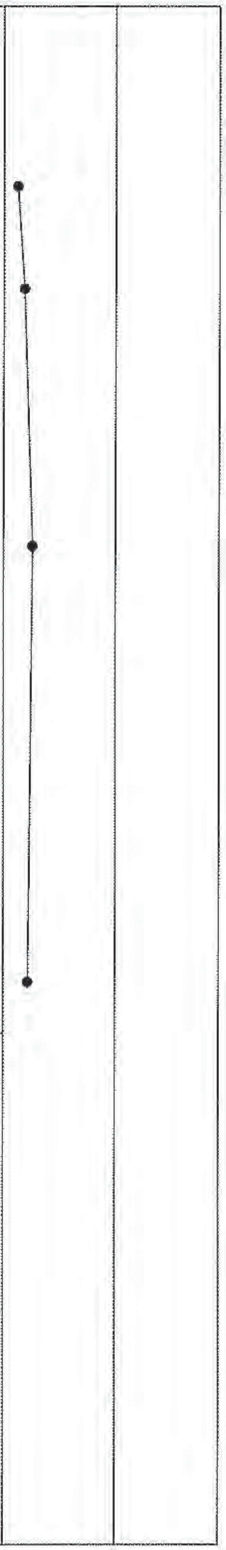
Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					▒	SP-SM			SAND WITH SILT: pale yellowish brown to white, loose, dry, fine to coarse grained, few fine gravel
		◧			▒				
		◧		6,6,7	▒				cobbles
5	■	◧		7,9,10	▒				
10		◧		10,12,14	▒				
15		◧			▒				
		◧		10,11,11	▒				dense
20									Total Depth 20 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout
25									
30									

Graphic Trend
Blow Count Dry Density



Boring No: I-6

Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0			░	SP-SM			SAND WITH SILT: moderate yellowish brown, loose, dry, fine to coarse grained
	◧	5,3,4	░				
5	◧	7,8,9	░				pale to moderate yellowish brown, medium dense
	◧		░				grab sample
10			░				few fine to coarse gravel
	◧	10,11,13	░				some gravel
15	◧	14,15,18	░				moderate brown, dense, damp, few fine gravel, cobbles
20	◧		░				
							Total Depth 20 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout

Graphic Trend
Blow Count Dry Density

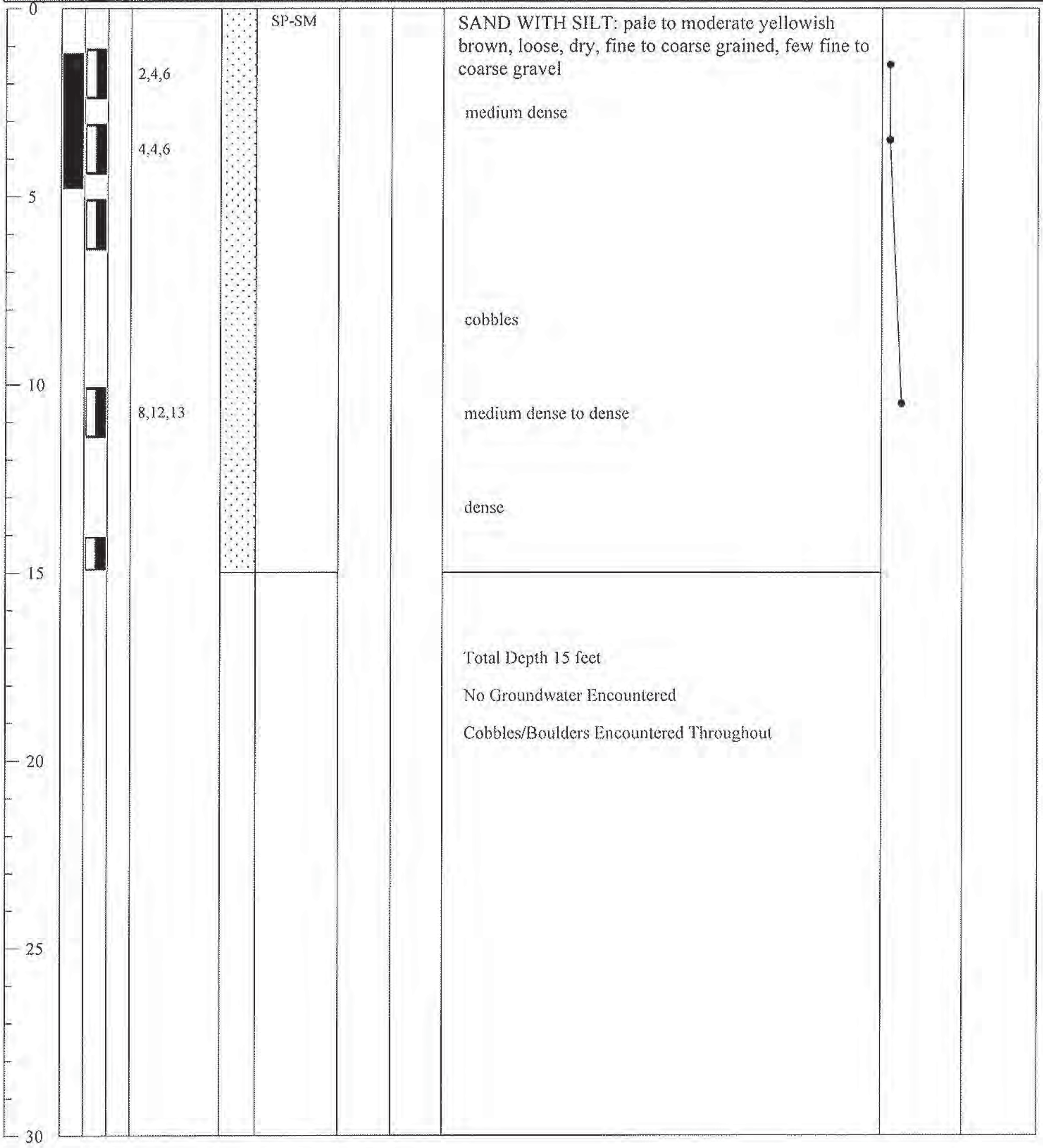
Boring No: I-7
Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.



Penetration Resistance (Blows/6")	USCS	Description of Units
	SP-SM	SAND WITH SILT: pale to moderate yellowish brown, loose, dry, fine to coarse grained, few fine to coarse gravel
2,4,6		
		medium dense
4,4,6		
		cobbles
8,12,13		medium dense to dense
		dense
		Total Depth 15 feet
		No Groundwater Encountered
		Cobbles/Boulders Encountered Throughout

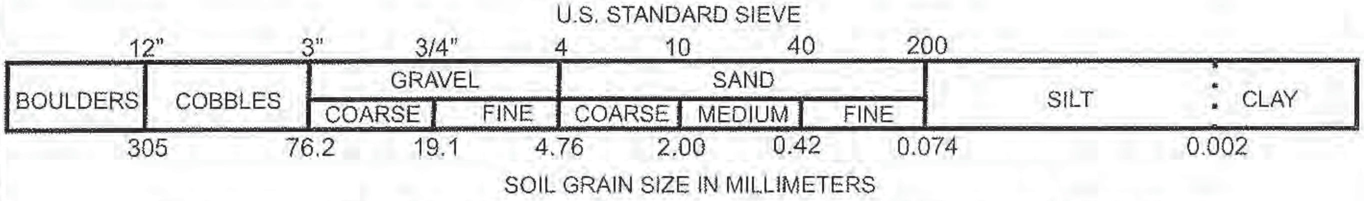
TEST PITS BY

EARTH SYSTEMS SOUTHWEST
(2007d)

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE



RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	*N=0-4	RD=0-30	Easily push a 1/2-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a 1/2-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a 1/2-inch reinforcing rod with hammer
Dense	N=31-50	RD=70-90	Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer
Very Dense	N>50	RD=90-100	Drive a 1/2-inch reinforcing rod a few inches with hammer

*N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler, 140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	*N=0-1	*C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very Stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000	Dented slightly by a pencil point or thumbnail

MOISTURE DENSITY

Moisture Condition:	An observational term; dry, damp, moist, wet, saturated.
Moisture Content:	The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.
Dry Density:	The pounds of dry soil in a cubic foot.

MOISTURE CONDITION

Dry....................	Absence of moisture, dusty, dry to the touch
Damp................	Slight indication of moisture
Moist.................	Color change with short period of air exposure (granular soil) Below optimum moisture content (cohesive soil)
Wet....................	High degree of saturation by visual and touch (granular soil) Above optimum moisture content (cohesive soil)
Saturated..........	Free surface water

RELATIVE PROPORTIONS

Trace.............	minor amount (<5%)
with/some......	significant amount
modifier/and...	sufficient amount to influence material behavior (Typically >30%)

PLASTICITY

DESCRIPTION	FIELD TEST
Nonplastic	A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.
Low	The thread can barely be rolled.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit.
High	The thread can be rerolled several times after reaching the plastic limit.

LOG KEY SYMBOLS

▮	Bulk, Bag or Grab Sample
▯	Standard Penetration Split Spoon Sampler (2" outside diameter)
▮	Modified California Sampler (3" outside diameter)
⍂	No Recovery

GROUNDWATER LEVEL

▼	Water Level (measured or after drilling)
▽	Water Level (during drilling)

Terms and Symbols used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is larger than No. 200 sieve size	**GRAVEL AND GRAVELLY SOILS** More than 50% of coarse fraction retained on No. 4 sieve	**CLEAN GRAVELS < 5% FINES**	░	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			▓	GP	Poorly-graded gravels, gravel-sand mixtures. Little or no fines
		GRAVELS WITH FINES > 12% FINES	▥	GM	Silty gravels, gravel-sand-silt mixtures
			▩	GC	Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS More than 50% of coarse fraction passing No. 4 sieve	**CLEAN SAND (Little or no fines) < 5%**	░	SW	Well-graded sands, gravelly sands, little or no fines
			▒	SP	Poorly-graded sands, gravelly sands, little or no fines
		SAND WITH FINES (appreciable amount of fines) > 12%	▥	SM	Silty sands, sand-silt mixtures
			▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more of material is smaller than No. 200 sieve size	**SILTS AND CLAYS**	**LIQUID LIMIT LESS THAN 50**	▥	ML	Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity
			▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			▥	OL	Organic silts and organic silty clays of low plasticity
		LIQUID LIMIT GREATER THAN 50	▥	MH	Inorganic silty, micaceous, or diatomaceous fine sand or silty soils
			▨	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			▩	PT	Peat, humus, swamp soils with high organic contents
VARIOUS SOILS AND MAN MADE MATERIALS			▦		Fill Materials
MAN MADE MATERIALS			■		Asphalt and concrete

Soil Classification System

Earth Systems
Southwest

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-1

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, dry, fine to coarse grained with abundant fine to coarse grained gravels, all sizes of cobbles, small boulders
				▨		114	0.8	
				▨		113	0.53	Approximation By Weight: 40% Sands and Gravels 50% Cobbles (to 12") 10% Boulders
5				▨		111	0.40	
10				▨				
15				▨				
20								GPS: 569416, 3716840 Elevation: 61 feet Total Depth: 20 feet Groundwater not encountered Bedrock not encountered High caving probability due to large boulders Backfilled with native soil
25								
30								

Earth Systems
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Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-2

Project Name: Travertine

File Number: 11112-04

Test Pit Location: See Figure 2

Exploration Date: October 16, 2007

Excavation Method: Excavator

Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: dense, dry, sand matrix with predominant boulders, gravels and cobbles to 10 feet Approximation By Weight: 30% Sands and Gravels 30% Cobbles (to 12") 40% Boulders
5				▨				
10				▨				10 to 18 feet: mostly sand and gravels, few cobbles and boulders
15				▨				
				▨				18 to 20 feet: boulders predominant, largest boulders 2.5 feet in diameter, abundant cobbles and gravels, medium grained sands
20								GPS: 569021, 3716850 Elevation: 117 feet Total Depth: 20 feet Groundwater not encountered Bedrock not encountered High caving probability Backfilled with native soil
25								
30								

Earth Systems
Southwest

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Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-3

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW	116	0.5	WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand with some fine to coarse gravels, boulders from surface to depth, abundant cobbles Approximation By Weight: 20% Sands and Gravels 40% Cobbles 40% Boulders
5								very large boulders (from landslide) encountered at 5 feet
10								
15								
20								GPS: 568662, 3717050 Elevation: 179 feet Total Depth: 13 feet Groundwater not encountered Bedrock not encountered No stratification High caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-4
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	 SPT	 MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand with fine to coarse gravels, abundant cobbles (to 8" diameter)
				░		116	0.7	Approximation By Weight: 70% Sands and Gravels 20% Cobbles 10% Boulders Few large boulders removed here
5				░				
10				░				
15								
20								GPS: 567996, 3717080 Elevation: 273 feet Total Depth: 15 feet (due to boulders) Groundwater not encountered Bedrock not encountered No stratification High caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-5

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: loose to medium dense, dry, mostly fine to coarse grained sand, few cobbles to 10 feet, fine to coarse grained gravels Approximation By Weight: 60% Sands and Gravels 10% Cobbles 30% Boulders
5								
10								
15								
20								GPS: 567740, 3717370 Elevation: 304 feet Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Some stratification Moderate caving observed in test pit Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-6
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					SP-SM			SAND TO SILTY SAND: light brown to white, medium dense, dry, mostly fine to coarse grained sand, occassional cobble
					SW			WELL GRADED SAND: light brown, medium dense to dense, dry, mostly medium to coarse grained sand, abundant gravel and cobbles (to 8" diameter) to 9 feet
5								
								over size cobbles and boulders dominate by weight from 9 to 25 feet Approximation By Weight: 60% Boulders from 9 to 20 feet 30% Boulders from 20 to 25 feet
10								
15								
20								
25								GPS: 567932, 3717684 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Stratification not evident Extreme risk of caving due to boulders and dry conditions below 9 feet Backfilled with native soil
30								

Test Pit No: TP-7

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	 SPT	 MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, dry, fine to coarse grained sand with abundant gravels and cobbles to 12" diameter Approximation By Weight: 50% Sands and Gravels 40% Cobbles 10% Boulders possible cobble layer
5				░				
10				░				
15								
20								GPS: 568522, 3717350 Elevation: 176 feet Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-8
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type			Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
	Bulk	SPT	MOD Calif.					
0				░	SW			WELL GRADED SAND: dense, dry, fine to coarse grained sand, abundant gravels and cobbles from surface to bottom Approximation By Weight: 60% Sands and Gravels 30% Cobbles 10% Boulders
5				░				
10				░				
15				░				
20				░				boulders at bottom of excavation
25								GPS: 568350, 3717330 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered No stratification visible Moderate caving potential Backfilled with native soil
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-9
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense to dense, dry, fine to coarse grained sand, abundant gravels and cobbles
				▨		119.0	0.9	
				▨		104.5	1.5	Approximation By Weight: 50% Sands and Gravels 40% Cobbles 10% Boulders
5				▨				
				▨		102	1.1	
10				▨				
15				▨				
20				▨				cobble layer (resistant)
				▨				boulders at bottom of excavation
25								GPS: 569440, 3717140 Total Depth: 23 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
30								

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Test Pit No: TP-10

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravels and cobbles, no large boulders
				▨		102.4	0.7	
				▨		116.3	0.35	Approximation By Weight: 48% Sands and Gravels 50% Cobbles 2% Boulders
5				▨		110.5	0.35	
10				▨				
15				▨				
20				▨				
25								GPS: 569483, 3717480 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Some stratification visible Moderate caving potential Backfilled with native soil
30								

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Test Pit No: TP-11
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					SP-SM			SAND TO SILTY SAND: light brown, medium dense, dry, fine to coarse grained sand, trace cobbles
5					SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, stratified with cobbles, abundant gravels, trace oversize and boulders Approximation By Weight: 95% Sands, Gravels, and Cobbles 5% Boulders Note: from surface to 25 feet, at least 15 flood episodes - each "strata" about 2 foot thick
10								
15								
20								
25								GPS: 569517, 3717842 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Moderate caving Backfilled with native soil
30								

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Test Pit No: TP-12
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown, dense, dry, sands near surface, boulders near surface
				▨		117	0.6	predominantly cobbles (to 12" diameter) from 2 feet
				▨		110	0.9	Approximation By Weight: 20% Sands and Gravels 70 to 80% Cobbles and Boulders
5				▨		112	0.9	
10				▨				
15								
20								GPS: 569143, 3717100 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered No stratification obvious High caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-13
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand, cobbles > 50%, abundant gravel
								~ 10' thick layer of cobbles (8-12") to 12' deep
						102	0.8	Approximation By Weight: 40% Sands and Gravels 40% Cobbles 20% Boulders
5								
10								
15								
								boulders at bottom of excavation
20								GPS: 5691230, 3717355 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

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Test Pit No: TP-14
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0	■			▨	SW			WELL GRADED SAND: light brown, very dense, dry, fine to coarse grained sand on cobbles and boulders abundant gravels Approximation By Weight: 30% Sands and Gravels 20% Cobbles 60% Boulders
5								
10								Refusal on boulder GPS: 568800, 3717300 Total Depth: 10 feet Groundwater not encountered Bedrock not encountered High caving potential Backfilled with native soil
15								
20								
25								
30								

Test Pit No: TP-15

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown, dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter
				▨		110	1.0	Approximation By Weight: 75% Sands and Gravels 20% Cobbles < 5% Boulders
5				▨				
10				▨				
				▨				No boulders at bottom of excavation
15								
20								
								GPS: 568752, 3717410 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-16
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					SM			SILTY SAND: light brown to white, medium dense, dry, fine to coarse grained sand with abundant gravel and cobbles to 10" diameter
								Approximation By Weight: 80% Sands and Gravels
5						103	1.5	20% Cobbles 1% Boulders
	■							
10								
15								
								dense
20								
25								
								GPS: 568550, 3717728 Total Depth: 26 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
30								

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Test Pit No: TP-17
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant cobbles and gravel Approximation By Weight: 75% Sands and Gravels 20% Cobbles ~ 5% Boulders
5	■			▨		106	0.75	
10				▨				
15				▨				
20								GPS: 568726, 3717660 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

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Test Pit No: TP-18

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown, dense, dry, fine to coarse grained sand, abundant cobbles
	■			▨				
				▨		112	0.7	Approximation By Weight: 50% Sands and Gravels 40% Cobbles 10% Boulders
20								GPS: 568880, 3717590 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil

Depth scale: 0, 5, 10, 15, 20, 25, 30

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Test Pit No: TP-19
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Page 1 of 1 Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▒	SW			WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 8" diameter, scattered small boulders
				▒		105	0.5	
	■			▒				Approximation By Weight: 80% Sands and Gravels ~ 15% Cobbles < 5% Boulders
5				▒				
10				▒				
				▒				few large boulders in bottom
15								
20								GPS: 569268, 3717590 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

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Test Pit No: TP-20
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Description of Units

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Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained, abundant gravel and cobbles
	■			▨		110	0.3	Approximation By Weight: 75% Sands and Gravels 20% Cobbles < 5% Boulders
5				▨				
10				▨				
15				▨				
20								GPS: 569097, 3717720 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Some thin stratification visible Moderate caving potential Backfilled with native soil
25								
30								

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Test Pit No: TP-21
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SP-SM			SAND WITH SILT: light brown, medium dense, dry, fine to coarse grained, trace fine gravel
	■			▨	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, some fine to coarse gravel and few cobbles to 3" diameter Approximation By Weight: 95% Sands, Gravels and Cobbles to 3" diameter Occasional cobbles > 6" to < 10" Trace small boulders trace larger cobbles and trace small boulders
5								
10								
15								GPS: 568893, 3717822 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Stratification evident ~ 1' thick each throughout Moderate caving potential Backfilled with native soil
20								
25								
30								

Test Pit No: TP-22
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Description of Units

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Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				░	SW	103	0.3	WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand to 2' , abundant gravel and cobbles to 6" diameter throughout Approximation By Weight: 20% Sands and Gravels 30% Cobbles ~ 50% Boulders
5				░				
10				░				
								Refusal on boulders
15								
20								GPS: 568420 E, 3717166 N Total Depth: 12 feet Groundwater not encountered Bedrock not encountered No stratification visible High caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-23
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained, gravel below 2', abundant cobbles and gravel
						106	0.9	
								Approximation By Weight: 75% Sands and Gravels 20% Cobbles ~ 5% Boulders
5								
10								
15								
20								GPS: 568200, 3717330 N Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Some stratification visible Moderate caving potential Backfilled with native soil
25								
30								

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Test Pit No: TP-24
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					SW			WELL GRADED SAND: light brown, very loose to loose, dry, fine to coarse grained, few gravel, occasional cobbles to 8" diameter top to bottom medium dense Approximation By Weight: 85% Sands, Gravels and Cobbles 15% Boulders
5								
10								dense
15								
20								GPS: 567893, 3717489 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Thinly bedded stratification evident top to bottom Moderate caving of hole Backfilled with native soil
25								
30								

Test Pit No: TP-25
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					SW			WELL GRADED SAND: light brown, loose, dry, fine to coarse grained sand with abundant gravel and cobbles to 8" diameter
								medium dense to very dense
								Approximation By Weight: ~ 50% Sands and Gravels 20% Cobbles 30% Boulders
5								
10								
15								
								dense
20								
25								GPS: 568159, 3717603 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Thin stratification layers visible Moderate caving potential Backfilled with native soil
30								

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Test Pit No: TP-26
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Description of Units

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Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand below 2' with abundant gravel and cobbles, trace large boulders
				▨		100	0.9	Approximation By Weight: ~ 70% Sands and Gravels 30% Cobbles 1% Boulders
5	■			▨				
10				▨				
15				▨				
20				▨				
25								GPS: 568271, 3717471 Total Depth: 23 feet Groundwater not encountered Bedrock not encountered Some thin stratification layers obvious Moderate caving potential Backfilled with native soil
30								

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Test Pit No: TP-27
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SP-SM			SAND WITH SILT: light brown to white, medium dense, dry, fine to coarse grained
				░	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, some fine to coarse gravel and cobbles to 3" diameter Approximation By Weight: 98% Sands, Gravels and occasional Cobbles to 3" diameter 2% Boulders (trace)
5				░				
				░				~ 20% Boulders, abundant large cobbles 8-15' deep
10				░				
				░				trace larger cobbles and trace small boulders
15								
20								GPS: 568184, 3717834 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Stratification not very evident Moderate caving of hole Backfilled with native soil
25								
30								

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Test Pit No: TP-28

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date:
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0								
5								Test Pit Not Excavated
10								
15								
20								
25								
30								

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Test Pit No: TP-29

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" Approximation By Weight: 80% Sands and Gravels ~ 19% Cobbles < 1% Boulders
5	■			▨				
10				▨				cobbles at bottom
15								
20								GPS: 568573 E, 3718706 N Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Hole not backfilled
25								
30								

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Test Pit No: TP-30
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					RX			ROCK: ~ 80% boulders at surface to 10', abundant cobbles, dense, dry
5								
10					SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand to mostly gravel, cobbles and sand
15								light brown, damp, abundant gravel and cobbles to 10" diameter, few boulders
20								
								~ 90% cobbles, sand and gravel, no boulders
25								GPS: 568010, 3718496 N Total Depth: 25 feet Groundwater not encountered Bedrock not encountered High top caving potential Hole not backfilled
30								

Test Pit No: TP-31
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type: Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▒	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter, white minerals Approximation By Weight: 75% Sands and Gravel 15% Cobbles 10% Boulders
5	■			▒				
10				▒				few boulders at bottom
15								Refusal at 15'
20								GPS: 568011 E, 3718070 N' Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

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Test Pit No: TP-32
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter, some boulders near surface
	■			▨				Approximation By Weight: 80% Sands and Gravel ~ 15% Cobbles
5				▨		111	0.5	~ 5% Boulders
10				▨				
15				▨				
				▨				no boulders at bottom
20								GPS: 567900, 3718060 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

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Test Pit No: TP-33

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					RX			ROCK: mostly boulders by weight, dense, dry
5					SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 8" diameter Approximation By Weight: 80% Sands and Gravel ~ 15% Cobbles ~ 5% Boulders no boulders at bottom
20								GPS: 568300, 3718577 N Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-34

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 10" diameter Approximation By Weight: 80% Sands and Gravel ~ 15% Cobbles < 5% Boulders
5	■			▨				
10				▨				
15				▨				cobbles in bottom, broken irrigation line
20								GPS: 568506 E, 3718546 N Total Depth: 18 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-35
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type: Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter
	■			▨		106	1.6	
				▨				Approximation By Weight: 85% Sands and Gravel 10% Cobbles < 5% Boulders
5				▨				
10				▨				very dense
				▨				damp
				▨				boulders at bottom, broken irrigation pipe
15								
20								GPS: 568215 E, 3718062 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

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Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-36
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter
				░		105	1.3	
				░				Approximation By Weight: 80% Sands and Gravel
5				░				~ 15% Cobbles ~ 5% Boulders
10				░				
15				░				damp
				░				no boulders or cobbles at bottom
20								
								GPS: 568608 E, 3718014 N Total Depth: 18 feet Groundwater not encountered Bedrock not encountered Moderate caving potential
25								Backfilled with native soil
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-37
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 26, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand , abundant gravel and cobbles to 12" diameter
5	■			░		111	2.6	damp
				░				Approximation By Weight: 75% Sands and Gravels 20% Cobbles < 2% Boulders
10				░				
15				░				
20				░				
				░				no boulders in bottom, broken irrigation pipe
25								GPS: 568808 E, 3718016 N Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Stratification visible High caving potential Backfilled with native soil
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-38
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter Approximation By Weight: 75% Sands and Gravel 20% Cobbles 5% Boulders
5								
10								
15								some cobbles, no boulders at bottom
20								GPS: 568807 E, 3718329 N Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Stratification visible Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-39
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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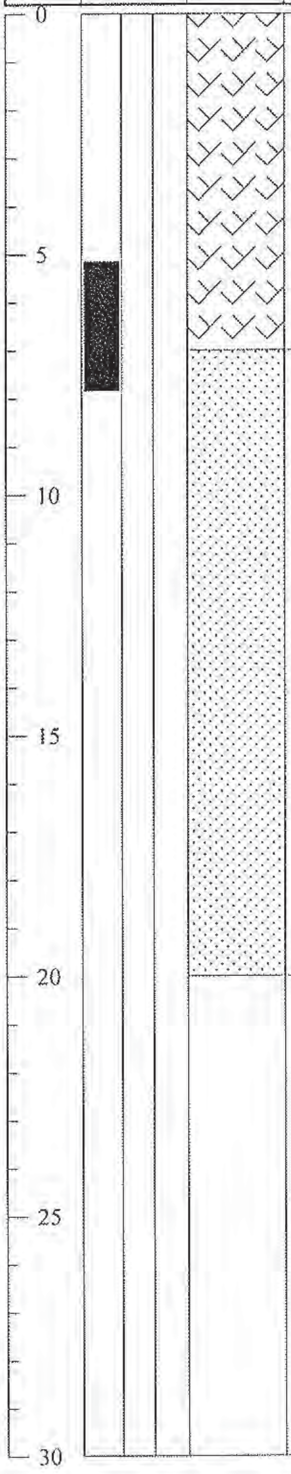

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
RX	112	1.0	ROCK: boulders predominate by weight, very dense, dry, some sands and gravel
SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter Approximation By Weight: 80% Sands and Gravel 15% Cobbles ~ 5% Boulders no boulders at bottom
			GPS: 567905, 3718311 N Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-40
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter
				▨		114	1.5	
				▨				Approximation By Weight: 80% Sands and Gravel 18% Cobbles 2% Boulders
5				▨				
10				▨				
				▨				damp, cobbles, no boulders, broken irrigation pipe
15								
20								GPS: 569005, 3718315 N Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-41
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 25, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 8" diameter
	■			░		105	0.6	Approximation By Weight: 90% Sands and Gravel < 10% Cobbles < 1% Boulders
5				░				
10				░				
15				░				damp
				░				no cobbles or boulders at bottom
20								GPS: 569407 E, 3717971 Total Depth: 18 feet Groundwater not encountered Bedrock not encountered Some stratification visible Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-42
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 25, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	 SPT	 MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 8" diameter Approximation By Weight: 75% Sands and Gravel 20% Cobbles 5% Boulders
5								
10								
15								
20								
								GPS: 568030, 3718828 Total Depth: 22 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-43
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter Approximation By Weight: 50% Sands and Gravel ~ 40% Cobbles ~ 10% Boulders
5				▨				
10				▨				cobbles at bottom
15								
20								GPS: As planned Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-44
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Description of Units

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Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, abundant gravel, few cobbles to 6" diameter scattered throughout
				▨		103	0.6	Approximation By Weight: 98% Sands and Gravel 2% Cobbles No Boulders
5				▨				
10				▨				slightly damp
15								
20								GPS: 567986 E, 3719298 Total Depth: 15 feet Groundwater not encountered Bedrock at bottom Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-45

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, abundant gravel
	■			▨		106	1.0	Approximation By Weight: 70% Sands and Gravel 25% Cobbles < 5% Boulders
5				▨				5 to 8 feet: cobbles, few boulders
10				▨				
15								
20								GPS: 567998, 3719216 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-46
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, abundant gravel, few cobbles
				░		106	0.6	Approximation By Weight: 90% Sands and Gravel 10% Cobbles No Boulders
5				░				
10				░				
15								
20								GPS: 568070, 3719220 Total Depth: 15 feet Groundwater not encountered Bedrock near outcrop/ridge Some stratification visible Moderate caving potential Hole not backfilled
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-47
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand, abundant gravel, cobbles and boulders to 12" diameter Approximation By Weight: 30% Sands and Gravel 20% Cobbles 50% Boulders
5				▨				
10	■			▨				
15								
20								GPS: 567982, 3719012 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered High caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-48
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type: Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles Approximation By Weight: > 70% Sands and Gravel 30% Cobbles < 2% Boulders
20								GPS: 568221, 3719025 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Thinly statified Moderate caving potential Backfilled with native soil

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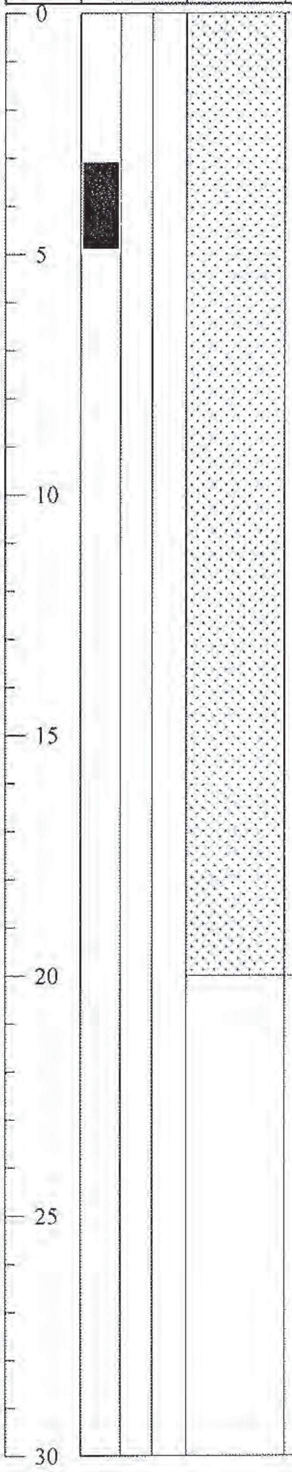
Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.



Test Pit No: TP-49
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date:
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.	Page 1 of 1
0									
5								Test Pit Not Excavated	
10									
15									
20									
25									
30									

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-50
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

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Depth (Ft.)	Sample Type Bulk	 SPT	 MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0–18				▒	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to ~ 10", trace boulders below 3' Approximation By Weight: 80% Sands and Gravel 18% Cobbles < 2% Boulders
18–30								GPS: 568306 E, 3718879 N Total Depth: 18 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-51
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type: Bulk, SPT, MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units

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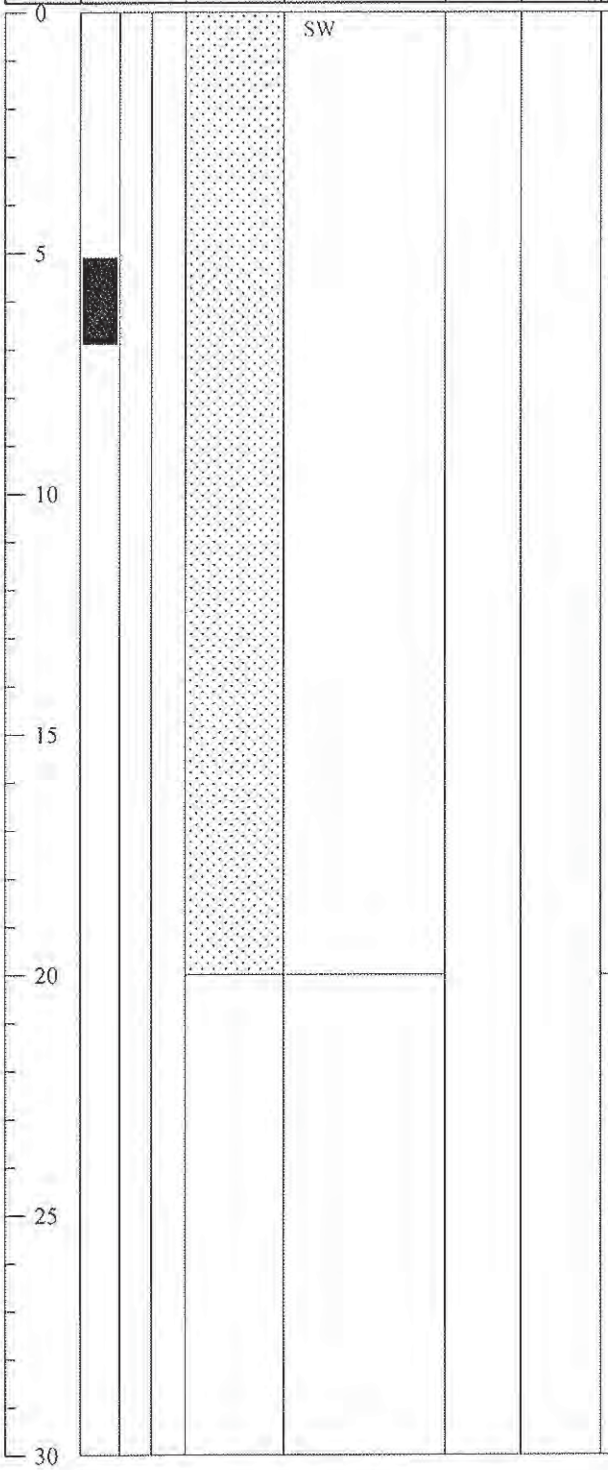
Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.



WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter

Approximation By Weight:
80% Sands and Gravel
20% Cobbles
< 1% Boulders

GPS: 568236, 3718773
Total Depth: 20 feet
Groundwater not encountered
Bedrock not encountered
Moderate caving potential
Backfilled with native soil

BORING LOGS BY

NMG

APPENDIX C

LABORATORY TEST RESULTS

BY NMG

Hofmann / La Quinta - Travertine
Project Number: 18186-01

APPENDIX
SUMMARY OF SOIL LABORATORY DATA

La Quinta, CA

Boring/Sample Information										Sieve/ Hydrometer		Atterberg Limits			Direct Shear				Compaction					
															Ultimate		Peak							
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)	Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Fines Content (% pass. #200)	Clay Content (% pass. 2µ)	LL (%)	PI (%)	USCS Group Symbol	Cohesion (psf)	Friction Angle (º)	Cohesion (psf)	Friction Angle (º)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
H-1	D-1	5.0		40.0	30	120.7	119.1	1.3	8.4															
H-1	B-1	5.0		40.0																				
H-1	D-2	10.0		35.0	40			1.1																Disturbed
H-1	D-3	15.0		30.0	41	117.3	115.3	1.7	9.8															
H-1	D-4	20.0		25.0	45	117.9	116.4	1.3	7.8															
H-1	SPT-1	21.5		23.5	32			1.4		13	2			SM										
H-1	D-5	23.0		22.0	40			0.9																Disturbed
H-1	SPT-2	24.5		20.5	21			1.9																
H-1	D-6	26.0		19.0	30			2.5																Disturbed
H-1	SPT-3	27.5		17.5	15			1.1																
H-1	D-7	29.0		16.0	50	126.5	123.9	2.1	15.5															
H-1	SPT-4	30.5		14.5	32			1.8		10				SW-SM										
H-1	D-8	32.0		13.0	70			1.4																Disturbed
H-1	SPT-5	33.5		11.5	22			2.0																
H-1	D-9	35.0		10.0	57			1.8		7				SW-SM										Disturbed
H-1	SPT-6	36.5		8.5	32			1.6																
H-1	D-10	38.0		7.0	85			1.2																Disturbed
H-1	SB-1	38.1		6.9																				
H-2	D-1	5.0		45.0	24			0.5																Disturbed
H-2	D-2	10.0		40.0	43			0.5																Disturbed
H-2	B-1	10.0		40.0																				
H-2	D-3	15.0		35.0	40			0.7																Disturbed
H-2	D-4	17.0		33.0	50			0.6																Disturbed
H-2	SPT-1	18.5		31.5	24			0.6																
H-2	D-5	20.0		30.0	43			0.7		4				SW										Disturbed
H-2	SPT-2	21.5		28.5	31			0.7																
H-2	D-6	23.0		27.0	60			1.0																Disturbed
H-2	SPT-3	24.5		25.5	48			0.8																
H-2	D-7	26.0		24.0	82/9"			0.9																Disturbed
H-2	SPT-4	27.5		22.5	50/1"																			NR
H-2	D-8	29.0		21.0	89			0.5		5				SW										Disturbed
H-2	SPT-5	30.5		19.5	28			0.8																
H-2	D-9	32.0		18.0	70	118.4	117.5	0.8	4.7					SP/SW										CN
H-2	SPT-6	33.5		16.5	27			0.8																
H-2	D-10	35.0		15.0	58			1.0																Disturbed

NMG Geotechnical, Inc.

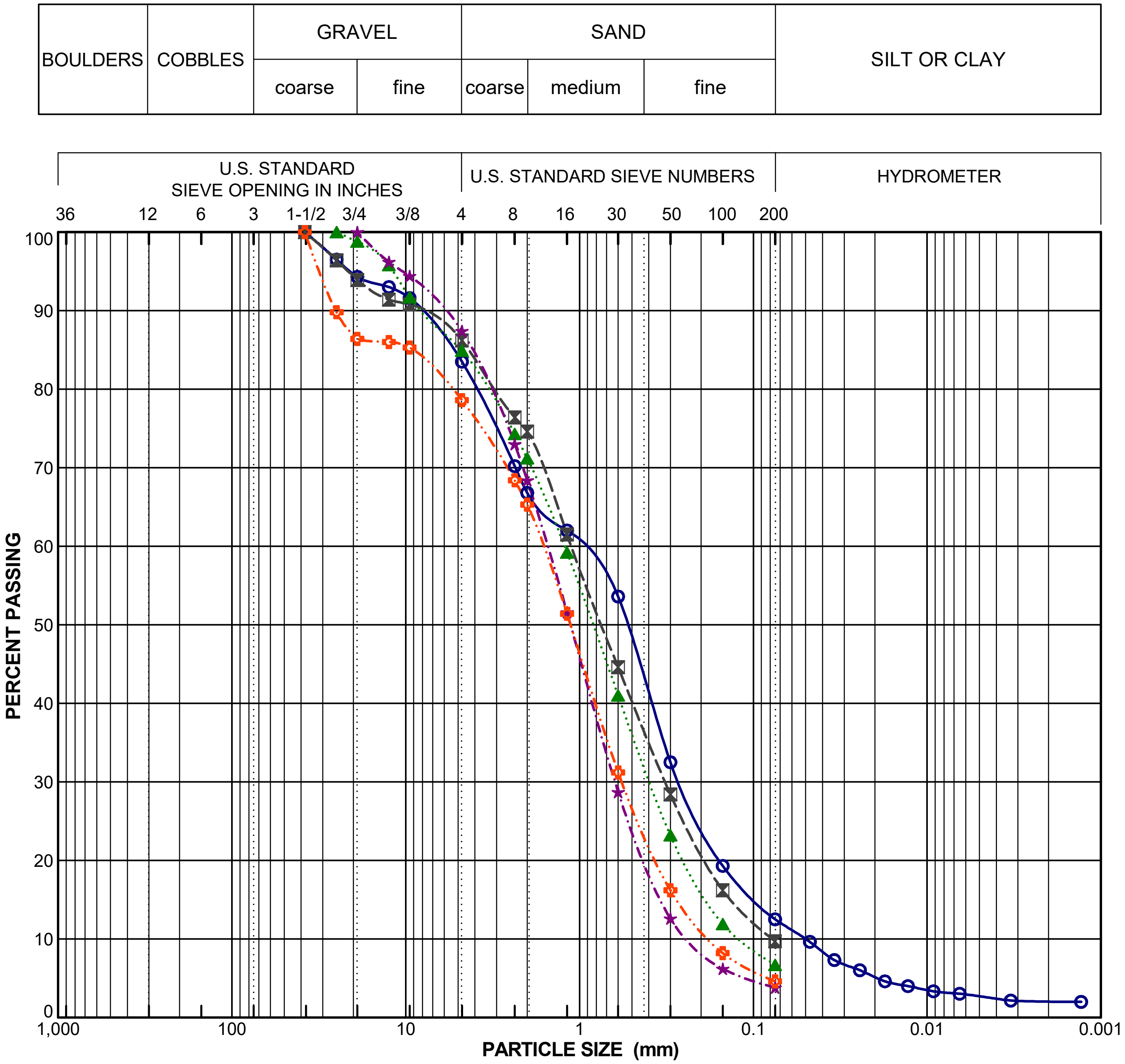
Hofmann / La Quinta - Travertine
Project Number: 18186-01

APPENDIX
SUMMARY OF SOIL LABORATORY DATA

La Quinta, CA

Boring/Sample Information										Sieve/ Hydrometer		Atterberg Limits			Direct Shear				Compaction					
															Ultimate		Peak							
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)	Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Fines Content (% pass. #200)	Clay Content (% pass. 2µ)	LL (%)	PI (%)	USCS Group Symbol	Cohesion (psf)	Friction Angle (º)	Cohesion (psf)	Friction Angle (º)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
H-2	SPT-7	36.5		13.5	28			0.8																
H-2	D-11	38.0		12.0	55			1.0																Disturbed
P-1	D-1	5.0		40.0	42	122.0	120.5	1.2	8.2															
P-1	D-2	10.0		35.0	26	116.7	112.5	3.8	20.5															
P-1	D-3	15.0		30.0	36	120.4	112.3	7.3	39.1	9	1			SW-SM										
P-1	D-4	20.0		25.0	50/6"																			NR
P-1	D-5	21.5		23.5	64	122.6	118.3	3.7	23.3					SP/SW										CN
P-2	D-1	5.0		38.0	56			1.1																Disturbed
P-2	D-2	10.0		33.0	46																			NR
P-2	D-3	15.0		28.0	31			1.6																Disturbed
P-2	D-4	20.0		23.0	46	122.4	120.6	1.4	9.8															
P-2	D-5	22.5		20.5	77			1.9		4				SP										Disturbed
P-3	D-1	5.0		41.0	18			0.8																Disturbed
P-3	D-2	10.0		36.0	20			1.1																Disturbed
P-3	D-3	13.5		32.5	45			0.8																Disturbed
P-3	D-4	15.0		31.0	44			0.9																Disturbed
P-3	D-5	16.5		29.5	37			0.7		4				SW										Disturbed
P-3	D-6	18.5		27.5	31			0.7																Disturbed
P-4	D-1	5.0		50.0	29			0.8																Disturbed
P-4	D-2	10.0		45.0	28			0.8																Disturbed
P-4	D-3	15.0		40.0	48			1.0																Disturbed
P-4	D-4	20.0		35.0	39																			NR
P-4	D-5	22.0		33.0	46			0.7																Disturbed
P-4	D-6	23.5		31.5	44			0.7																Disturbed
P-5	D-1	5.0		55.0	27			0.7																Disturbed
P-5	B-1	5.0		55.0																				
P-5	D-2	10.0		50.0	50/6"			0.7																Disturbed
P-5	D-3	15.0		45.0	45																			NR
P-5	D-4	20.0		40.0	80			0.5																Disturbed
P-5	D-5	25.0		35.0	55	121.1	120.7	0.3	2.0															
P-5	D-6	27.0		33.0	51			0.7		4				SW										Disturbed
P-5	D-7	28.5		31.5	72			0.6																Disturbed

Sheet 2 of 2

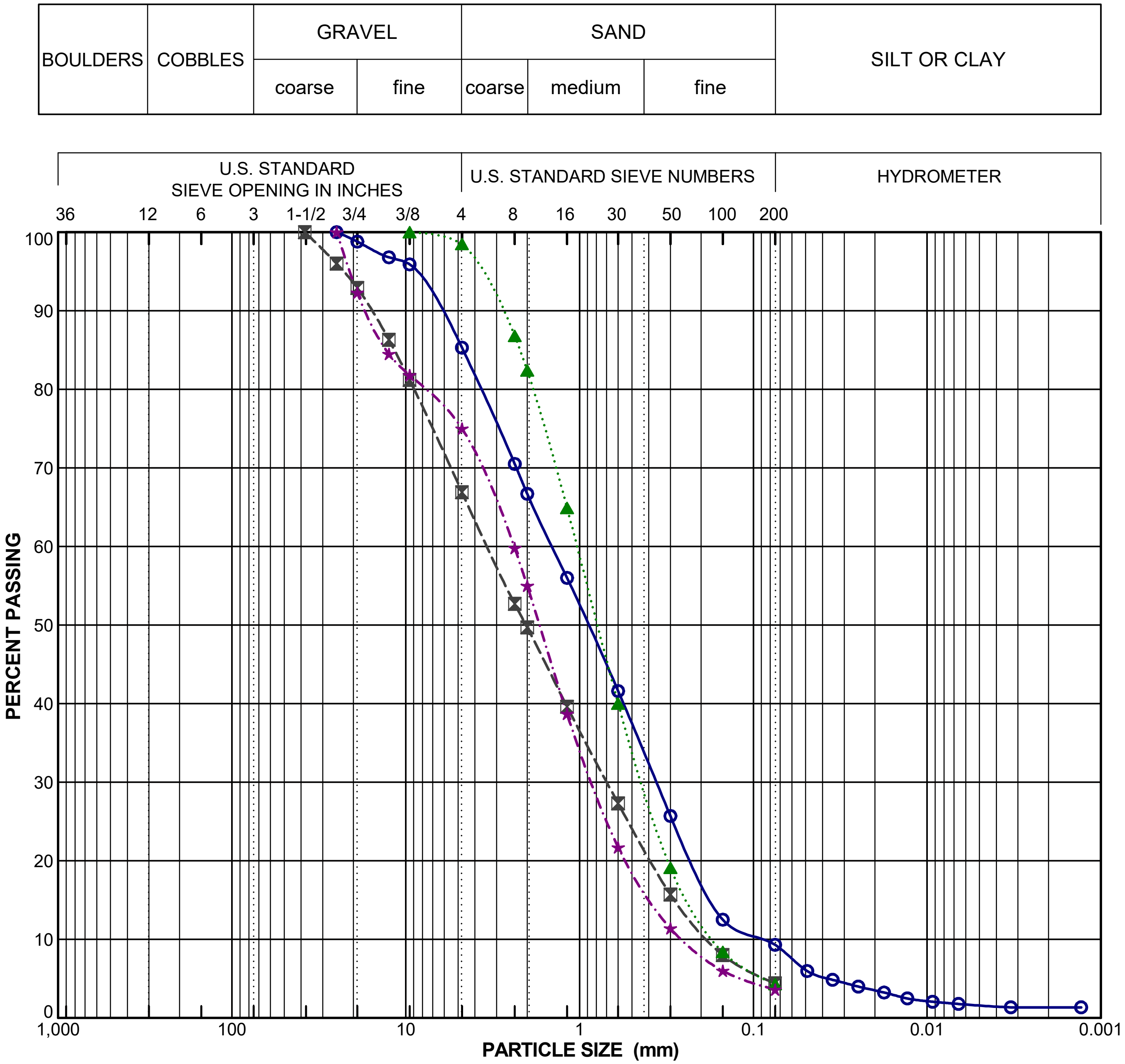


Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	H-1	SPT-1	21.5	1						13	2	SM
☒	H-1	SPT-4	30.5	2				14.4	1.2	10		SW-SM
▲	H-1	D-9	35.0	2				10.5	1.1	7		SW-SM
★	H-2	D-5	20.0	1				6.8	1.1	4		SW
✿	H-2	D-8	29.0	1				9.3	1.1	5		SW

PARTICLE SIZE DISTRIBUTION

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG Geotechnical, Inc.

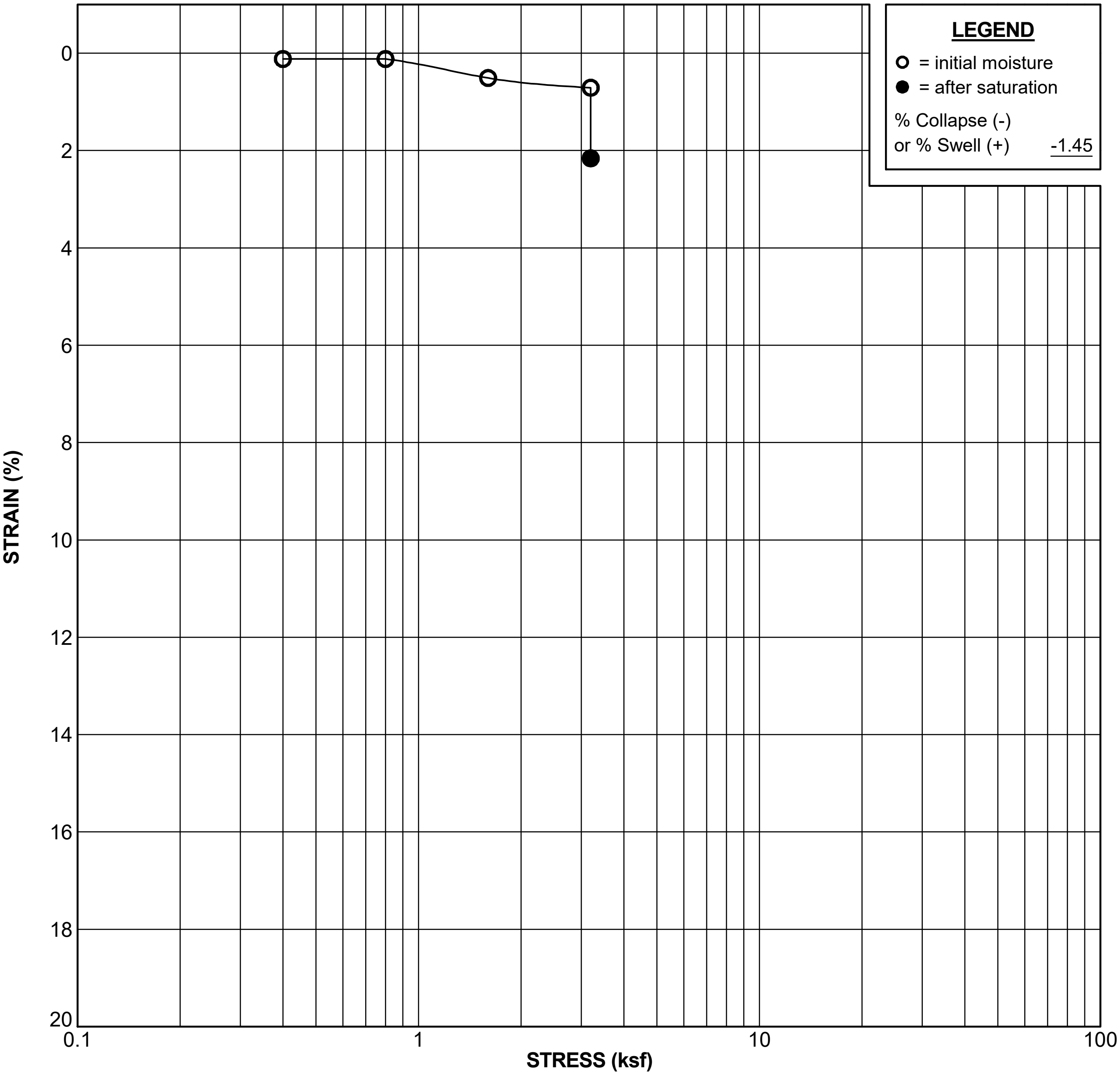


Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	P-1	D-3	15.0	7				16.5	1.0	9	1	SW-SM
☒	P-2	D-5	22.5	2				18.8	0.8	4		SP
▲	P-3	D-5	16.5	1				6.2	1.1	4		SW
★	P-5	D-6	27.0	1				9.5	1.2	4		SW

PARTICLE SIZE DISTRIBUTION

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG Geotechnical, Inc.



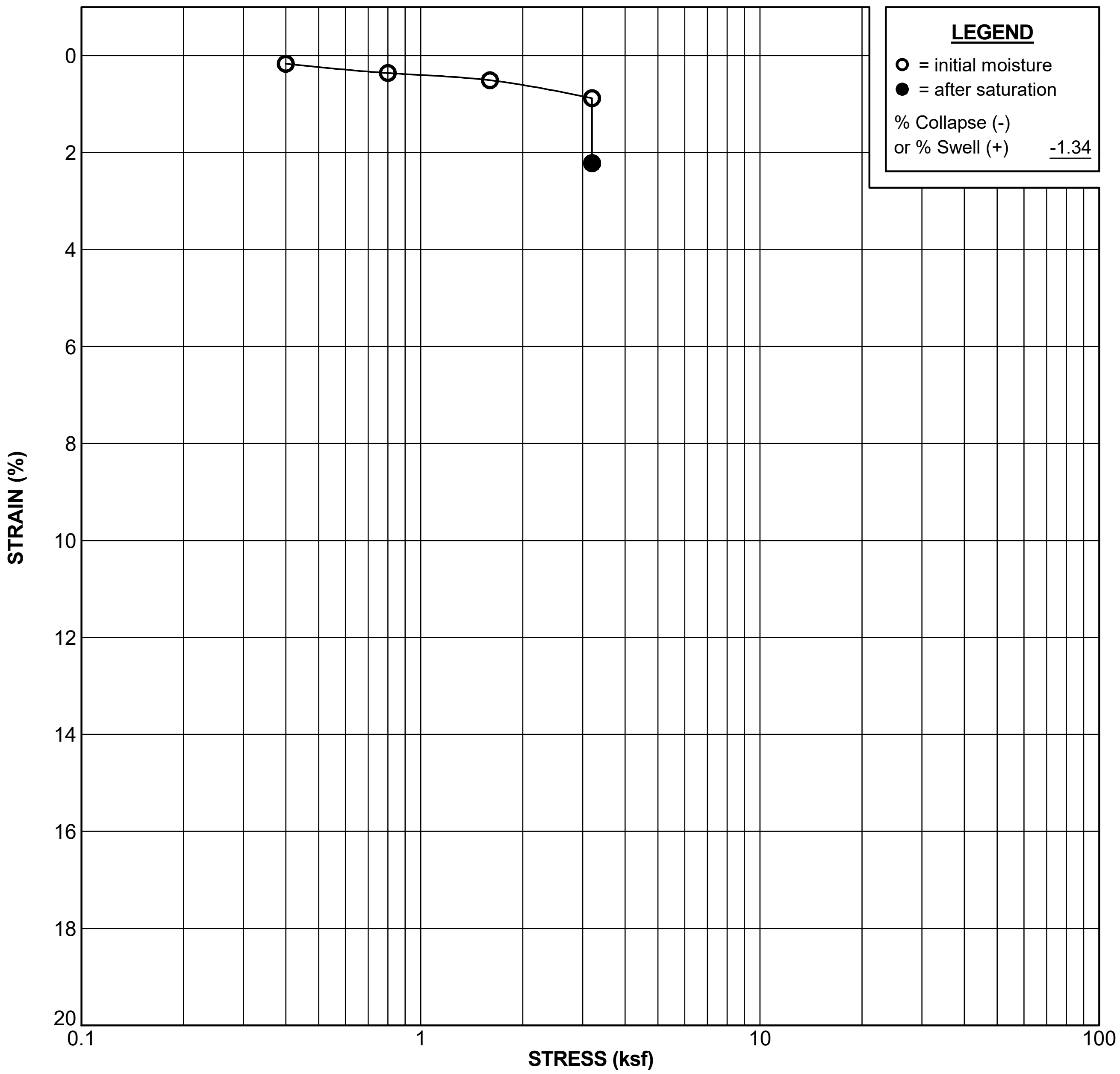
Boring No. H-2	**Sample No. D-9**	**Depth: 32.0 ft**
Sample Description: (Qal) Olive brown SAND		**USCS:** SP/SW
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	1.3	111.3	6.8	0.514
Final	15.9	113.7	89.1	0.482

CONSOLIDATION TEST RESULTS

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG Geotechnical, Inc.



Boring No. P-1	**Sample No. D-5**	**Depth: 21.5 ft**

Sample Description: (Qal) Olive brown SAND		**USCS:** SP/SW
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	2.0	109.0	9.9	0.546
Final	15.8	111.4	83.3	0.512

CONSOLIDATION TEST RESULTS

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG Geotechnical, Inc.

LABORATORY TEST RESULTS

BY OTHERS

LABORATORY TEST RESULTS

BY SLADDEN (2001)

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed 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

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Boring Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of this testing are presented graphically 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. This is shown on the Boring Logs, and is useful in estimating the strength and compressibility of the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses and Atterberg Limits determinations. These provide information for developing classifications for the soil in accordance with the Unified Classification System. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing are very useful in detecting variations in the soils and in selecting samples for further testing.

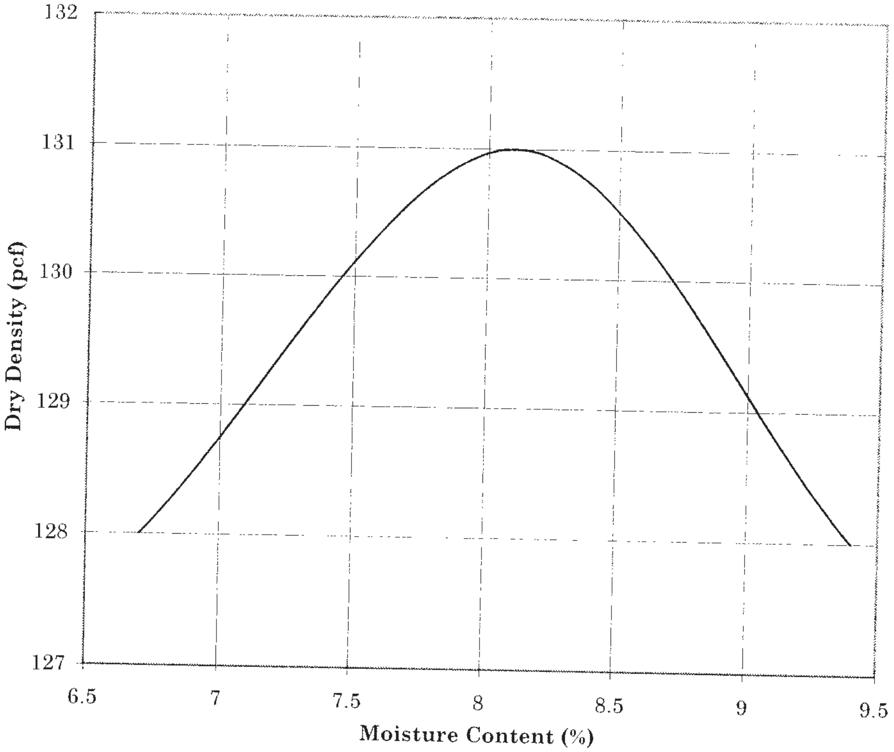
SOIL MECHANIC'S TESTING

Direct Shear Testing: One bulk sample was selected for Direct Shear Testing. This testing measures the shear strength of the soil under various normal pressures and is used in developing parameters for foundation design and lateral design. Testing was performed using recompacted test specimens, which were saturated prior to testing. Testing was performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Expansion Testing: One bulk sample was 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.

Consolidation Testing: Ten relatively undisturbed samples were selected for consolidation testing. For this testing one-inch thick test specimens are subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. The specimens were saturated at the 575 psf or 720 psf load increment.

Job No.: 544-1211



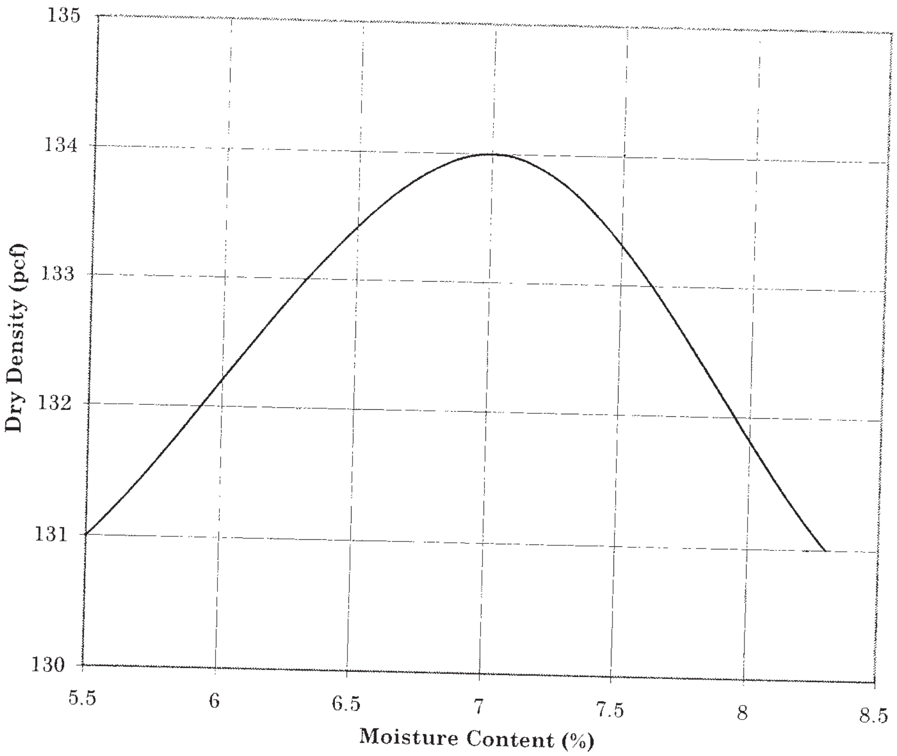
METHOD OF COMPACTION

ASTM D-1557-91, METHOD A OR C

BORING	MAXIMUM UNIT WEIGHT	OPTIMUM MOISTURE CONTENT
1 @ 0 - 5'	131	8.1

MAXIMUM DENSITY-OPTIMUM MOISTURE CURVE

Job No.: 544-1211

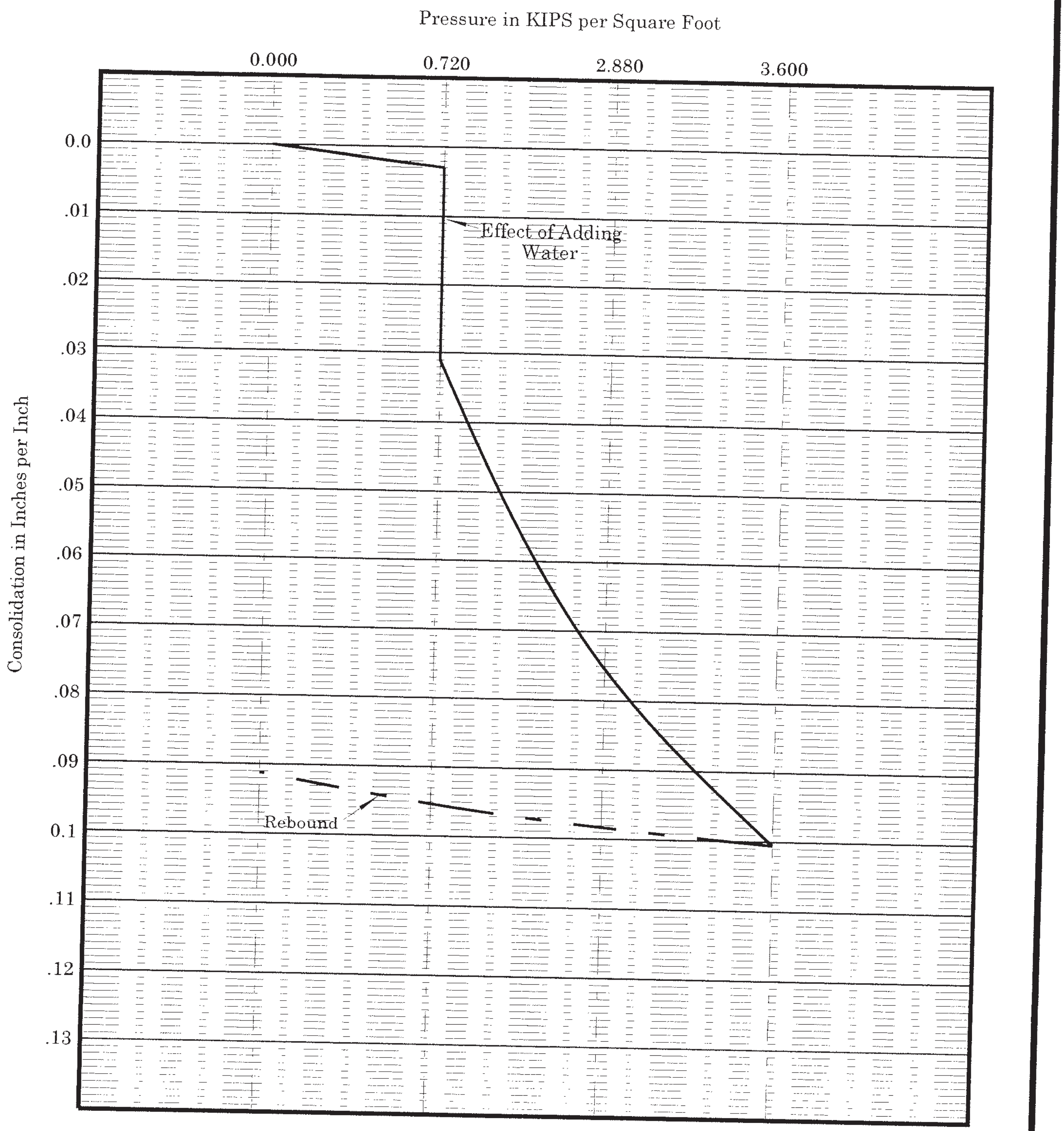


METHOD OF COMPACTION

ASTM D-1557-91, METHOD A OR C

BORING	MAXIMUM UNIT WEIGHT	OPTIMUM MOISTURE CONTENT
3 @ 0 - 5'	134	7.0

MAXIMUM DENSITY-OPTIMUM MOISTURE CURVE



Consolidation Diagram

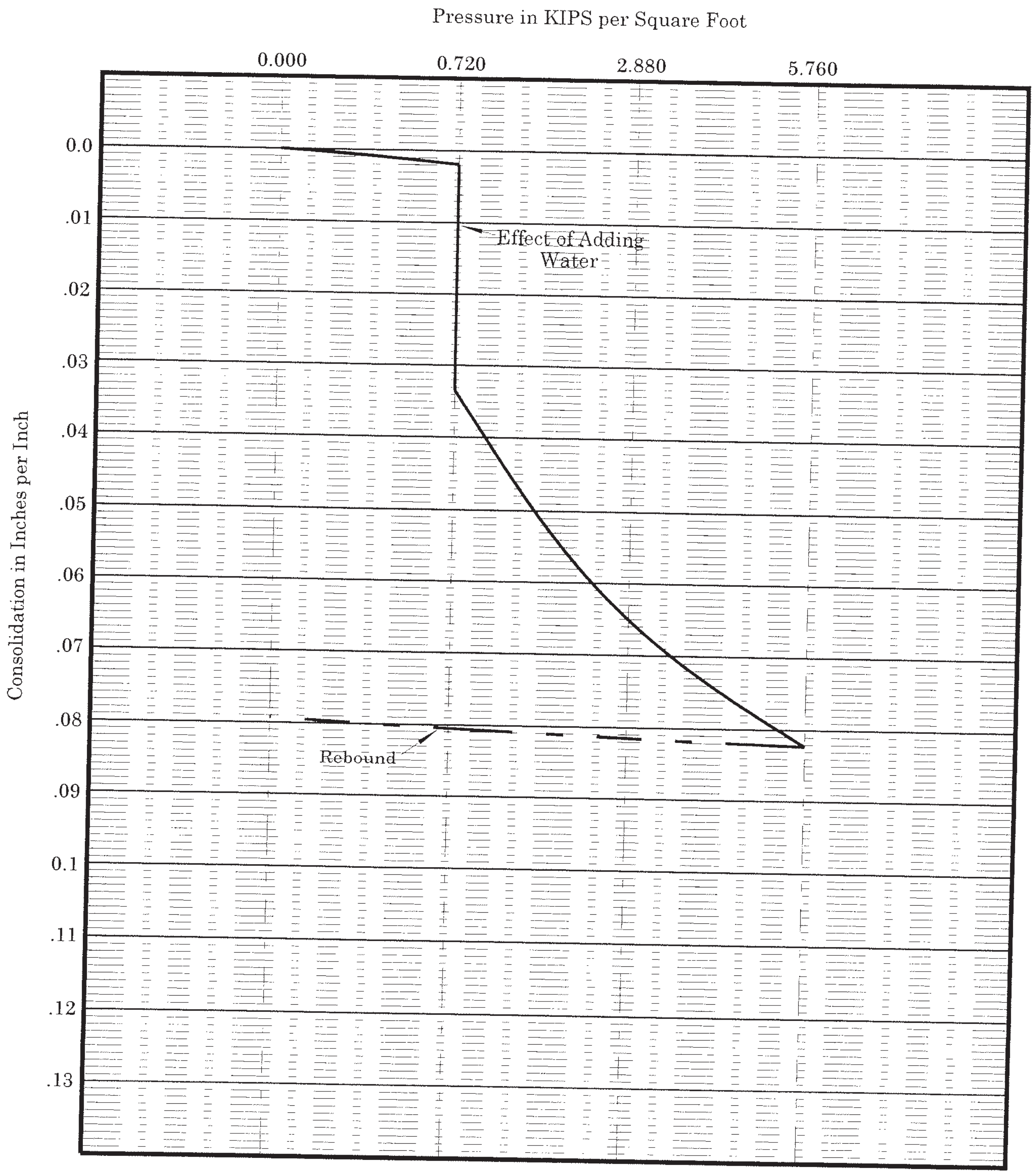
Trilogy at La Quinta

Boring 1 @ 5'

SLADDEN ENGINEERING

Date: 9/16/01

Job No.: 544-1211



Consolidation Diagram

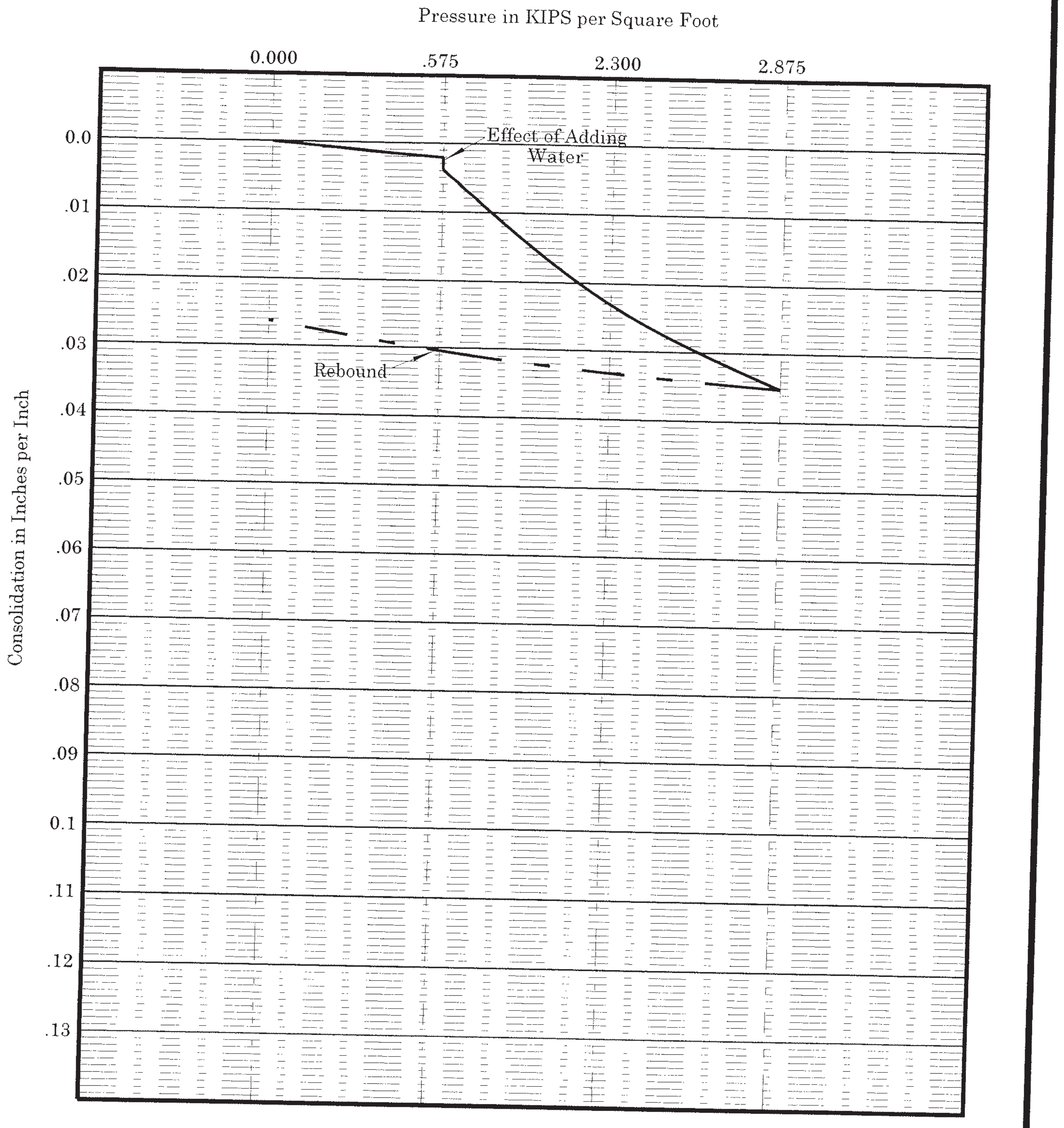
Trilogy at La Quinta

Boring 1 @ 15'

SLADDEN ENGINEERING

Date: 9/16/01

Job No.: 544-1211



Consolidation Diagram

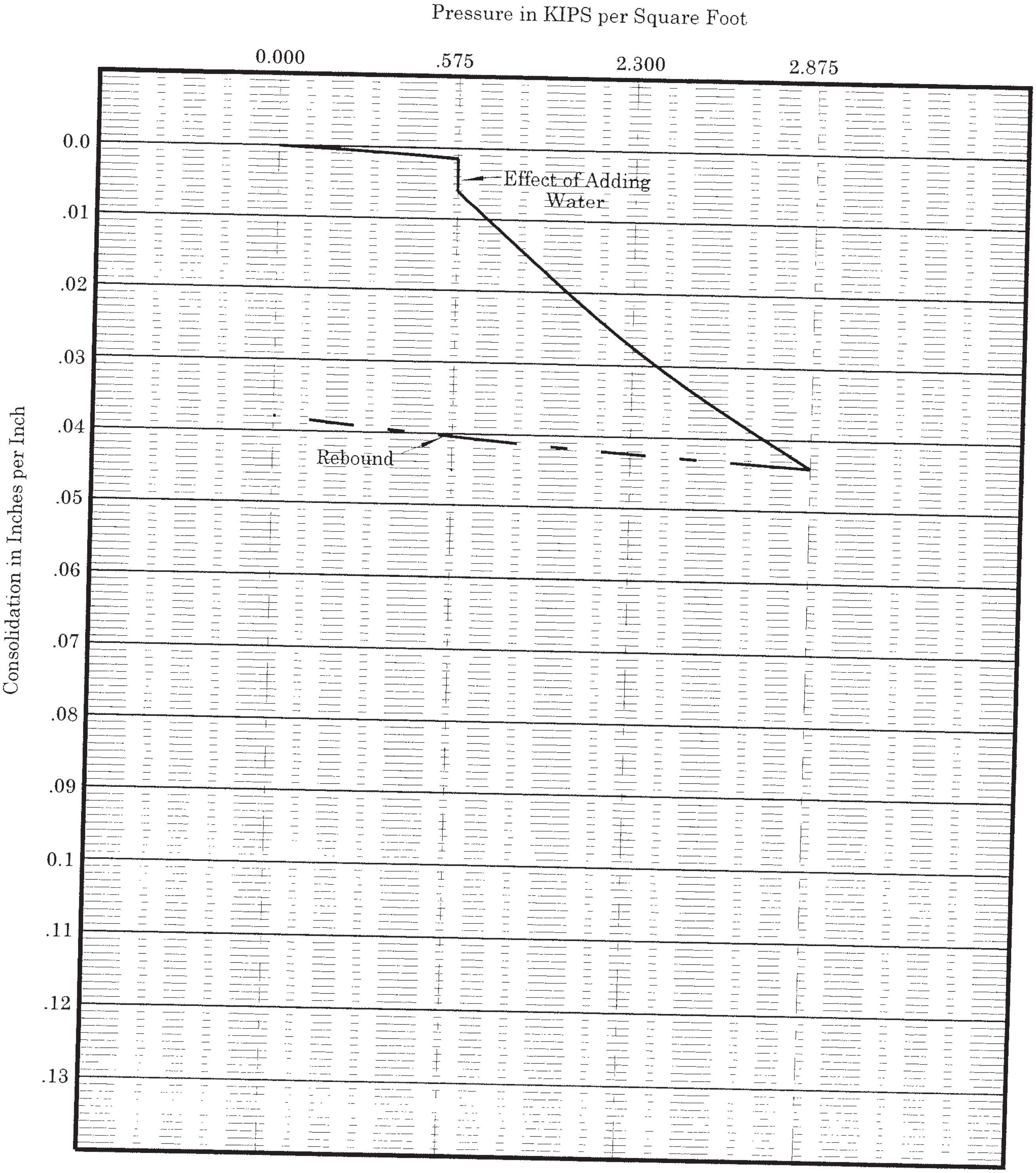
Trilogy at La Quinta

Boring 1 @ 20'

SLADDEN ENGINEERING

Date: 9/16/01

Job No.: 544-1211



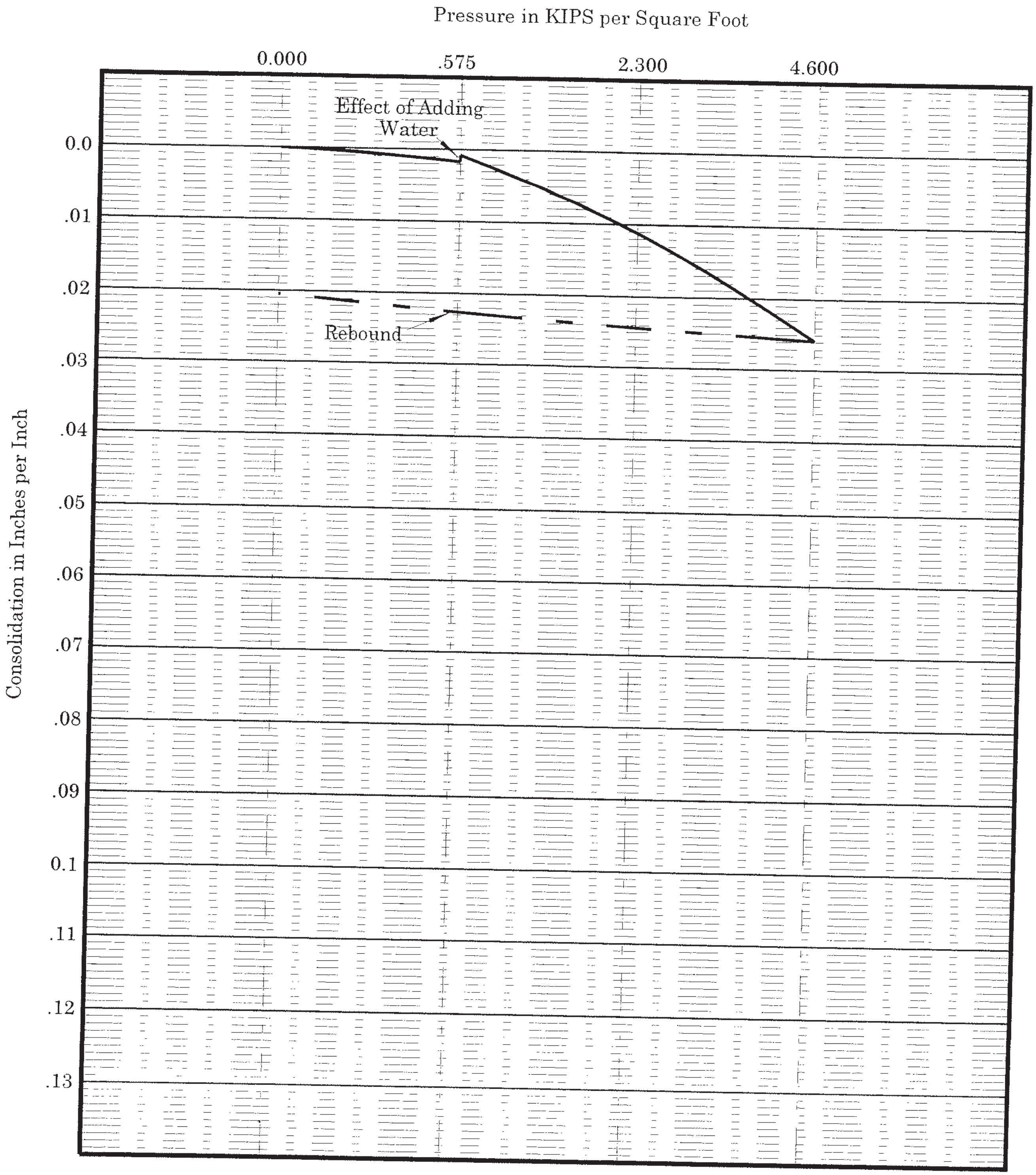
Consolidation Diagram

Trilogy at La Quinta

Boring 1 @ 25'

SLADDEN ENGINEERING

Date: 9/16/01 Job No.: 544-1211

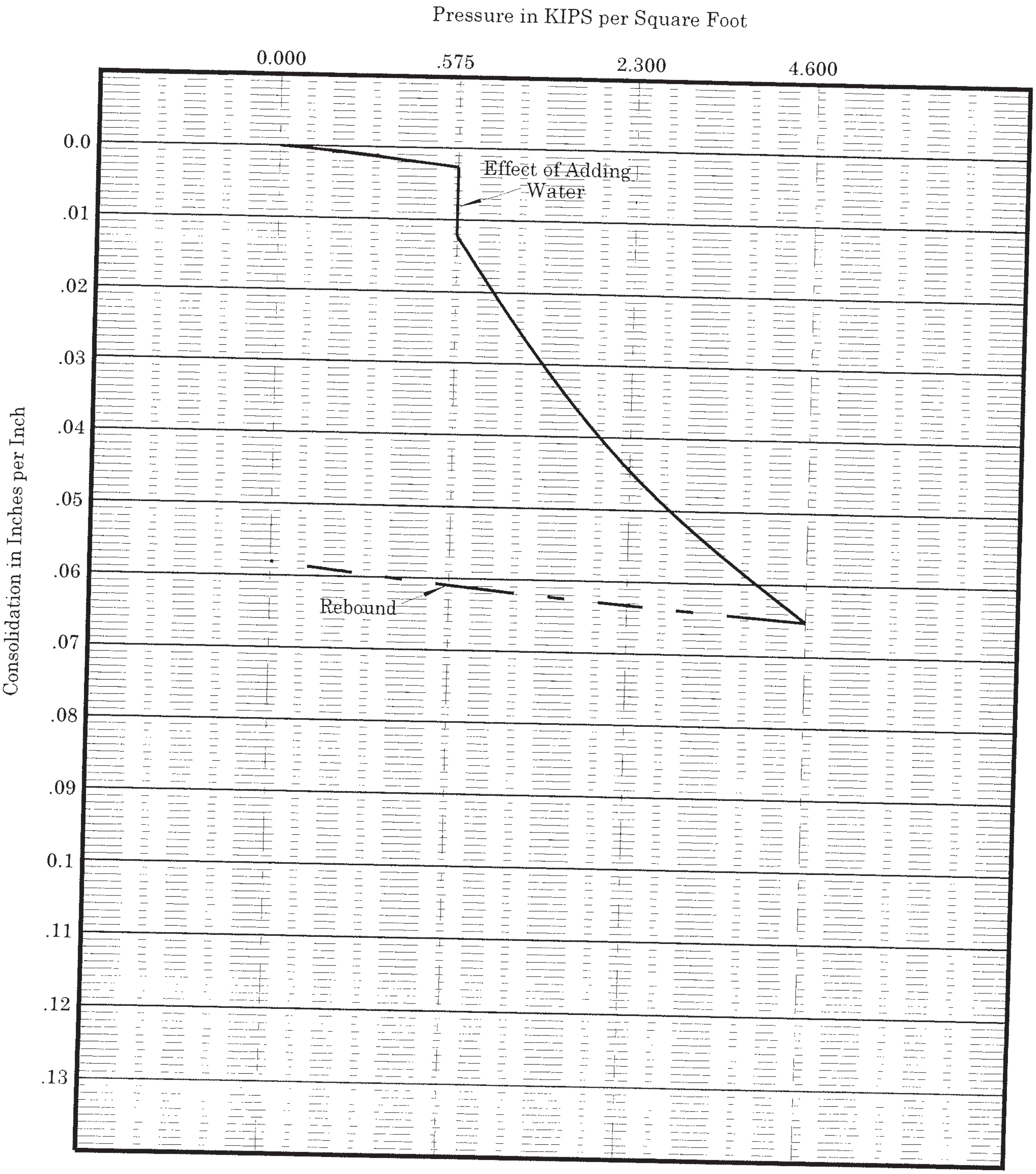


Consolidation Diagram

Trilogy at La Quinta
Boring 1 @ 30'
SLADDEN ENGINEERING

Date: 9/16/01

Job No.: 544-1211

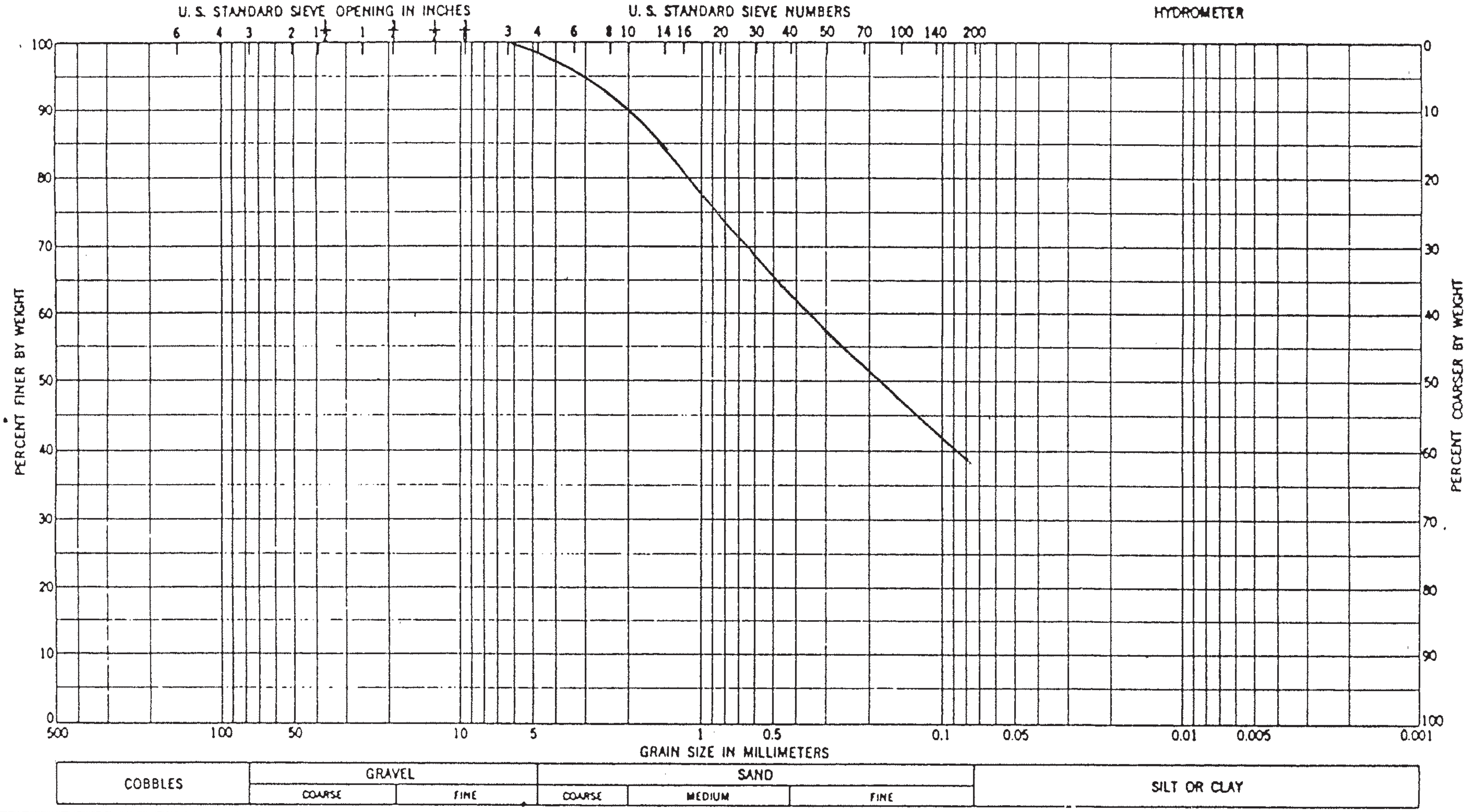


Consolidation Diagram

Trilogy at La Quinta
Boring 1 @ 40'
SLADDEN ENGINEERING

Date: 9/16/01

Job No.: 544-1211



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

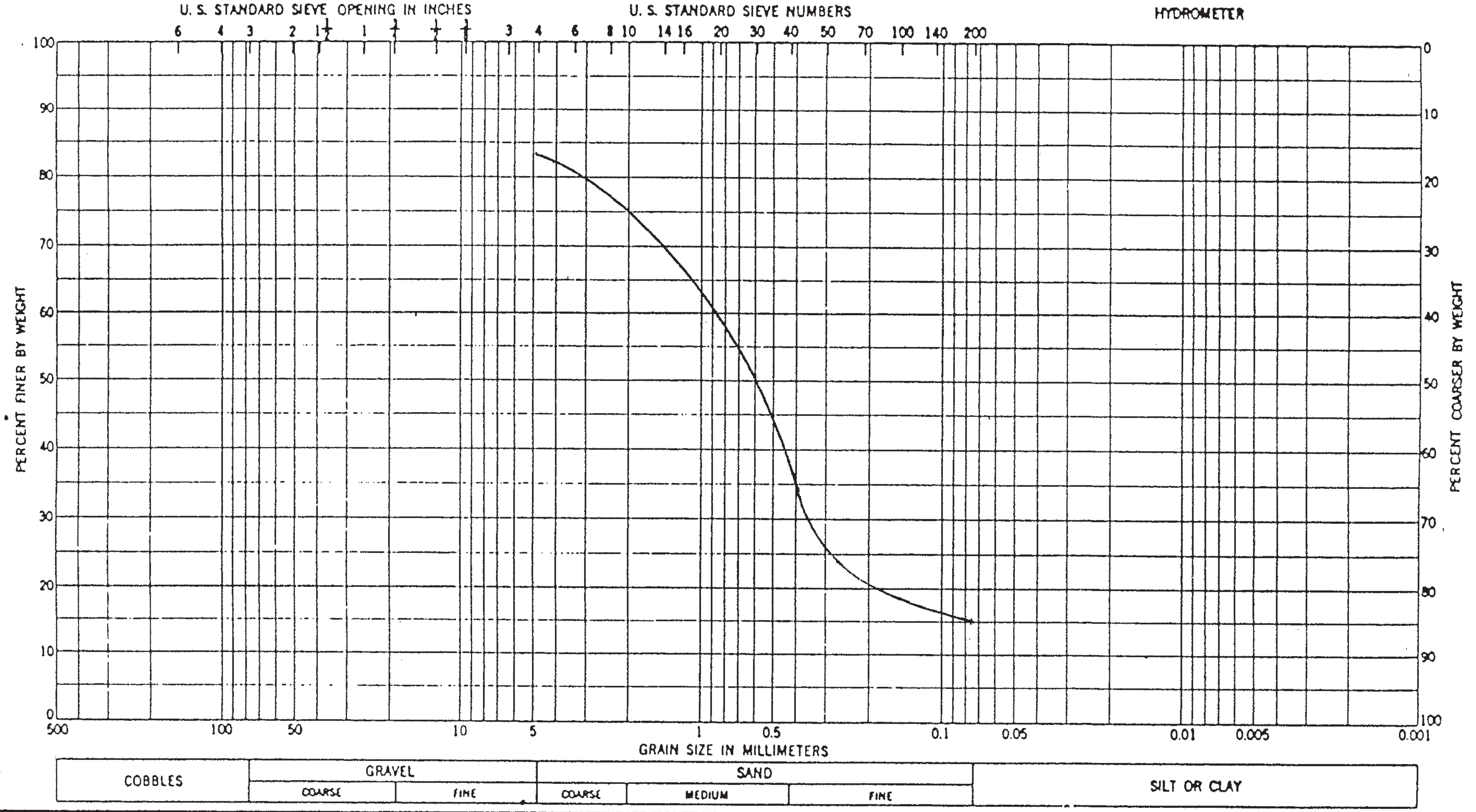
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 1 @ 0 - 5’



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

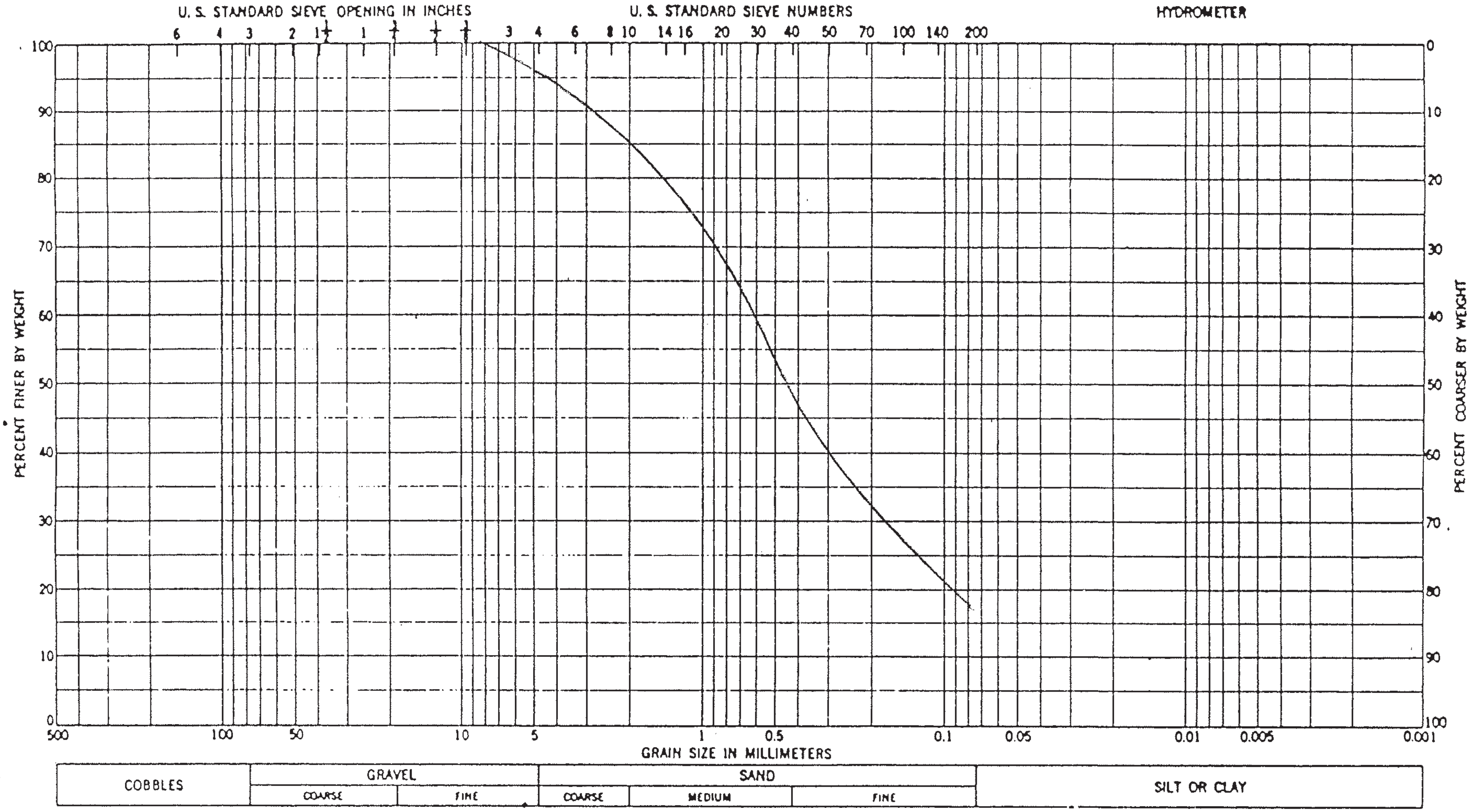
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 3 @ 0 - 5'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

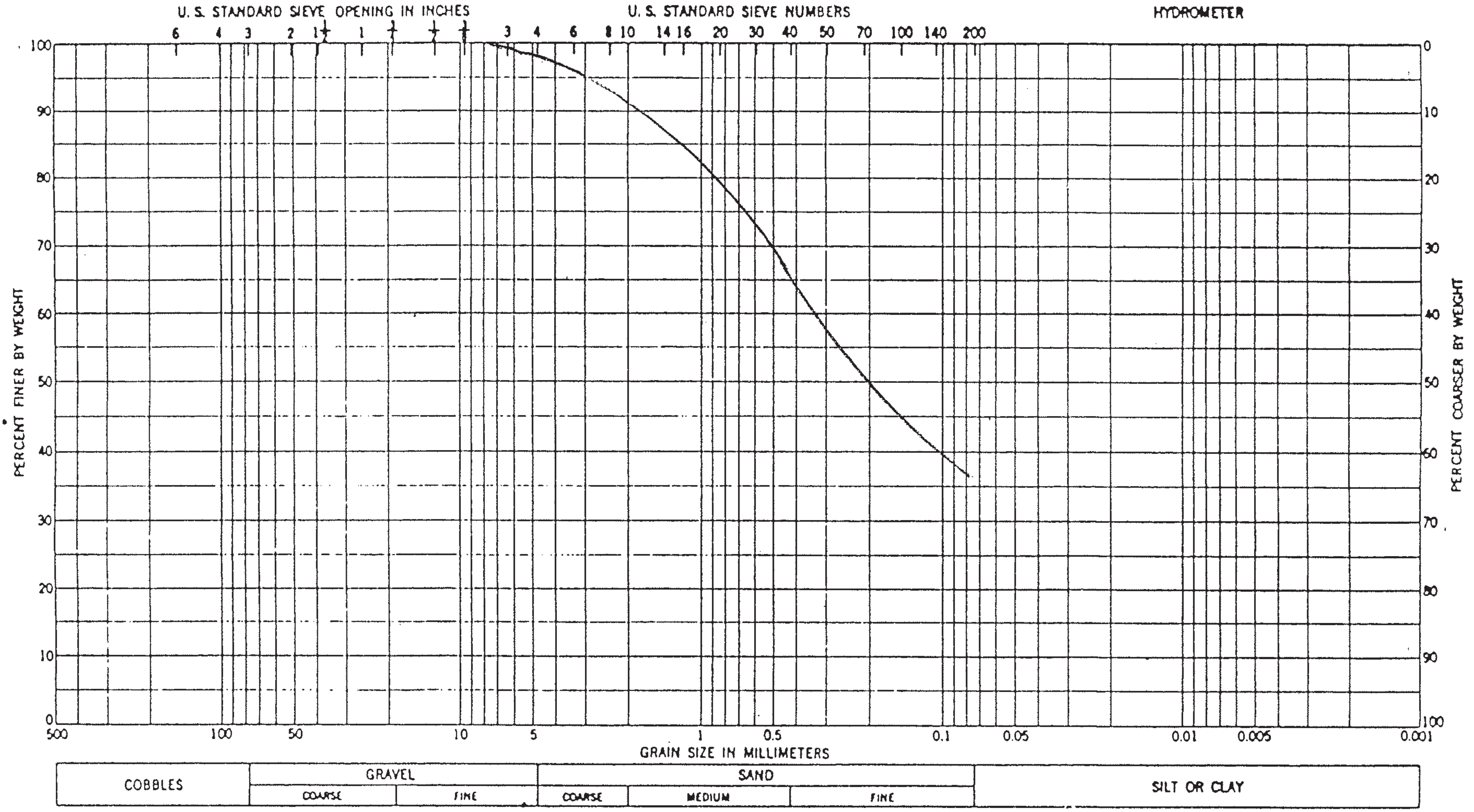
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 2 @ 5'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

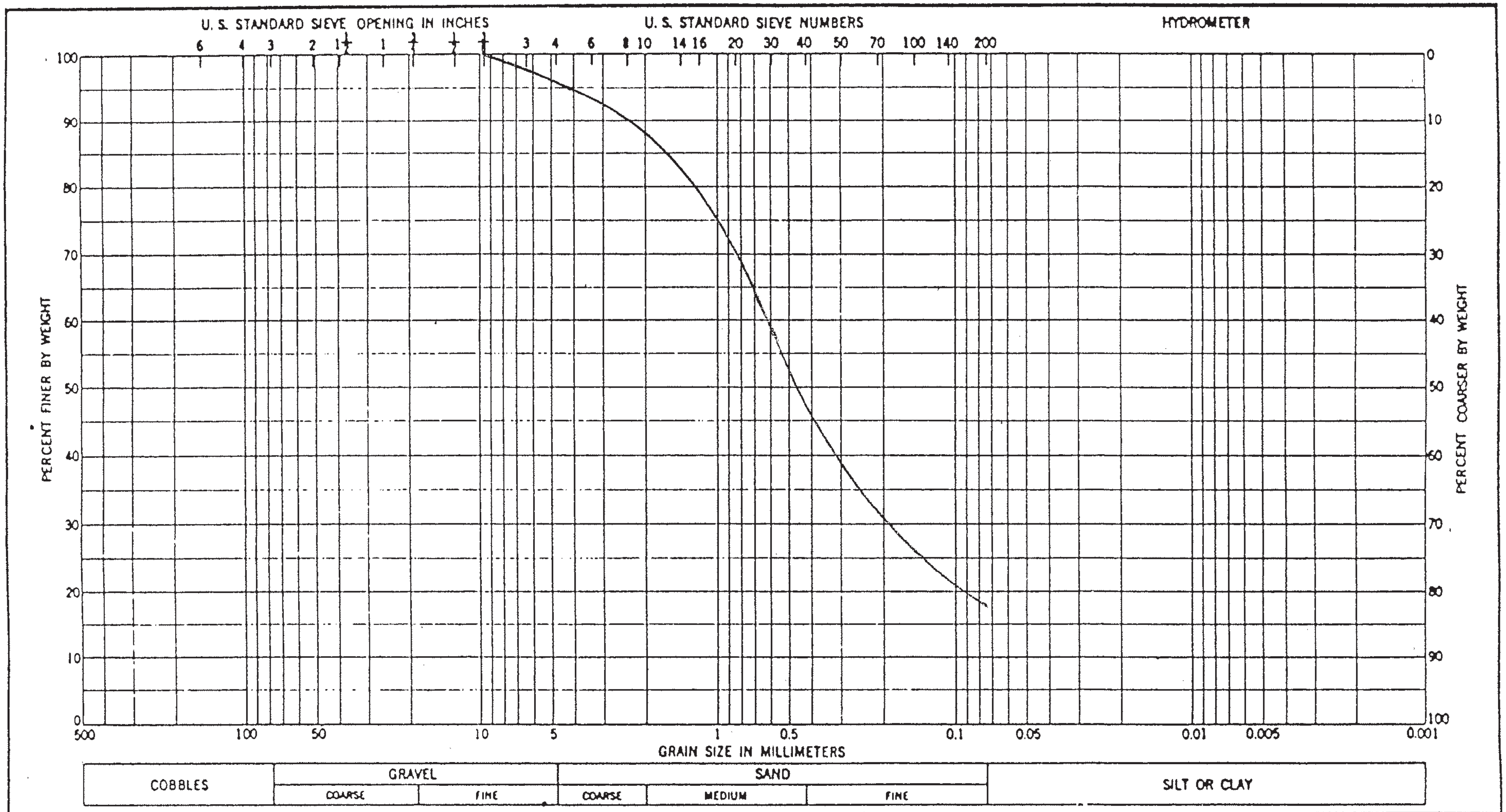
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 2 @ 10’



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

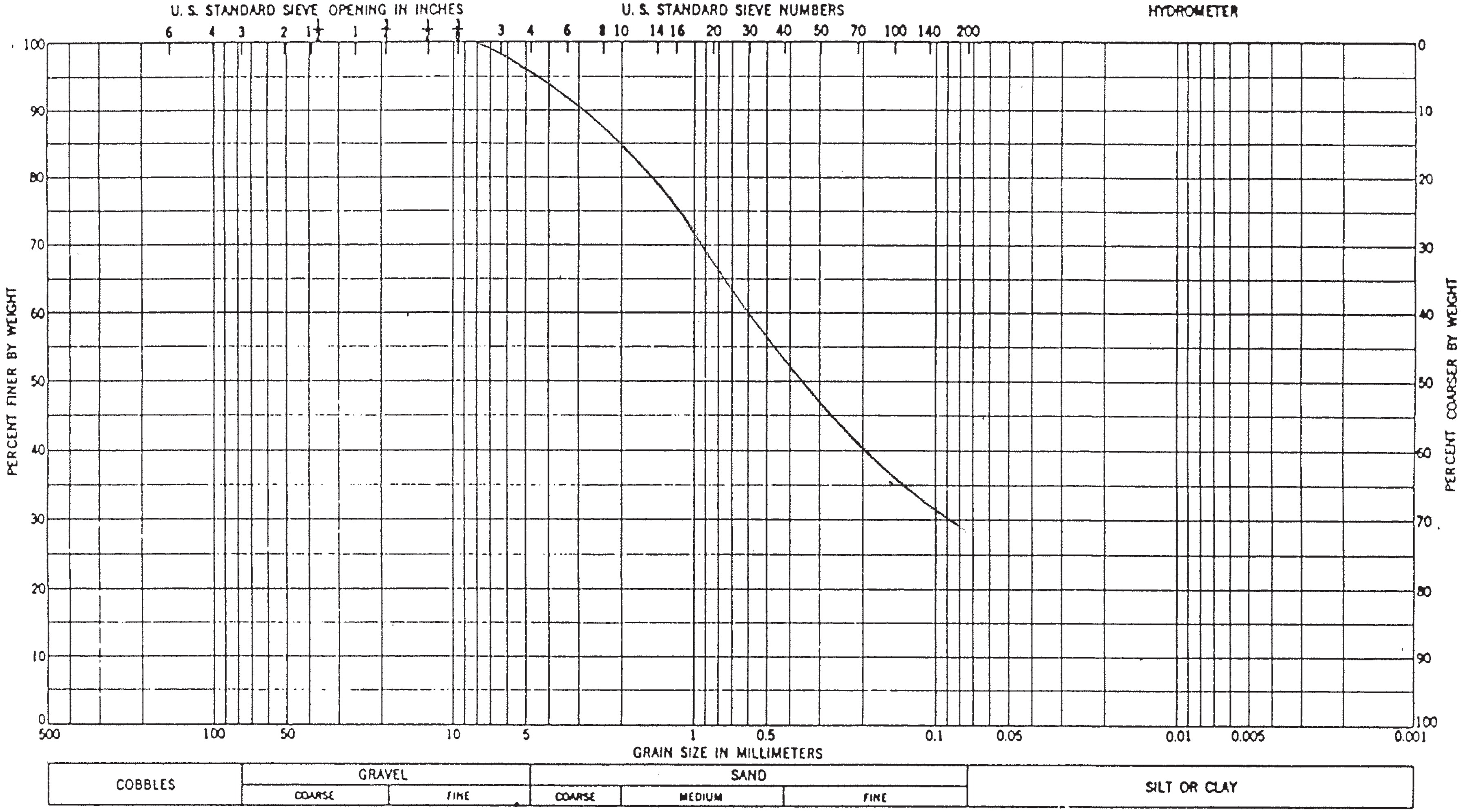
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 2 @ 20'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

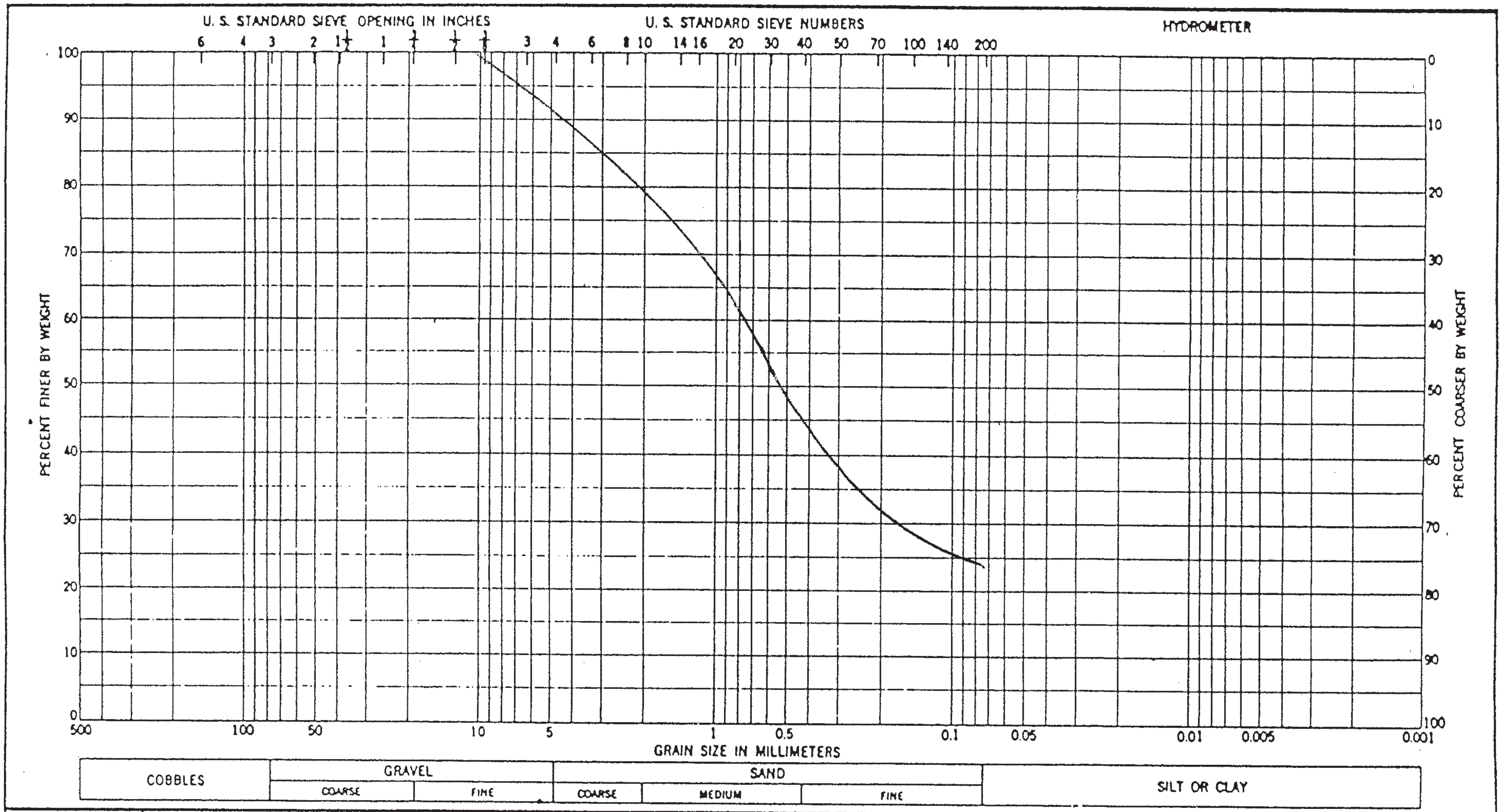
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 5 @ 5'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

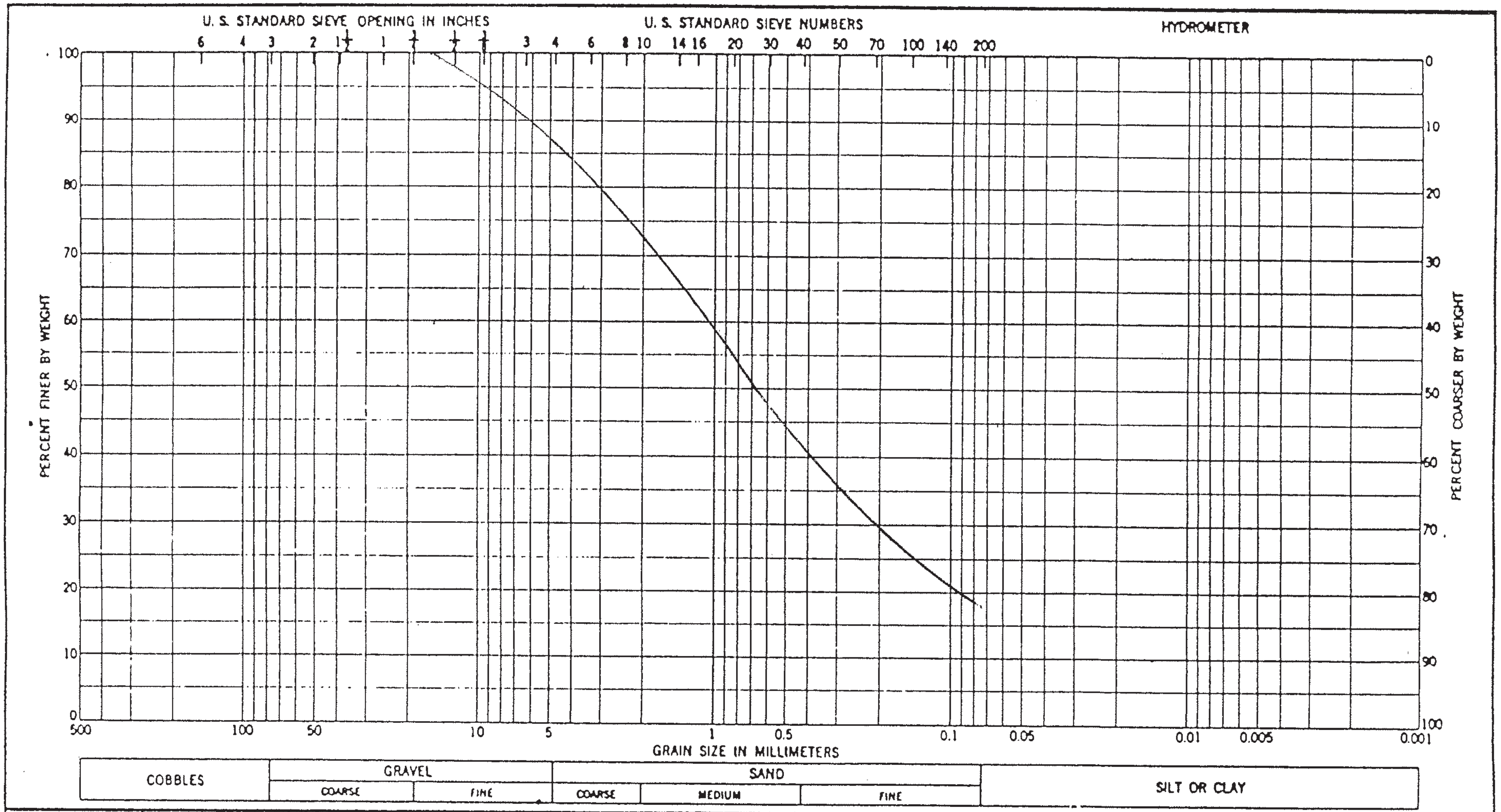
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 5 @ 10'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

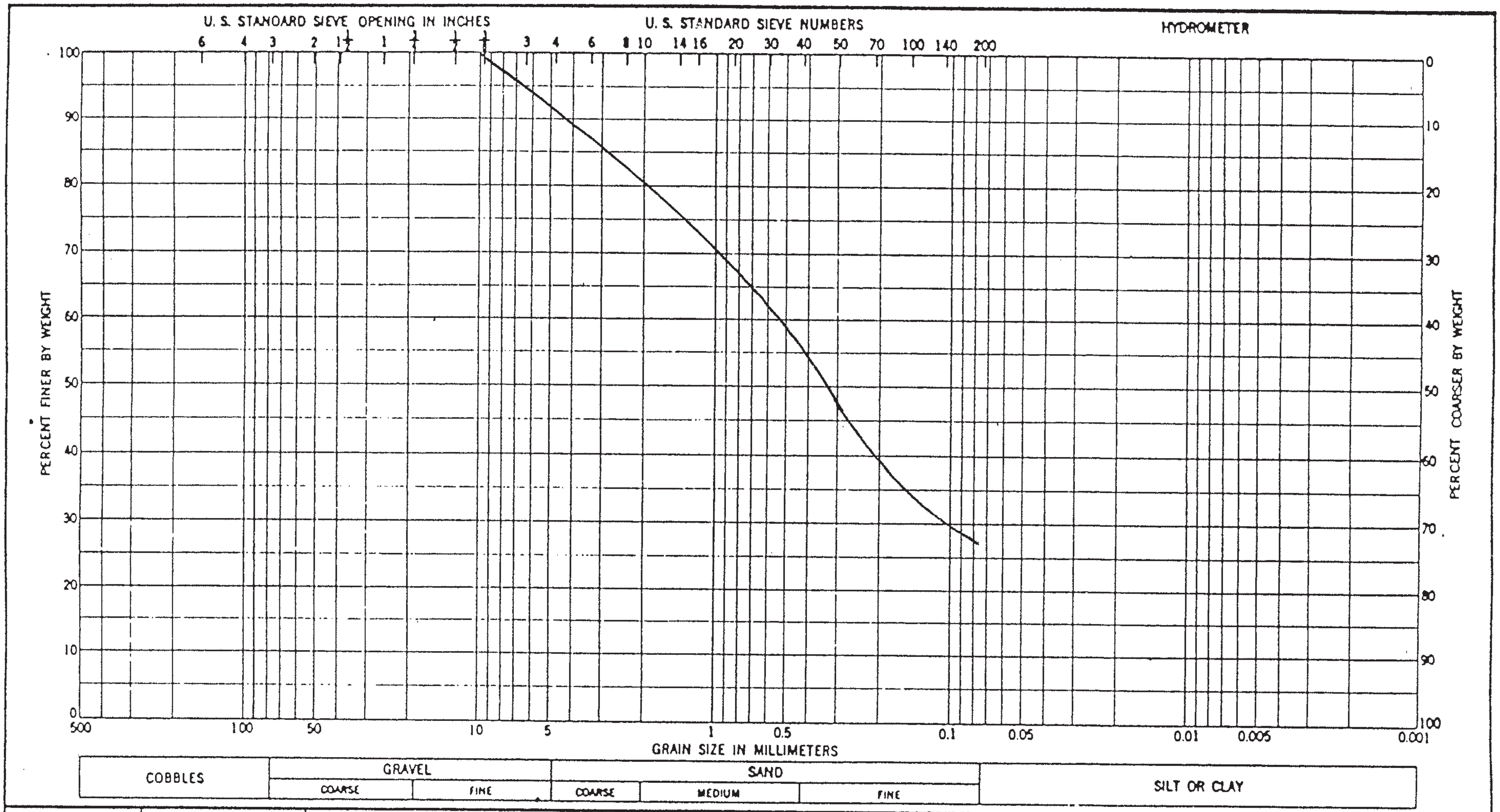
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 5 @ 15'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 5 @ 20'

ANAHEIM TEST LABORATORY

3008 S. ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

AUG 28 2001

TO: SLADDEN ENGINEERING:
6782 STANTON AVE. SUITE E
BUENA PARK, CA. 90621

ATTN: BRETT/DAVE

PROJECT: #544-1211

DATE: 8/28/01

P.O. No. Chain of Custody

Shipper No.

Lab. No. B 8961 1-2

Specification:

Material: SOIL

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

	pH	SOLUBLE SULFATES per CA. 417 ppm	SOLUBLE CHLORIDES per CA. 422 ppm	MIN. RESISTIVITY per CA. 643 ohm-cm
#1 Bülk H-1 @ 0-5'	8.1	255	787	600 max
#2 Bulk H-3 @ 0-5'	9.1	49	37	2,628

RESPECTFULLY SUBMITTED

Poppy Bridger

POPPY BRIDGER Chief Chemist

FORM #2

INLAND FOUNDATION ENGINEERING, INC.
Consulting Geotechnical Engineers
1310 South Santa Fe Avenue
San Jacinto, California 92583-4638
(909) 654-1555
FAX (909) 654-055

September 17, 2001
Project No.: S435-001
Your Project No.: 544-1211 Trilogy

SLADDEN ENGINEERING
Attention: Brett Anderson
6782 Slanton Avenue, Suite E
Buena Park, California 90621

Re: Laboratory Testing – Permeability Study

Gentlemen:

Transmitted herewith are the results of laboratory testing performed on soil samples obtained by your representative and delivered to our laboratory on August 30, 2001 for testing. Our testing was performed in accordance with current ASTM test methods. The results of our testing are as follows:

BORING NO.	DEPTH (FT.)	AVERAGE PERMEABILITY (cm/sec.)
H-2 S-3	0.0-15	2.09 E-05
H-6 S-9	0.0-45	5.30 E-04
H-6 S-3	0.0-15	3.60 E-05
H-2 S-8	0.0-40	1.40 E-05

These test results relate only to those items tested. This report may be reproduced for the purpose of your investigation and report. The laboratory testing was performed in accordance with the appropriate methodology as-well-as contemporary principals and practice. We make no other warranty, either express or implied.

We hope this information is sufficient for your present needs. If you have any questions, please contact our office.

Respectfully,
INLAND FOUNDATION ENGINEERING, INC.

No. 4254

Donald O. Swenson, P.E.

DOS:jg
Distribution: Addressee (2)

LABORATORY TEST RESULTS

URS CORPORATION

(2002)

TABLE C-1
SUMMARY OF SOIL LABORATORY DATA

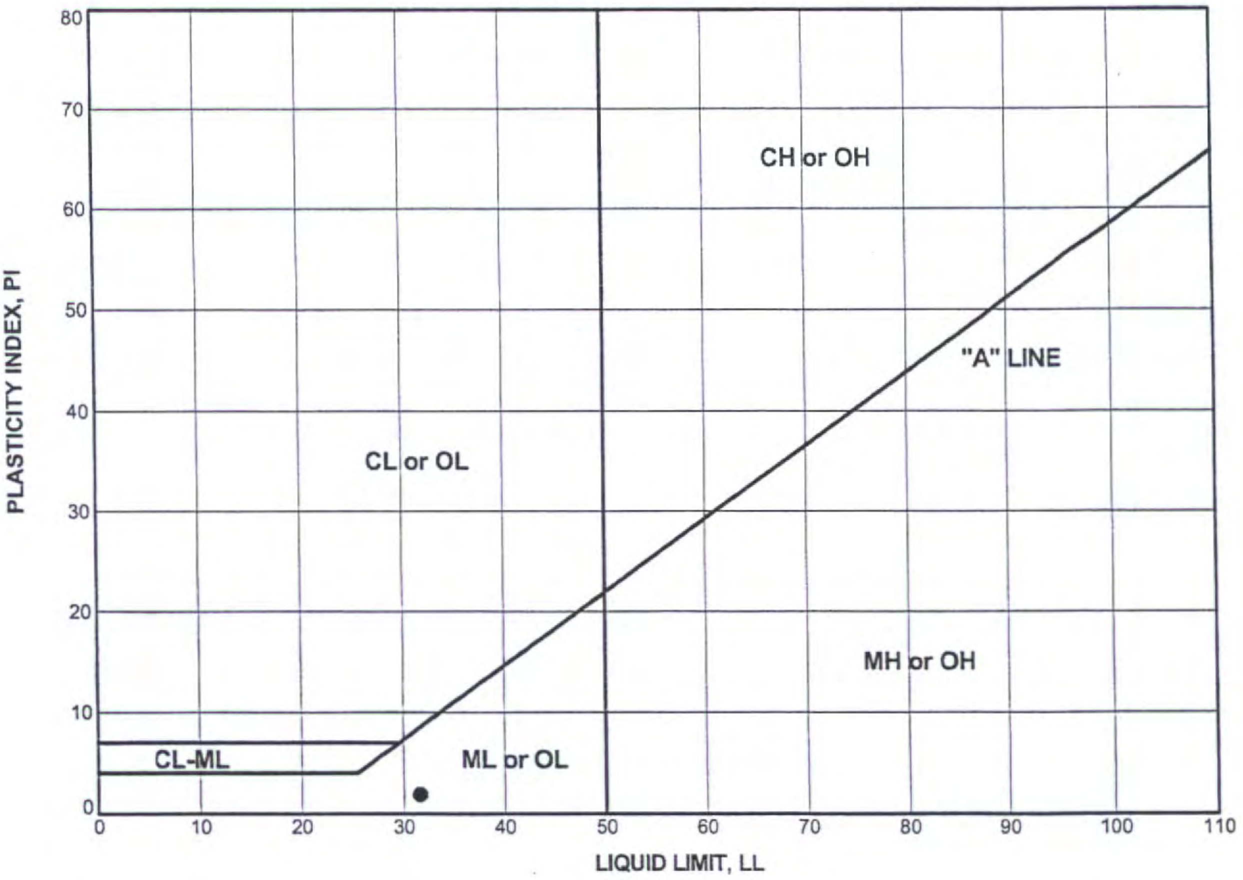
Sample Information							Sieve			Atterberg Limits			Lab Compaction		
Boring Number	Sample Number	Depth, feet	Elevation, feet MSL	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	Gravel, %	Sand, %	< #200, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %	Other Tests
B-1	1	2.5-4	17.0	SP			14.3	80.8	4.9						
B-1	2	5-6.5	14.5	SP	1.5										SE=79
B-1	3	10-11.5	9.5	SP-SM	1.8				10.3						
B-2	SK-1	0-5	35.3	SP	0.4		9.8	85.9	4.3				122.0	3.0	
B-2	1	2-3.5	33.5	SP	0.4										
B-2	3	6.5-8	29.0	SP-SM	0.6				6.7						
B-2	5	15-16.5	20.5	SW-SM			12.4	80.9	6.7						
B-3	SK-1	0-5	19.3	SW	0.6		30.7	64.8	4.5						
B-3	1	2.5-4	17.0	SW-SM	0.5				8.7						
B-3	3	10-11.5	9.5	SW-SM	0.6										
B-4	SK-1	0-5	3.3	SW-SM	0.7		8.5	85.1	6.4						
B-4	1	2-3.5	1.5	SW-SM	0.5										
B-4	3	10-11.5	-6.5	SW-SM	0.8										
B-5	SK-1	0-10	13.3	SW	0.4		17.7	77.7	4.6						
B-5	1	2.5-4	11.0	SW	0.3										
B-5	3	7-8.5	6.5	SW-SM	0.5				6.3						
B-6	1	2.5-4	3.0	SW-SM	0.5		4.6	85.4	10.0						
B-6	2	5-6.5	0.5	SW-SM	0.5										SE=75
B-6	5	20-21.5	-14.5	SM					28.7						
B-7	SK-1	0-8	11.3	SP	0.4		10.6	85.9	3.5						
B-7	2	5-6.5	6.5	SP	1.2										
B-7	3	10-11.5	1.5	SP	0.8										
B-7	5	20-21.5	-8.5	SM					31.3						
B-8	1	2.5-4	63.0	SM	0.9										
B-8	3	10-11.5	55.5	SM	0.1										
B-8	4	15-16.5	50.5	SW-SM			19.9	72.1	7.9						
B-8	7	26.5-28	39.0	SW-SM					9.8						
B-9	1	2.5-4	82.0	SP-SM	0.5				5.8						
B-9	3	6.5-8	78.0	SM	1.0				12.5						
B-9	4	10-11.5	74.5	SM											SE=69
B-9	6	16.5-18	68.0	SM	0.9										
B-9	7	20-21.5	64.5	SP-SM					7.0						
B-10	SK-1	0-7	49.3	SW-SM	0.5		15.3	78.2	6.4						

TABLE C-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information							Sieve			Atterberg Limits			Lab Compaction		
Boring Number	Sample Number	Depth, feet	Elevation, feet MSL	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	Gravel, %	Sand, %	< #200, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %	Other Tests
B-10	1	2.5-4	47.0	SW-SM	0.4										
B-10	3	10-11.5	39.5	SW-SM	0.9										
B-10	7	21.5-23	28.0	SW-SM	0.7				9.3						
B-11	SK-1	0-10	7.3	SP	0.8		9.6	85.7	4.6						
B-11	1	2.5-4	5.0	SP	0.7										
B-11	3	6.5-8	1.0	SP	0.7										
B-11	6	20-21.5	-12.5	SP-SM	0.5										
B-11	8	26.5-28	-19.0	SP-SM					11.4						
B-12	SK-1	0-7	12.3	SW	0.5		11.8	84.4	3.8						
B-12	1	2.5-4	10.0	SW	0.5										
B-12	2	5-6.5	7.5	SW	0.4										
B-12	3	10-11.5	2.5	SW											SE=69
B-12	4	15-16.5	-2.5	SM					18.0						
B-12	5	20-21.5	-7.5	SM	1.0										
TP-1	SK-1	0-4	4.2	SP-SM	0.8		11.3	82.4	6.3						
TP-1	PB-3	12-13	-6.2	ML	2.8				71.1	32	30	2			
TP-1	SK-2	12-15	-7.3	SW-SM	0.9		9.4	80.1	10.5						
TP-2	SK-1	0-5	20.7	SW-SM	0.7		6.8	86.3	6.9				125.0	4.0	
TP-2	SK-2	10-15	10.7	SW	0.8		11.4	84.0	4.6						
TP-3	SK-1	0-5	44.7	SP	0.5		14.2	83.0	2.8				121.5	3.5	
TP-3	SK-2	10-14	35.2	SW-SM	1.2		12.4	80.3	7.3						
TP-4	SK-1	0-5	61.7	SP	0.4		11.1	85.8	3.1						
TP-5	SK-1	5-10	27.7	SP	0.7		17.4	78.5	4.1						
TP-6	SK-1	0-6	15.2	SP-SM	0.8		14.3	80.2	5.4				123.0	4.5	
TP-7	SK-1	0-5	7.7	SP	0.7		11.3	84.3	4.5						
TP-8	SK-1	0-10	11.2	SP	0.8		18.3	78.4	3.3						

NOTE: The laboratory tests were performed in general accordance with the following standards:

Water Content - ASTM Test Method D2216
Dry Unit Weight - ASTM Test Method D2937
Particle Size Distribution Analysis by Mechanical Sieving - ASTM Test Method D422
Atterberg Limits - ASTM Test Method D4318
Laboratory Compaction by Modified Effort - ASTM Test Method D1557
Sand Equivalent [SE] - ASTM Test Method D2419



Boring Number	Sample Number	Depth (feet)	Test Symbol	Water Content (%)	LL	PL	PI	Classification
TP-1	PB-3	12-13	●	3	32	30	2	Silt with Sand (ML)

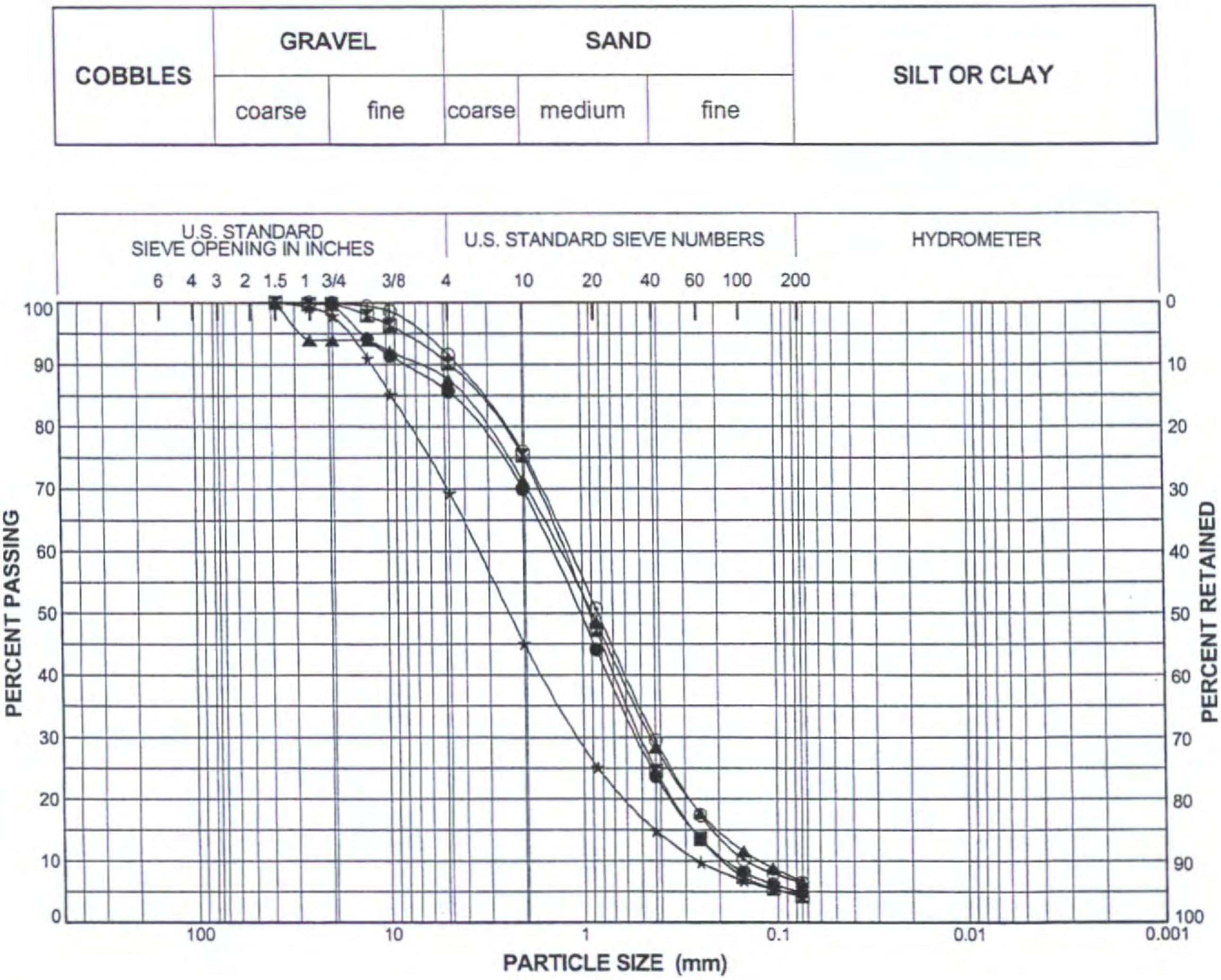
Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PLASTICITY CHART

URS

Figure C-1

Report: ATTERBERG_PLOT_12 PTS; File: DIKE4COA.GPJ; 1/7/2003 TP-01



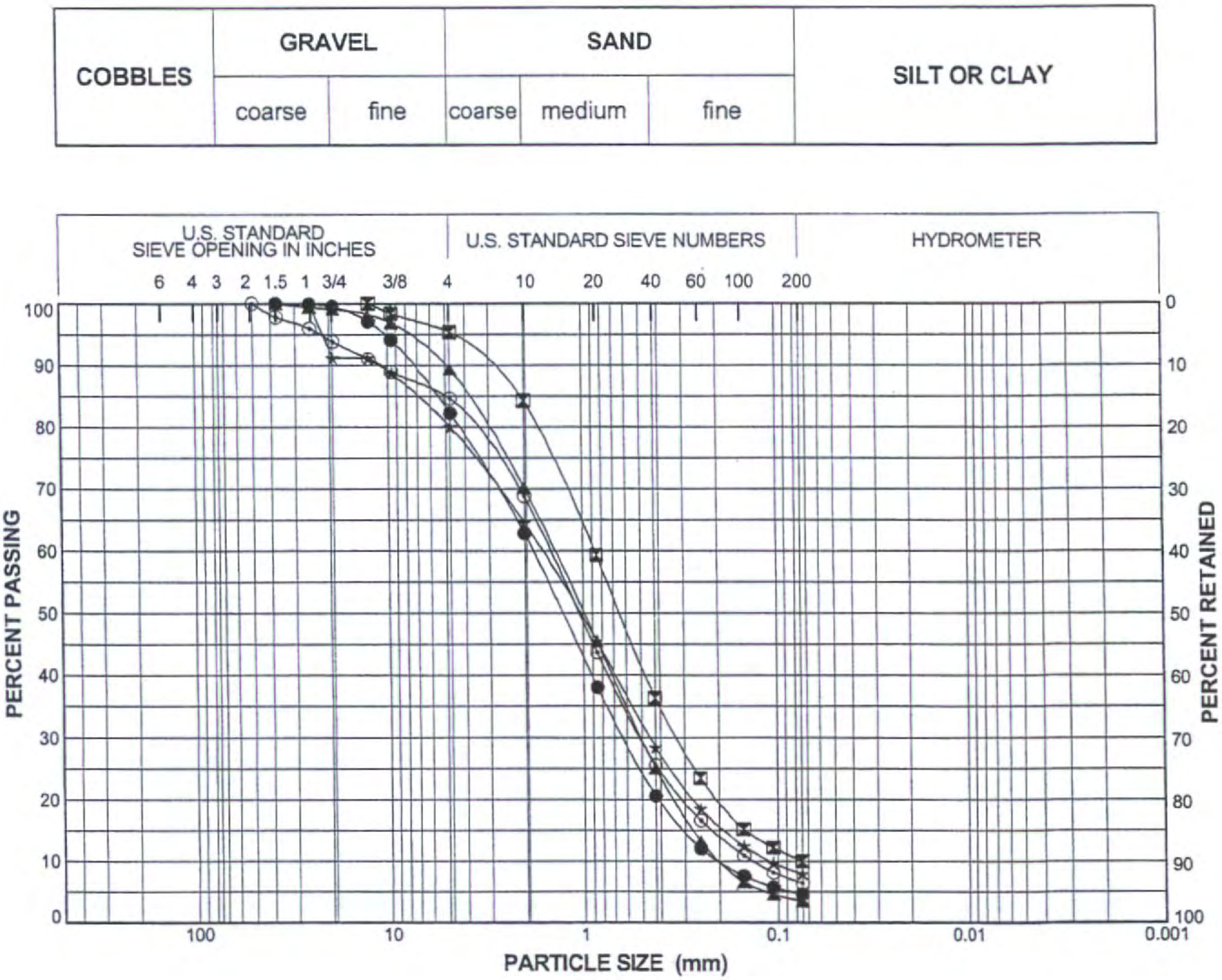
Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-1	1	2.5-4	●			Poorly Graded Sand (SP)
B-2	SK-1	0-5	⧗			Poorly Graded Sand (SP)
B-2	5	15-16.5	▲			Well-Graded Sand with Silt (SW-SM)
B-3	SK-1	0-5	★			Well-Graded Sand with Gravel (SW)
B-4	SK-1	0-5	⊙			Well-Graded Sand with Silt (SW-SM)

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

URS

Figure C-2



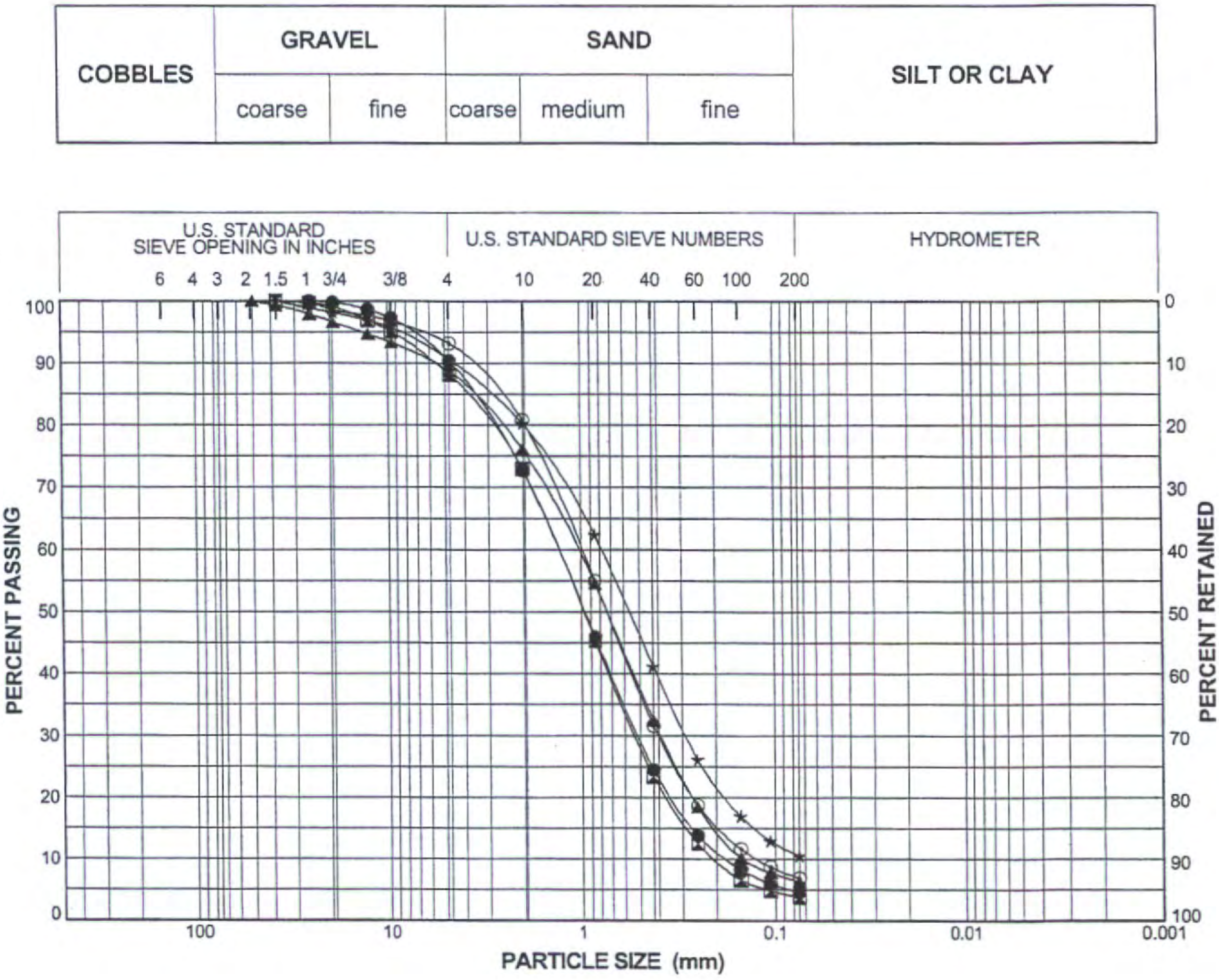
Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-5	SK-1	0-10	●			Well-Graded Sand with Gravel (SW)
B-6	1	2.5-4	⧗			Well-Graded Sand with Silt (SW-SM)
B-7	SK-1	0-8	▲			Poorly Graded Sand (SP)
B-8	4	15-16.5	★			Well-Graded Sand with Silt and Gravel (SW-SM)
B-10	SK-1	0-7	⊙			Well-Graded Sand with Silt and Gravel (SW-SM)

Report: SIEVE_5_CURVES_SNA; File: DIKE4COA.GPJ; 1/7/2003 B-10

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

Figure C-3



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-11	SK-1	0-10	●			Poorly Graded Sand (SP)
B-12	SK-1	0-7	⊠			Well-Graded Sand (SW)
TP-1	SK-1	0-4	▲			Poorly Graded Sand with Silt (SP-SM)
TP-1	SK-2	12-15	★			Well-Graded Sand with Silt (SW-SM)
TP-2	SK-1	0-5	⊙			Well-Graded Sand with Silt (SW-SM)

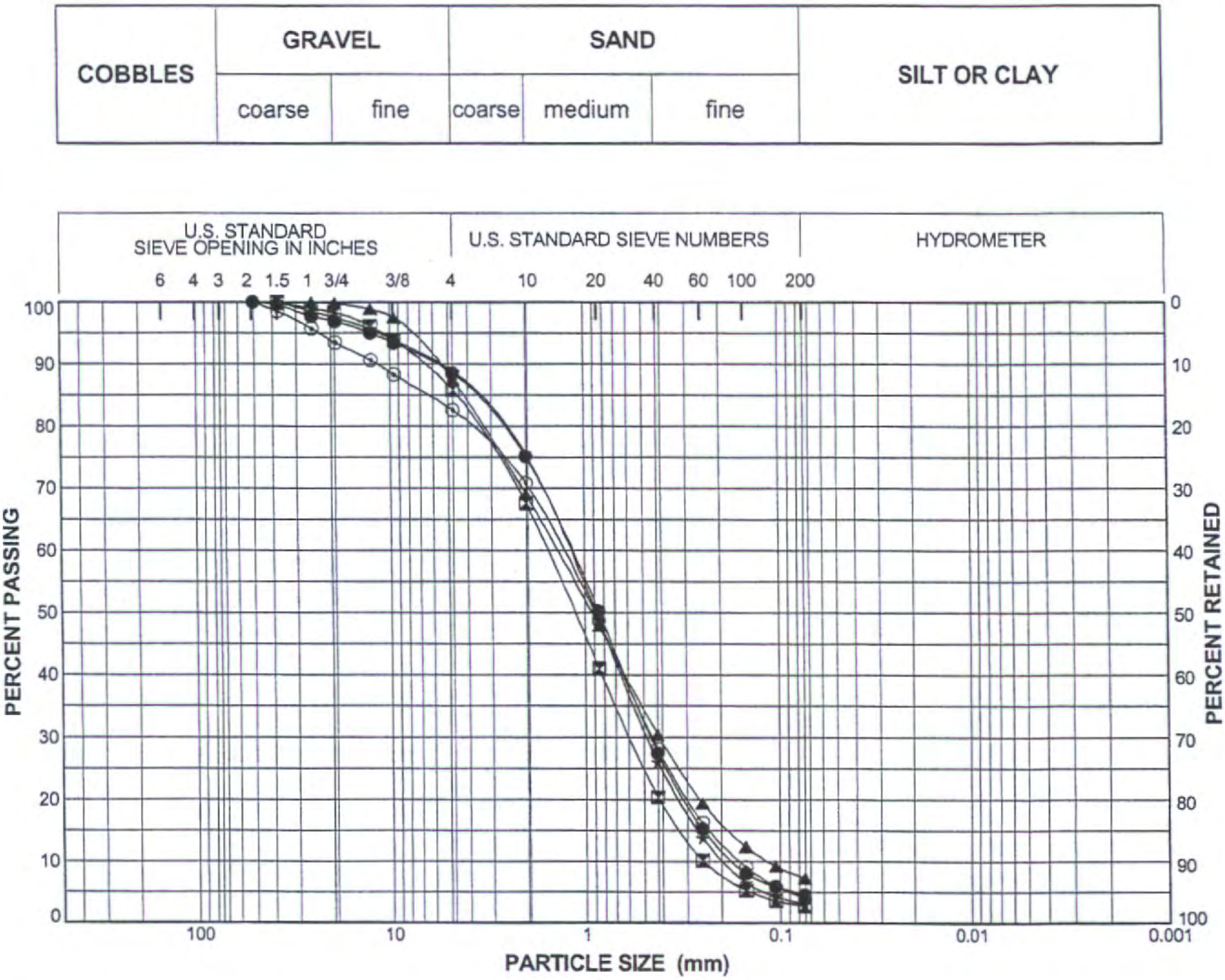
Report: SIEVE_5_CURVES_SNA; File: DIKE4COA.GPJ; 1/7/2003 TP-02

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

URS

Figure C-4



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
TP-2	SK-2	10-15	●			Well-Graded Sand (SW)
TP-3	SK-1	0-5	⧗			Poorly Graded Sand (SP)
TP-3	SK-2	10-14	▲			Well-Graded Sand with Silt (SW-SM)
TP-4	SK-1	0-5	★			Poorly Graded Sand (SP)
TP-5	SK-1	5-10	⊙			Poorly Graded Sand with Gravel (SP)

Report: SIEVE_5_CURVES_SNA; File: DIKE4COA.GPJ; 1/7/2003 TP-05

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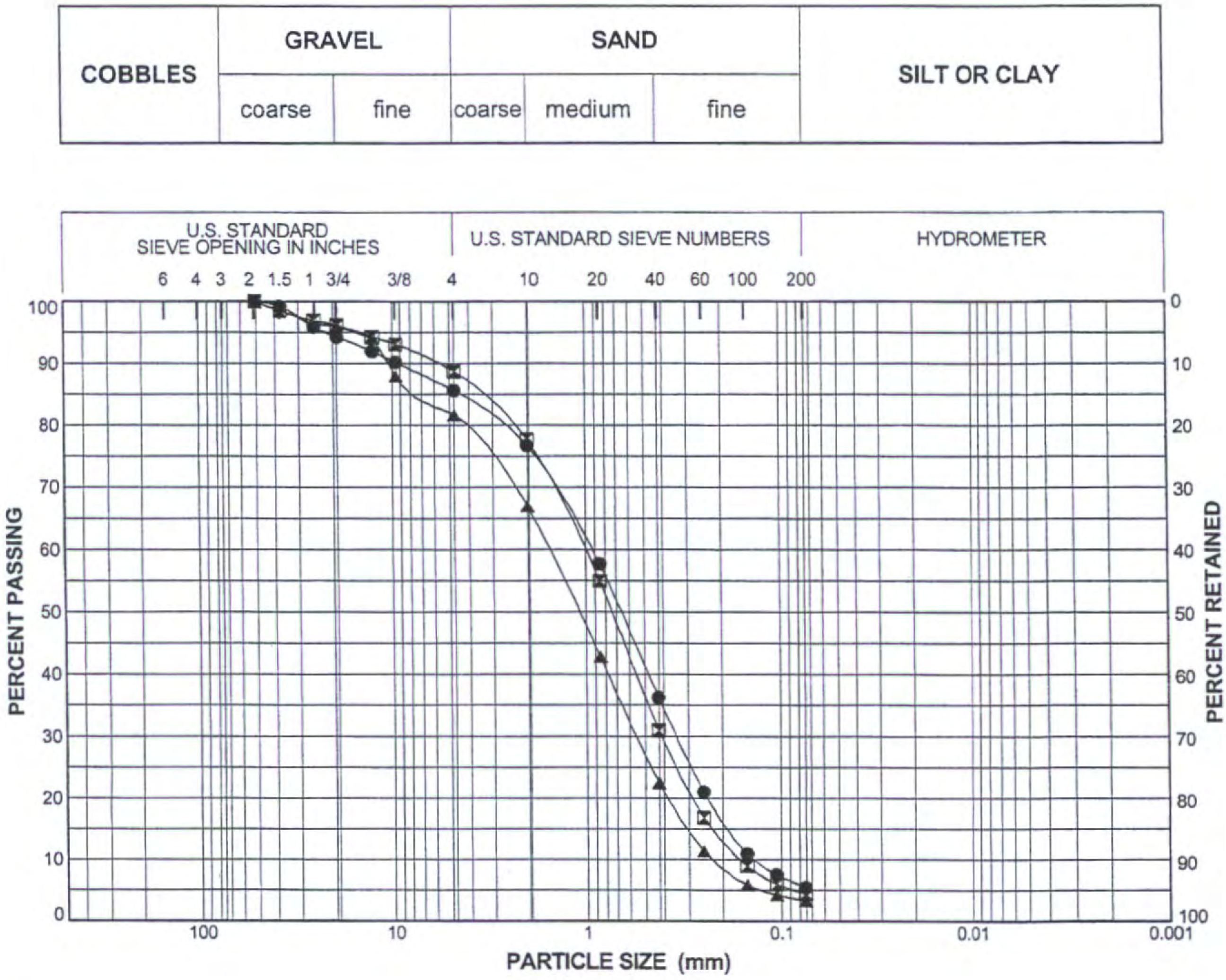
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

URS

Figure C-5



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
TP-6	SK-1	0-6	●			Poorly Graded Sand with Silt (SP-SM)
TP-7	SK-1	0-5	⧗			Poorly Graded Sand (SP)
TP-8	SK-1	0-10	▲			Poorly Graded Sand with Gravel (SP)

Report: SIEVE_5_CURVES_SNA; File: DIKE4COA.GPJ; 1/7/2003 TP-08

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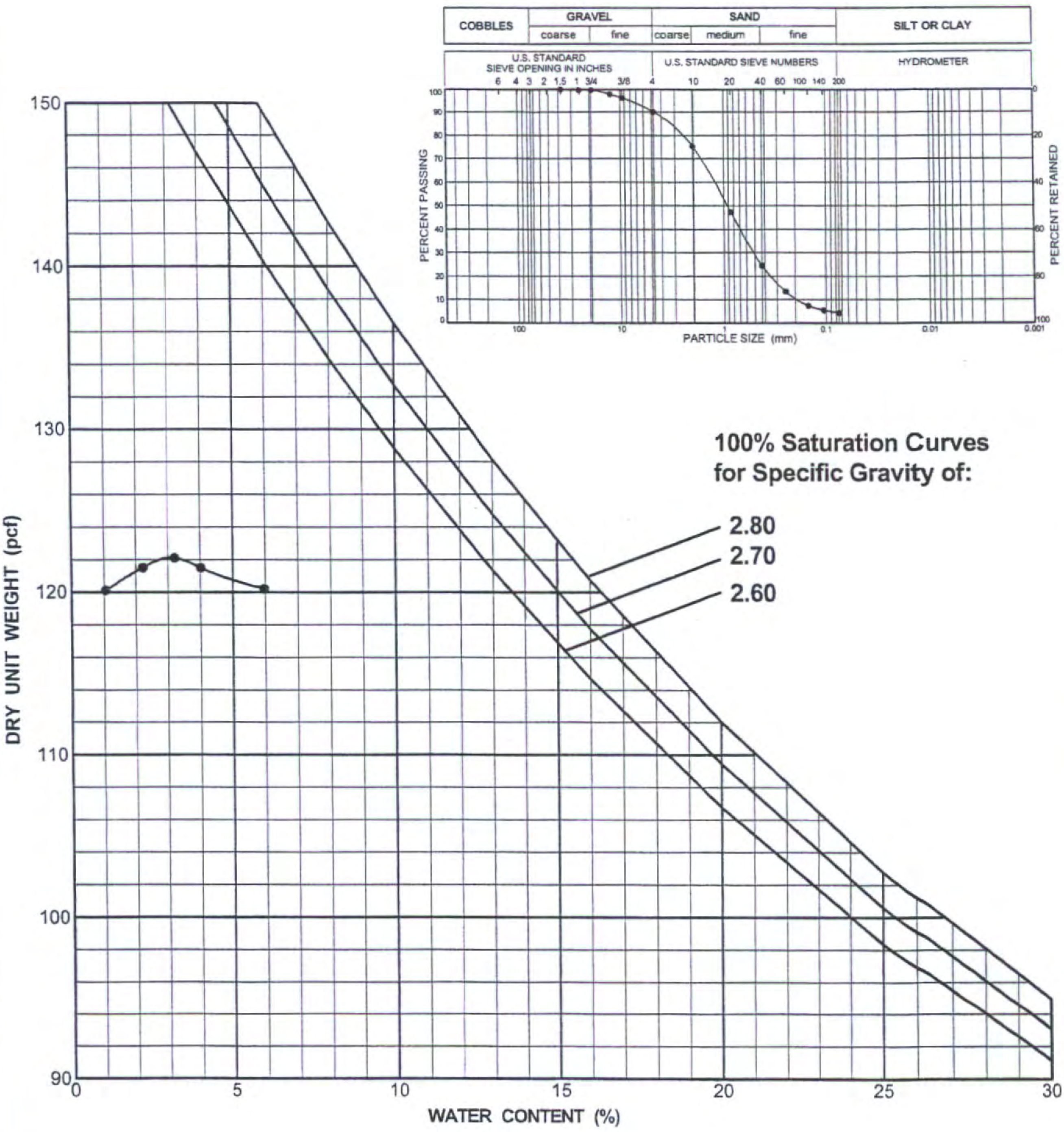
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

URS

Figure C-6

B-02 0.70 B-02 0.70



Boring Number **Sample Number**	**B-2** **SK-1 at 0-5 ft**	**Maximum Dry Unit Weight**	122.0 pcf
Test Method	ASTM D1557B	**Optimum Water Content**	3.0 %
Description	Poorly Graded Sand (SP)		
Liquid Limit	**Plasticity Index**	**Specific Gravity**	

Report: COMPACTION_SPLINE_FIT; File: DIKE4COA.GPJ; 1/9/2003 B-02

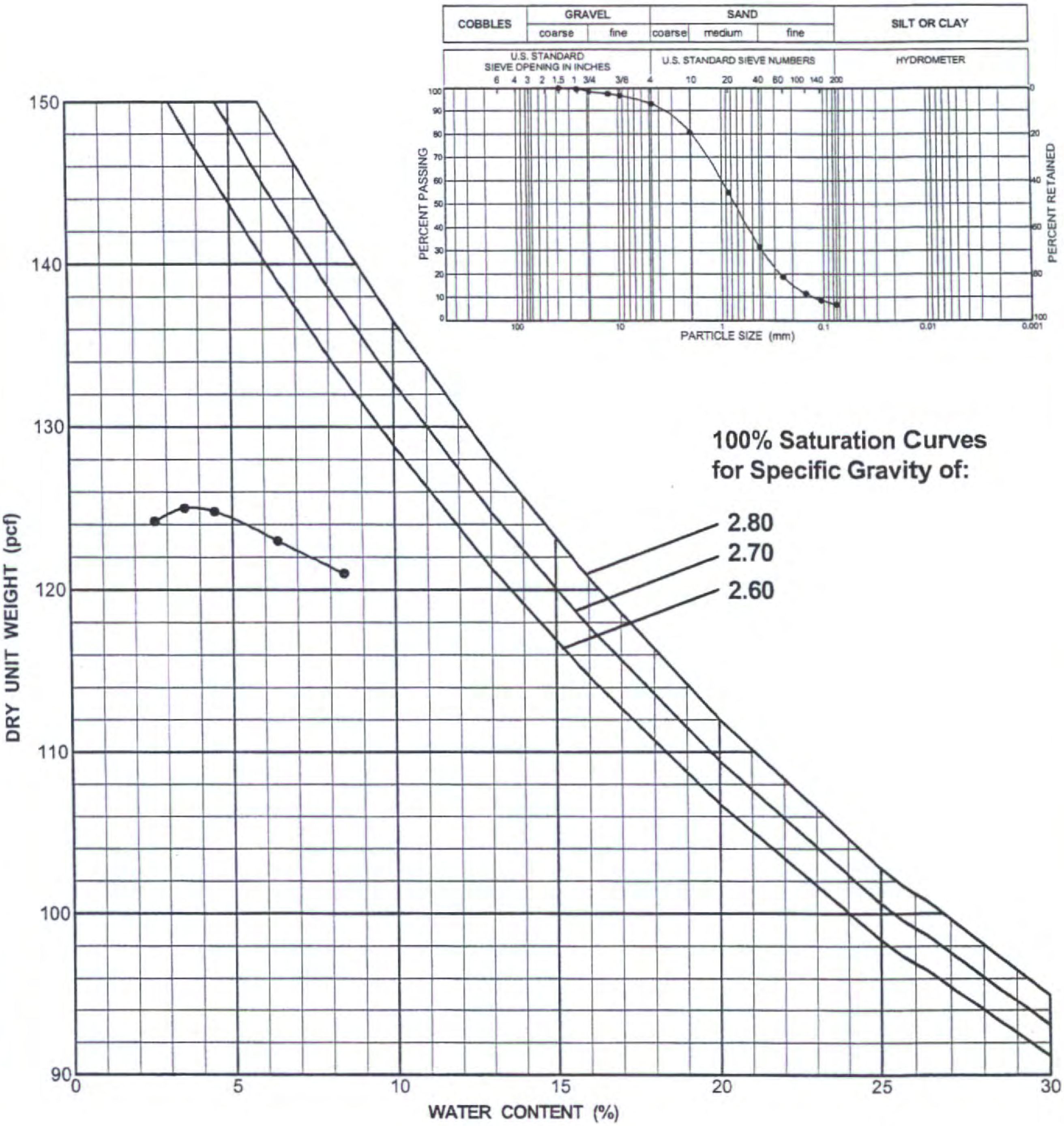
Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

COMPACTION TEST

URS

Figure C-7

TP-02 2.30 TP-02 2.30



Boring Number	**TP-2**	**Maximum Dry Unit Weight**	125.0 pcf
Sample Number	**SK-1 at 0-5 ft**		
Test Method	ASTM D1557B	**Optimum Water Content**	4.0 %
Description	Well-Graded Sand with Silt (SW-SM)		
Liquid Limit	**Plasticity Index**	**Specific Gravity**	

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

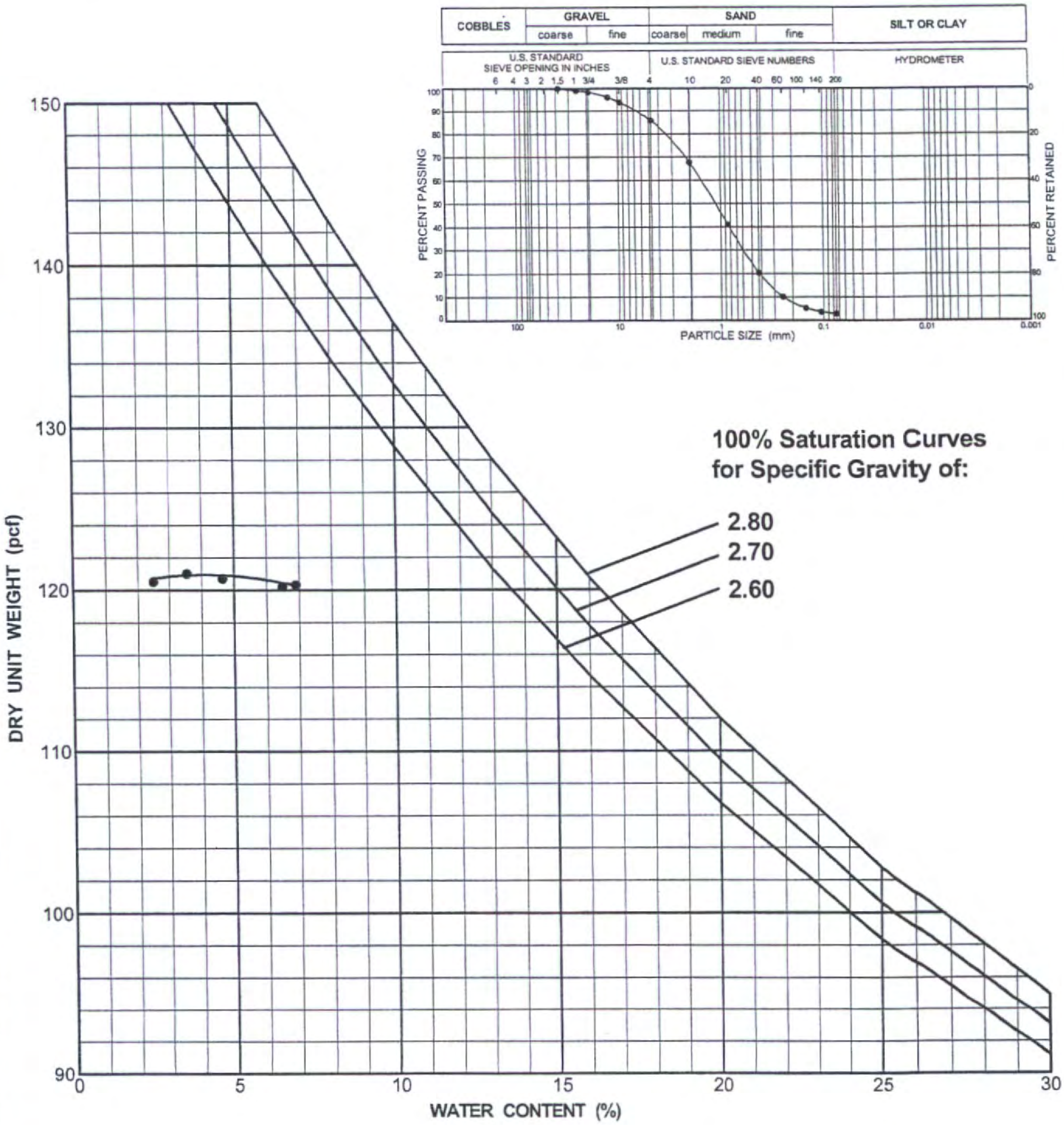
COMPACTION TEST

Figure C-8

URS

Report: COMPACTION_SPLINE_FIT; File: DIKE4COA.GPJ; 1/9/2003 TP-02

TP-03 2.30 TP-03 2.30



Boring Number **Sample Number**	**TP-3** **SK-1 at 0-5 ft**	**Maximum Dry Unit Weight**	121.5 pcf		
Test Method	ASTM D1557B	**Optimum Water Content**	3.5 %		
Description	Poorly Graded Sand (SP)				
Liquid Limit		**Plasticity Index**		**Specific Gravity**	

Report: COMPACTION_PARABOLA; File: DIKE4COA.GPJ; 1/9/2003 TP-03

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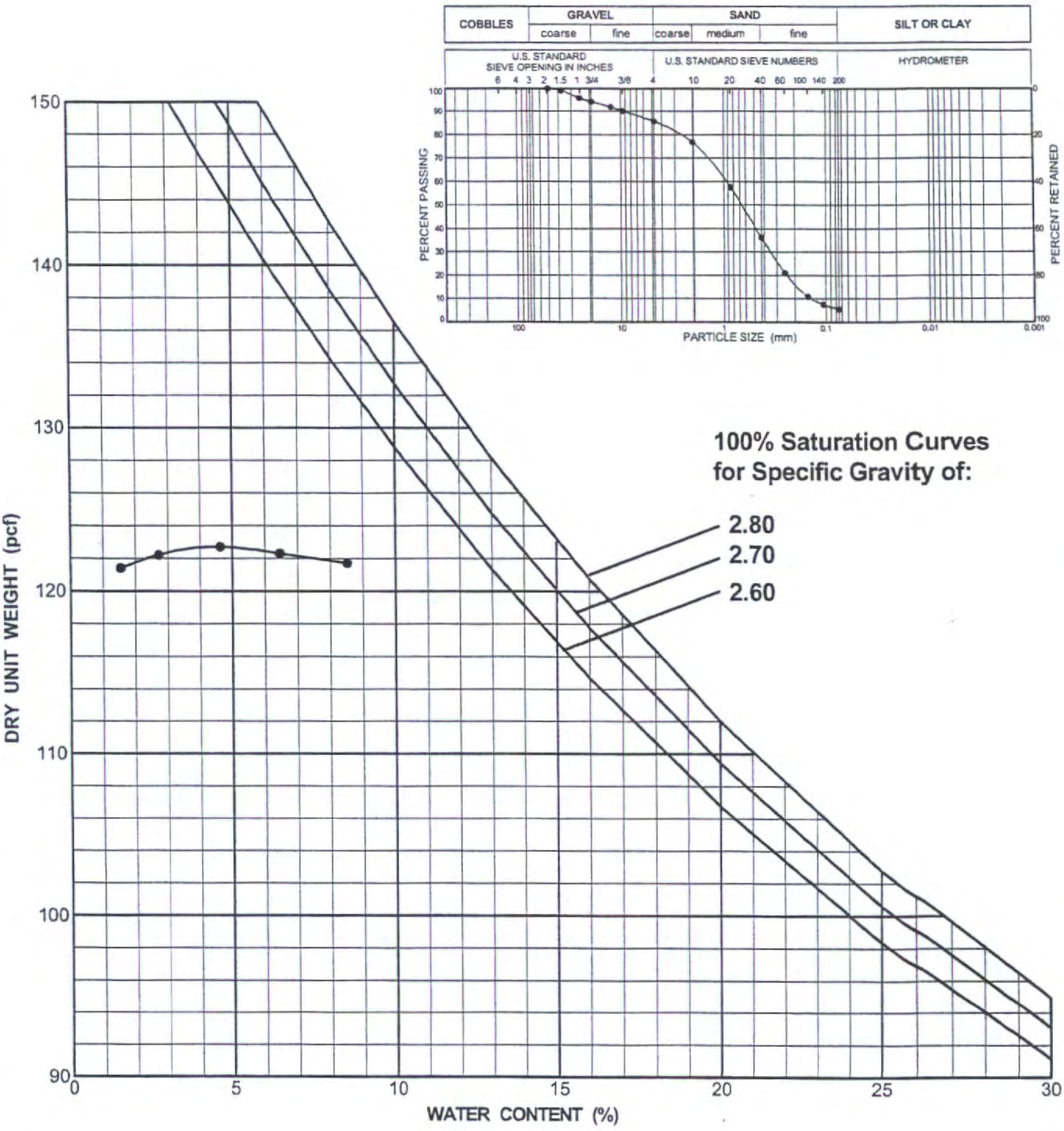
Coachella, California
29864604.00001

COMPACTION TEST

Figure C-9



Boring Number **Sample Number**	**TP-6** **SK-1 at 0-6 ft**	**Maximum Dry Unit Weight**	123.0 pcf
Test Method	ASTM D1557B	**Optimum Water Content**	4.5 %
Description	Poorly Graded Sand with Silt (SP-SM)		
Liquid Limit	**Plasticity Index**	**Specific Gravity**	

Dike No. 4 Recharge Facility
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29864604.00001

COMPACTION TEST

Figure C-10

URS

LABORATORY TEST RESULTS

BY SLADDEN (2005a)

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed 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

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Boring Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of this testing are presented graphically 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. This is shown on the Boring Log, and is useful in estimating the strength and compressibility of the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses and Atterberg Limits determinations. These provide information for developing classifications for the soil in accordance with the Unified Classification System. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing are very useful in detecting variations in the soils and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Direct Shear Testing: One bulk sample was selected for Direct Shear Testing. This testing measures the shear strength of the soil under various normal pressures and is used in developing parameters for foundation design and lateral design. Testing was performed using recompacted test specimens, which were saturated prior to testing. Testing was performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Expansion Testing: One bulk sample was 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.

Consolidation Testing: Four relatively undisturbed samples were selected for consolidation testing. For this testing one-inch thick test specimens are subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. The specimens were saturated at the 575 psf or 720 psf load increment.

Gradation

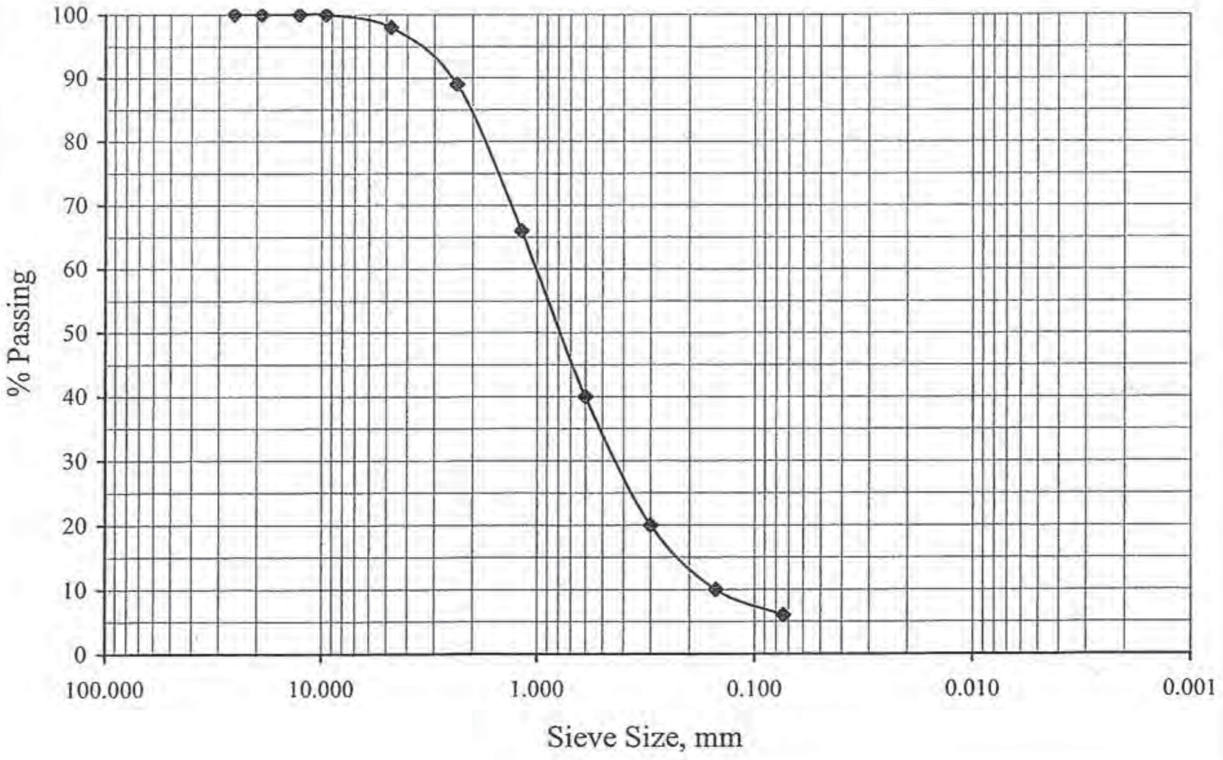
ASTM C117 & C136

Project Number: 544-4769
Project Name: S.W.C. 38th & Jefferson, La Quinta

December 22, 2004

Sample ID: Bulk 8 @ 0-5'

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	98.0
#8	2.36	89.0
#16	1.18	66.0
#30	0.60	40.0
#50	0.30	20.0
#100	0.15	10.0
#200	0.074	6.0



Gradation

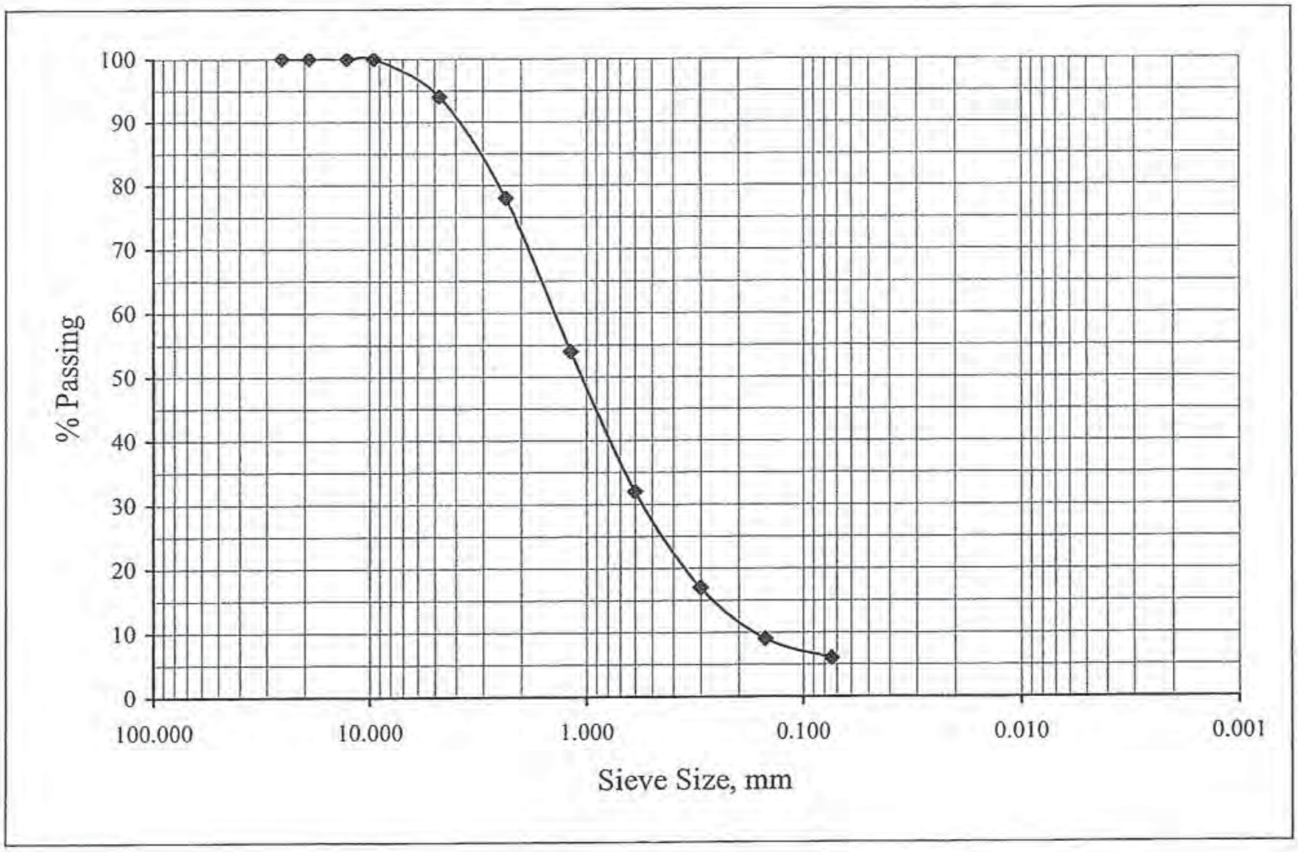
ASTM C117 & C136

Project Number: 544-4769
Project Name: S.W.C. 38th & Jefferson, La Quinta

December 22, 2004

Sample ID: Boring 8 @ 5'

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	94.0
#8	2.36	78.0
#16	1.18	54.0
#30	0.60	32.0
#50	0.30	17.0
#100	0.15	9.0
#200	0.074	6.0



Gradation

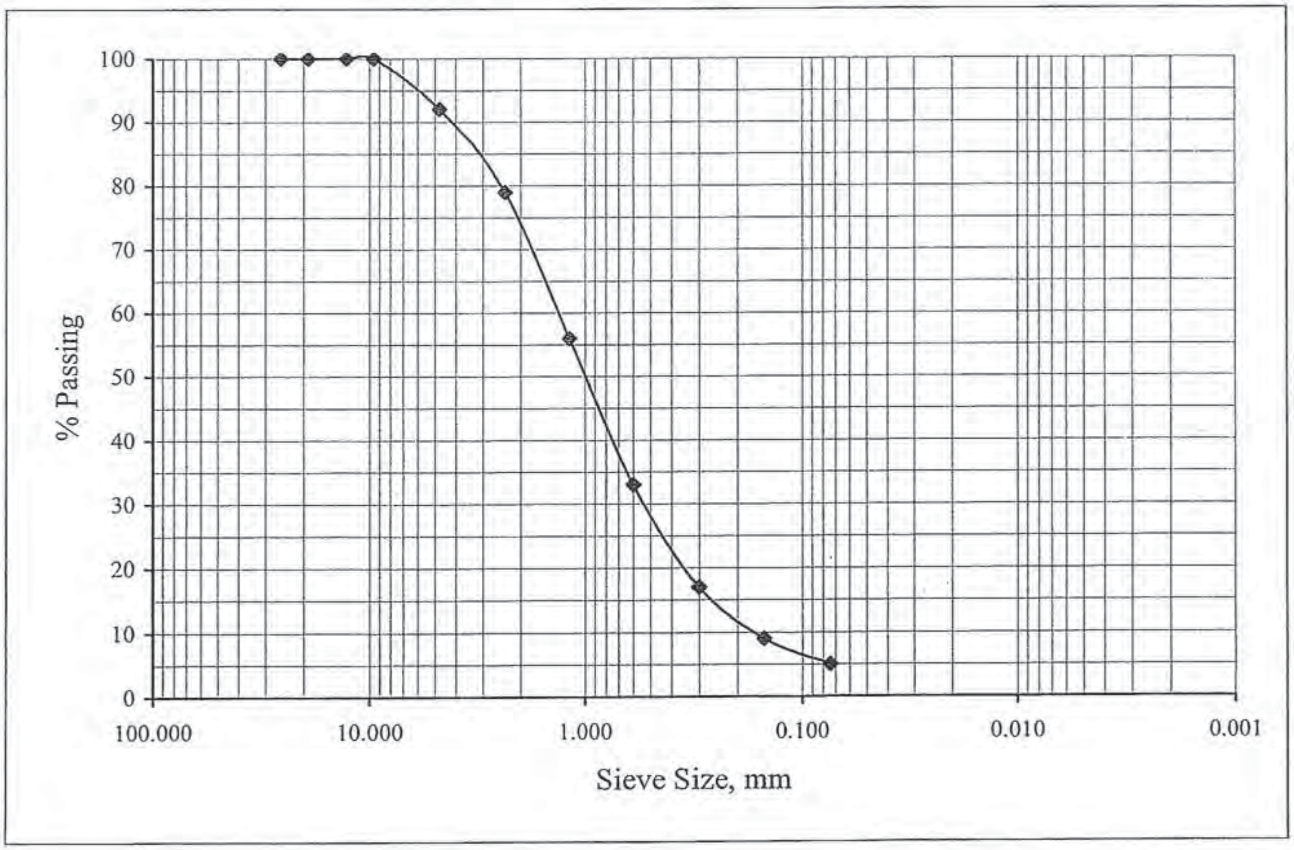
ASTM C117 & C136

Project Number: 544-4769
Project Name: S.W.C. 38th & Jefferson, La Quinta

December 22, 2004

Sample ID: Boring 8 @ 10'

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	92.0
#8	2.36	79.0
#16	1.18	56.0
#30	0.60	33.0
#50	0.30	17.0
#100	0.15	9.0
#200	0.074	5.0



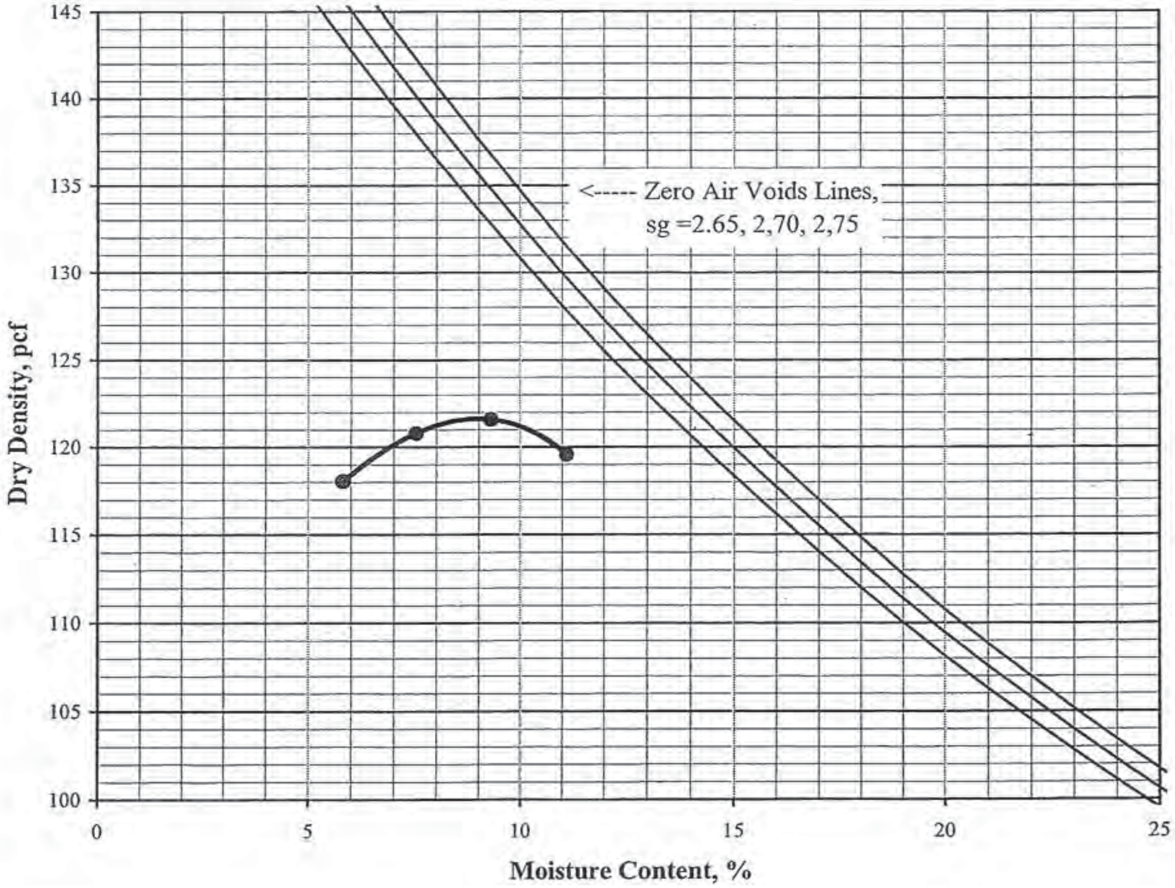
Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number:	544-4769	December 22, 2004
Project Name:	S.W.C. 38th & Jefferson, La Quinta	ASTM D-1557 A
Lab ID Number:		Rammer Type: Manual
Sample Location:	Bulk 8 @ 0-5'	
Description:	Sand with Gravel	

Maximum Density: **122 pcf**
Optimum Moisture: **9.5%**

Sieve Size	% Retained
3/4"	
3/8"	
#4	0.0



Expansion Index

ASTM D 4829/UBC 29-2

Job Number: 544-4769

Date: 12/22/2004

Job Name: S.W.C. 38th & Jefferson, La Quin

Tech: Jake

Lab ID:

Sample ID: Bulk 8 @ 0-5'

Soil Description: Sand with Gravel

Wt of Soil + Ring:	595.0
Weight of Ring:	179.0
Wt of Wet Soil:	416.0
Percent Moisture:	8%

Wet Density, pcf:	126.0
Dry Denstiy, pcf:	116.7

% Saturation:	48.7

Expansion

Rack #

Date/Time	12/24/2004	10:30 AM
Initial Reading	0.500	
Final Reading	0.500	

Expansion Index

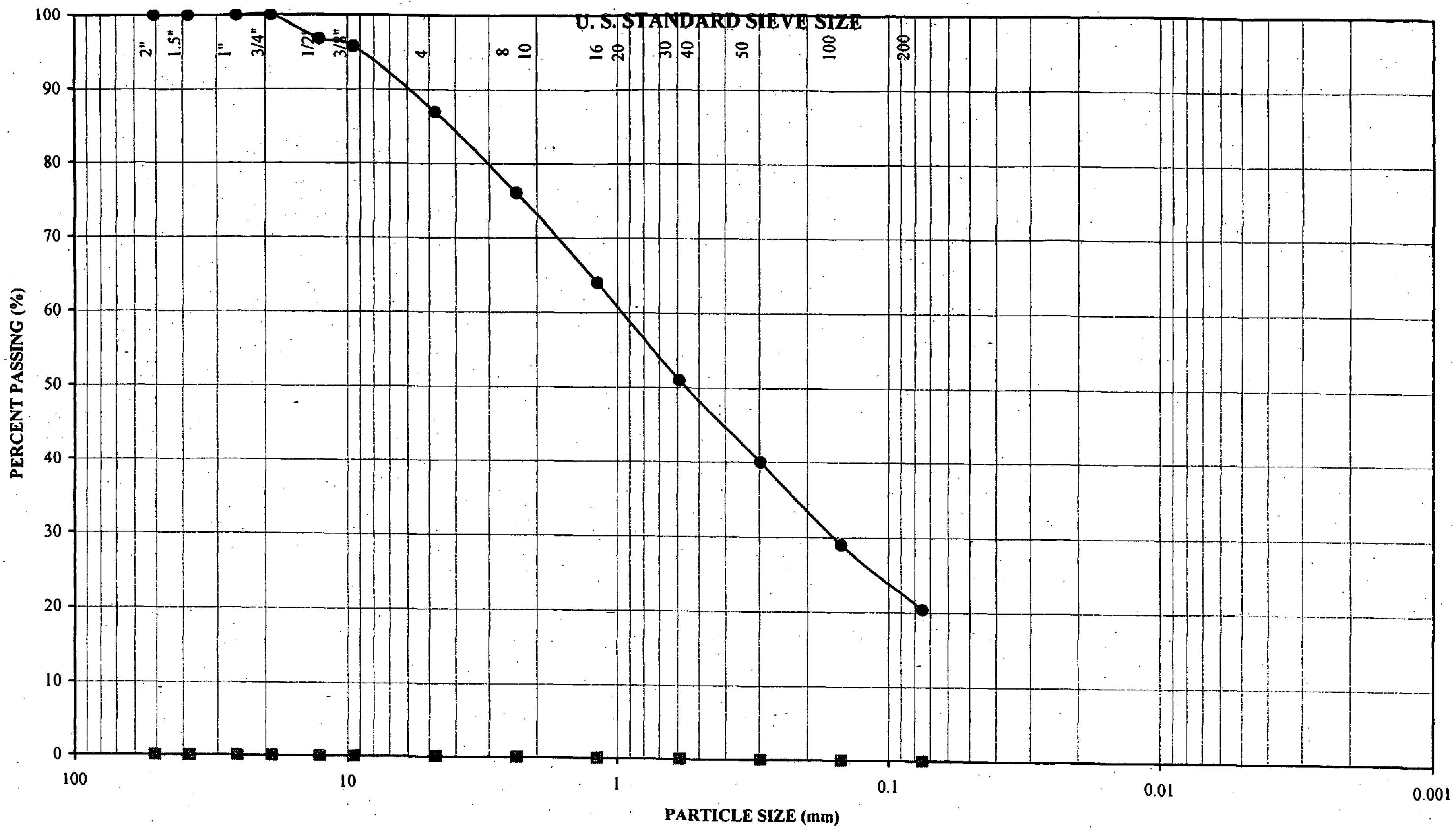
0

(Final - Initial) x 1000

LABORATORY TEST RESULTS

CONSTRUCTION TESTING & ENGINEERING, INC.

(2007)

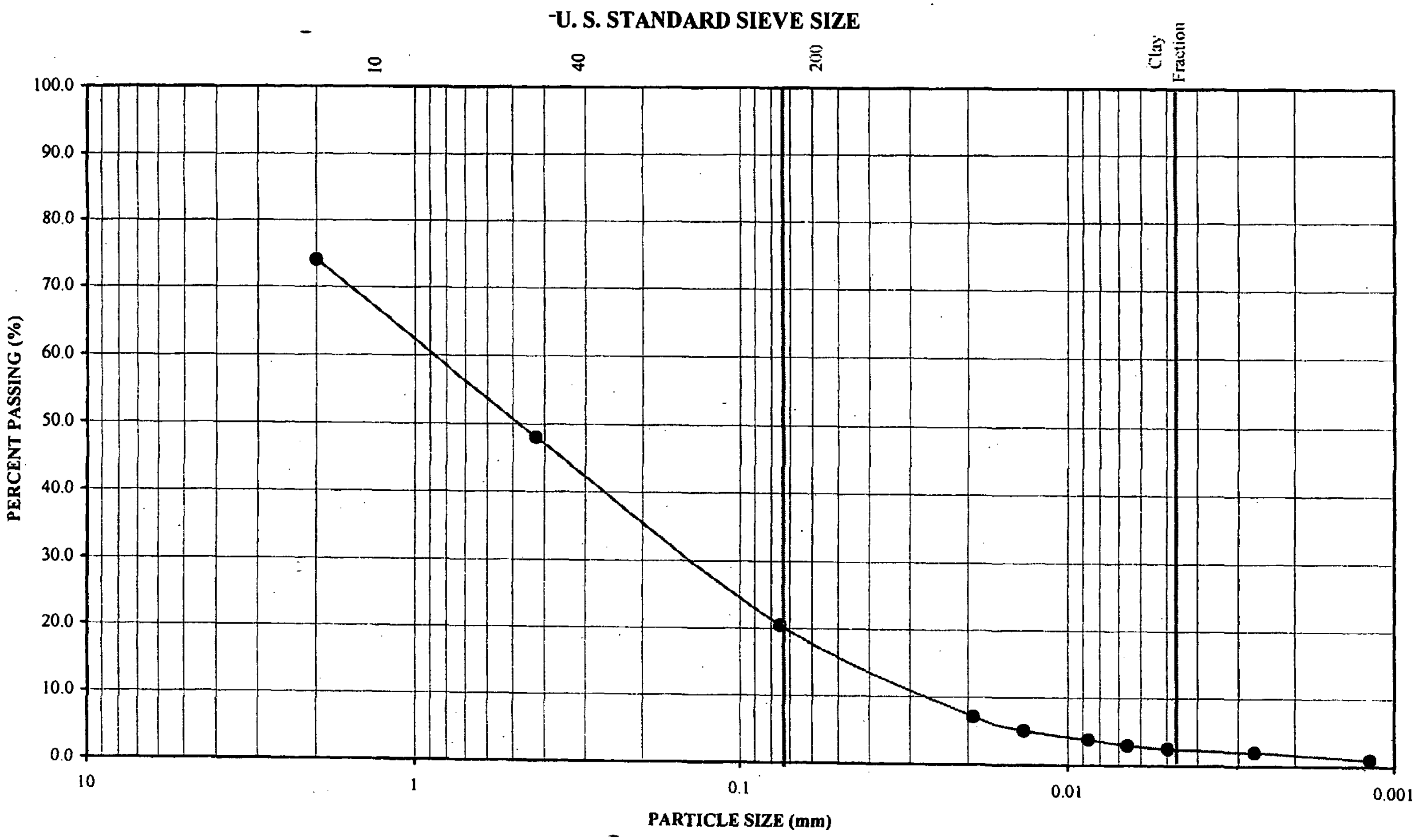


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	0-6 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

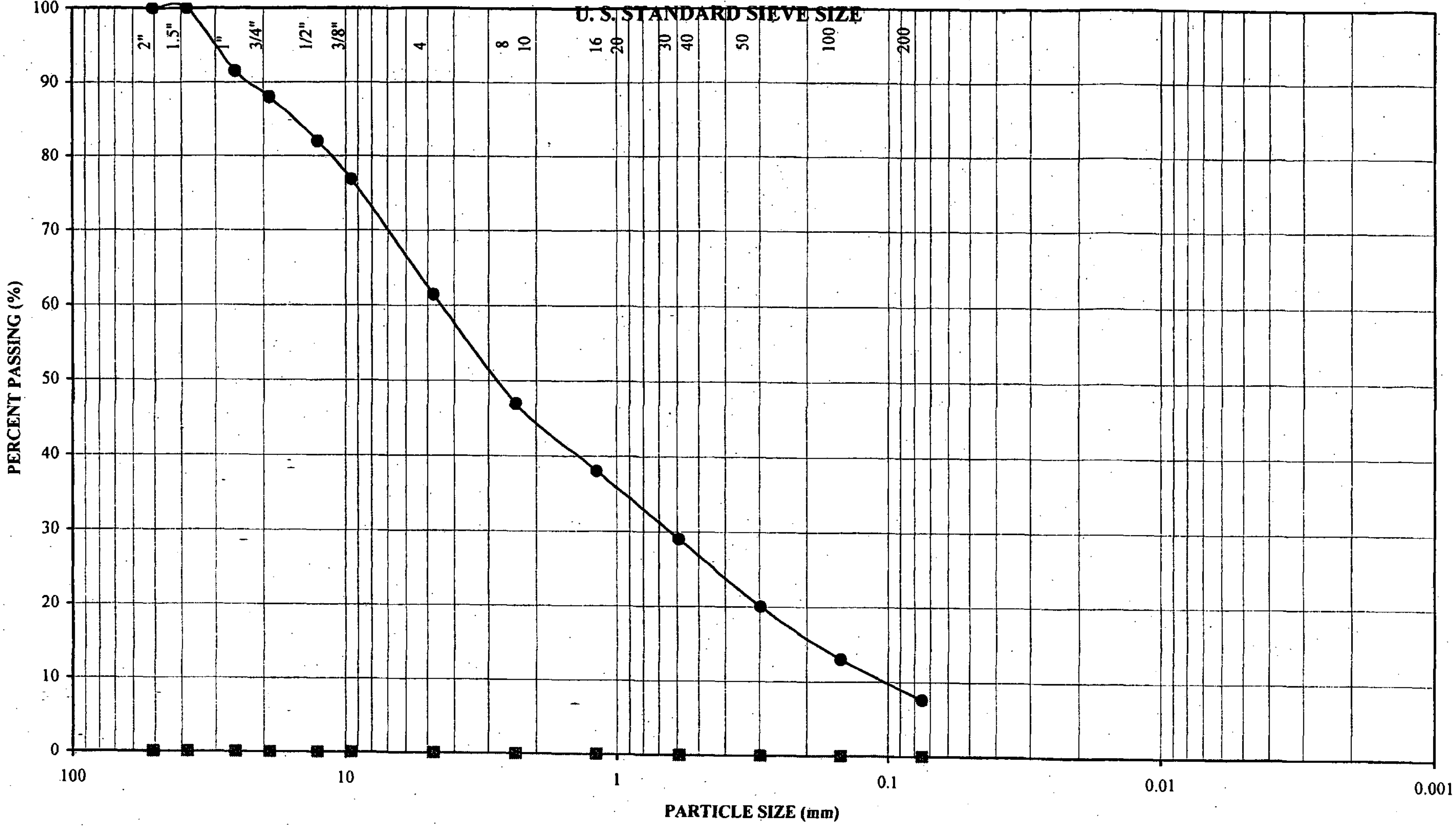


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-1	0-6 inches			SM

CTE JOB NUMBER: 40-2251



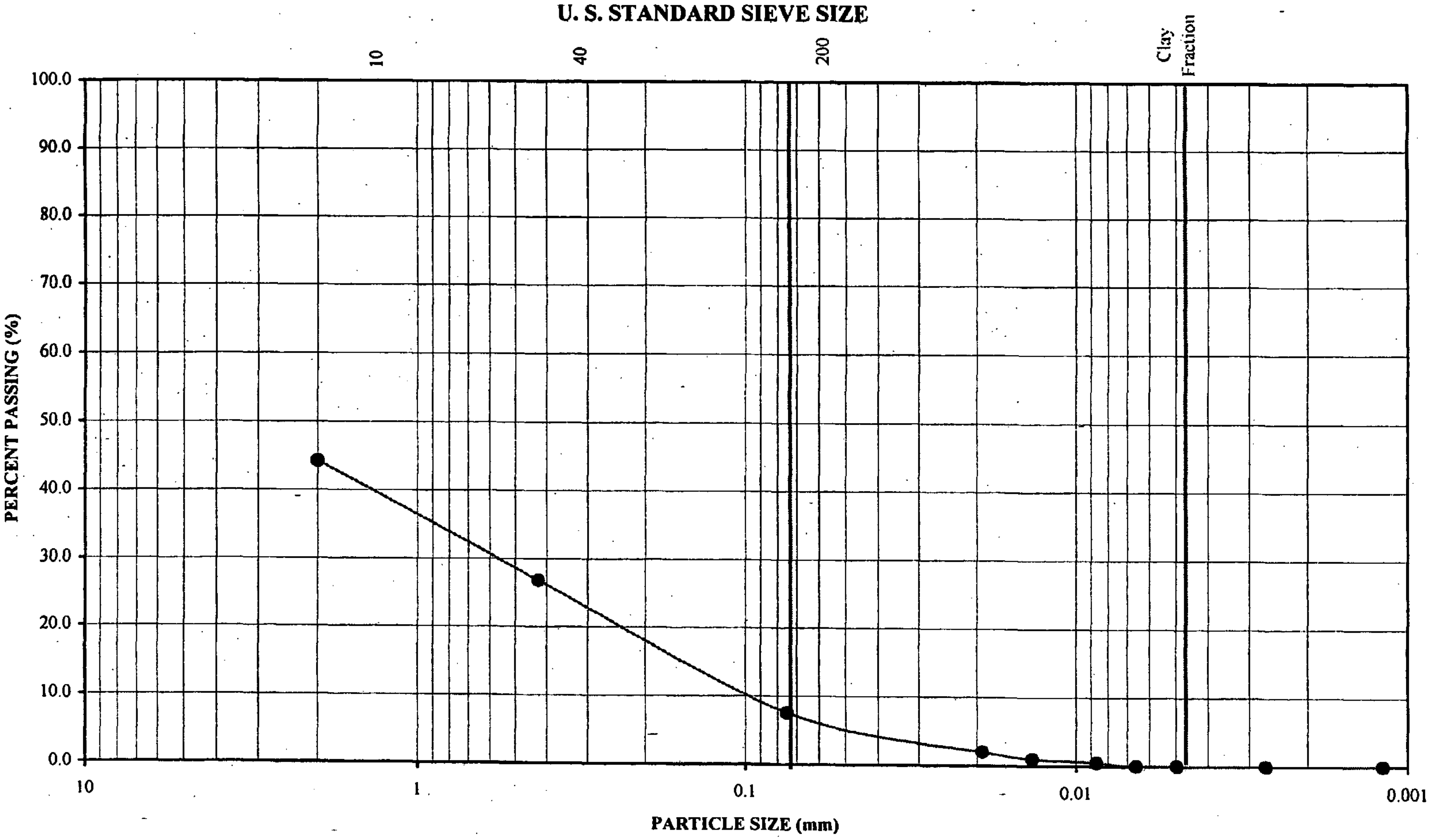
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	36-42 inches	●	NR	NR	SP-SM
		■			

CTE JOB NUMBER: 40-2251

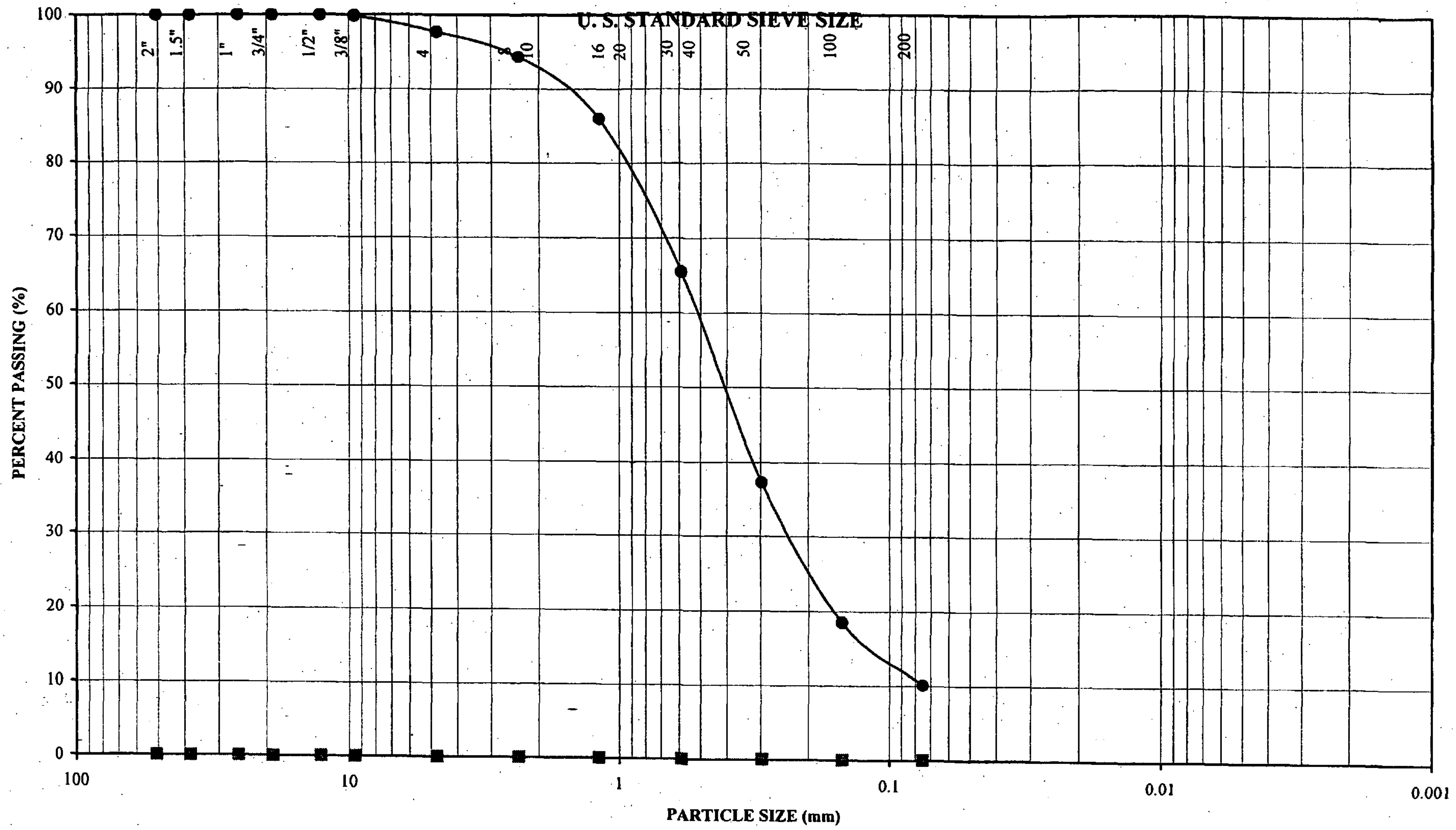


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 Meridian Parkway, Suite A | Riverside, CA 92518 | 951.571.4081 | Fax 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-1	36-42 inches			SP-SM

CTE JOB NUMBER: 40-2251

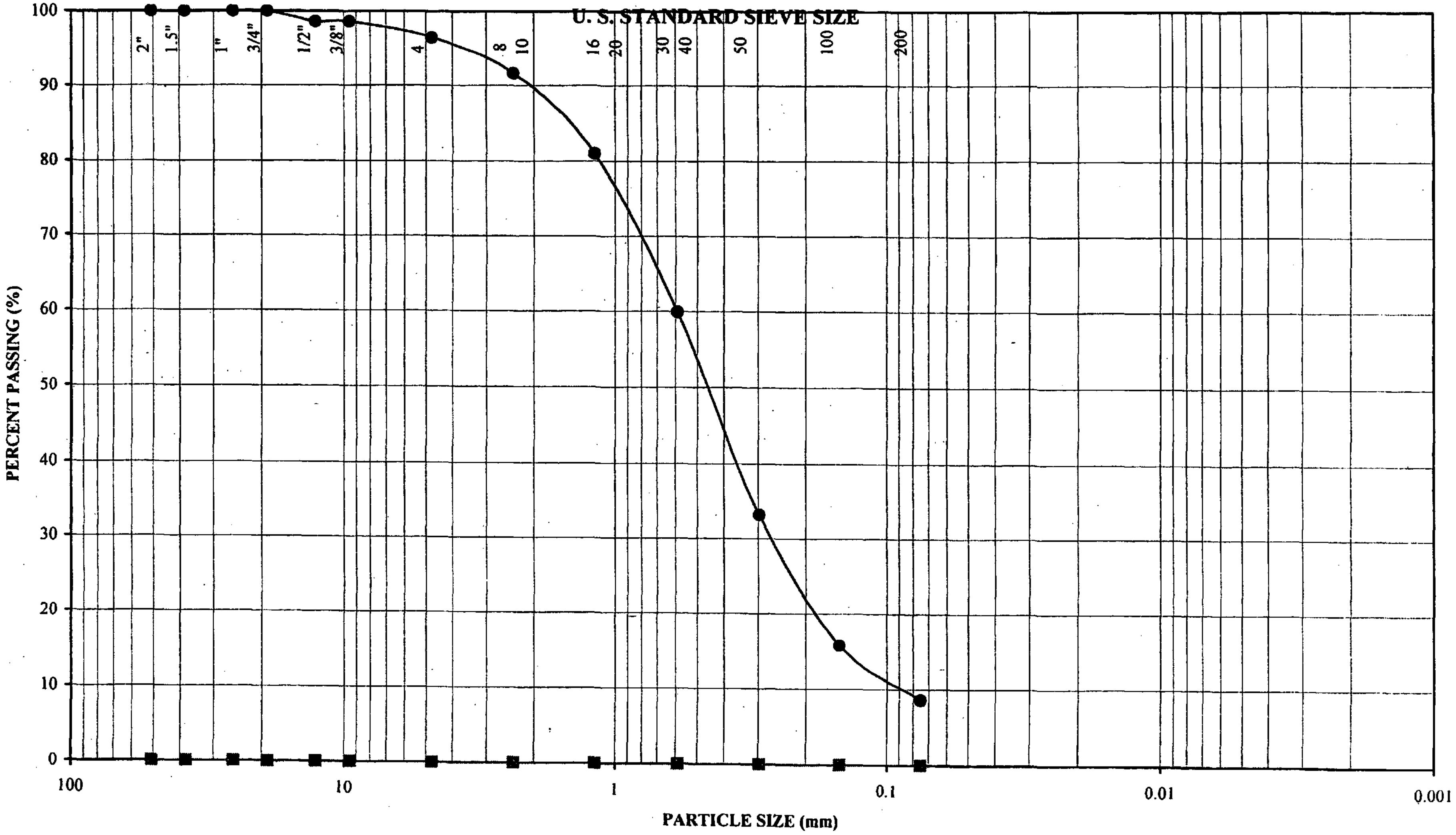


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14530 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-2	0-12"	●	NR	NR	SP-SM
		■			

CTE JOB NUMBER: 40-2251

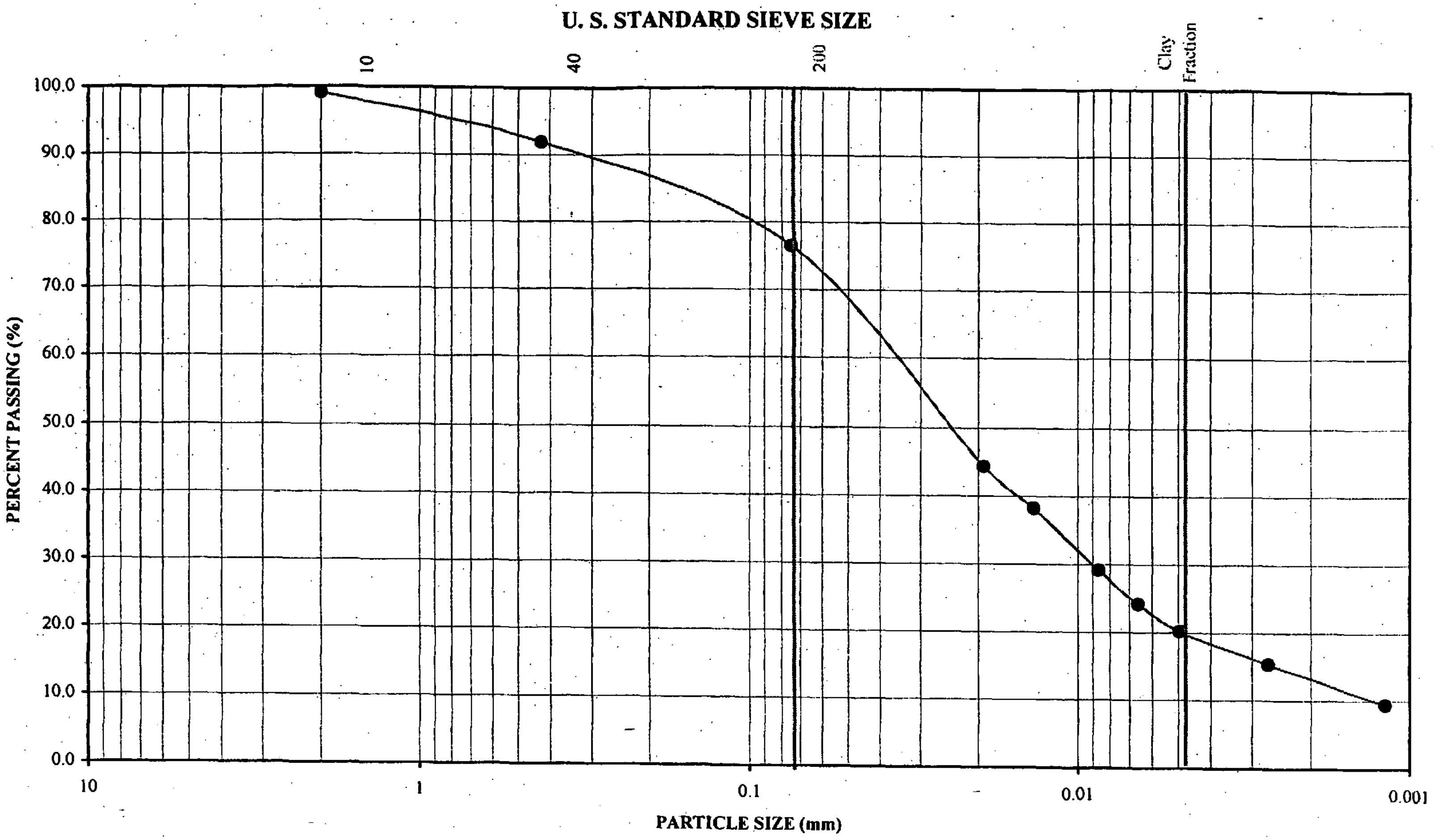


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-2	24-33"	●	NR	NR	SP-SM
		■			

CTE JOB NUMBER: 40-2251

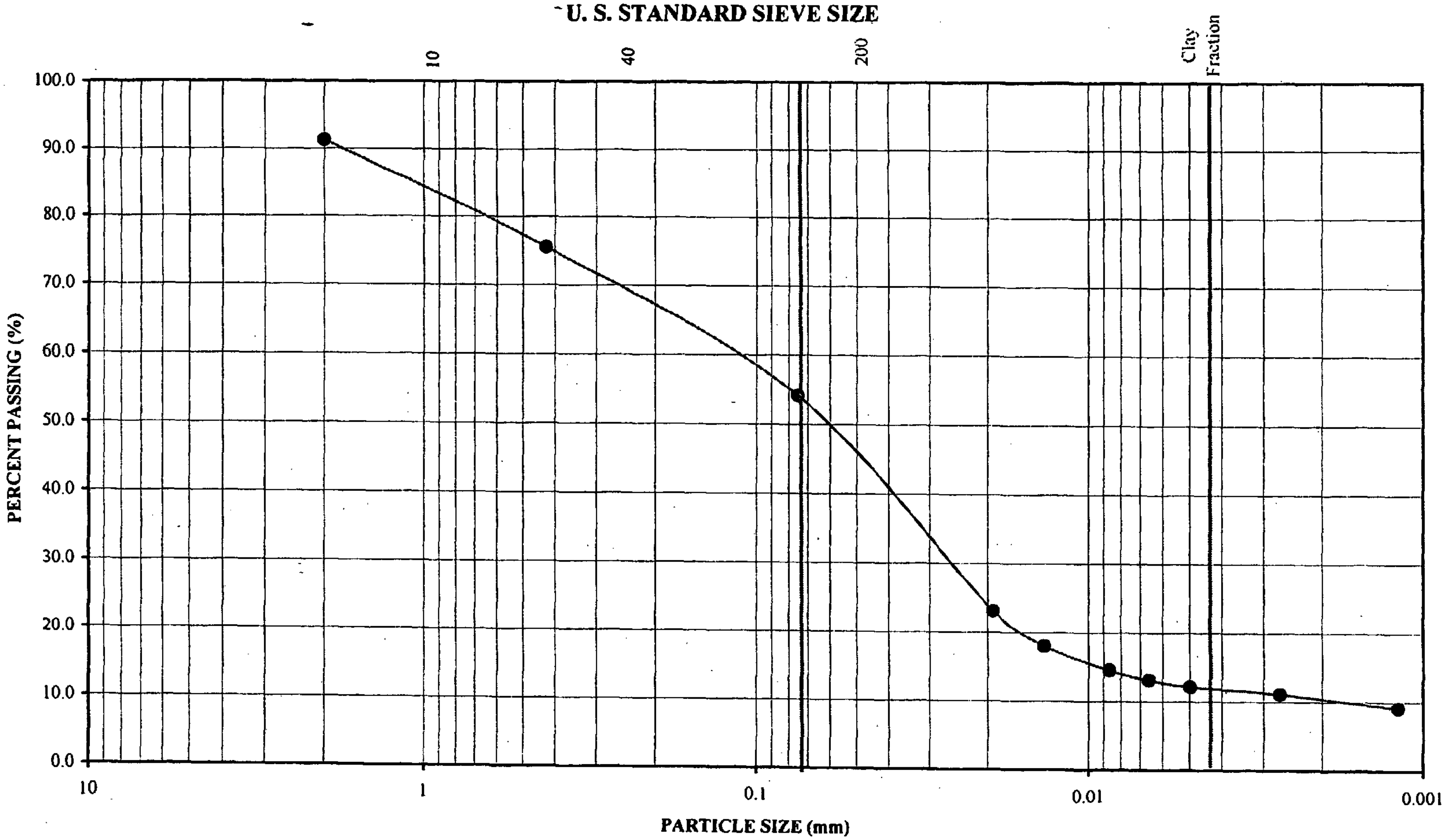


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 Meridian Parkway, Suite A | Riverside, CA 92518 | 951.571.4081 | Fax 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-2	33-66 inches			ML

CTE JOB NUMBER: 40-2251

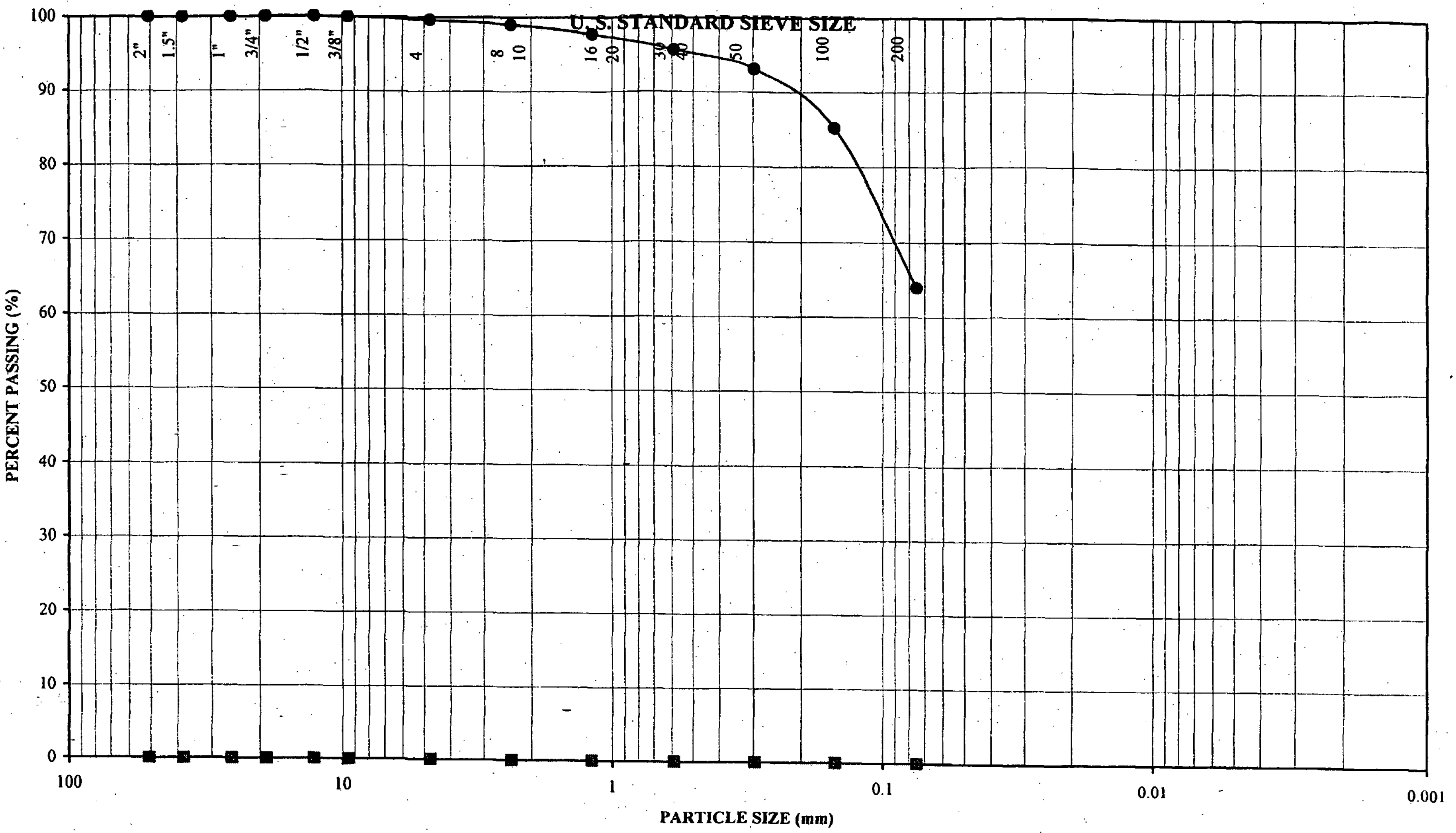


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-3	6-12 inches			ML

CTE JOB NUMBER: 40-2251

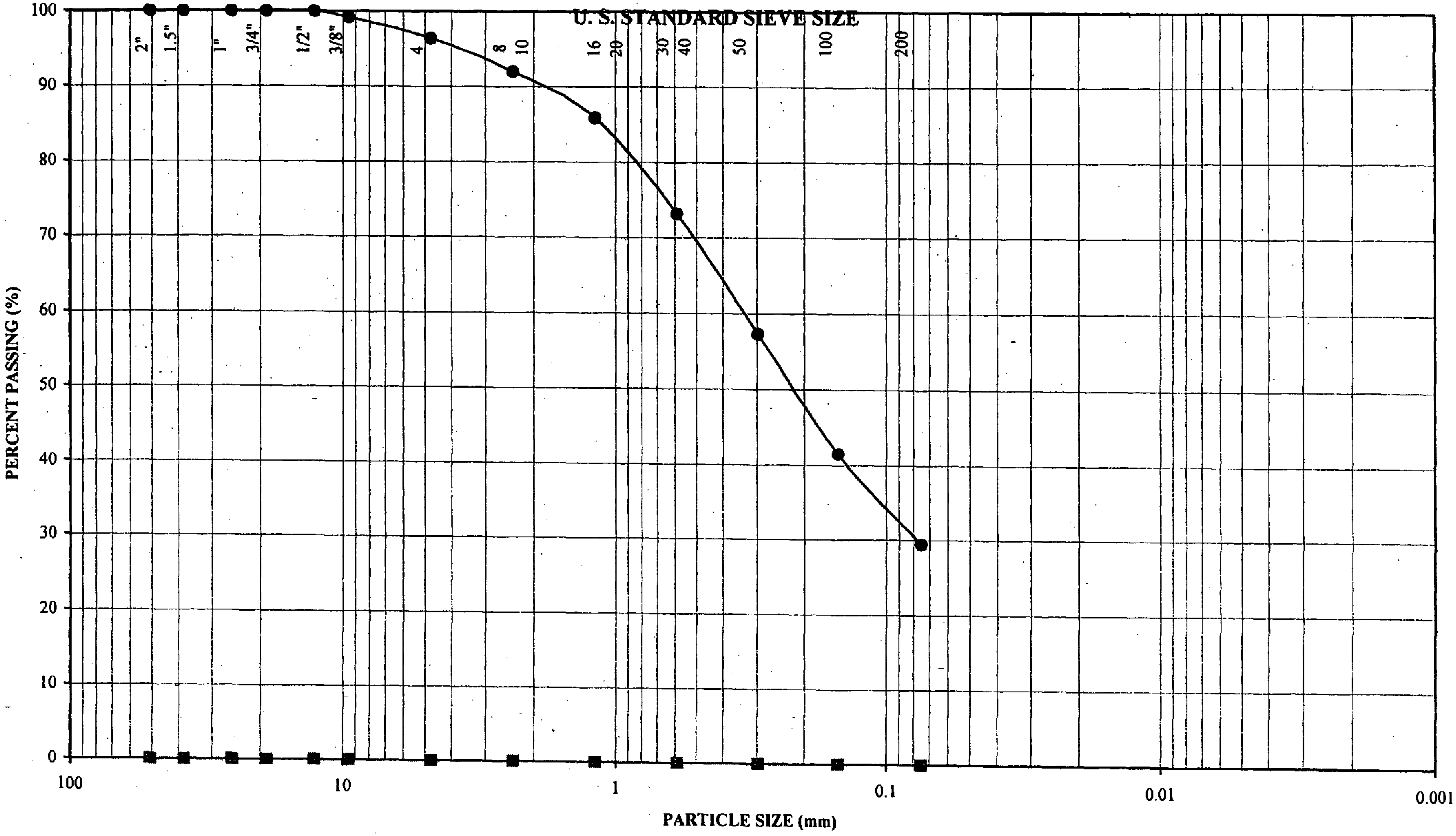


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-3	18-24"	●	NR	NR	ML
		■			

CTE JOB NUMBER: 40-2251



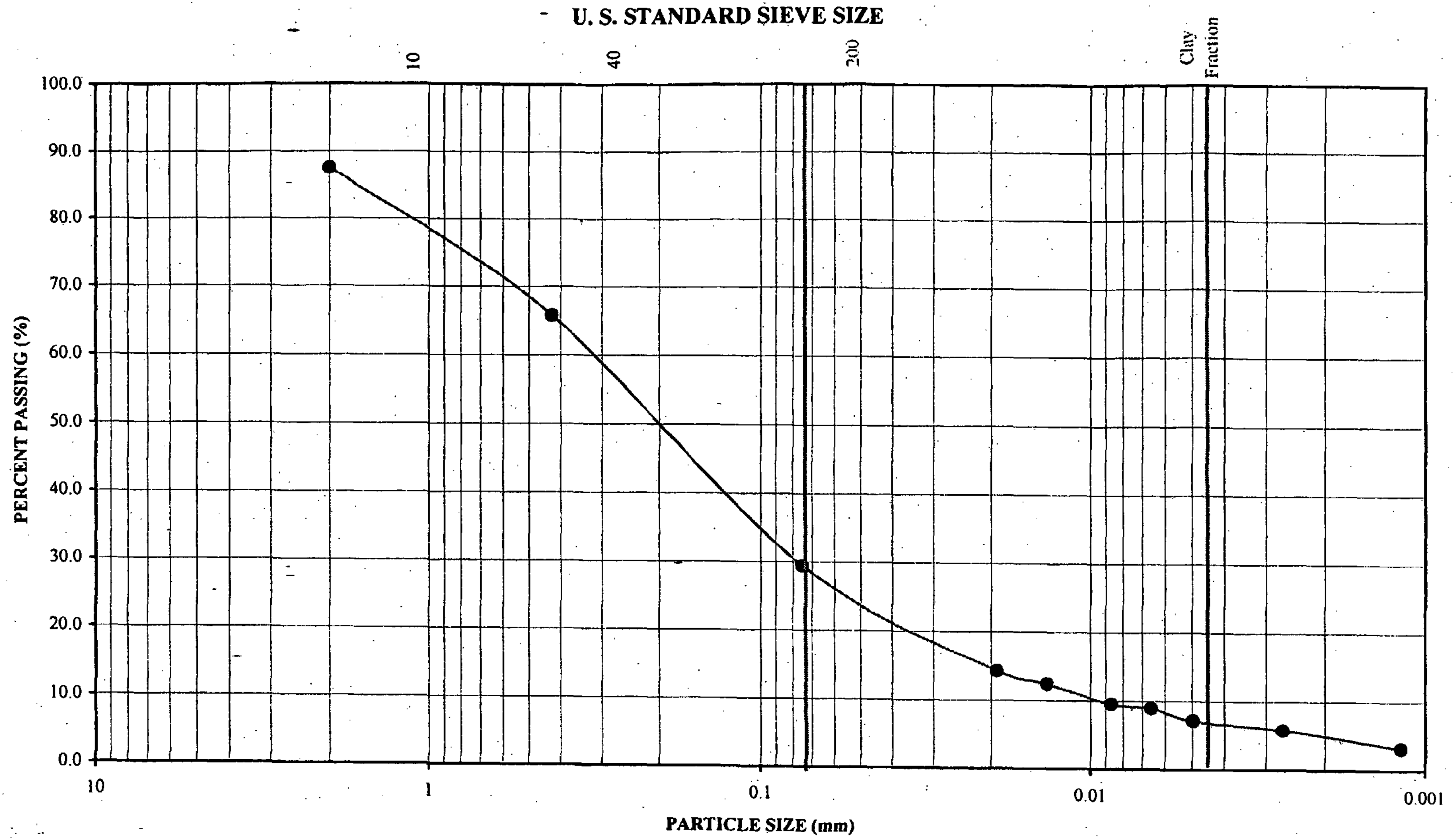
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-4	0-12 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

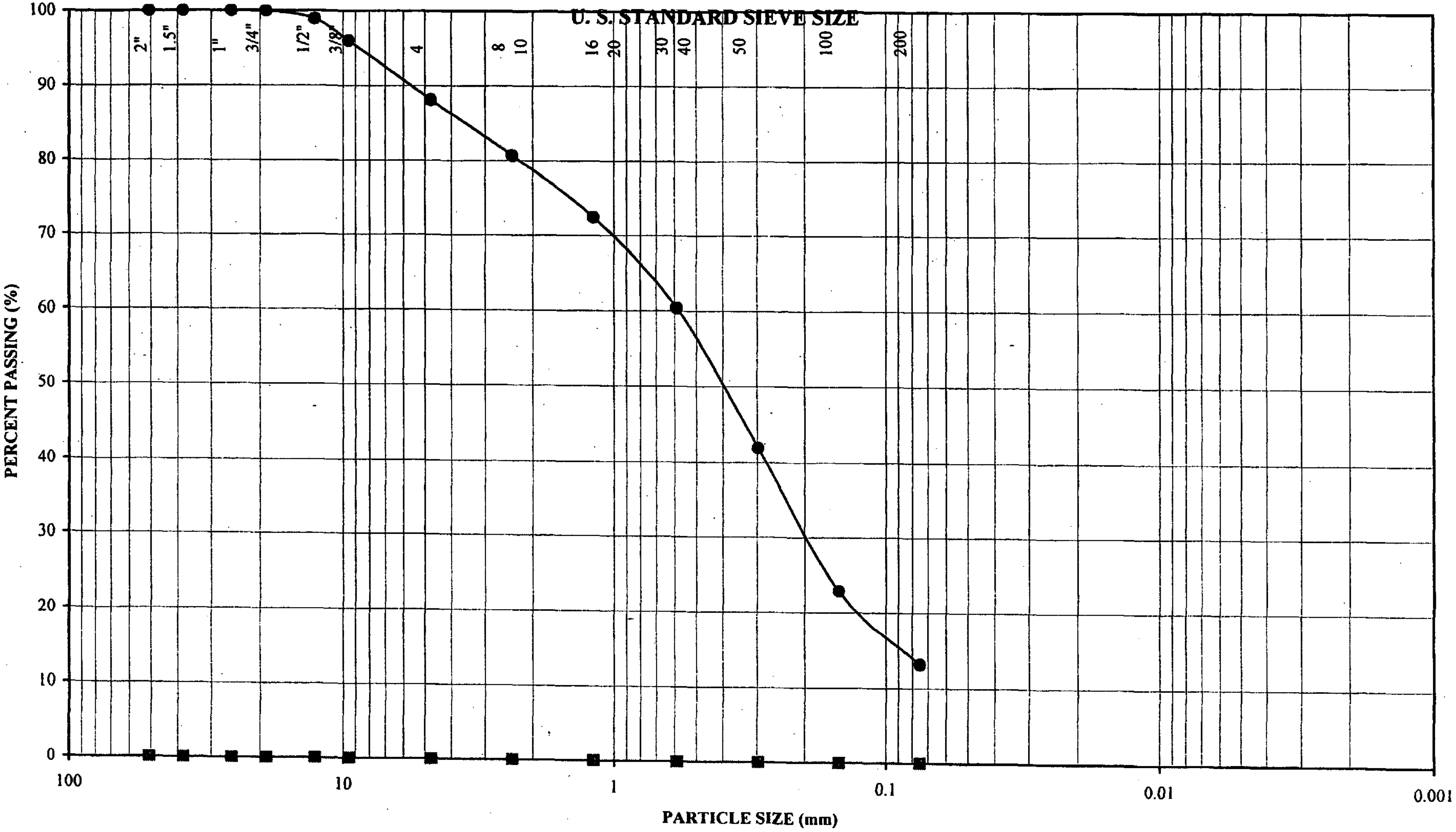


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-4	0-12 inches			SM

CTE JOB NUMBER: 40-2251

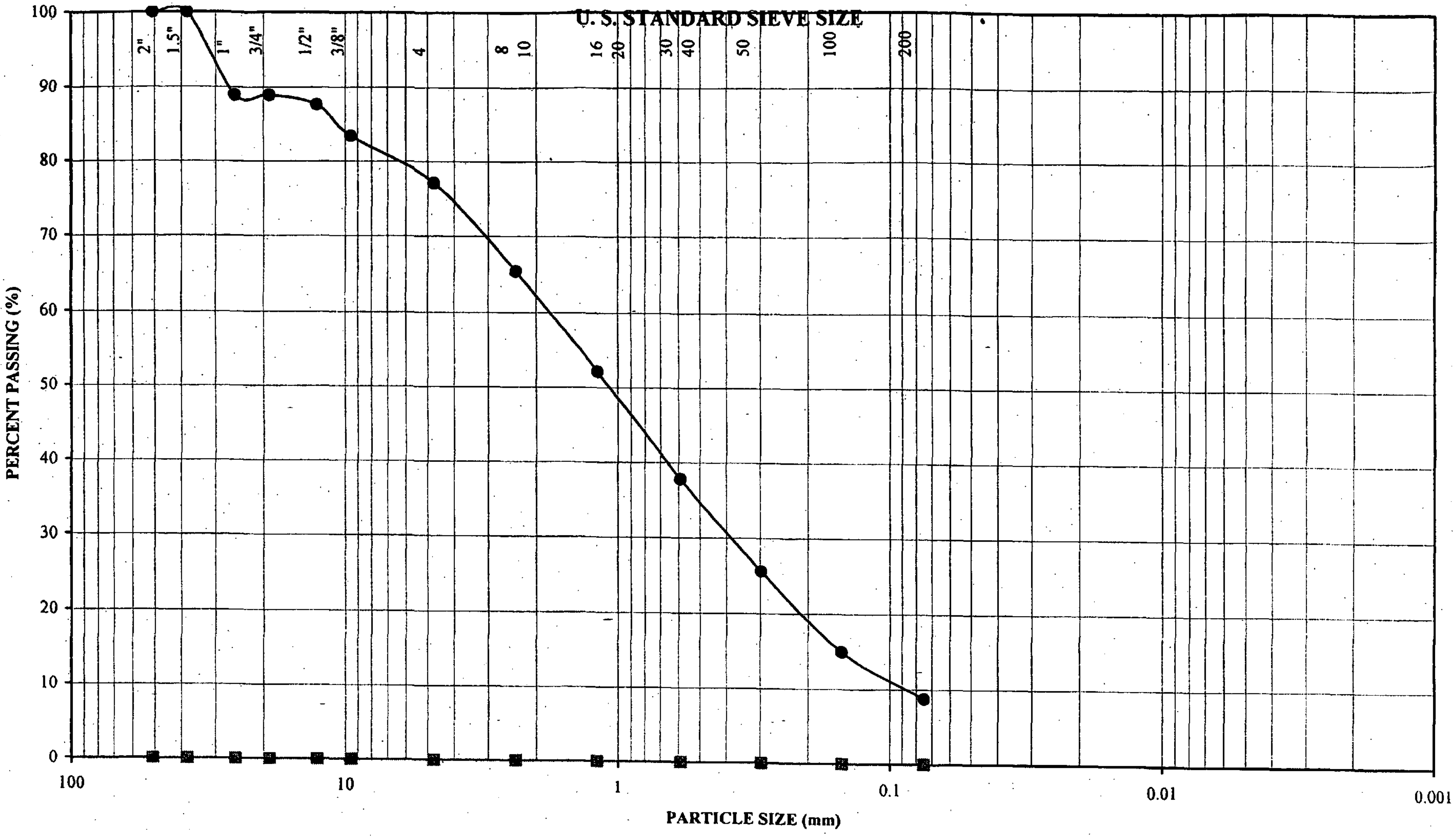


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 Meridian Parkway, Suite A | Riverside, CA 92518 | 951.571.4081 | Fax 951.571.4186

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-4	24-31"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251



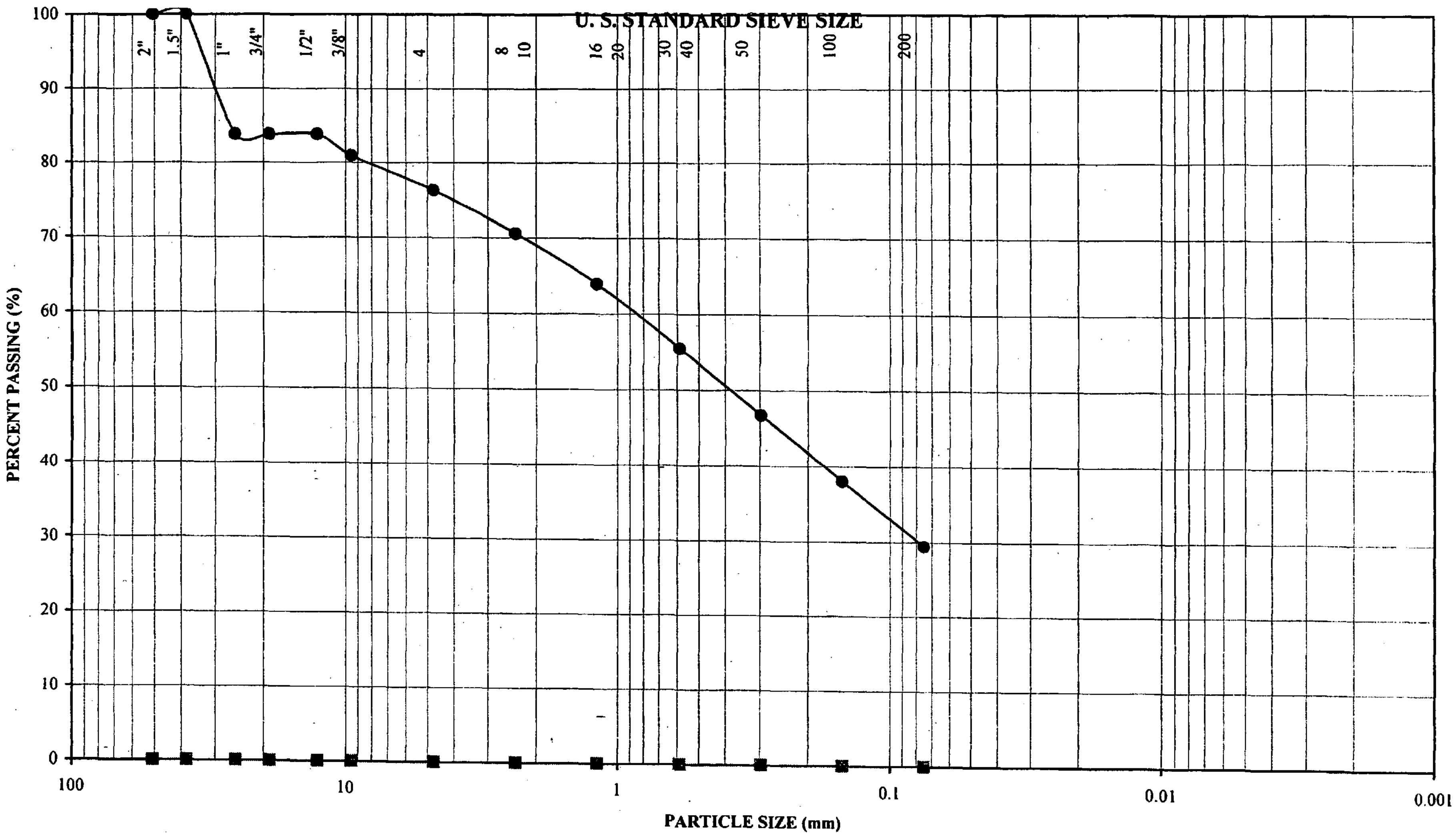
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-4	48-60"	●	NR	NR	SW-SM
		■			

CTE JOB NUMBER: 40-2251



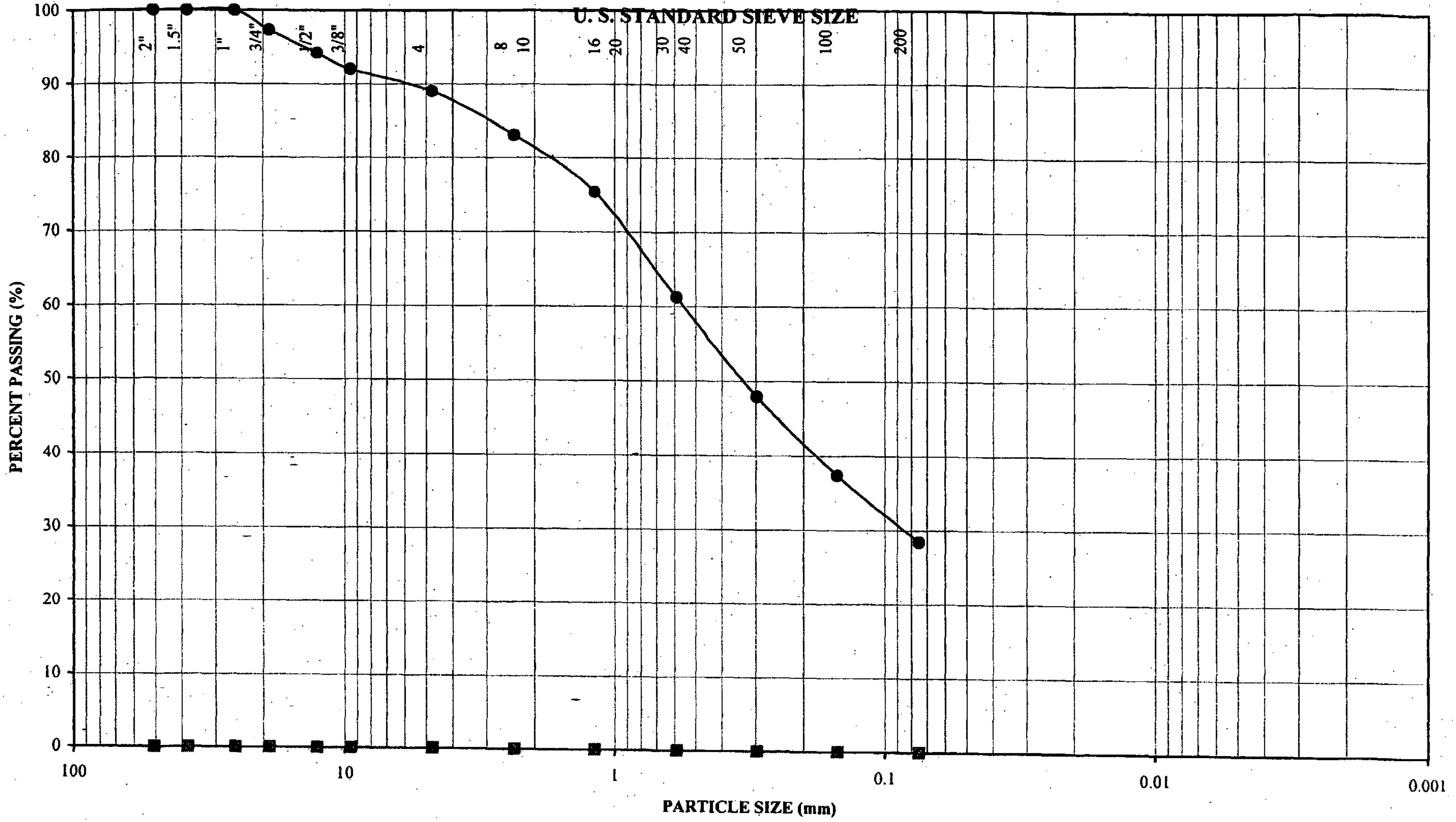
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4186

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-5	0-12"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

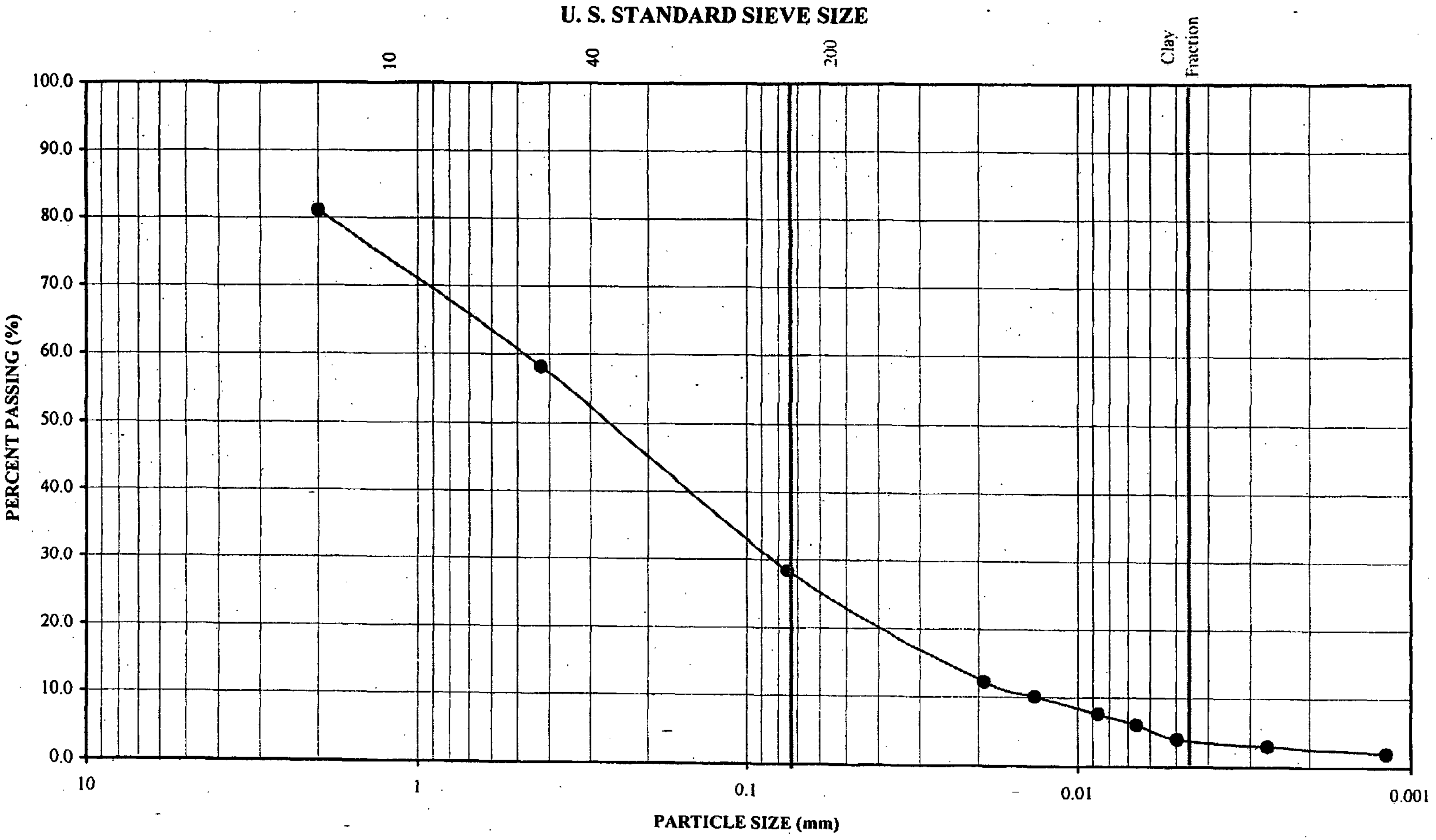


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-5	12-18 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

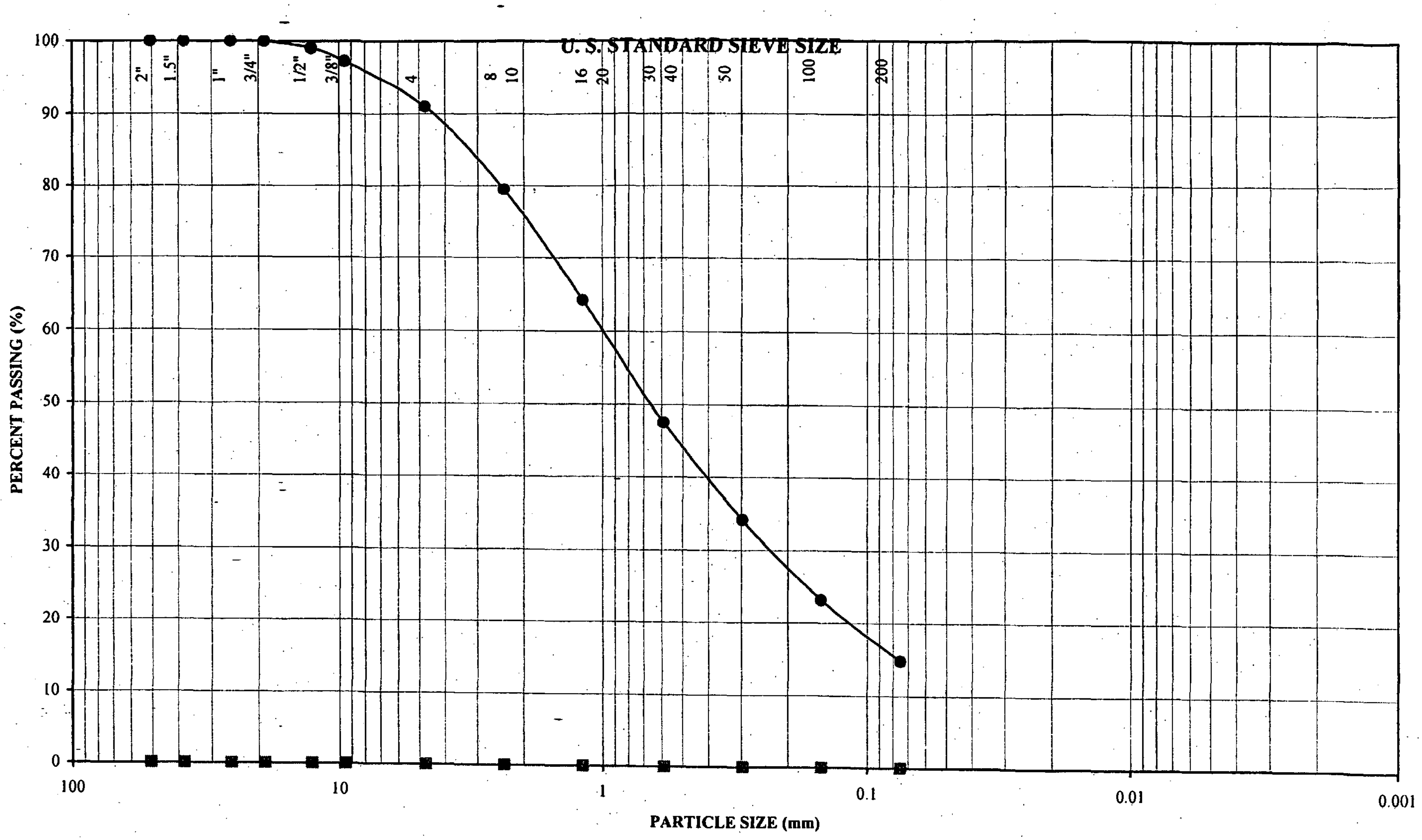


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-5	12-18 inches			SM

CTE JOB NUMBER: 40-2251



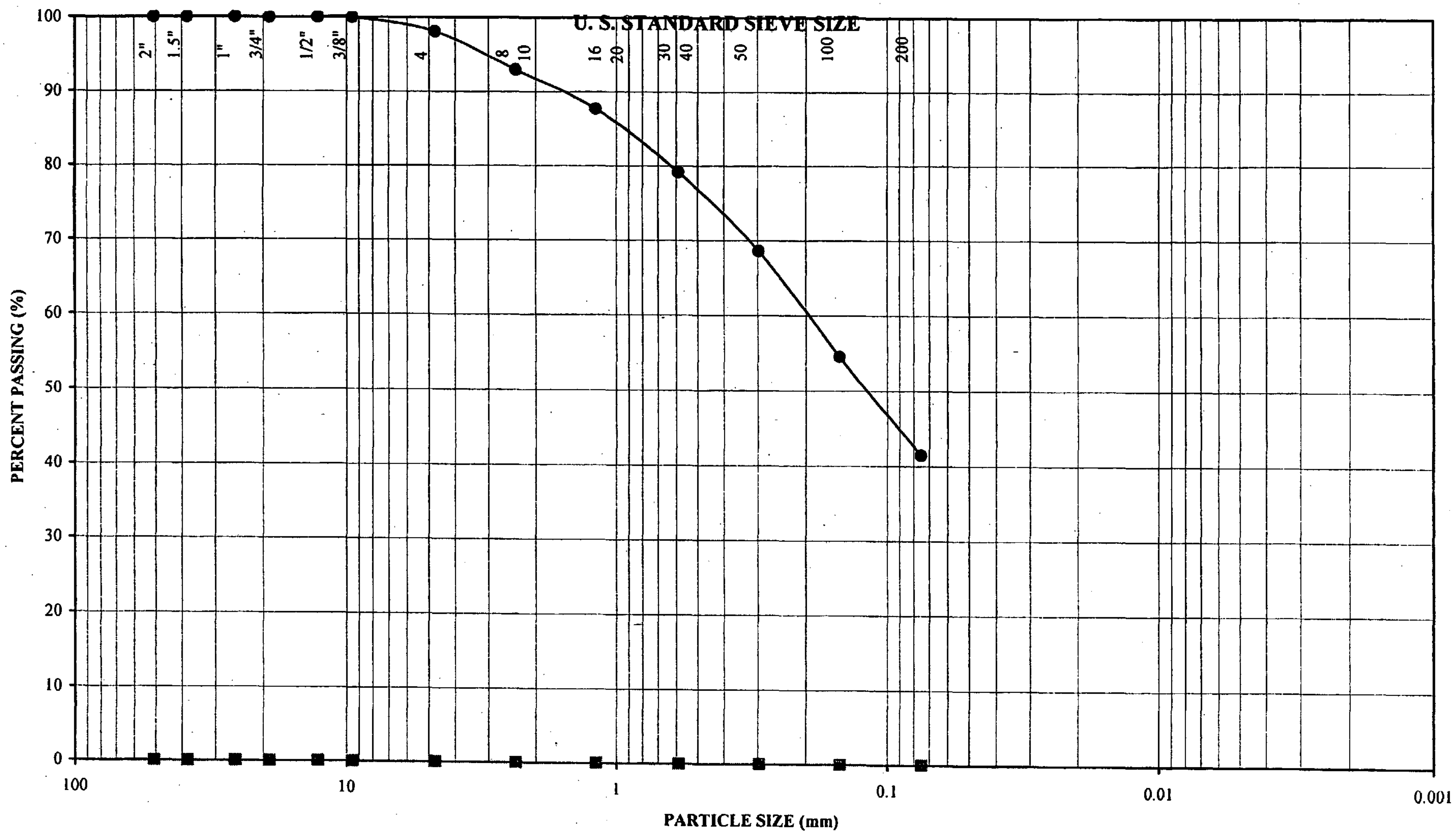
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-5	30-36"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251



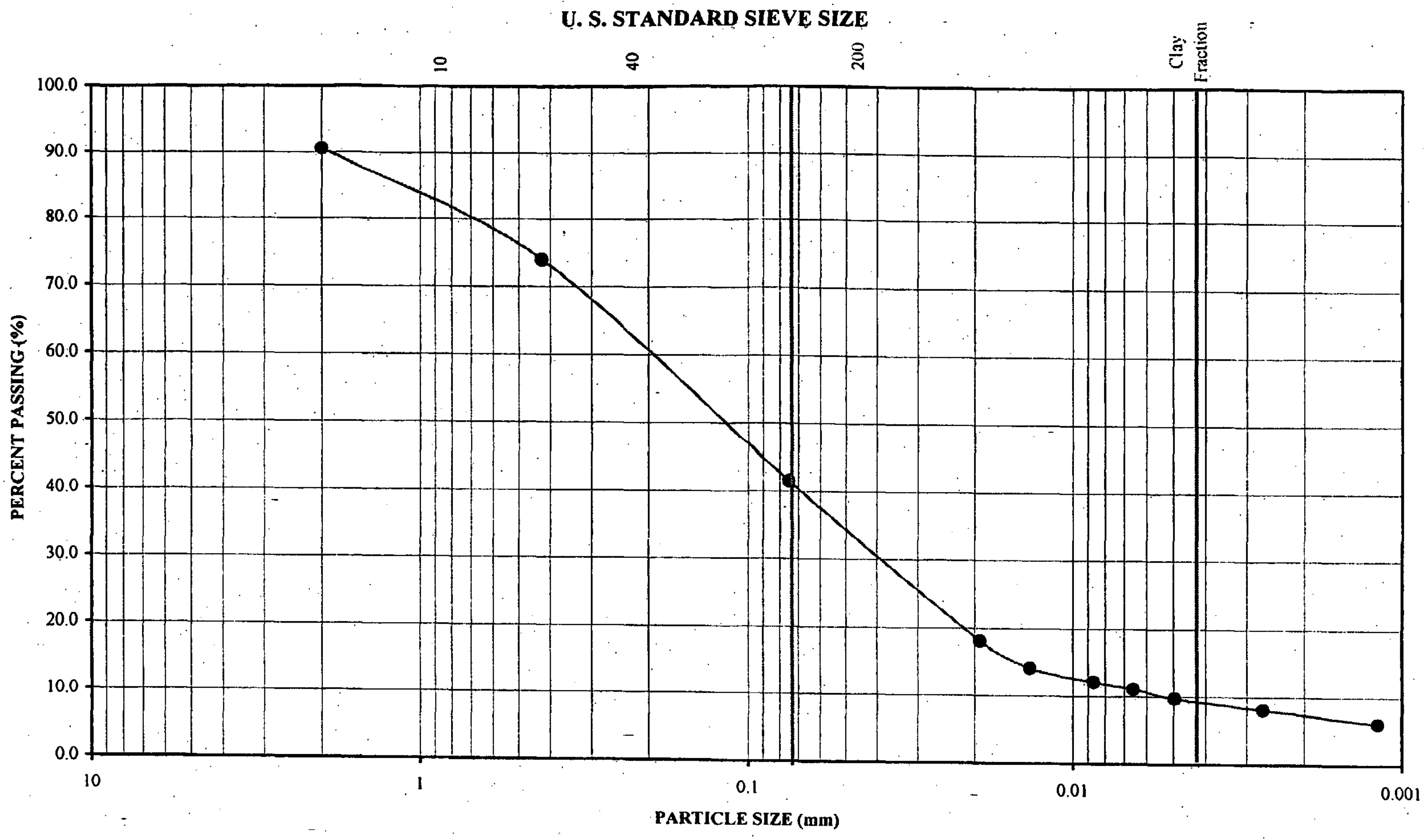
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-6	0-12 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

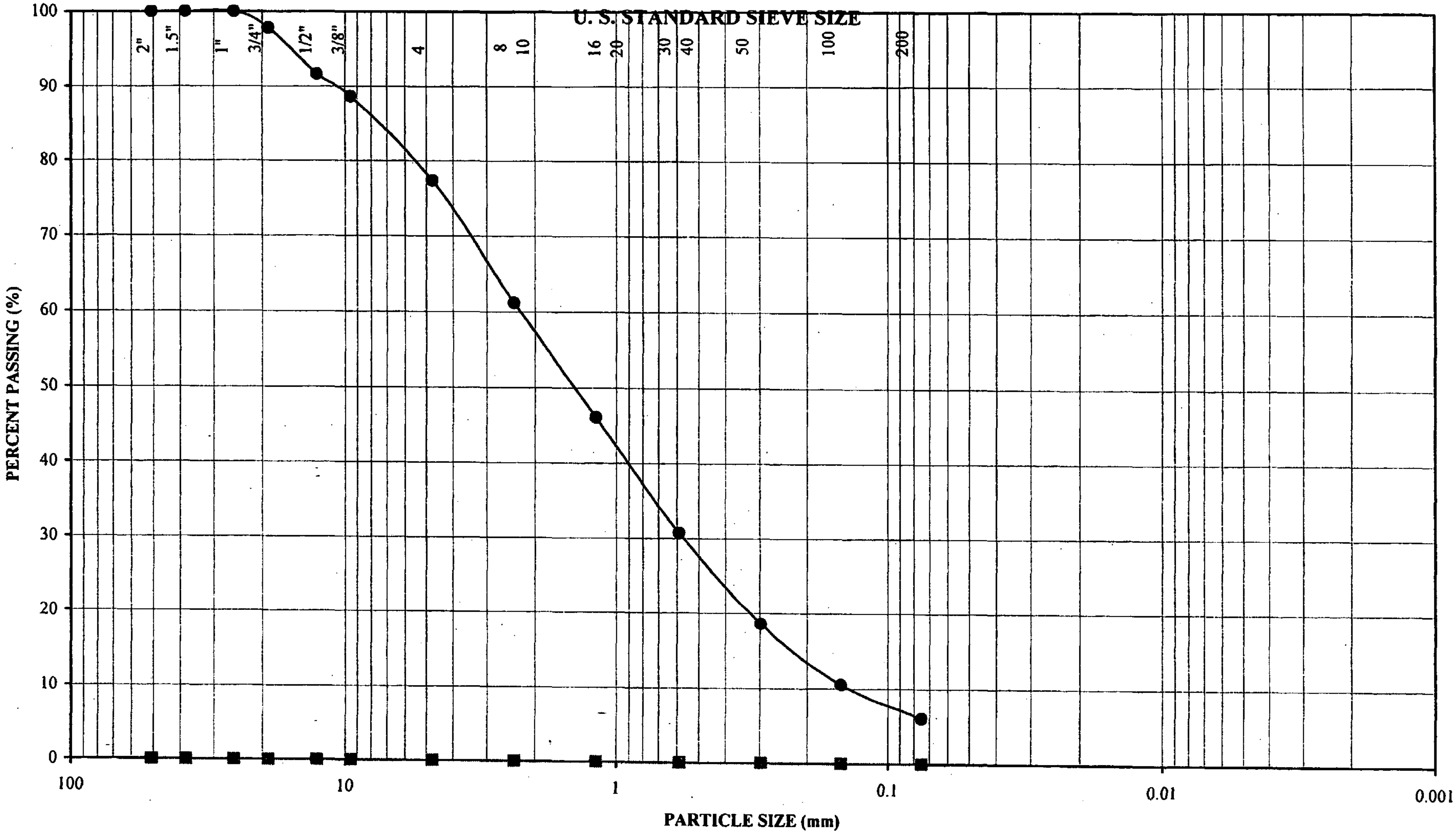


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-6	0-12 inches			SM

CTE JOB NUMBER: 40-2251



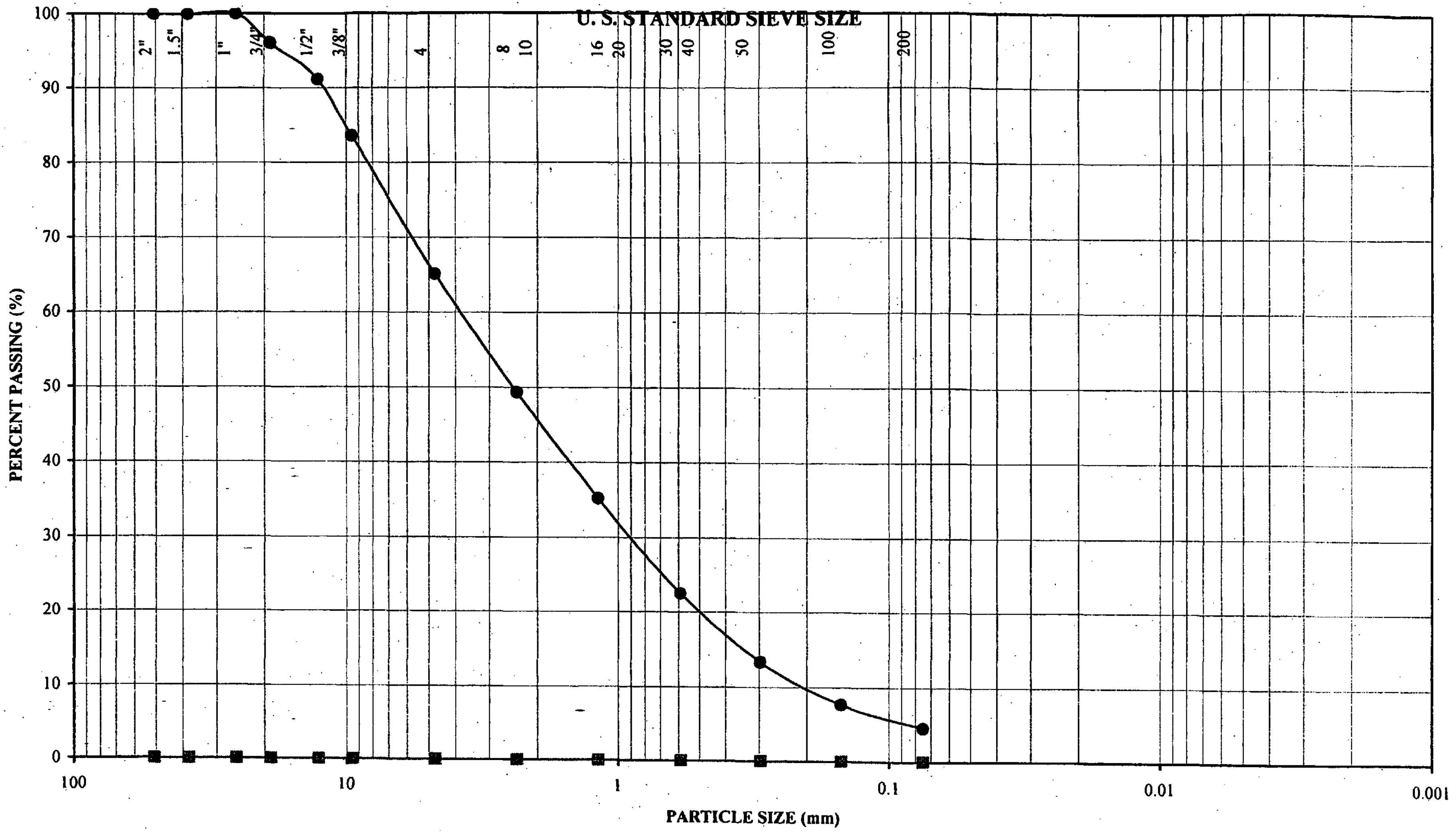
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-6	33-50"	●	NR	NR	SP-SM
		■			

CTE JOB NUMBER: 40-2251

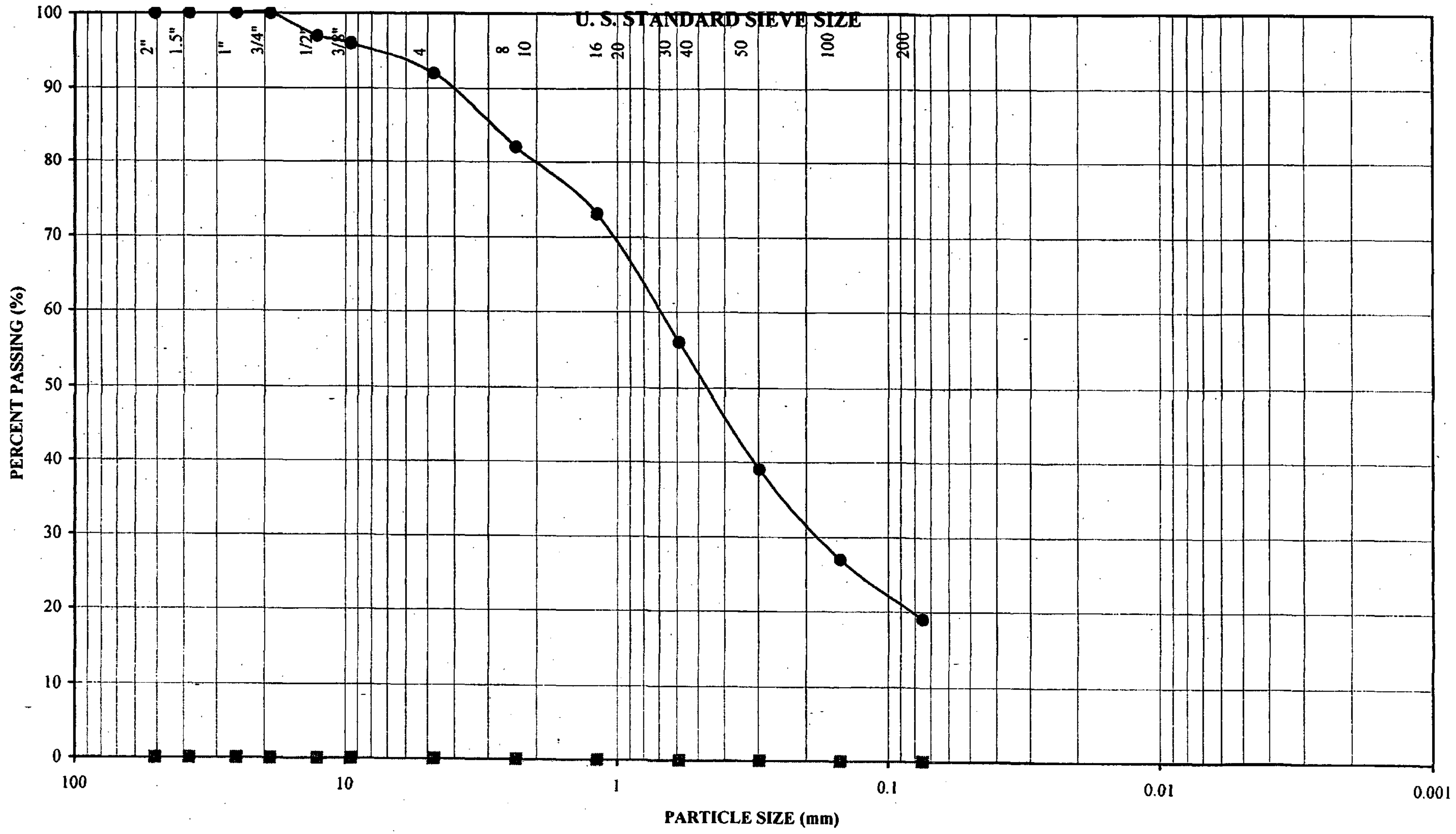


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-6	50-60"	●	NR	NR	SW-SM
		■			

CTE JOB NUMBER: 40-2251

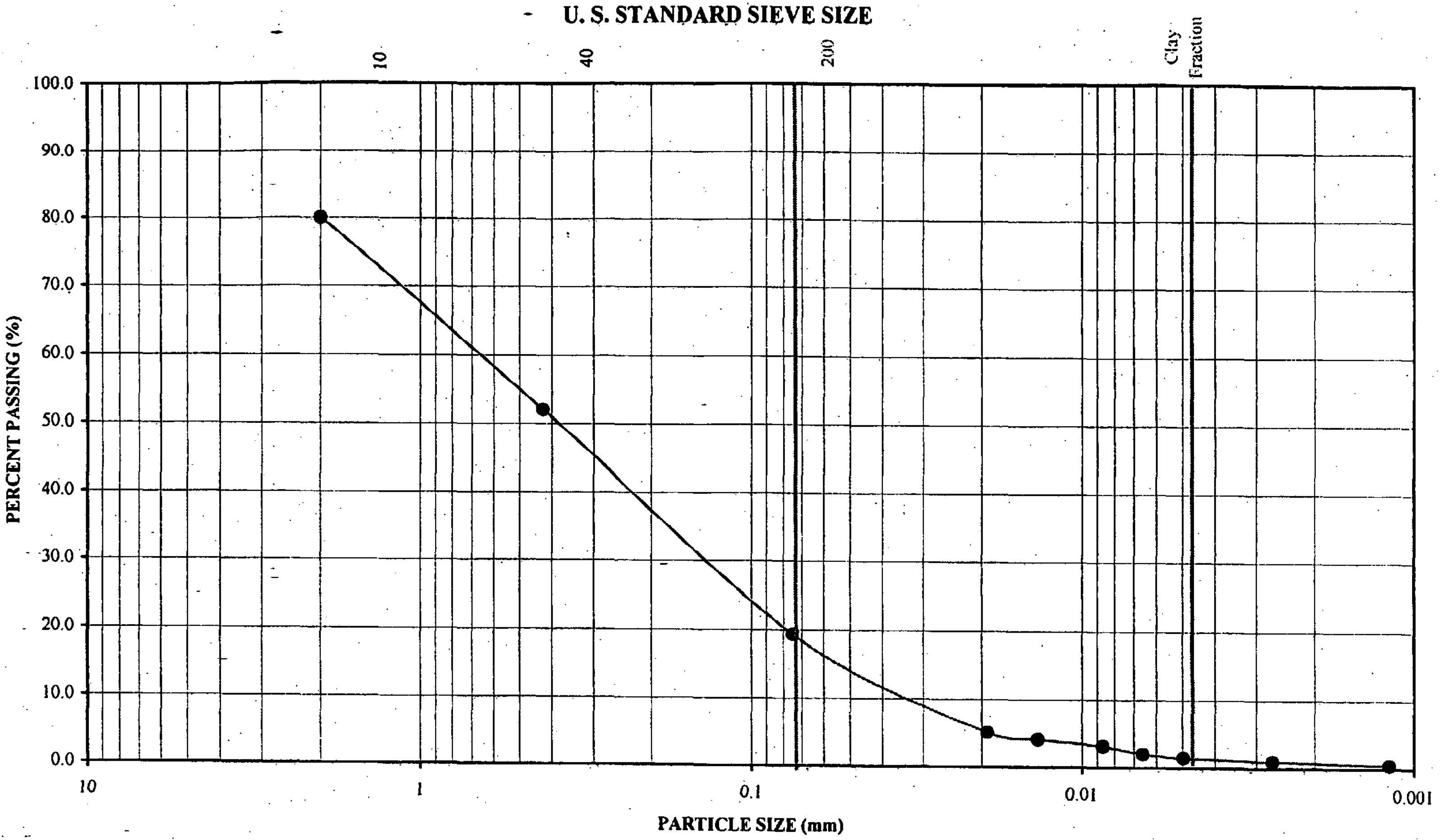


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-7	0-12"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

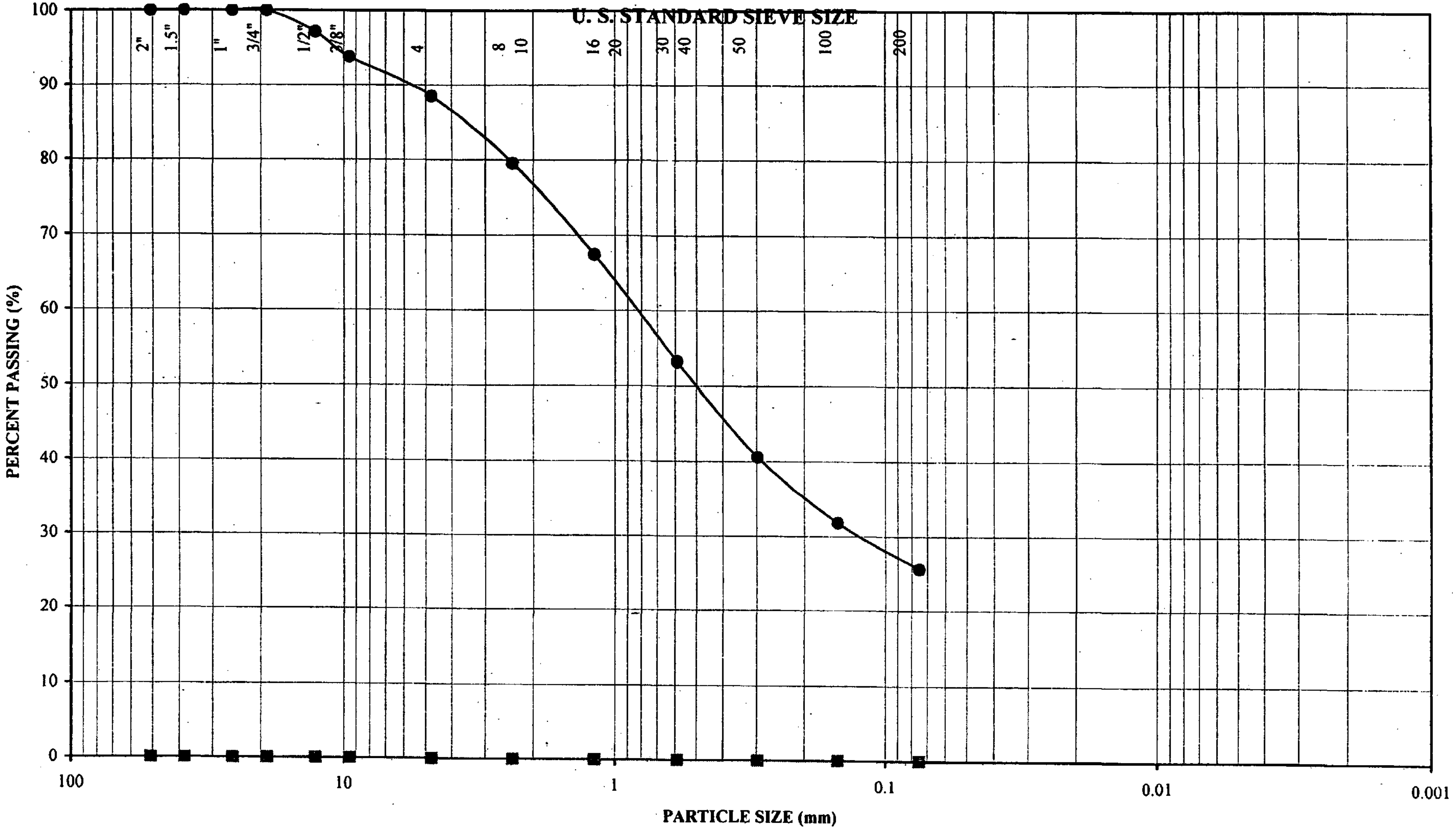


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
[illegible] Meridian Parkway, Suite A • Riverside, CA [illegible]

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-7	0-12 inches			SM

CTE JOB NUMBER: 40-2251



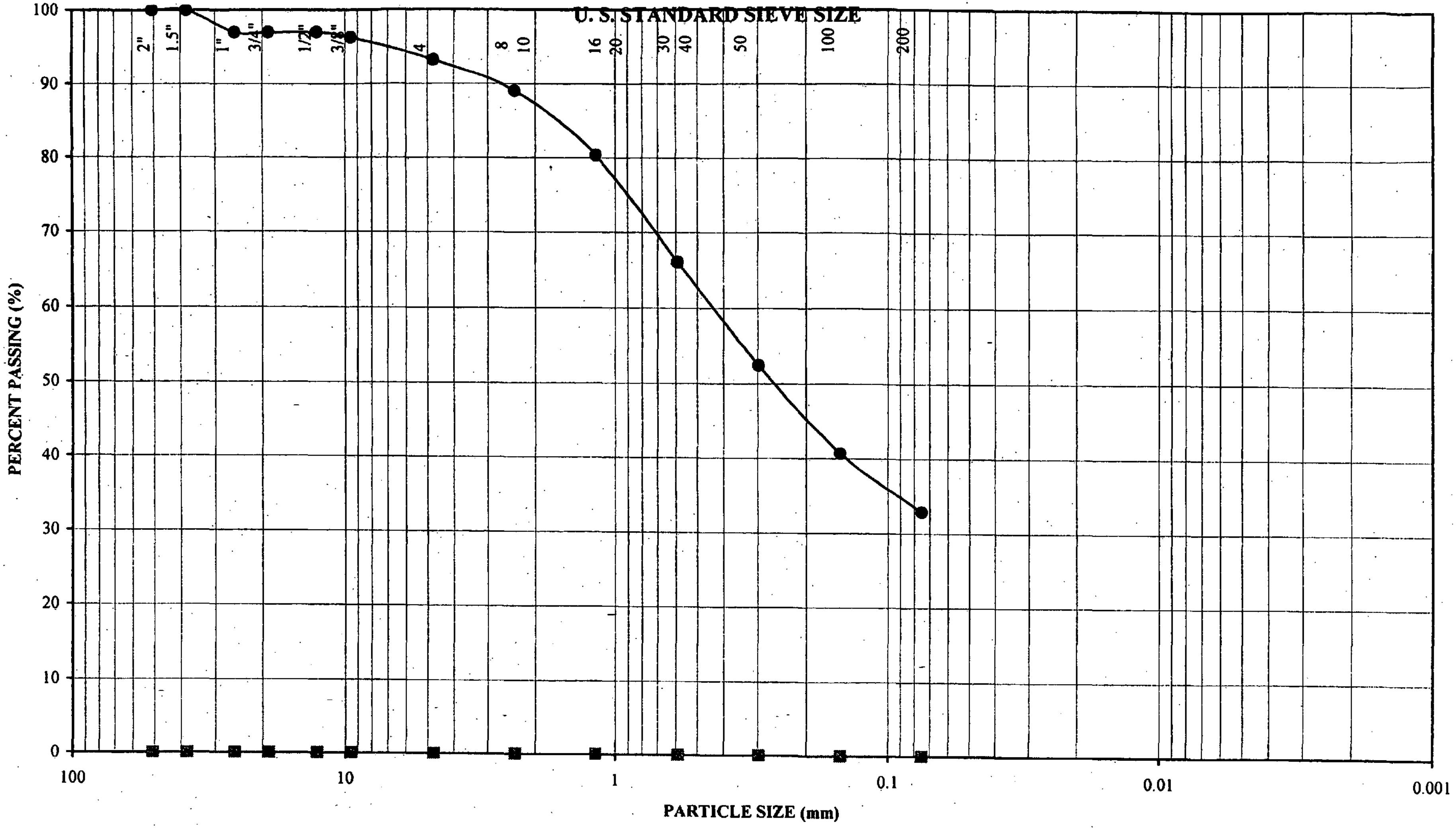
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-7	12-24"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

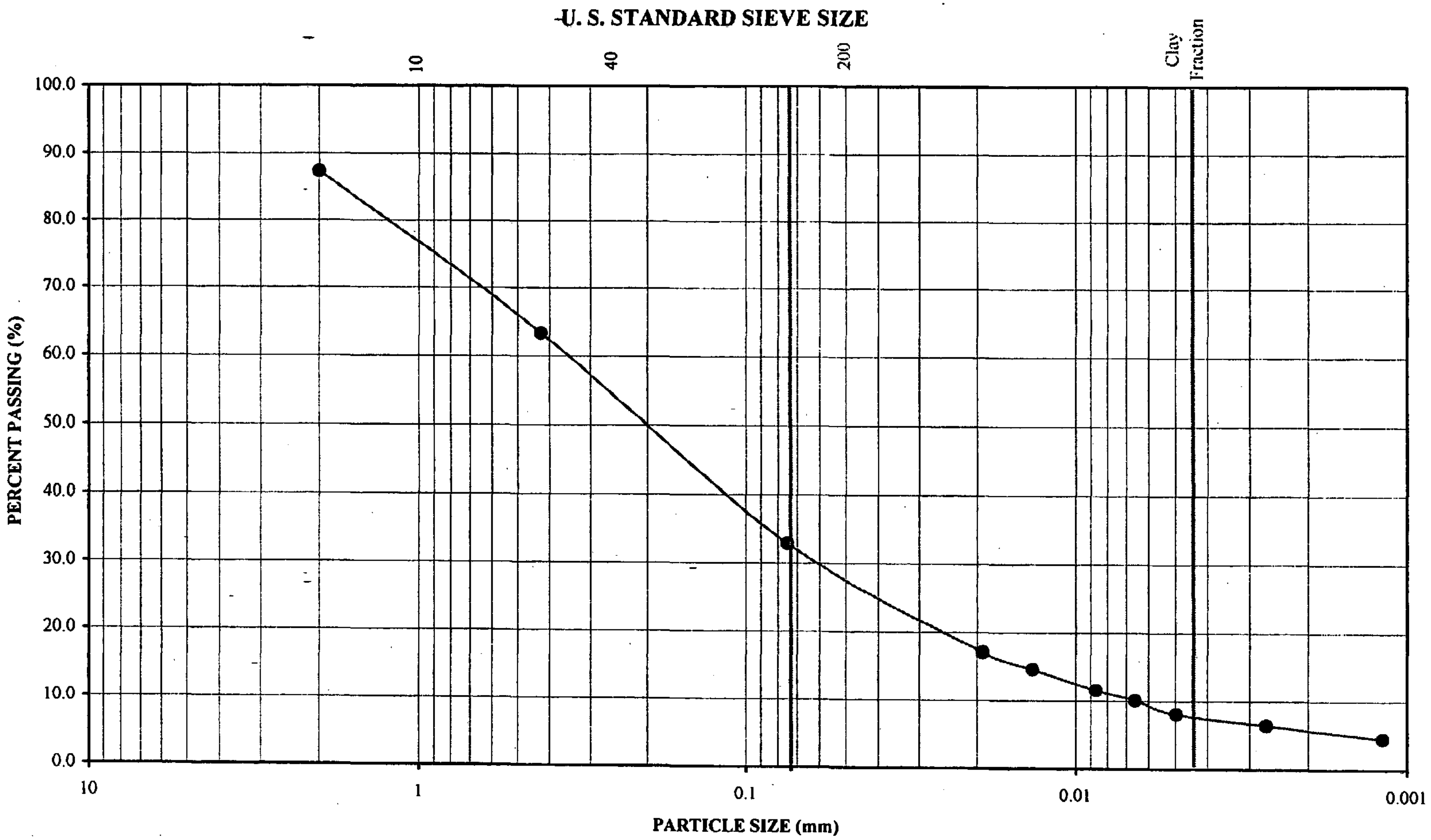


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-8	6-12 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251



PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-8	6-12 inches			SM

CTE JOB NUMBER: 40-2251

LABORATORY TEST RESULTS

BY EARTH SYSTEMS SOUTHWEST
(2007b)

File No.: 11112-02 September 12, 2007
Lab Number: 07-0507

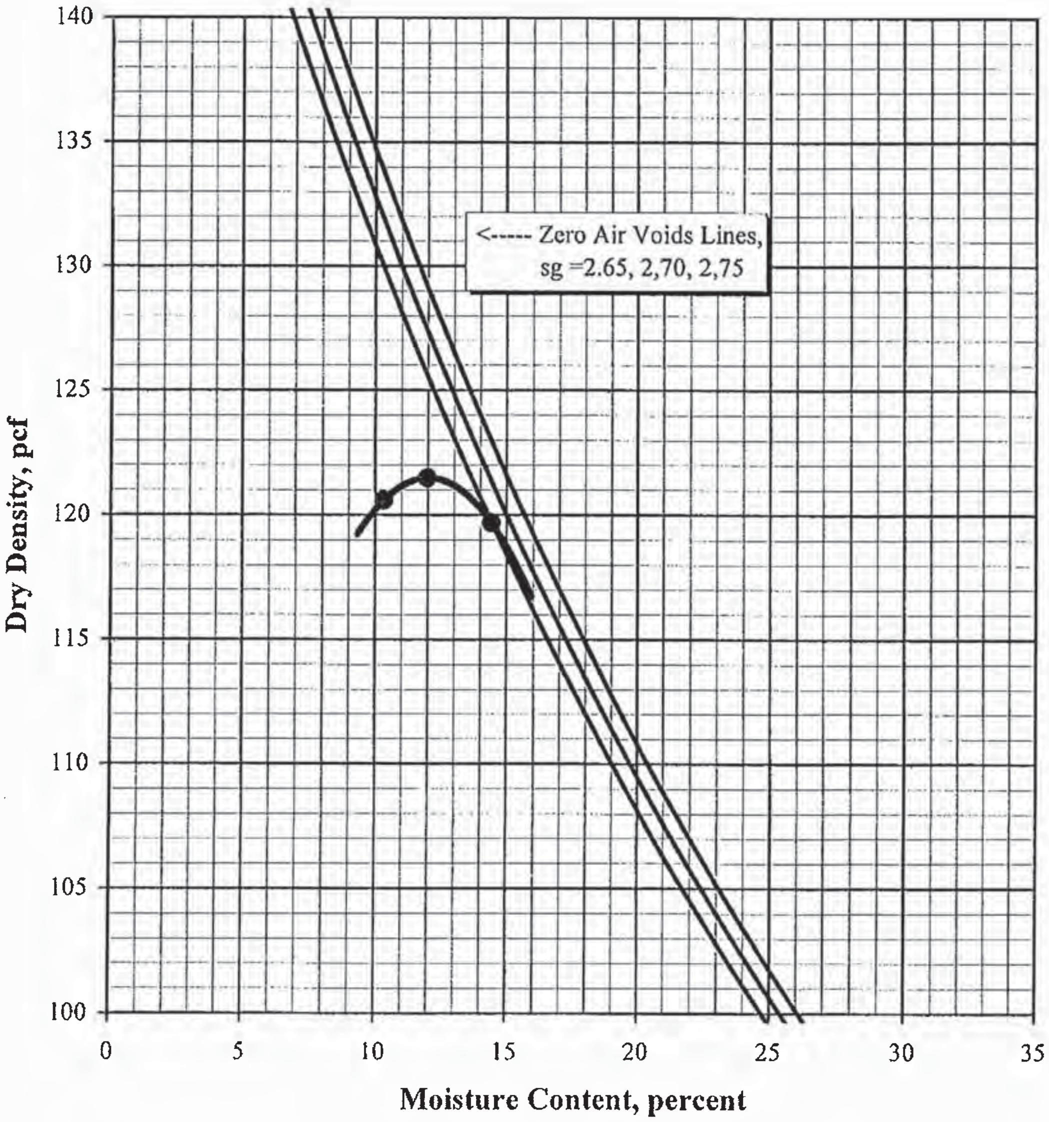
MAXIMUM DENSITY / OPTIMUM MOISTURE ASTM D 1557-02 (Modified)

Job Name: Travertine, La Quinta
Sample ID: 1
Location:
B1 @ 1-4 feet
Description: Yellowish Gray Silty Fine to Coarse Sand w/Gravel (SM)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical

Maximum Density: **121.5 pcf**
Optimum Moisture: **12%**

Sieve Size	% Retained
3/4"	0.6
3/8"	3.3
#4	7.6



LABORATORY TEST RESULTS

BY EARTH SYSTEMS SOUTHWEST
(2007c)

SIEVE ANALYSIS

ASTM C-136

JOB NUMBER: 11112-04

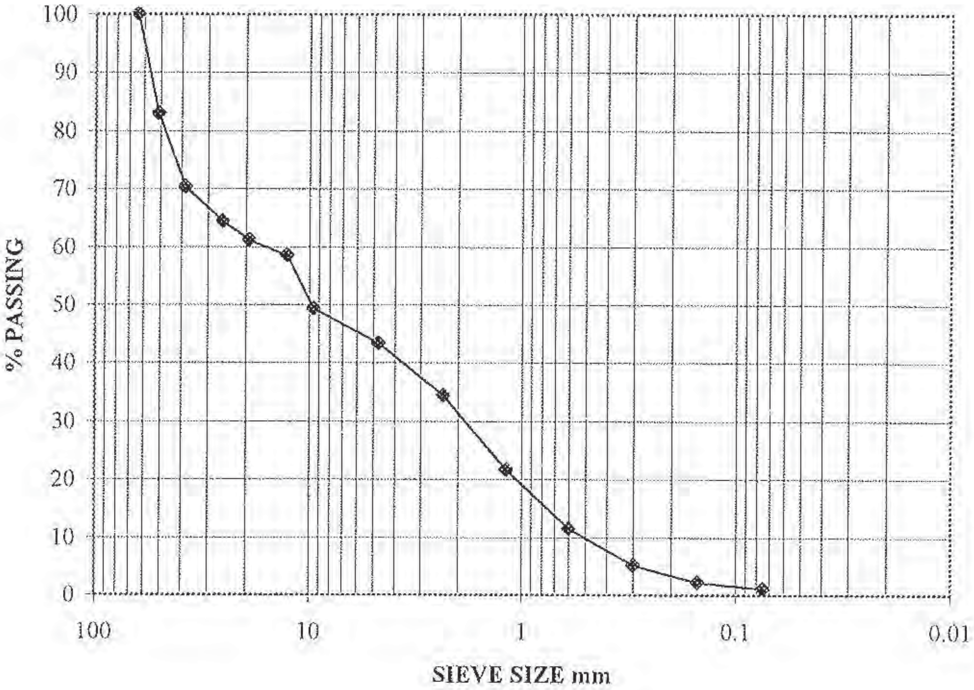
9/24/2007

JOB NAME: Travertine Project, Between Ave 60 & 64, La Quinta

SAMPLE I.D.: Sandy Gravel (GW)

LOCATION: S2 @ 1 feet

SIEVE SIZE	% PASSING
2 1/2"	100
2"	83
1 1/2"	70
1"	64
3/4"	61
1/2"	58
3/8"	49
#4	43
#8	34
#16	22
#30	12
#50	5
#100	2
#200	1.1



EARTH SYSTEMS CONSULTANTS SOUTHWEST

SIEVE ANALYSIS

ASTM C-136

JOB NUMBER: 11112-04

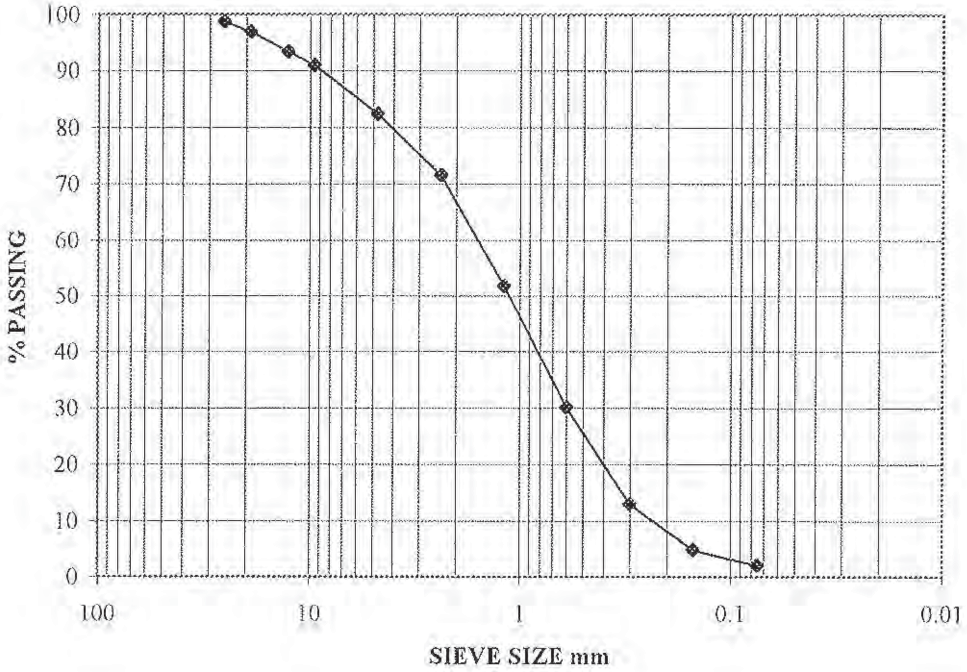
9/24/2007

JOB NAME: Travertine Project, Between Ave 60 & 64, La Quinta

SAMPLE I.D.: Well Graded Sand w/Gravel (SW)

LOCATION: S3 @ 1 feet

SIEVE SIZE	% PASSING
1 1/2"	100.0
1"	98.7
3/4"	96.9
1/2"	93.3
3/8"	91.0
#4	82.3
#8	71.5
#16	51.7
#30	30.1
#50	13.0
#100	4.8
#200	2.1



SIEVE ANALYSIS

ASTM C-136

JOB NUMBER: 11112-04

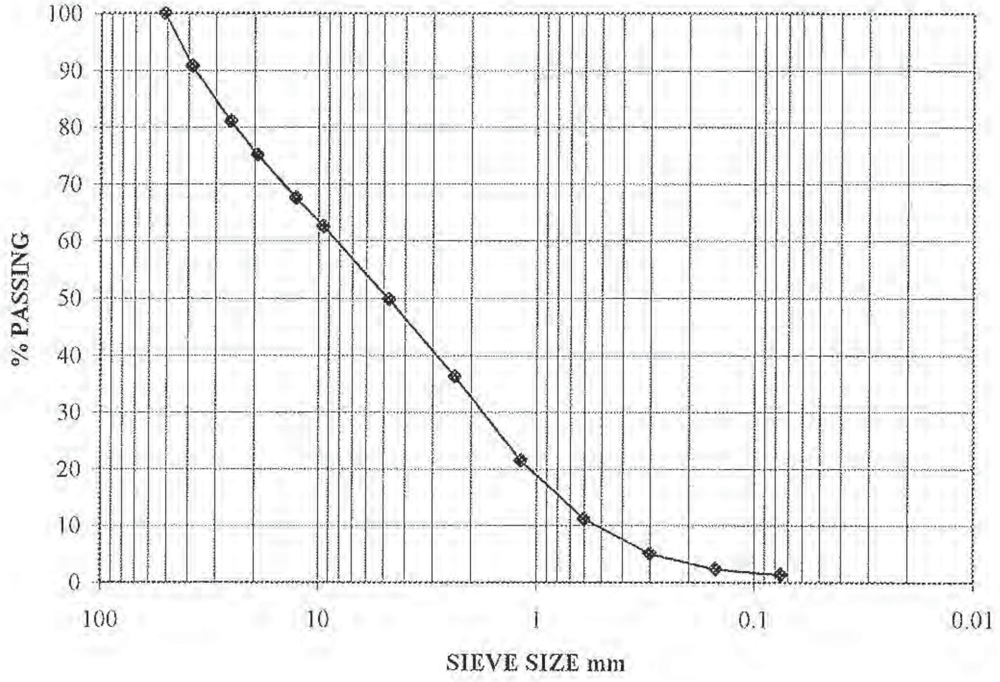
9/24/2007

JOB NAME: Travertine Project, Between Ave 60 & 64, La Quinta

SAMPLE I.D.: Gravelly Sand (GW/SW)

LOCATION: S5 @ 1 feet

SIEVE SIZE	% PASSING
2"	100
1 1/2"	91
1"	81
3/4"	75
1/2"	68
3/8"	62
#4	50
#8	36
#16	21
#30	11
#50	5
#100	2
#200	1.3



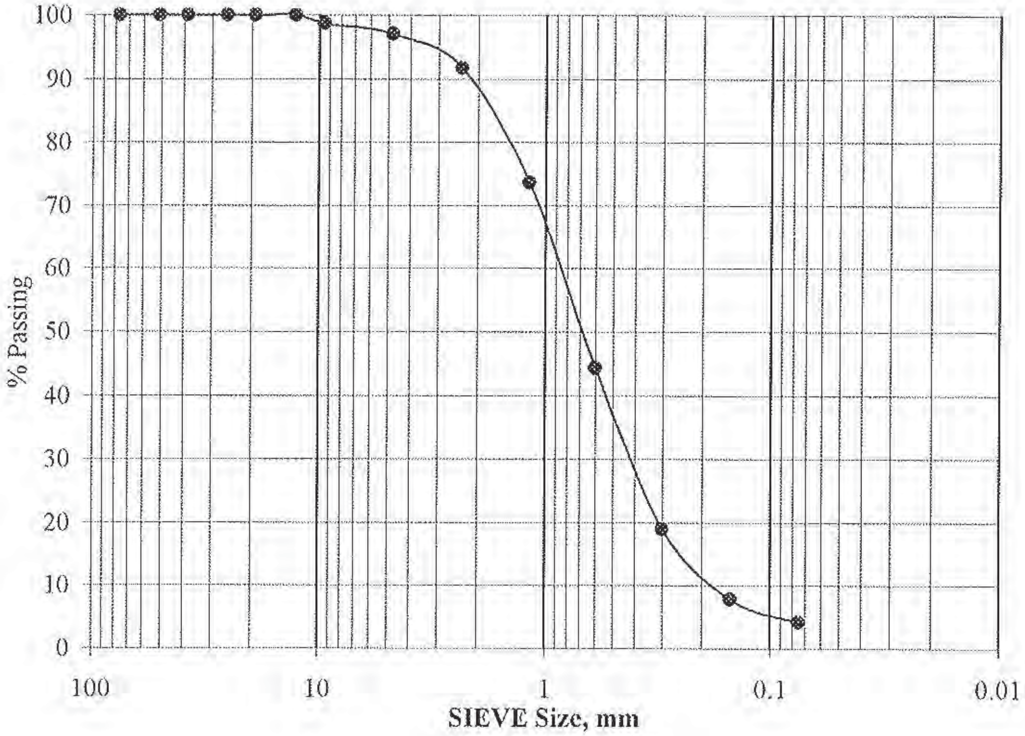
File No.: 11112-04 September 24, 2007

SIEVE ANALYSIS

ASTM C-136

Job Name: Travertine Project, Between Ave 60 & 64, La Quinta
Sample ID: S6 @ 1 feet
Description: Poorly Graded Sand (SP)

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	99
#4	97
#8	92
#16	74
#30	44
#50	19
#100	8
#200	4



PARTICLE SIZE ANALYSIS

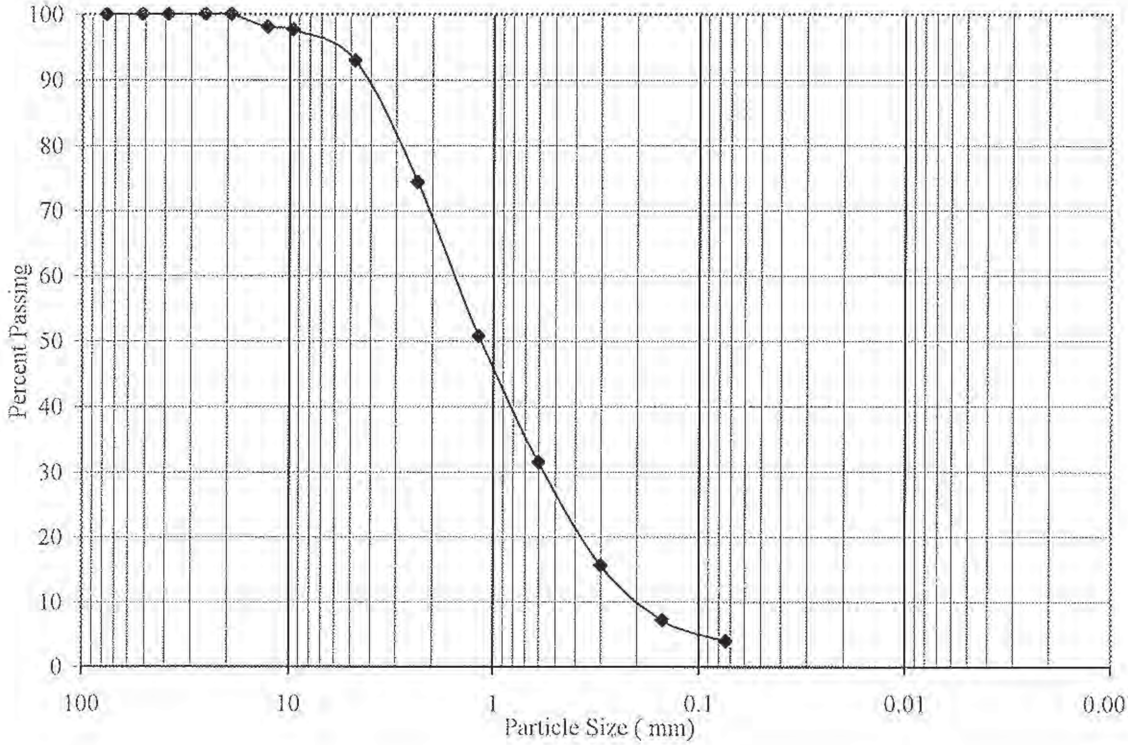
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #4 - 2-4 feet**
Description: **Well Graded Sand w/Gravel (SW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	98
3/8"	98
#4	93
#8	74
#16	51
#30	31
#50	16
#100	7
#200	4

% Gravel:	**7**
% Sand:	**89**
% Silt:	**1**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

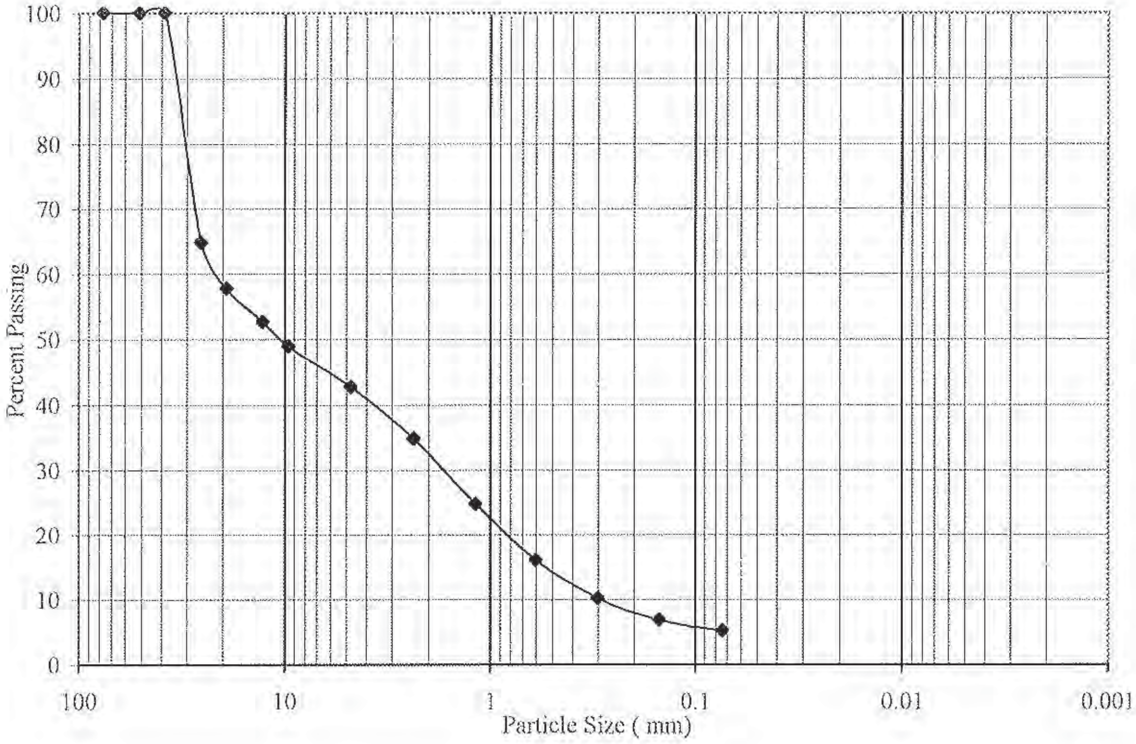
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #14 - 1-3 feet**
Description: **Sandy Gravel (GW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	65
3/4"	58
1/2"	53
3/8"	49
#4	43
#8	35
#16	25
#30	16
#50	10
#100	7
#200	5

% Gravel:	**57**
% Sand:	**38**
% Silt:	**3**
% Clay (3 micron):	**2**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

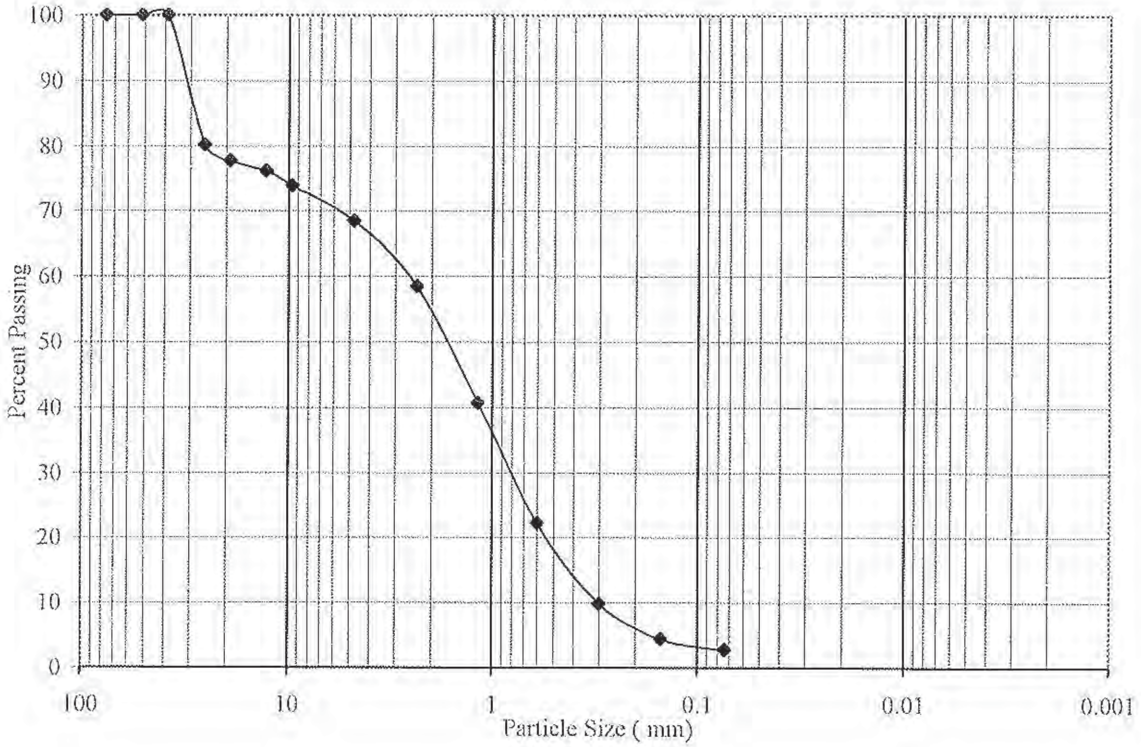
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #17 - 4-5 feet**
Description: **Gravelly Sand (SW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	80
3/4"	78
1/2"	76
3/8"	74
#4	68
#8	58
#16	41
#30	22
#50	10
#100	4
#200	3

% Gravel:	**32**
% Sand:	**66**
% Silt:	**0**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

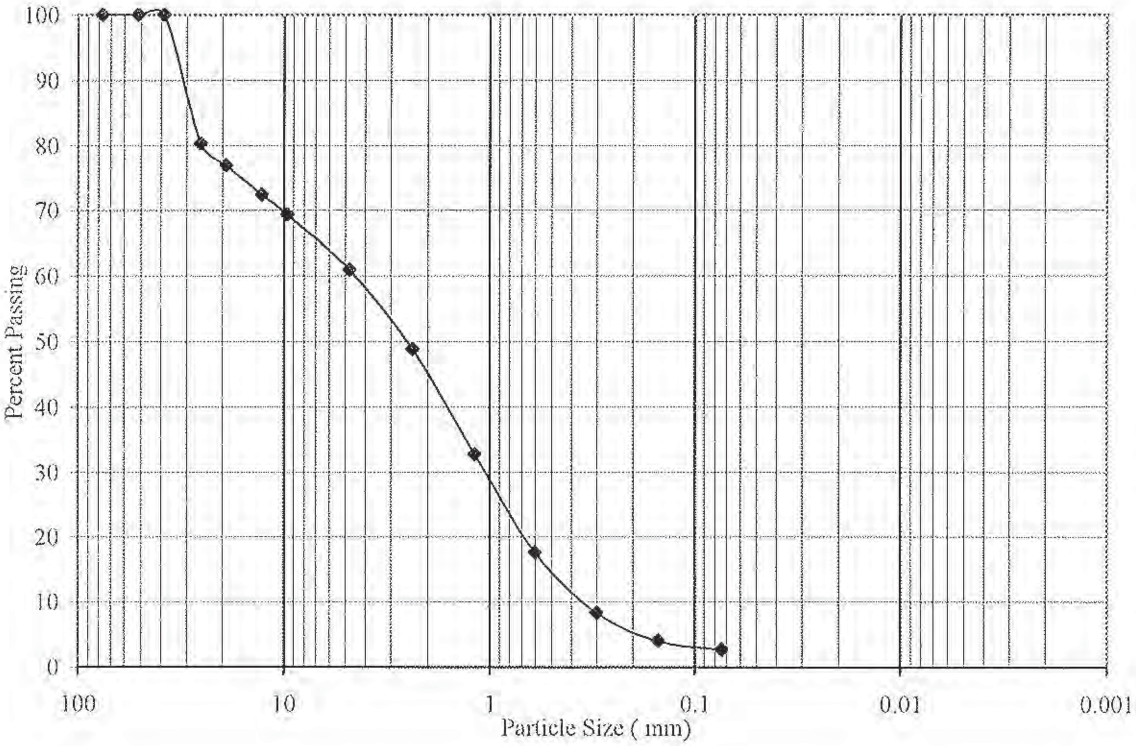
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #19 - 2.5-4 feet**
Description: **Gravelly Sand (SW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	80
3/4"	77
1/2"	72
3/8"	69
#4	61
#8	49
#16	33
#30	18
#50	8
#100	4
#200	3

% Gravel:	**39**
% Sand:	**58**
% Silt:	**0**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

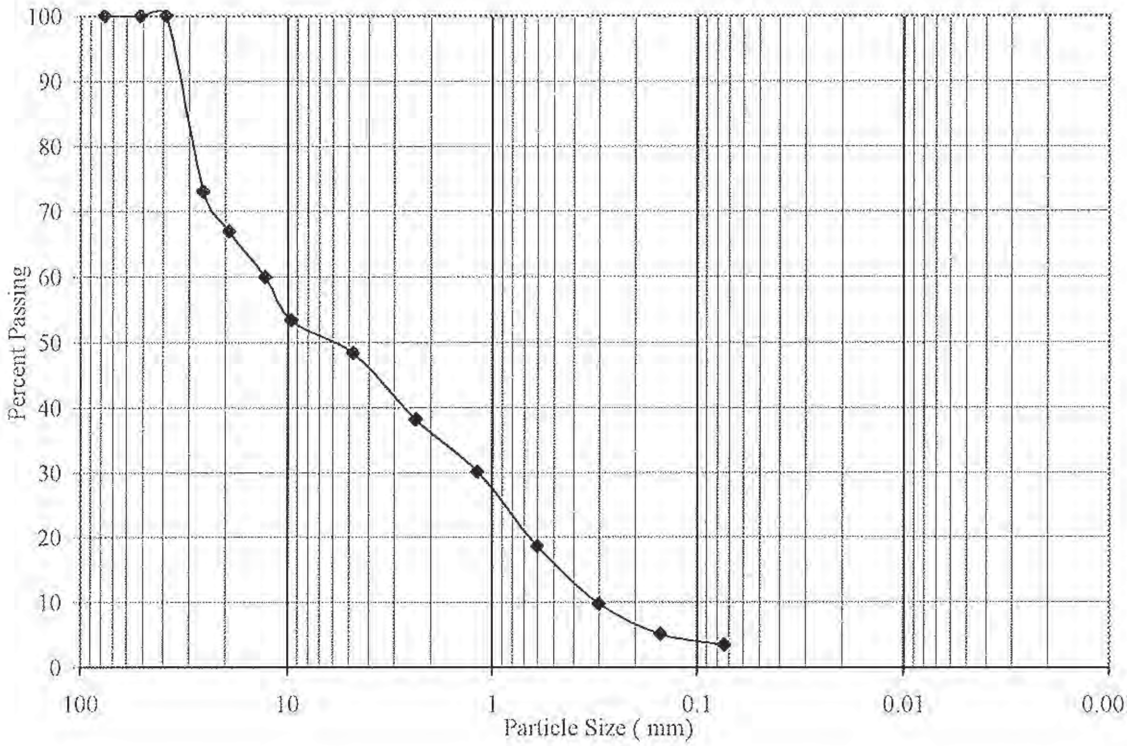
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #26 - 5-6 feet**
Description: **Sandy Gravel (GW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	73
3/4"	67
1/2"	60
3/8"	53
#4	48
#8	38
#16	30
#30	19
#50	10
#100	5
#200	3

% Gravel:	**52**
% Sand:	**45**
% Silt:	**1**
% Clay (3 micron):	**2**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

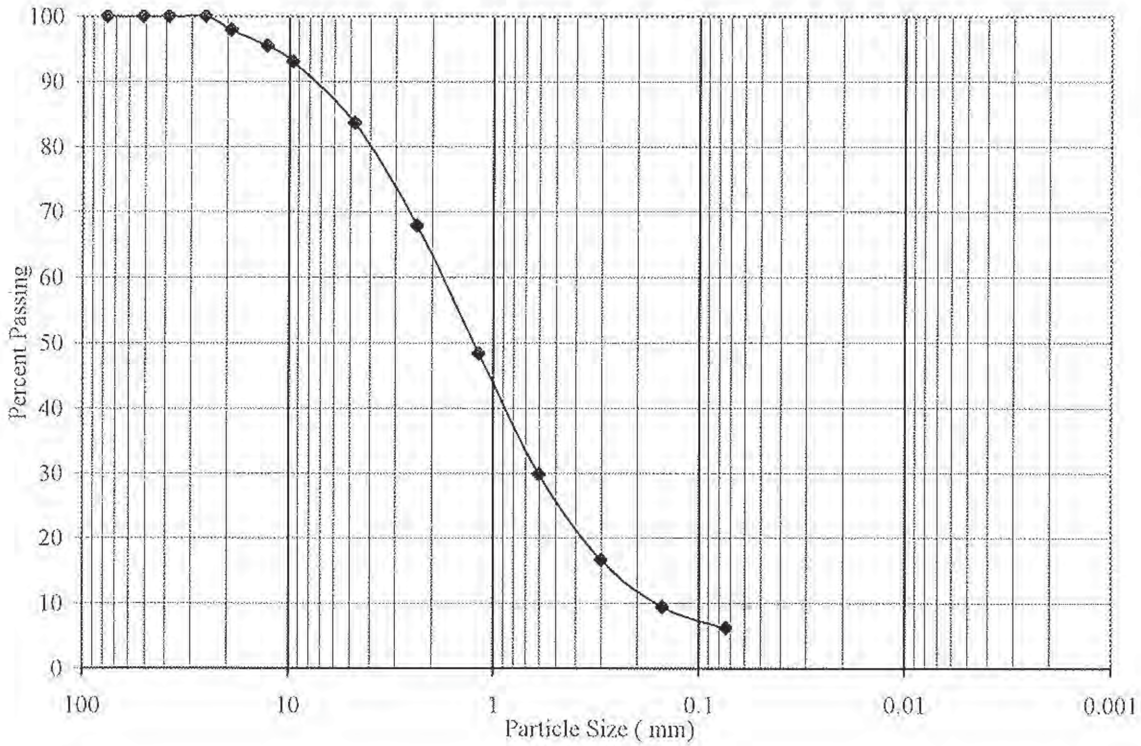
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #29 - 4-6 feet**
Description: **Well Graded Sand w/Silt (SW-SM)**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	98
1/2"	95
3/8"	93
#4	84
#8	68
#16	48
#30	30
#50	17
#100	9
#200	6

% Gravel:	**16**
% Sand:	**77**
% Silt:	**2**
% Clay (3 micron):	**4**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

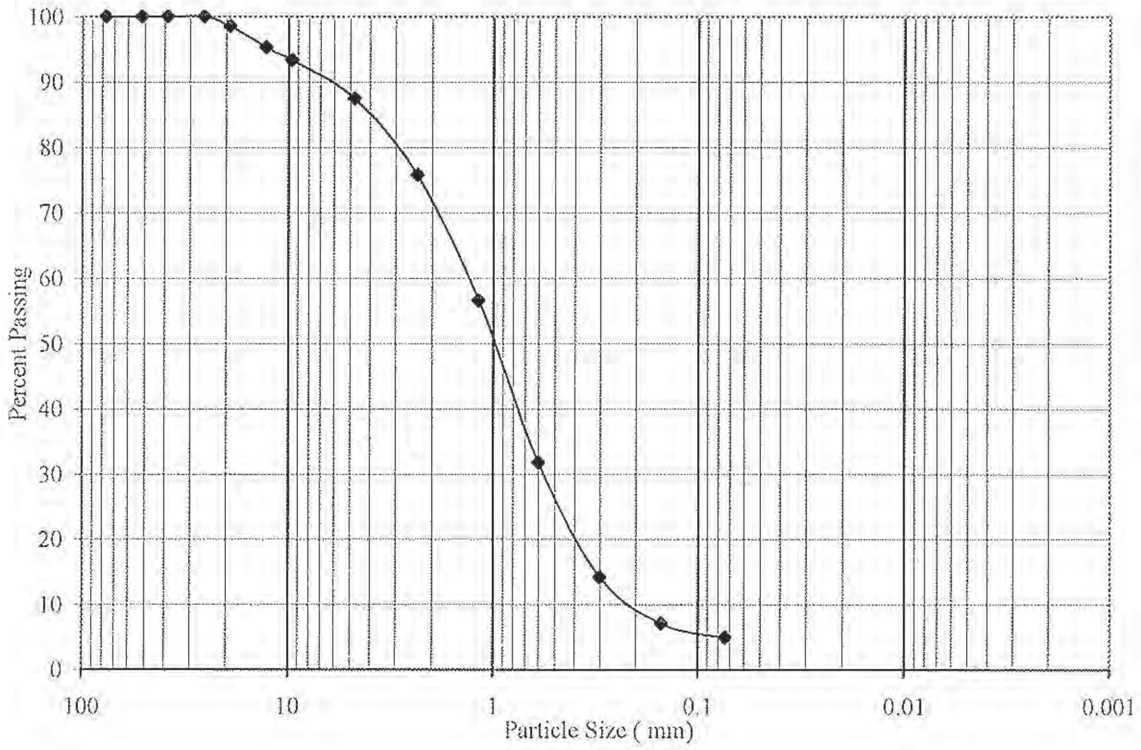
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #32 - 3-5 feet**
Description: **Well Graded Sand w/Silt (SW-SM)**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	99
1/2"	95
3/8"	93
#4	87
#8	76
#16	57
#30	32
#50	14
#100	7
#200	5

% Gravel:	**13**
% Sand:	**83**
% Silt:	**1**
% Clay (3 micron):	**4**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

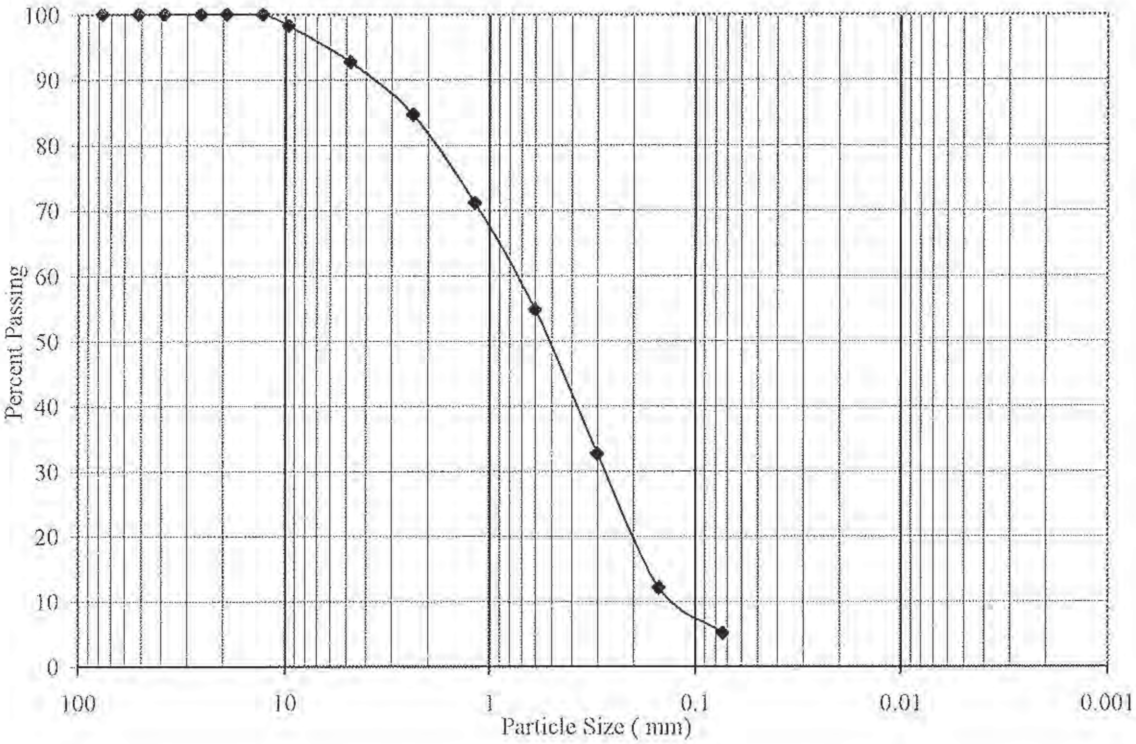
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #35 - 1-3 feet**
Description: **0.0**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	98
#4	93
#8	85
#16	71
#30	55
#50	33
#100	12
#200	5

% Gravel:	7
% Sand:	**87**
% Silt:	**2**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



November 21, 2007

PARTICLE SIZE ANALYSIS

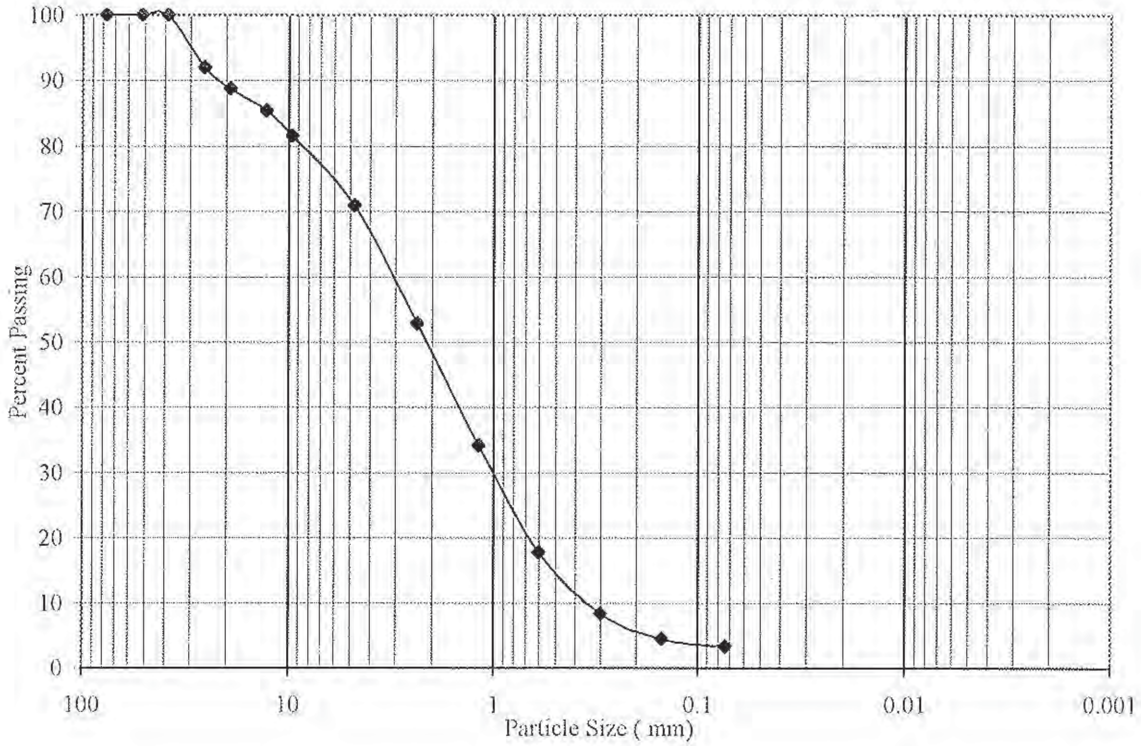
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #37 - 4-7 feet**
Description: **Gravelly Sand (SW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	92
3/4"	89
1/2"	85
3/8"	82
#4	71
#8	53
#16	34
#30	18
#50	8
#100	5
#200	3

% Gravel:	**29**
% Sand:	**68**
% Silt:	**0**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

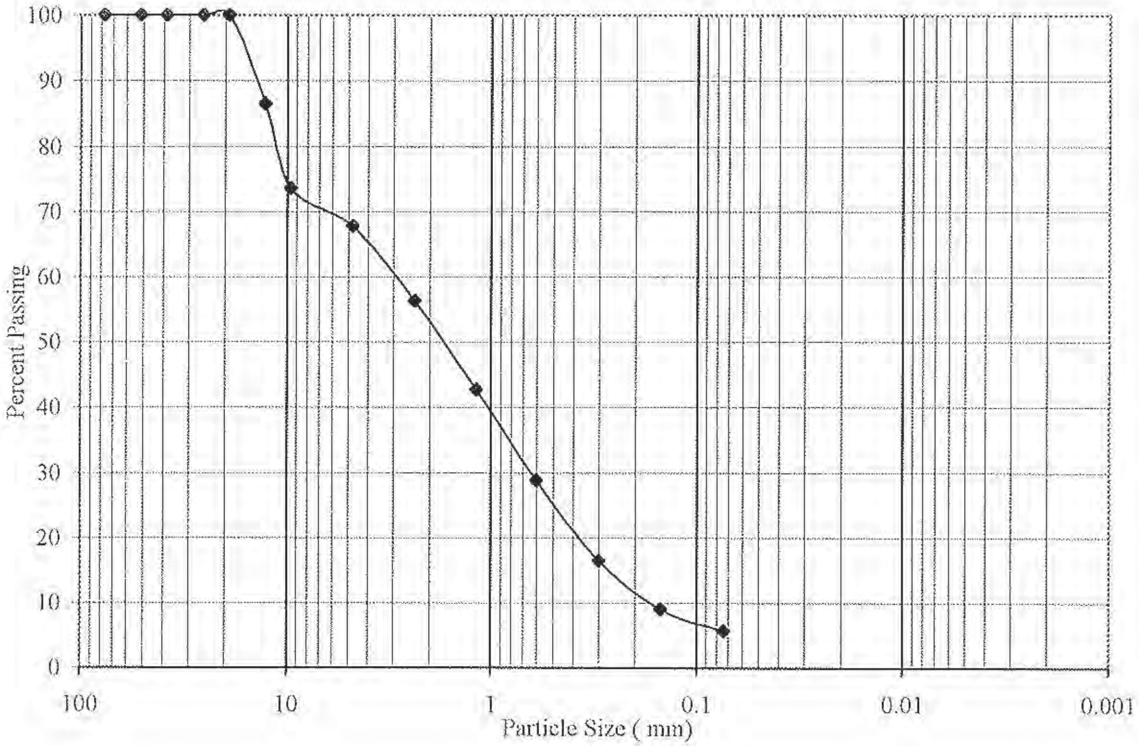
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #41 - 3-5 feet**
Description: **Gravelly Sand w/Silt (SW-SM)**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	86
3/8"	74
#4	68
#8	56
#16	43
#30	29
#50	17
#100	9
#200	6

% Gravel:	**32**
% Sand:	**62**
% Silt:	**2**
% Clay (3 micron):	**4**

(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

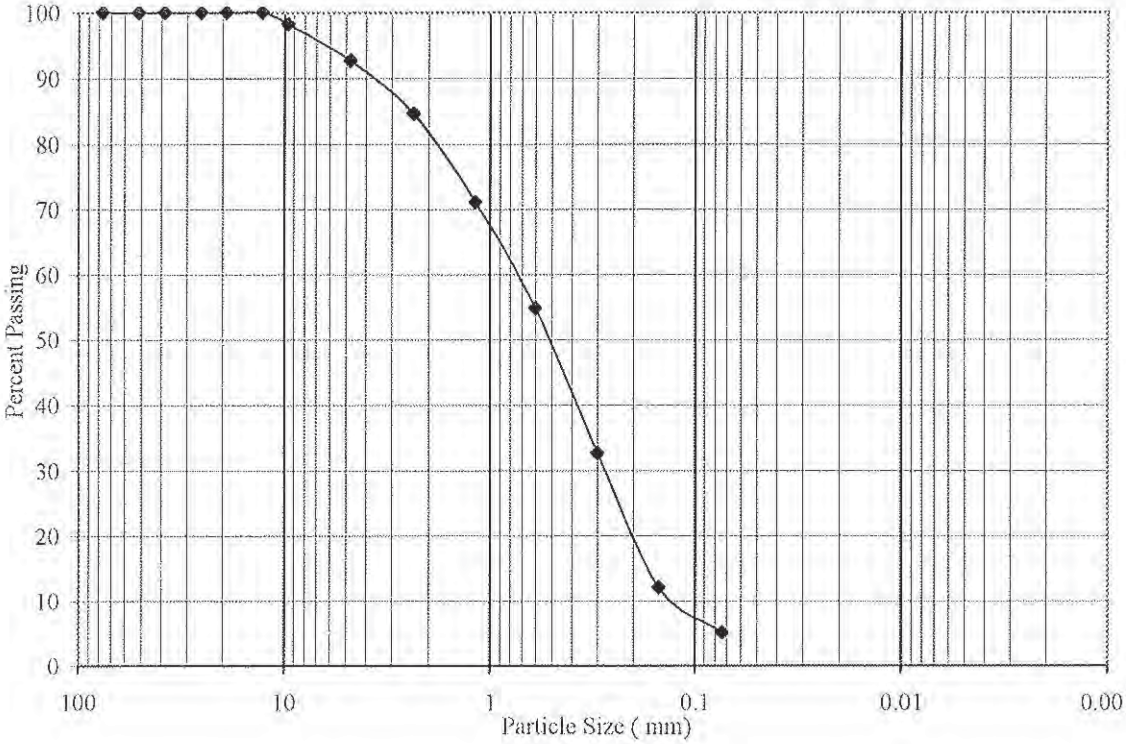
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #45 - 2-4 feet**
Description: **0.0**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	98
#4	93
#8	85
#16	71
#30	55
#50	33
#100	12
#200	5

% Gravel:	**7**
% Sand:	**87**
% Silt:	**2**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

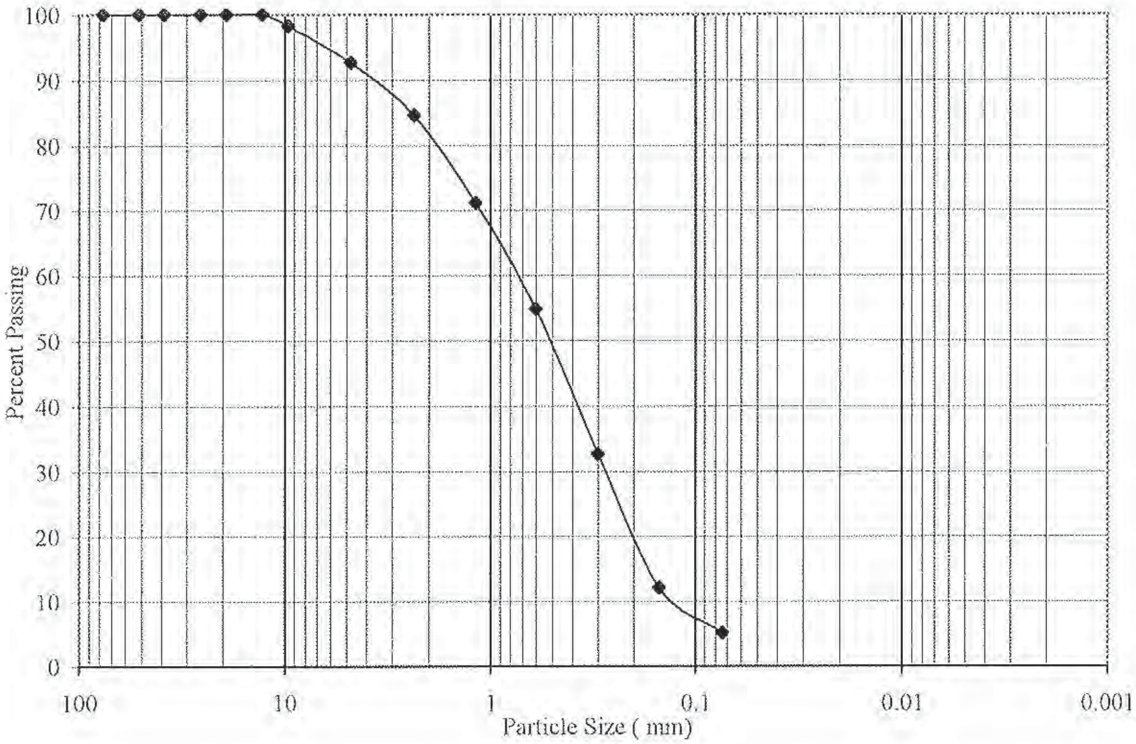
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #47 - 10-12 feet**
Description: **0.0**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	98
#4	93
#8	85
#16	71
#30	55
#50	33
#100	12
#200	5

% Gravel:	**7**
% Sand:	**87**
% Silt:	**2**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

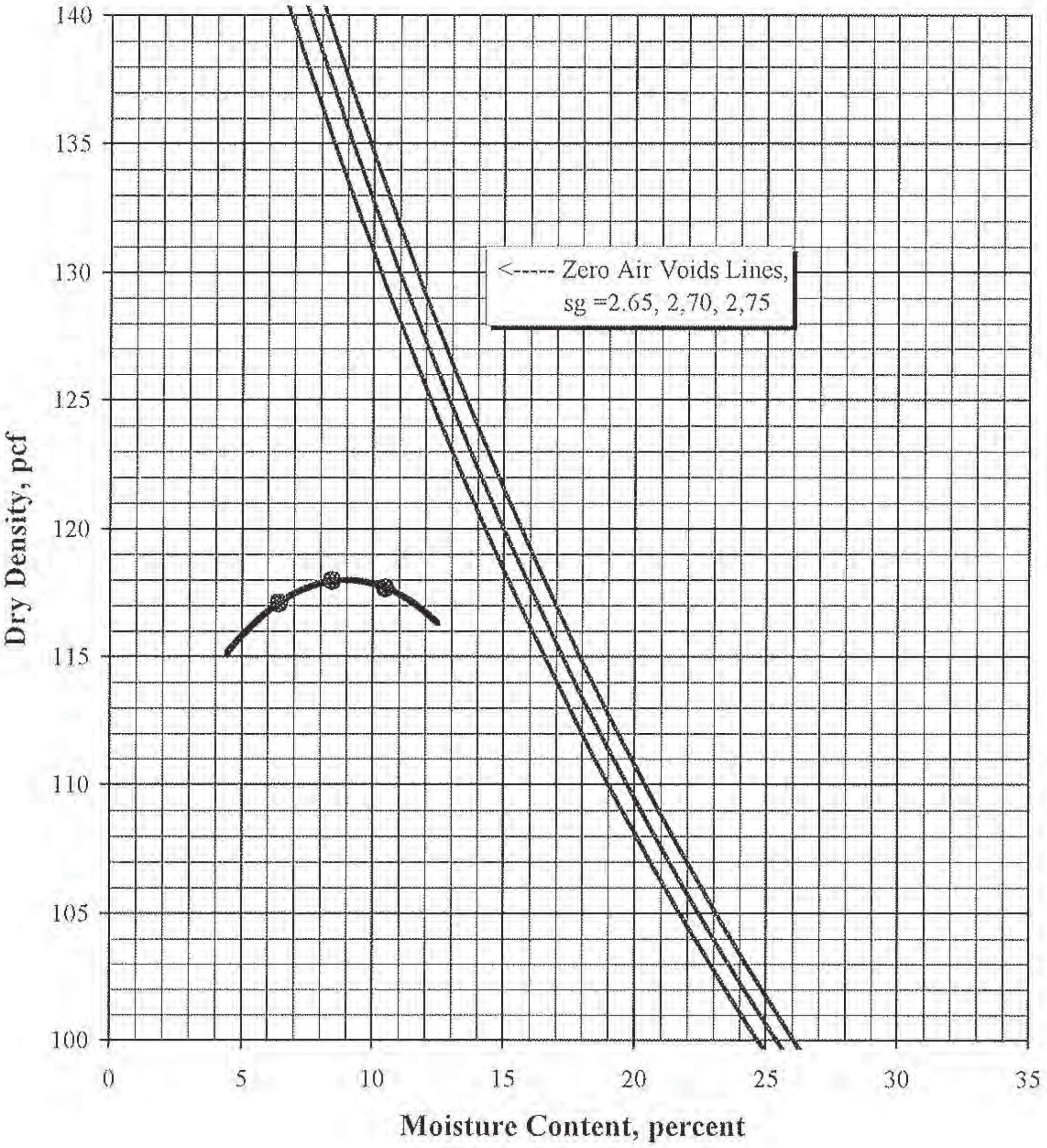
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 1
Location: Test Pit #4 - 2-4 feet
Description: Well Graded Sand w/Gravel (SW)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **118 pcf**
Optimum Moisture: **9%**

Sieve Size	% Retained
3/4"	0.4
3/8"	2.4
#4	9.5



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

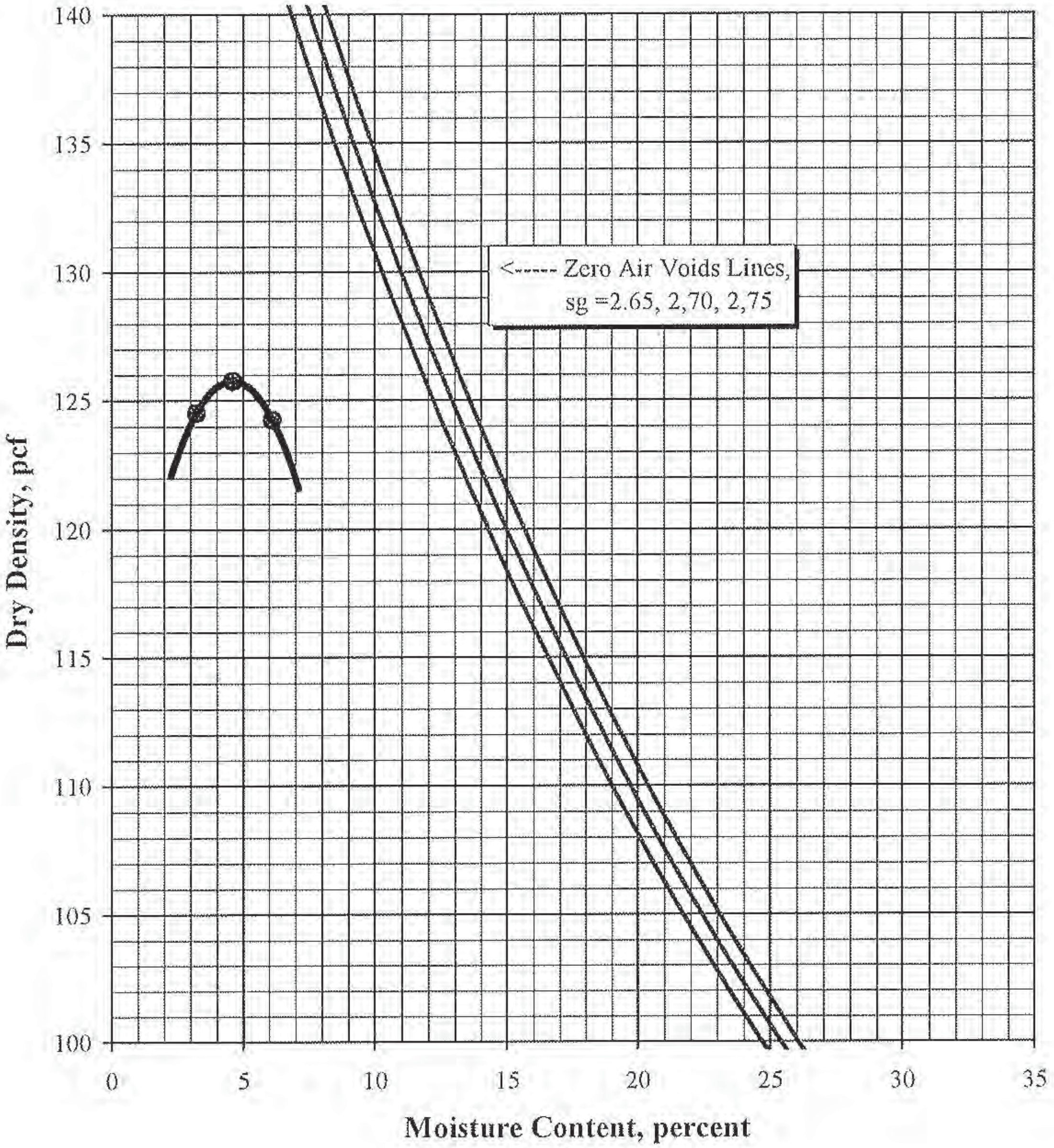
MAXIMUM DENSITY / OPTIMUM MOISTURE ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 2
Location: Test Pit #14 - 1-3 feet
Description: Sandy Gravel (GW)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **126 pcf**
Optimum Moisture: **5%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.7
3/8"	24.3
#4	30.8



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

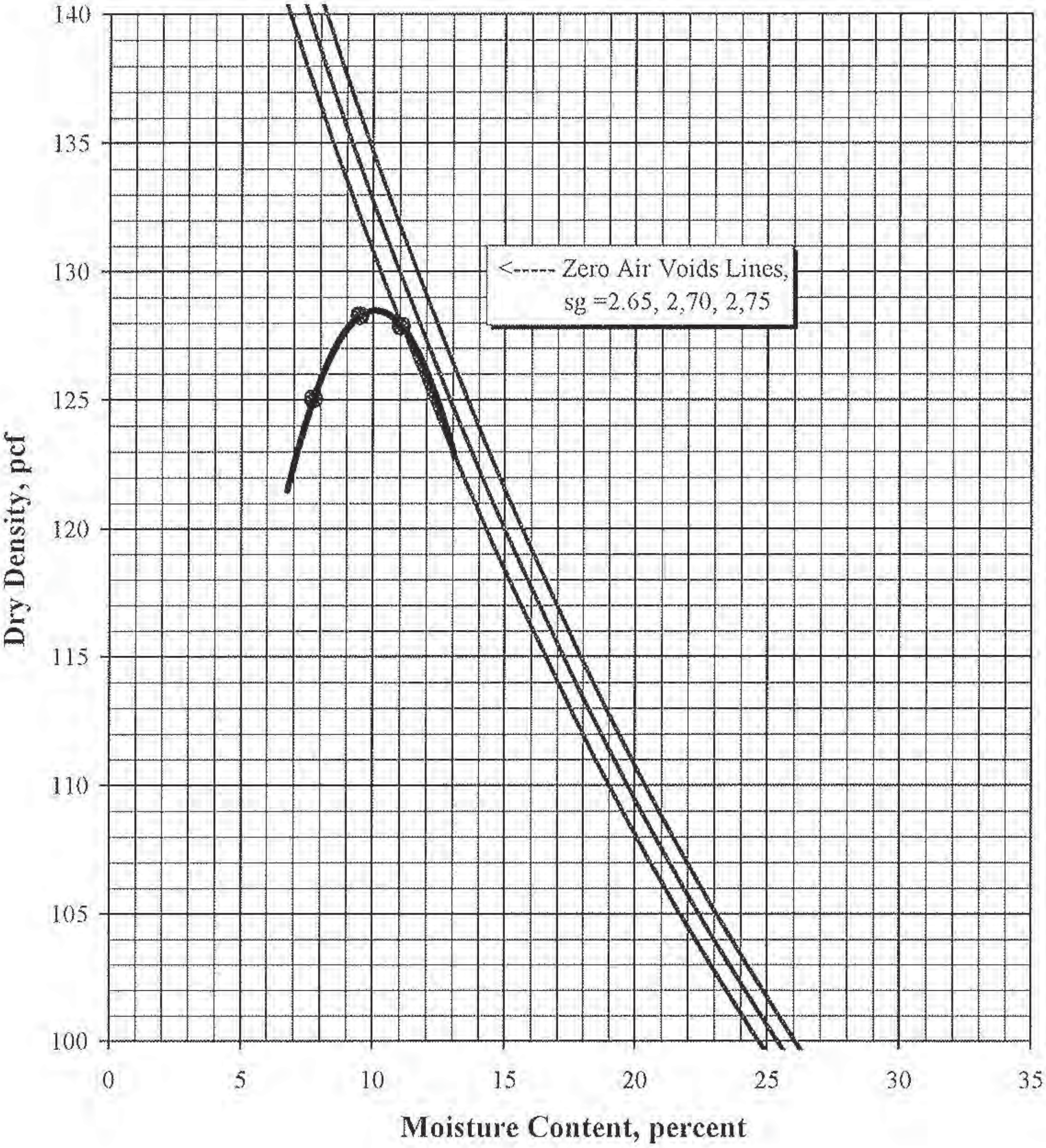
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 3
Location: Test Pit #17 - 4-5 feet
Description: Gravelly Sand (SW)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **128.5 pcf**
Optimum Moisture: **10%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.3
3/8"	22.9
#4	28.7



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

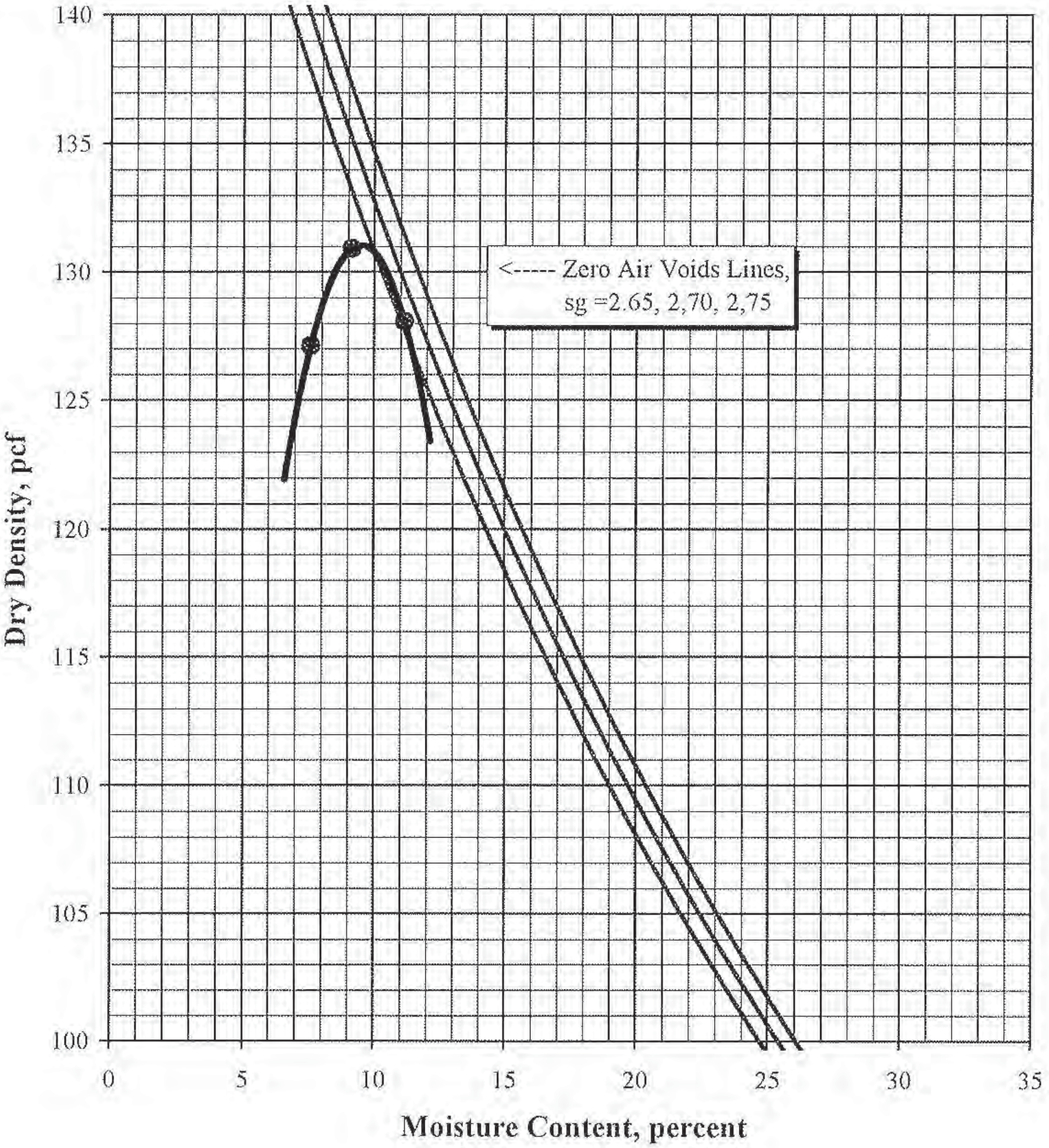
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 4
Location: Test Pit #19 - 2.5-4 feet
Description: Gravelly Sand (SW)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **131 pcf**
Optimum Moisture: **9.5%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.7
3/8"	26.8
#4	36.3



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

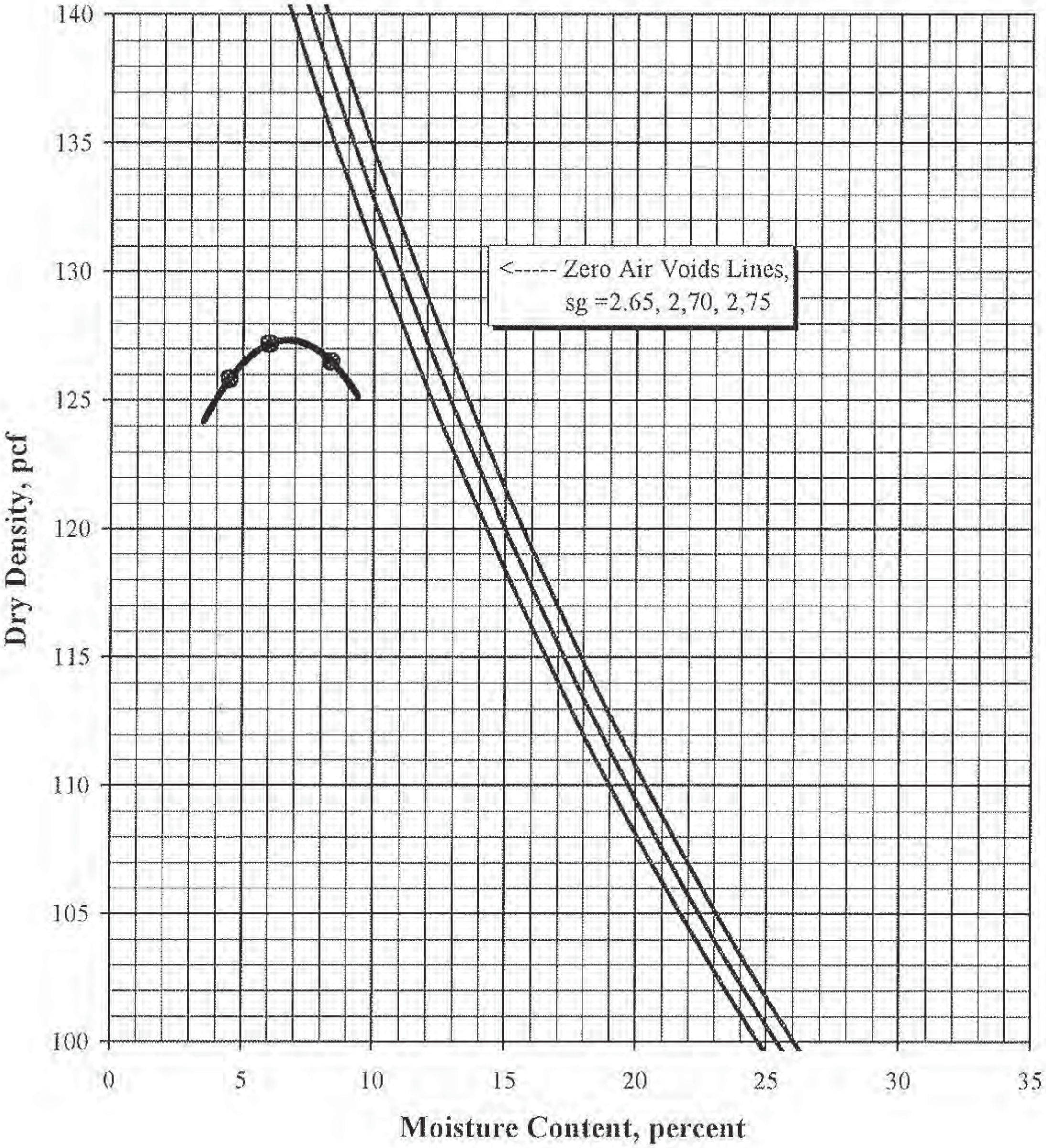
MAXIMUM DENSITY / OPTIMUM MOISTURE ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 5
Location: Test Pit #26 - 5-6 feet
Description: Sandy Gravel (GW)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **127.5 pcf**
Optimum Moisture: **7%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.8
3/8"	28.8
#4	39.1



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

ASTM D 1557-91 (Modified)

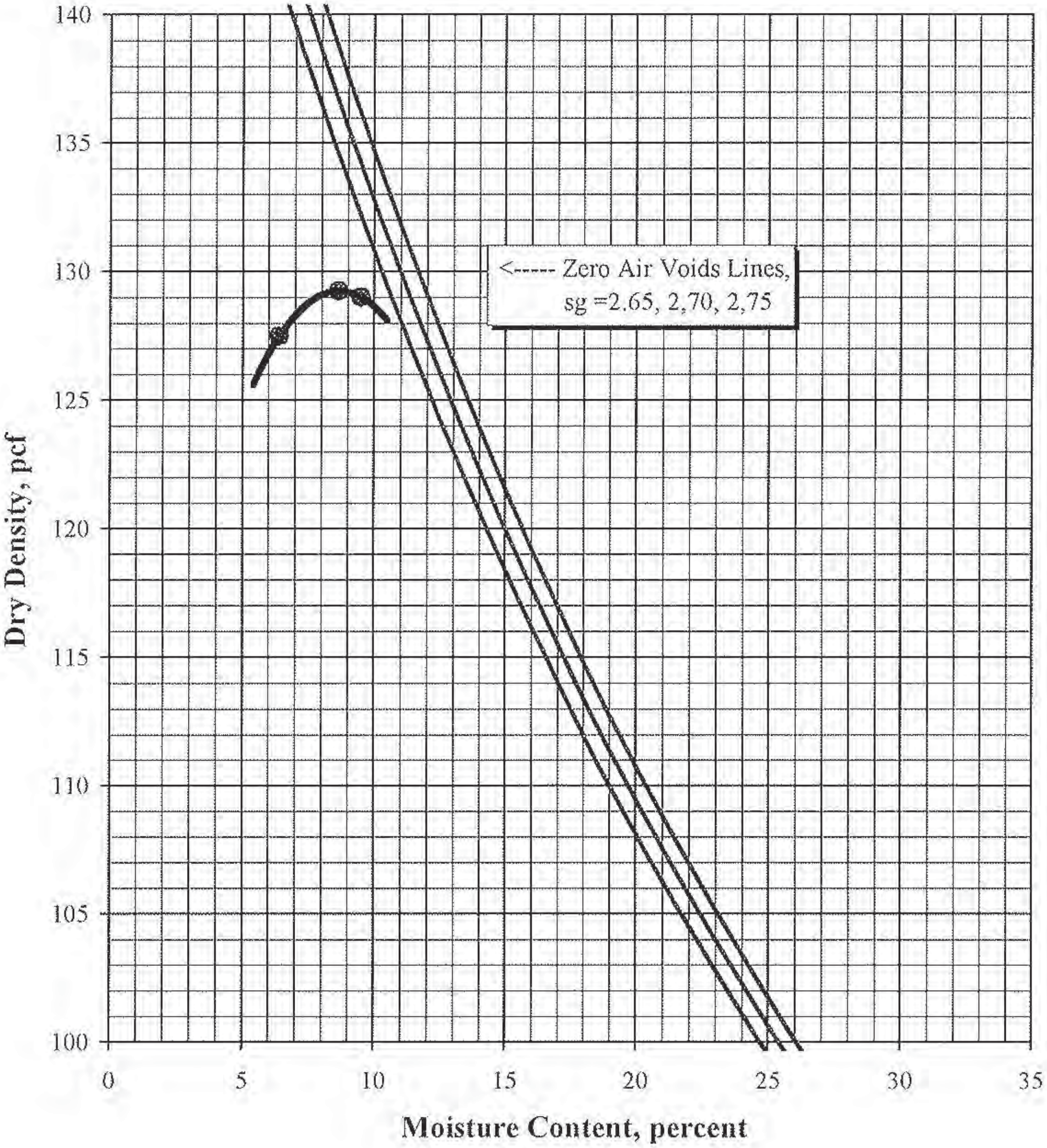
Job Name:	Travertine Project, La Quinta	Procedure Used:	C
Sample ID:	6	Preparation Method:	Moist
Location:	Test Pit #29 - 4-6 feet	Rammer Type:	Mechanical
Description:	Well Graded Sand w/Silt (SW-SM)	Lab Numbe	07-0682

Maximum Density: **129 pcf**

Optimum Moisture: **8.5%**

Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	15.2
3/8"	21.1
#4	28.7



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

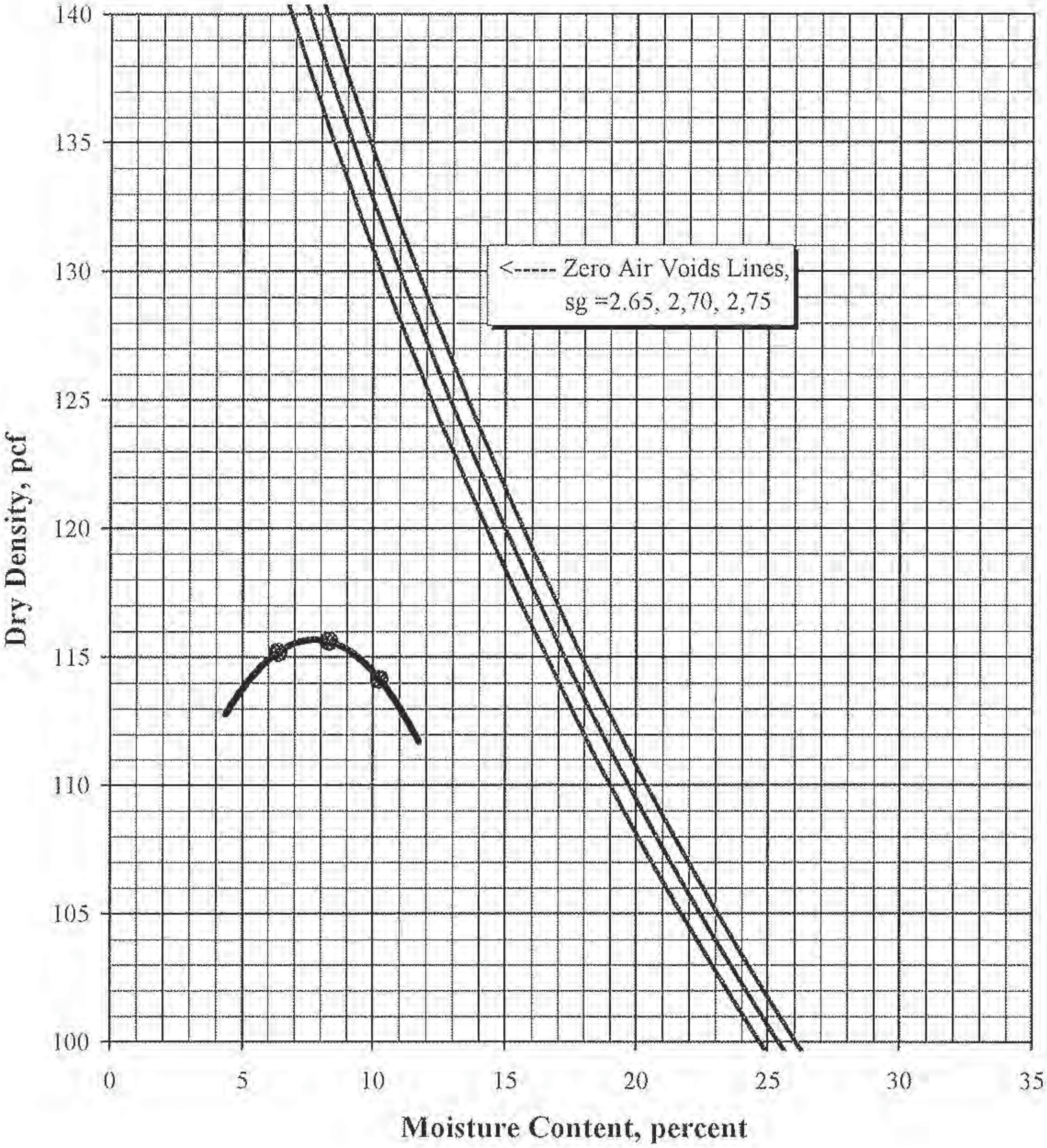
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 7
Location: Test Pit #32 - 3-5 feet
Description: Well Graded Sand w/Silt (SW-SM)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **115.5 pcf**
Optimum Moisture: **8%**

Sieve Size	% Retained
3/4"	3.5
3/8"	7.1
#4	13.2



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

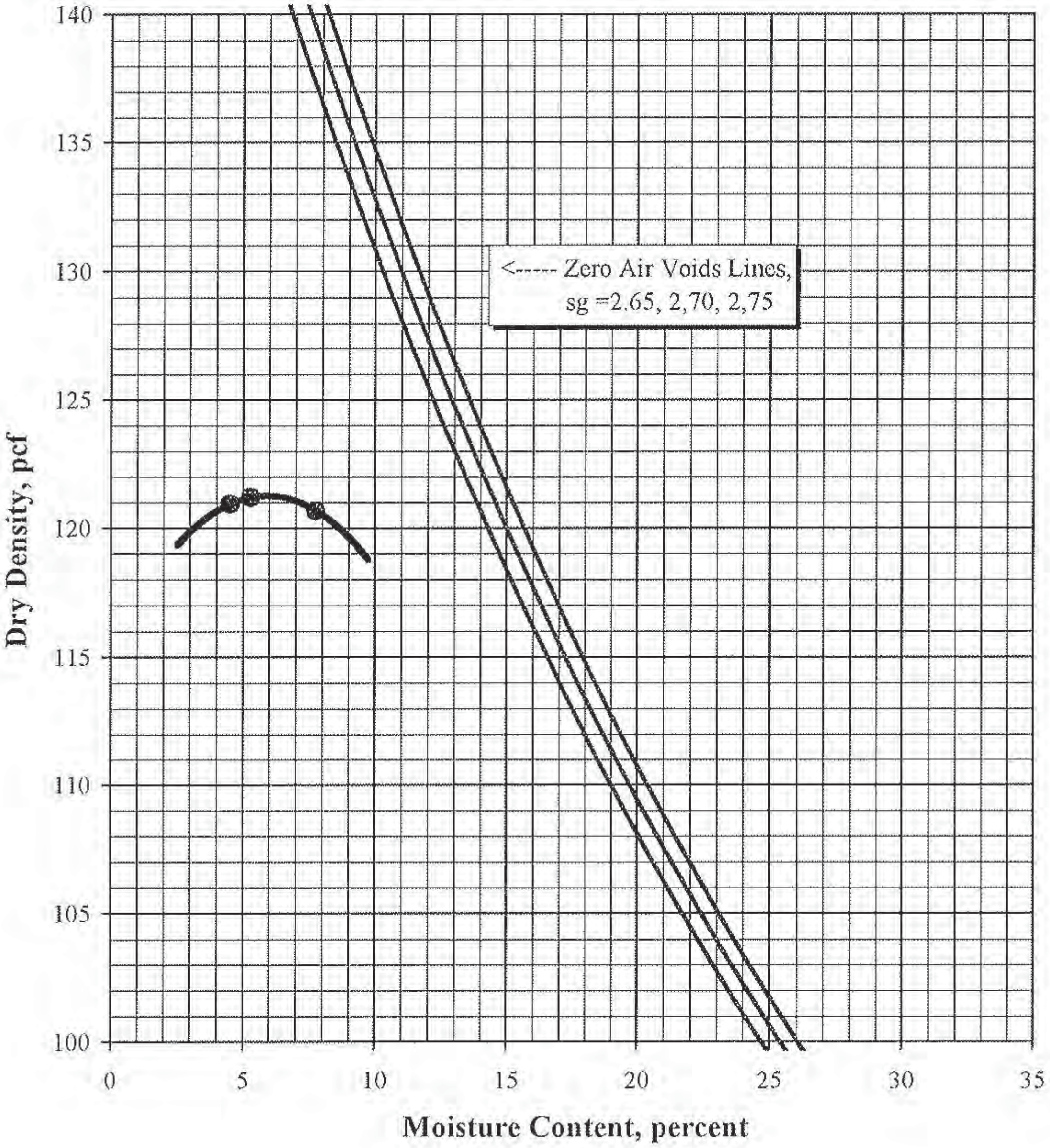
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 8
Location: Test Pit #37 - 4-7 feet
Description: Gravelly Sand (SW)

Procedure Used: B
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **121.5 pcf**
Optimum Moisture: **6%**

Sieve Size	% Retained
3/4"	5.9
3/8"	10.7
#4	19.8



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

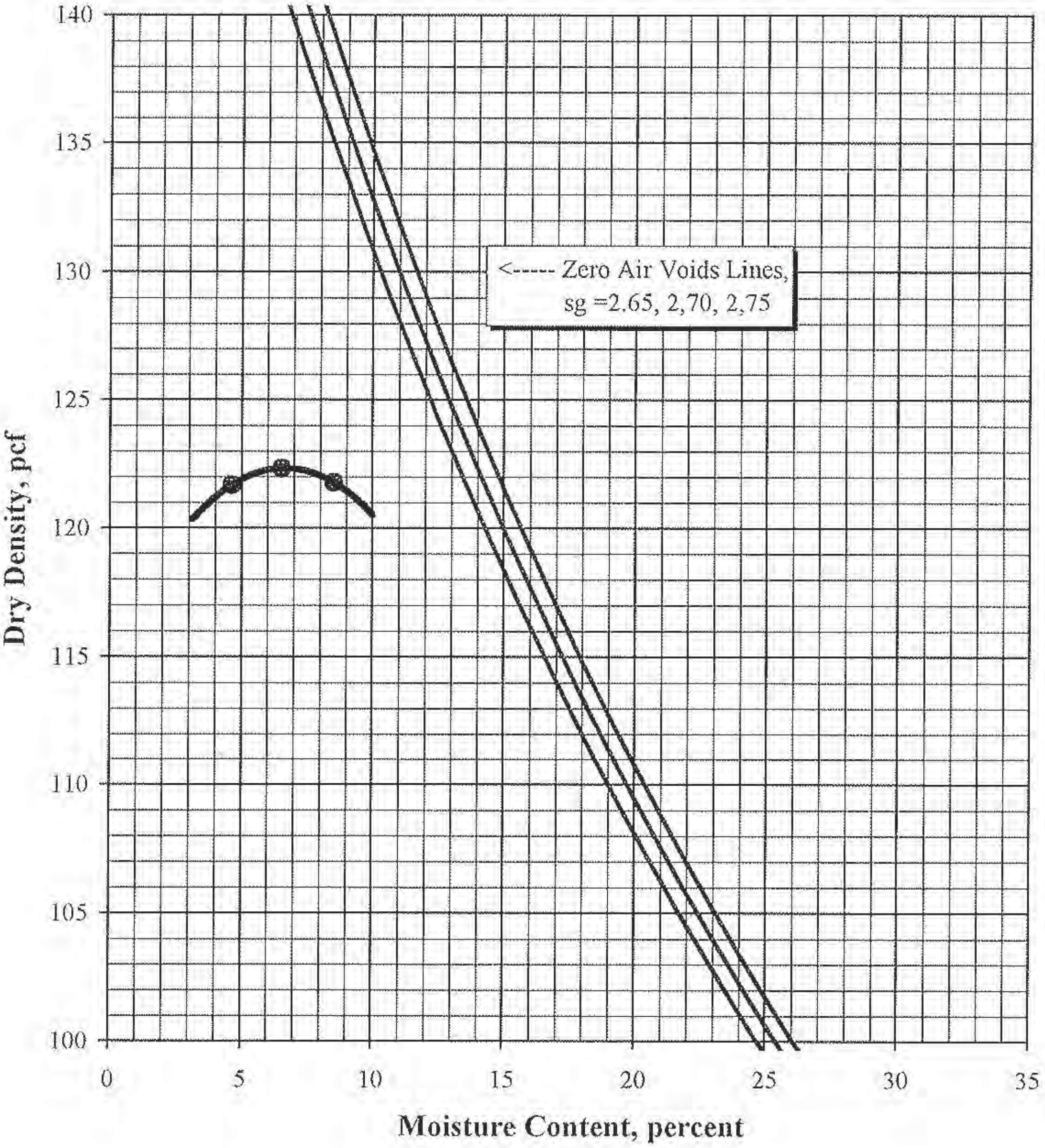
MAXIMUM DENSITY / OPTIMUM MOISTURE ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 9
Location: Test Pit #41 - 3-5 feet
Description: Gravelly Sand w/Silt (SW-SM)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **122.5 pcf**
Optimum Moisture: **6.5%**

Sieve Size	% Retained
3/4"	0.3
3/8"	2.1
#4	5.8



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta

Sample ID: 10

Location: Test Pit #45 - 2-4 feet

Description: Well Graded Sand w/Gravel (SW)

Procedure Used: C

Preparation Method: Moist

Rammer Type: Mechanical

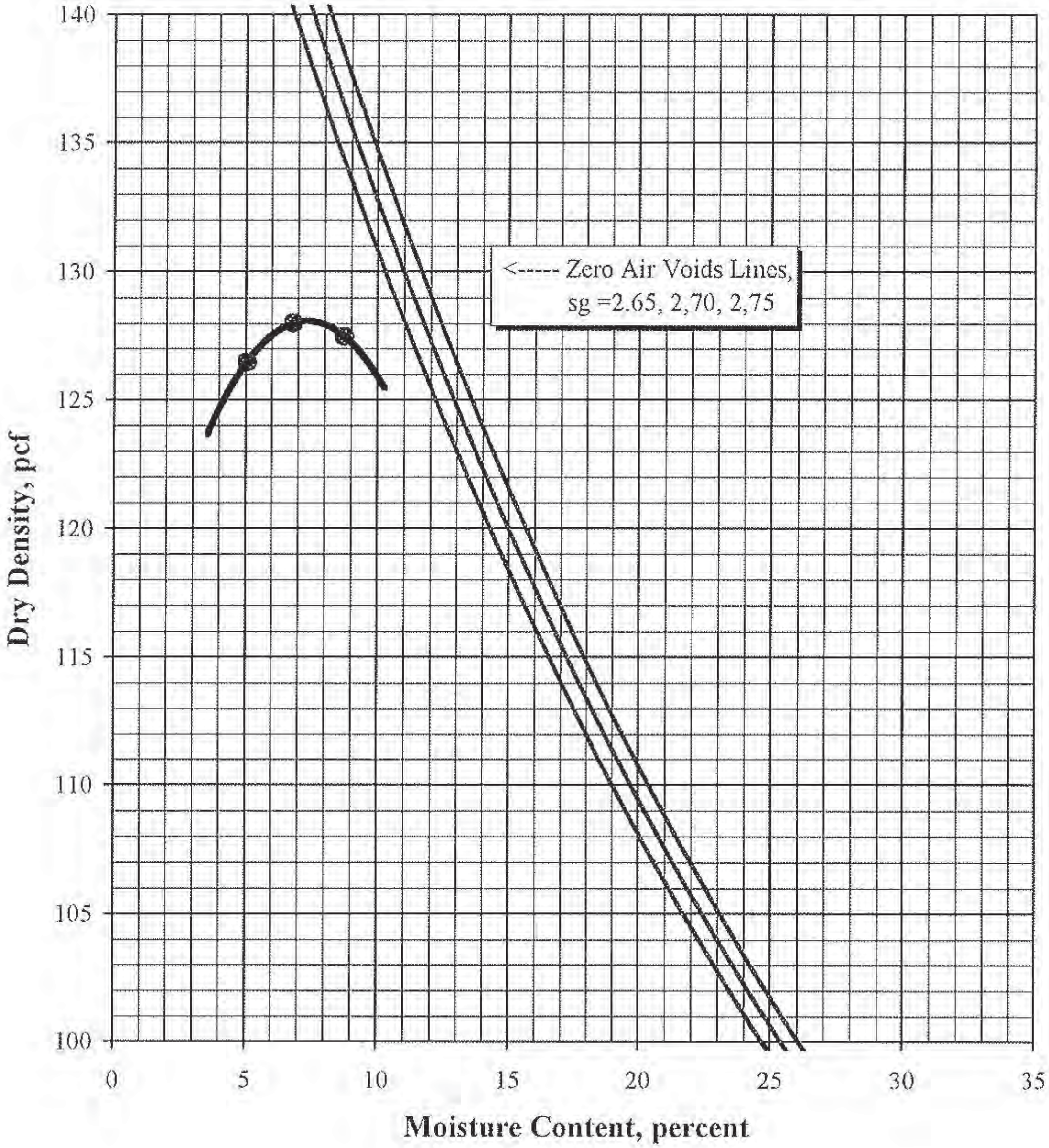
Lab Numbe 07-0682

Maximum Density: **128 pcf**

Optimum Moisture: **7.5%**

Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.0
3/8"	24.3
#4	29.5



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

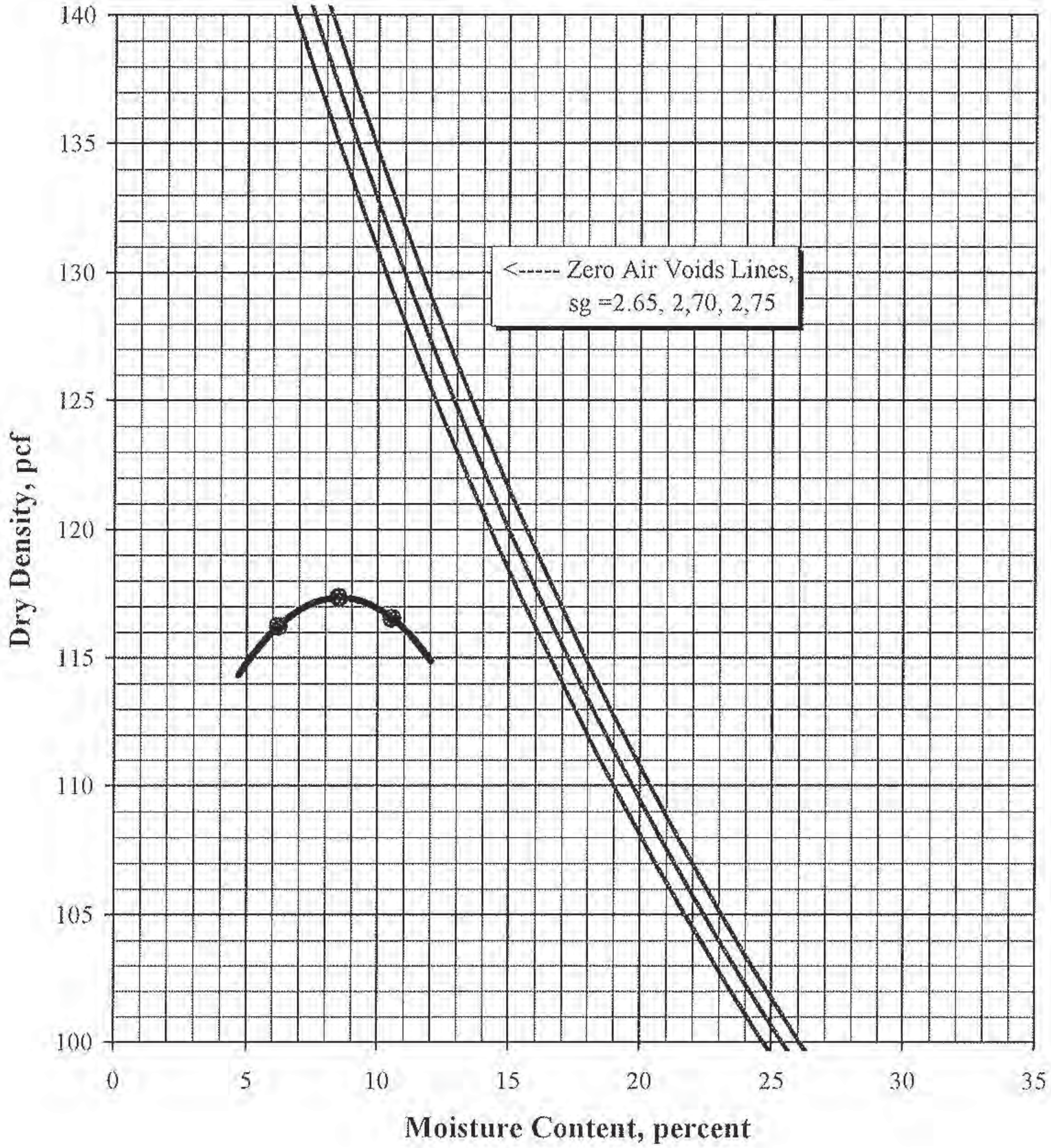
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 11
Location: Test Pit #47 - 10-12 feet
Description: Well Graded Sand w/Gravel (SW)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **117.5 pcf**
Optimum Moisture: **8.5%**

Sieve Size	% Retained
3/4"	7.6
3/8"	11.0
#4	14.5



EARTH SYSTEMS SOUTHWEST

File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

SOIL CHEMICAL ANALYSES

Job Name: Travertine Project, La Quinta
Job No.: 11112-04

Sample ID:	#4	#14	#17		
Sample Depth, feet:	2-4	1-3	4-5	DF	RL
Sulfate, mg/Kg (ppm):				1	0.50
Chloride, mg/Kg (ppm):				1	0.20
pH, (pH Units):	**8.40**	**7.40**	**8.10**	1	0.41
Resistivity, (ohm-cm):	**2,700**	**750**	**5,200**	N/A	N/A
Conductivity, (μmhos-cm):				1	2.00

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

DF: Dilution Factor
RL: Reporting Limit

General Guidelines for Soil Corrosivity

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

File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

SOIL CHEMICAL ANALYSES

Job Name: Travertine Project, La Quinta
Job No.: 11112-04

Sample ID:	#19	#26	#29		
Sample Depth, feet:	2.5-4	5-6	4-6	DF	RL
Sulfate, mg/Kg (ppm):				1	0.50
Chloride, mg/Kg (ppm):				1	0.20
pH, (pH Units):	**8.05**	**7.70**	**8.60**	1	0.41
Resistivity, (ohm-cm):	**3,650**	**980**	**5,300**	N/A	N/A
Conductivity, (μmhos-cm):				1	2.00

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

DF: Dilution Factor
RL: Reporting Limit

General Guidelines for Soil Corrosivity

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

File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

SOIL CHEMICAL ANALYSES

Job Name: Travertine Project, La Quinta
Job No.: 11112-04

Sample ID:	#32	#35	#37		
Sample Depth, feet:	3-5	1-3	4-7	DF	RL
Sulfate, mg/Kg (ppm):				1	0.50
Chloride, mg/Kg (ppm):				1	0.20
pH, (pH Units):	**8.60**	**8.15**	**7.90**	1	0.41
Resistivity, (ohm-cm):	**2,350**	**790**	**1,440**	N/A	N/A
Conductivity, (μmhos-cm):				1	2.00

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

DF: Dilution Factor
RL: Reporting Limit

General Guidelines for Soil Corrosivity

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

File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

SOIL CHEMICAL ANALYSES

Job Name: Travertine Project, La Quinta
Job No.: 11112-04

Sample ID:	#41	#45	#47		
Sample Depth, feet:	3-5	2-4	10-12	DF	RL
Sulfate, mg/Kg (ppm):				1	0.50
Chloride, mg/Kg (ppm):				1	0.20
pH, (pH Units):	**7.70**	**7.95**	**8.00**	1	0.41
Resistivity, (ohm-cm):	**280**	**3,150**	**1,950**	N/A	N/A
Conductivity, (µmhos-cm):				1	2.00

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

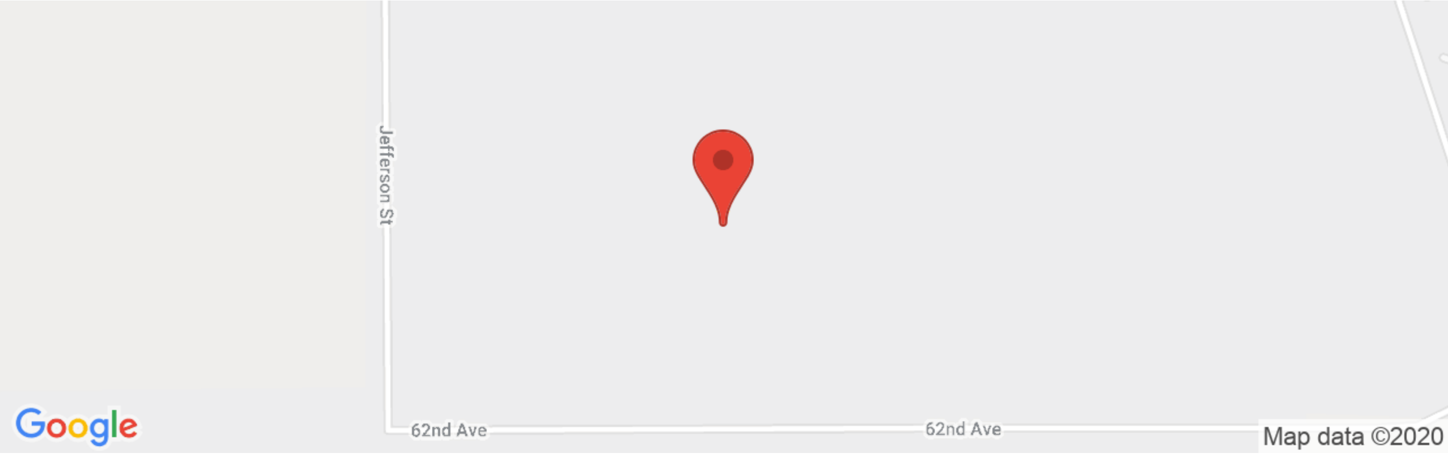
DF: Dilution Factor
RL: Reporting Limit

General Guidelines for Soil Corrosivity

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

APPENDIX D

Latitude, Longitude: 33.60143, -116.26159



Date	1/7/2020, 3:56:01 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.584	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.5	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1	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	0.522	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.575	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.553	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.688	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.584	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.652	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.522	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.92	Mapped value of the risk coefficient at short periods
C_{R1}	0.897	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (upd

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.60143

Time Horizon

Return period in years

2475

Longitude

Decimal degrees, negative values for western longitudes

-116.26159

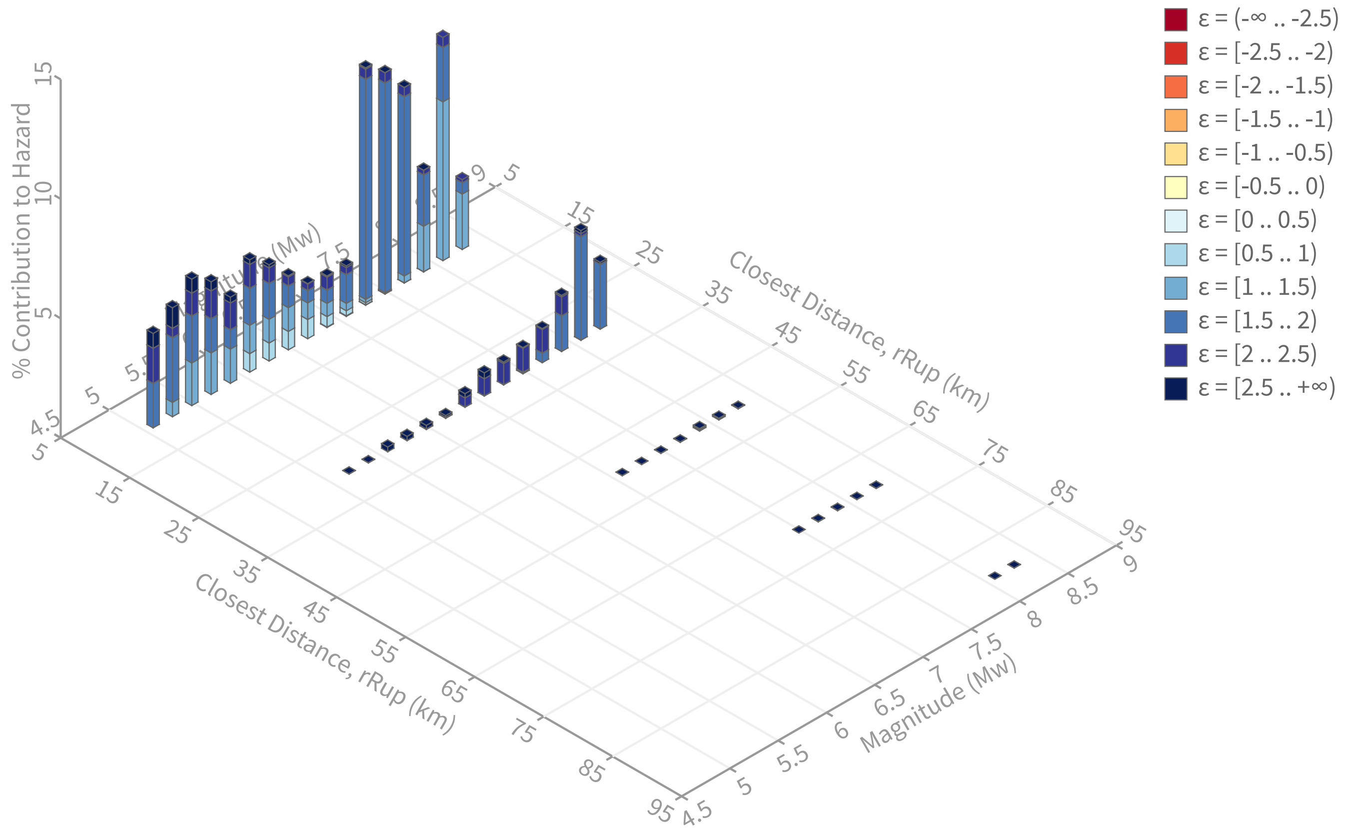
Site Class

259 m/s (Site class D)

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.75141644 g

Recovered targets

Return period: 3071.2487 yrs
Exceedance rate: 0.00032560046 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.1 %

Mean (over all sources)

m: 7.01
r: 14.58 km
ε_0: 1.73 σ

Mode (largest m-r bin)

m: 7.34
r: 15.62 km
ε_0: 1.81 σ
Contribution: 9.93 %

Mode (largest m-r-ε_0 bin)

m: 7.34
r: 15.83 km
ε_0: 1.8 σ
Contribution: 9.21 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							30.73
San Andreas (Coachella) rev [2]		15.84	7.68	1.66	116.143°W	33.704°N	43.80	22.64
San Jacinto (Anza) rev [5]		26.44	8.01	1.93	116.513°W	33.490°N	242.00	3.26
San Jacinto (Clark) rev [2]		23.82	7.78	1.97	116.366°W	33.406°N	203.99	3.10
UC33brAvg_FM32	System							30.54
San Andreas (Coachella) rev [2]		15.84	7.68	1.67	116.143°W	33.704°N	43.80	22.44
San Jacinto (Anza) rev [5]		26.44	7.99	1.94	116.513°W	33.490°N	242.00	3.31
San Jacinto (Clark) rev [2]		23.82	7.78	1.97	116.366°W	33.406°N	203.99	3.00
UC33brAvg_FM31 (opt)	Grid							19.37
PointSourceFinite: -116.262, 33.633		5.98	5.78	1.40	116.262°W	33.633°N	0.00	4.10
PointSourceFinite: -116.262, 33.633		5.98	5.78	1.40	116.262°W	33.633°N	0.00	4.07
PointSourceFinite: -116.262, 33.651		7.25	5.74	1.62	116.262°W	33.651°N	0.00	1.90
PointSourceFinite: -116.262, 33.651		7.25	5.74	1.62	116.262°W	33.651°N	0.00	1.88
PointSourceFinite: -116.262, 33.714		11.58	6.11	2.00	116.262°W	33.714°N	0.00	1.41
PointSourceFinite: -116.262, 33.705		11.16	5.99	2.01	116.262°W	33.705°N	0.00	1.40
PointSourceFinite: -116.262, 33.714		11.58	6.11	2.00	116.262°W	33.714°N	0.00	1.40
PointSourceFinite: -116.262, 33.705		11.16	5.99	2.01	116.262°W	33.705°N	0.00	1.39
UC33brAvg_FM32 (opt)	Grid							19.36
PointSourceFinite: -116.262, 33.633		5.98	5.78	1.40	116.262°W	33.633°N	0.00	4.09
PointSourceFinite: -116.262, 33.633		5.98	5.78	1.40	116.262°W	33.633°N	0.00	4.07
PointSourceFinite: -116.262, 33.651		7.25	5.73	1.62	116.262°W	33.651°N	0.00	1.90
PointSourceFinite: -116.262, 33.651		7.25	5.73	1.62	116.262°W	33.651°N	0.00	1.88
PointSourceFinite: -116.262, 33.714		11.58	6.11	2.00	116.262°W	33.714°N	0.00	1.41
PointSourceFinite: -116.262, 33.705		11.16	5.99	2.01	116.262°W	33.705°N	0.00	1.40
PointSourceFinite: -116.262, 33.714		11.58	6.11	2.00	116.262°W	33.714°N	0.00	1.39
PointSourceFinite: -116.262, 33.705		11.16	5.99	2.01	116.262°W	33.705°N	0.00	1.38

APPENDIX E

REPORT
SEISMIC REFRACTION SURVEY

Jefferson Street and 62nd Avenue
La Quinta, CA

GEO*Vision* Project No. 19201

Prepared for

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May 31, 2019

Report 19201

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1 INTRODUCTION

A P-wave seismic refraction survey was conducted near Jefferson St and 62nd Avenue La Quinta, California, on May 10th, 2019. The survey was conducted along three P-wave seismic refraction lines, designated as Lines 1 through 3 (Figure 1). The purpose of this investigation was to determine rock rippability and subsurface velocity variability for planning future construction activities.

The locations of the lines were placed by **GEO***Vision* personnel to gather the highest quality data in the areas of greatest interest as directed by NMG Geotechnical Inc. The endpoints of each refraction line were surveyed by **GEO***Vision* personnel using a Spectra SP60 with Centerpoint RTX submeter differential corrections (Table 1) and plotted on a site map (Figure 1).

The rippability of alluvium is not presented in the Caterpillar Handbook of Ripping; therefore other sedimentary rocks will be used, such as sandstone and conglomerate, for comparison. Sandstone is considered rippable by a Caterpillar D8R Ripper to a P-wave velocity of 6,500 ft/s and marginally rippable to a velocity of 8,250 ft/s, providing the rock is sufficiently jointed and fractured. Sandstone is considered rippable by a Caterpillar D9R Ripper to a velocity of 7,250 ft/s and marginally rippable to a velocity of 9,500 ft/s providing the rock is sufficiently jointed and fractured. Conglomerate is considered rippable by a Caterpillar D8R Ripper to a P-wave velocity of 6,300 ft/s and marginally rippable to a velocity of 8,000 ft/s, providing the rock is sufficiently jointed and fractured. Conglomerate is considered rippable by a Caterpillar D9R Ripper to a velocity of 7,500 ft/s and marginally rippable to a velocity of 9,250 ft/s providing the rock is sufficiently jointed and fractured. It should be noted that blasting may be more cost-effective in marginally rippable rock due to time and equipment wear considerations. Published data are not available for the ripping characteristics of excavators, but we typically assume that excavators have about half the ripping ability of a D8R.

The following sections include a discussion of equipment and field procedures, methodology, data processing, and results of the geophysical survey.

2 EQUIPMENT AND FIELD PROCEDURES

Seismic refraction equipment used during this investigation consisted of two Geometrics Geode 24-channel signal enhancement seismographs, 10 Hz vertical geophones, seismic cables with 10-foot takeouts, a 240-lb accelerated weight drop (AWD), a 10-lb sledgehammer, and an aluminum strike plate.

Each line consisted of one spread of 48 geophones aligned in a linear array. The geophone spacing and total lengths per line are outlined in Table 1. Elevations along the refraction lines were surveyed using a combination of a Nikon AP-8 automatic level and a Spectra SP60 with Centerpoint RTX submeter, real-time corrections. All geophone locations were measured using a 300-foot tape measure.

A typical seismic refraction survey field layout is shown in Appendix A. Up to seventeen (17) shot point locations were occupied on each P-wave line: off-end shots (where possible), end shots, and multiple interior shot points located between every fourth geophone. Space, access, and topography limited or prohibited the placement of some off-end shots. A 240-lb accelerated weight drop was used as the energy source where there was appropriate vehicle access; the remaining shots were done using a 10-lb sledgehammer as the energy source.

A 3D Geophysics or Geometrics hammer switch attached to the sledgehammer or inserted within the strike plate and coupled to the Geode via a trigger extension was used to trigger the seismograph upon impact. The final seismic record at each shot point was the result of stacking 6 to 10 shots to increase the signal to noise ratio. All seismic records were stored on a laptop computer. Data files were named with the sequential line, spread, and shot number and a ".dat" extension (e.g., data file 1105.dat is the seismic record from line 1, spread 1, shot 5). Data acquisition parameters, file names, and leveling data were recorded on a field form, which is retained in project files.

3 METHODOLOGY

Detailed discussions of the seismic refraction method can be found in Telford et al. (1990), Dobrin and Savit (1988), and Redpath (1973).

When conducting a seismic survey, acoustic energy is input to the subsurface by an energy source such as a sledgehammer impacting a metallic plate, weight drop, vibratory source, or explosive charge. The acoustic waves propagate into the subsurface at a velocity dependent upon the elastic properties of the material through which they travel. When the waves reach an interface where the density or velocity changes significantly, a portion of the energy is reflected back to the surface and the remainder is transmitted into the lower layer. Where the velocity of the lower layer is higher than that of the upper layer, a portion of the energy is also critically refracted along with the interface. Critically refracted waves travel along with the interface at the velocity of the lower layer and continually refract energy back to the surface. Receivers (geophones) laid out in linear array on the surface, record the incoming refracted, and reflected waves. The seismic refraction method involves analysis of the travel times of the first energy to arrive at the geophones. These first-arrivals are from either the direct wave (at geophones close to the source) or critically refracted waves (at geophones further from the source).

Analysis of seismic refraction data depends upon the complexity of the subsurface velocity structure. If the subsurface target is planar in nature then the slope-intercept method (Telford et al. [1990]) can be used to model multiple horizontal or dipping planar layers. A minimum of one end shot is required to model horizontal layers, and reverse end shots are required to model dipping planar layers. If the subsurface target is undulating (i.e. bedrock valley) then layer-based analysis routines such as the generalized reciprocal method (Palmer [1980 and 1981], Lankston and Lankston [1986], and Lankston [1990]), reciprocal method (Hawkins, 1961) also referred to as the ABC method, Hales' method (Hales, 1958), delay time method (Wyrobek [1956] and Gardner [1967]), time-term inversion (Scheidegger and Willmore, 1957), plus-minus method (Hagedoorn, 1959), and wavefront method (Rockwell, 1967) are required to model subsurface velocity structure. These methods generally require a minimum of 5 shot points per spread (end shots, off-end shots, and a center shot). If subsurface velocity structure is complex and cannot be adequately modeled using layer-based modeling techniques (i.e., complex weathering profile in bedrock, numerous lateral velocity variations), then Monte Carlo or tomographic inversion techniques (Zhang and Toksoz [1998], Schuster and Quintus-Bosz [1993]) are required to model the seismic refraction data. These techniques require a high shot density; typically every 2 to 6 stations/geophones. Generally, these techniques cannot effectively take advantage of off-end shots to extend the depth of investigation, so longer profiles are required.

Errors in seismic refraction models can be caused by velocity inversions, hidden layers, or lateral velocity variations. At sites with steeply dipping or highly irregular bedrock surfaces, out of plane refractions (refractions from structures to the side of the line rather than from beneath the line) may severely complicate modeling. A velocity inversion is a geologic layer with a lower seismic velocity than an overlying layer. Critical refraction does not occur along with such a layer because velocity has to increase with depth for critical refraction to occur. This type of layer, therefore, cannot be recognized or modeled, and depths to underlying layers would be overestimated. A hidden layer is a layer with a velocity increase, but of sufficiently small thickness relative to the velocities of overlying and underlying layers, that refracted arrivals do not arrive at the geophones before those from the deeper, higher velocity layer. Because the seismic refraction method generally only involves the interpretation of first arrivals, a hidden layer cannot be recognized or modeled, and depths to underlying layers would be underestimated. Saturated sediments, overlying high-velocity bedrock can be a hidden layer under many field conditions. However, saturated sediments generally have a much higher velocity than unsaturated sediments, typically in the 5,000 to 7,000 ft/s range, and can occasionally be interpreted as a second arrival when the layer does not give rise to a first arrival. A subsurface velocity structure that increases as a function of depth rather than as discrete layers will also cause depths to subsurface refractors to be underestimated, in a manner very similar to that of the hidden layer problem. Lateral velocity variations that are not adequately addressed in the seismic models will also lead to depth errors. Tomographic imaging techniques can often resolve the complex velocity structures associated with hidden layers, velocity gradients, and lateral velocity variations. However, in the event of an abrupt increase in velocity at a geologic horizon, the velocity model generated using tomographic inversion routines will smooth the horizon with velocity being underestimated at the interface and possibly overestimated at depth.

4 DATA REDUCTION AND MODELING

The first step in data processing consisted of picking the arrival time of the first energy received at each geophone (first-arrival) for each shot point. The first-arrivals on each seismic record are either a direct arrival from a compressional (P) wave traveling in the uppermost layer or a refracted arrival from a subsurface interface where there is a velocity increase. First-arrival times were selected using the automatic and manual picking routines in the software package SeisImager™ (Oyo Corporation). These first-arrival times were saved in an ASCII file containing shot location, geophone locations, and associated first-arrival time. Errors in the first-arrival times were variable with error generally increasing with distance from the shot point.

Relative elevations for each geophone location were calculated from the leveling data using a spreadsheet and converted to approximate elevations using GPS data collected at the end of each line.

Data quality was affected by factors such as topography, geologic conditions, and cultural noise, including nearby traffic noise.

Seismic refraction data were then modeled using the tomographic analysis technique available in the SeisImager™ Plotrefa software package, developed by Oyo Corporation. Refraction tomography techniques are often able to resolve complex velocity structure (e.g., velocity gradients) that can be observed in bedrock weathering profiles. Layer-based modeling techniques such as GRM are not able to accurately model the velocity gradients that can be observed in weathered or transitional zones.

The tomographic analysis was conducted in several steps. First, an initial model was generated using a smooth starting model. The initial model was then converted to 25 layers with the top of the bottom layer at a depth related to the imaged depth of the model. Velocity ranges were also set to values outside of the starting model minimum and maximum. A minimum of 30 iterations of non-linear raypath inversion was then implemented to improve the fits of the travel time curves to near-surface sediments/rock. After each set of inversions were completed, the initial parameters were adjusted, and the model run again in an iterative process. These steps were repeated until acceptable fits and RMS error was achieved. The final tomographic velocity models for the seismic line were exported as ASCII files and imported into the Geosoft Oasis montaj® v9 mapping system where the velocity model was gridded, contoured, and annotated for presentation.

5 DISCUSSION OF RESULTS

The smooth starting, P-wave seismic tomography models for Lines 1 through 3 are presented as Figures 2 through 4, respectively. The color scheme used on the tomography images consists of blue-green, yellow-orange, and red-pink representing low, intermediate, and high velocities, respectively. The transition from blue to cyan occurs at a P-wave seismic velocity of 1,000 ft/s and the transition from green to yellow occurs at a velocity of 2,500 ft/s. The transition from orange to red occurs at 3,500 ft/s.

Tomographic inversion techniques will typically model a gradual increase in velocity with depth even if an abrupt velocity contact is present. Therefore, if velocity gradients are not present, tomographic inversion routines will overestimate and underestimate velocity above and below a layer contact, respectively. Velocity gradients can, however, be very common in geologic environments with weathering zones and sedimentary rock, such as the project site. In tomographic images, layer contacts are not clearly defined, and thus, ranges of velocities are used to interpret possible rock conditions and competency. Groundwater was not expected to be encountered on any of the seismic lines.

Line 1 was located in the northern portion of the site and aligned south to north (Figure 1). The P-wave seismic tomography color contour model for Line 1 is presented in Figure 2. The line is imaged with velocities of up to about 3,500 ft/s within 100 ft bgs. Likely, this material consists of alluvial material and soil with an increase in velocity with depth over the entire model. Higher velocities are imaged at shallower depths beneath the southern portion of the model. This zone may be the result of the presence of a coarser material on the southern portion of the profile or an edge effect of the model. Modeled data indicates that the material is rippable to a depth of at least 100 ft beneath the line using a Caterpillar D8R. Marginally rippable and non-rippable material using a Caterpillar D8R was not imaged in the tomography model beneath the seismic line.

Line 2 was located in the central portion of the site and aligned south to north (Figure 1). The P-wave seismic tomography color contour model for Line 2 is presented in Figure 3. The line is imaged with velocities of up to about 3,500 ft/s within 100 ft bgs. Likely, this material consists of alluvial material and soil with an increase in velocity with depth over the entire model. Modeled data indicates that the material is rippable to a depth of 100 ft beneath the line using a Caterpillar D8R. Marginally rippable and non-rippable material using a Caterpillar D8R was not imaged in the tomography model for the seismic line.

Line 3 was located in the southern portion of the site and aligned roughly southeast to northwest (Figure 1). The P-wave seismic tomography color contour model for Line 3 is presented in Figure 4. The line is imaged with velocities of up to about 3,700 ft/s within 60 ft bgs. Likely, this material consists of alluvial material with an increase in velocity with depth over the entire model. Modeled velocities beneath this profile are higher than Line 1 and 2. The increase in the velocities may be related to coarser or more compacted/cemented material. Modeled data indicates that the material is rippable to a depth of at least 70 ft beneath the line using a Caterpillar D8R. Marginally rippable and non-rippable material using a Caterpillar D8R was not imaged in the tomography model for the seismic line.

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7 CERTIFICATION

All geophysical data, analysis, interpretations, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a **GEO***Vision* California Professional Geophysicist.

This geophysical investigation was conducted under the supervision of a California by

Prepared by:

J Jordan

5/31/2019

Jonathan Jordan
Senior Staff Geophysicist
GEO*Vision* Geophysical Services

Reviewed and Approved by:

DAVID M. CARPENTER
P.Gp. 1088

5/31/2019

David Carpenter
California Professinal Geophysicist, PGp 1088
GEO*Vision* Geophysical Services

* This geophysical investigation was conducted under the supervision of a California Professional Geophysicist using industry standard methods and equipment. A high degree of professionalism was maintained during all aspects of the project from the field investigation and data acquisition, through data processing, interpretation, and reporting. All original field data files, field notes, and observations, and other pertinent information are maintained in the project files and are available for the client to review for a period of at least one year.

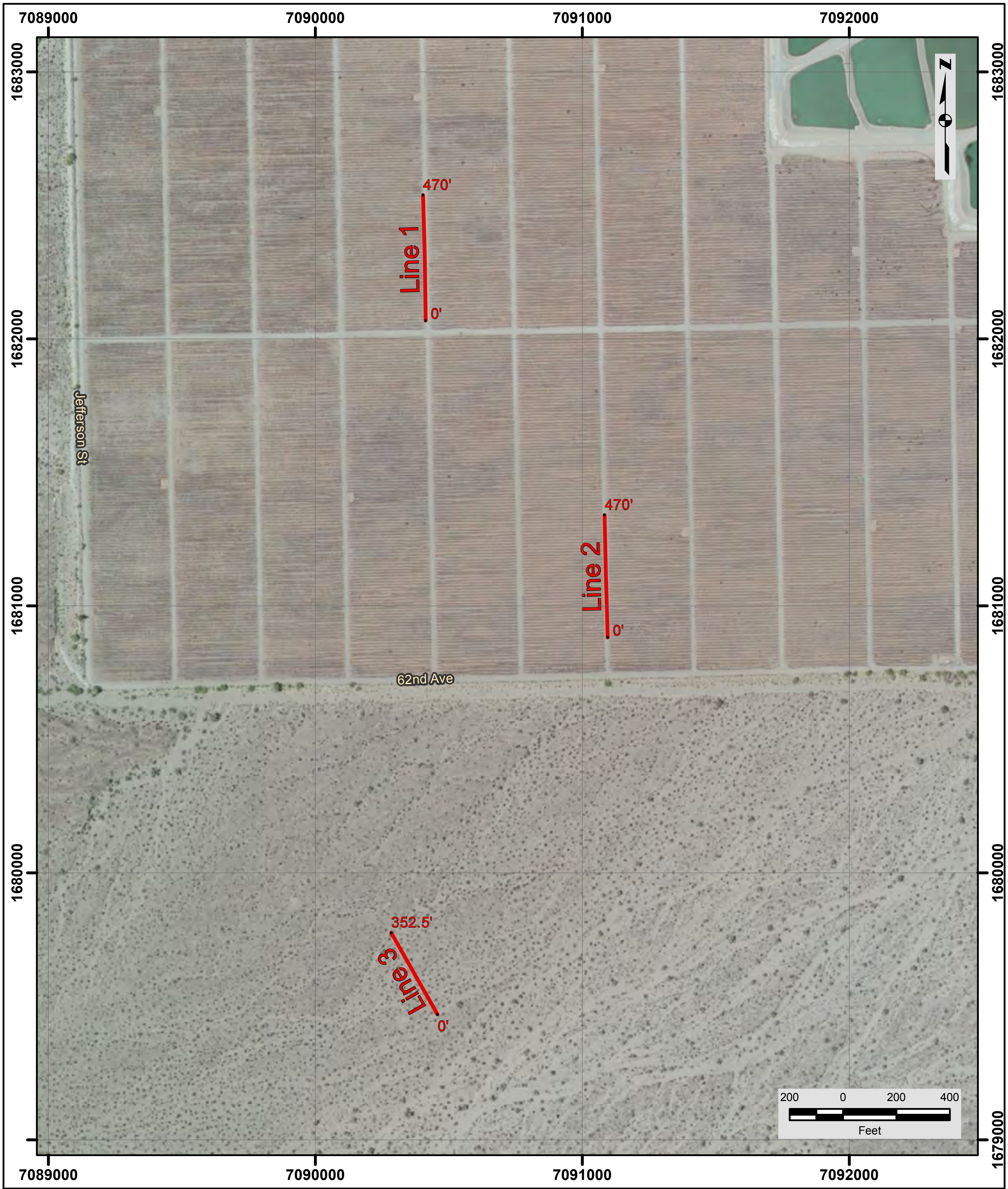
  A professional geophysicist's certification of interpreted geophysical conditions comprises a declaration of his/her professional judgment. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents, applicable codes, standards, regulations, or ordinances.

Table 1 Seismic Line Geometry

Name	**Spacing (ft)**	**Location (ft)**	**Northing (US Feet)**	**Easting (US Feet)**
Line 1	10	0	1,682,068	7,090,413
		470	1,682,538	7,090,403
Line 2	10	0	1,680,881	7,091,095
		470	1,681,340	7,091,084
Line 3	7.5	0	1,679,470	7,090,458
		352.5	1,679,776	7,090,284

Notes:

1. Plane coordinates in CA State Plane, Zone VI (0406), NAD83 (Conus), US Survey Feet.
3. Coordinates taken with a Spectra SP60 with Centerpoint RTX submeter corrections.



━ P-Wave Seismic Refraction Line

NOTES:
1. Coordinate System: California State Plane, NAD83, Zone V (0405), US Survey Feet
2. Base map source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

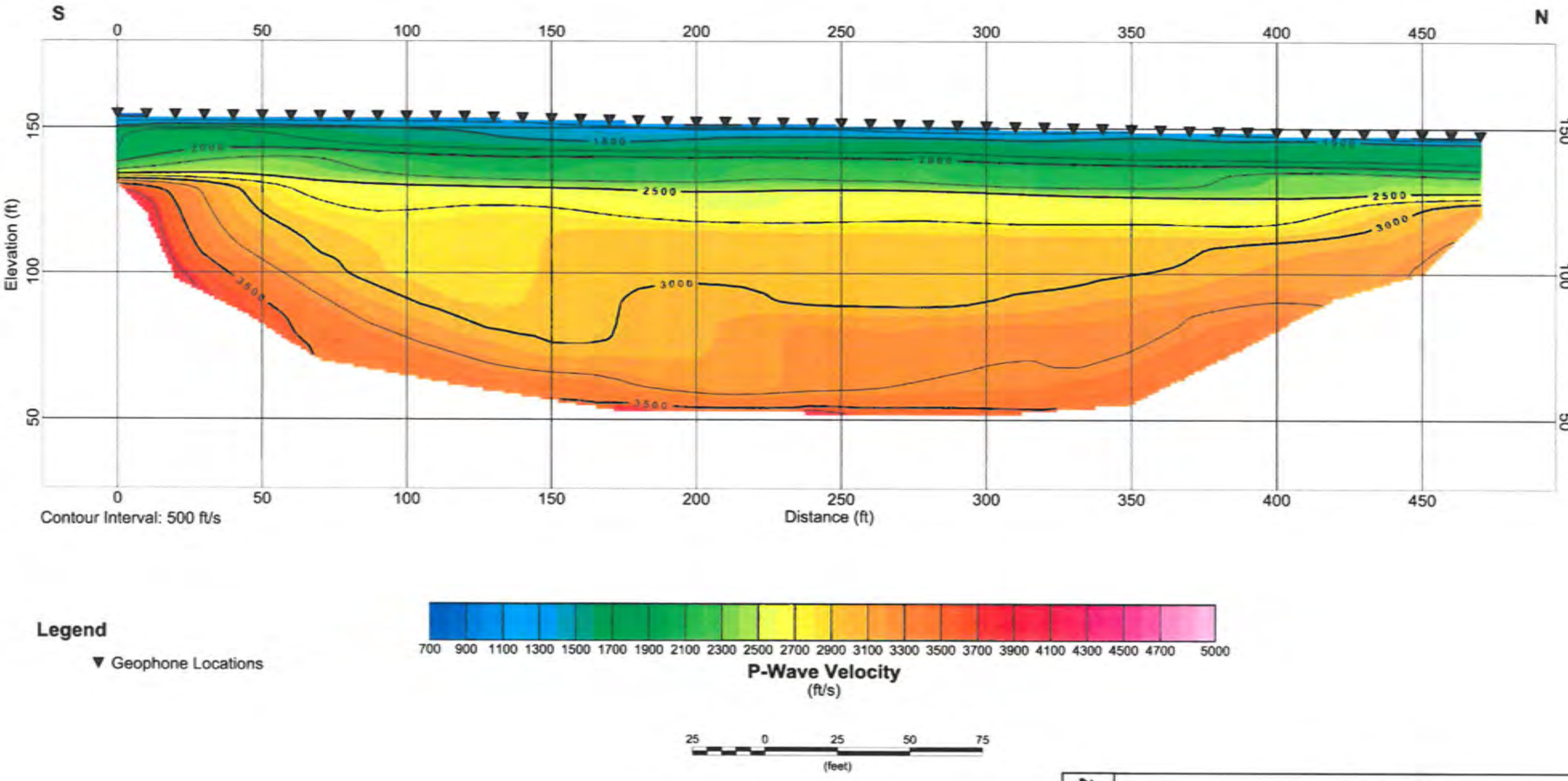
GEOVision
geophysical services

Date:	5/23/2019
GV Project:	19096
Developed by:	D Levy
Drawn by:	T Rodriguez
Approved by:	J Jordan
File Name:	19201-1.MXD

FIGURE 1
SITE MAP

SITE LOCATED NEAR
JEFFERSON ST AND 62nd AVE
LA QUINTA, CALIFORNIA

PREPARED FOR
NMG GEOTECHNICAL, INC.



Contour Interval: 500 ft/s

Figure 2

Line 1 P-Wave Seismic Tomography Model
GV Project Number 19201

Jefferson Street and 62nd Avenue
La Quinta, California

Prepared for NMG Geotechnical Inc.

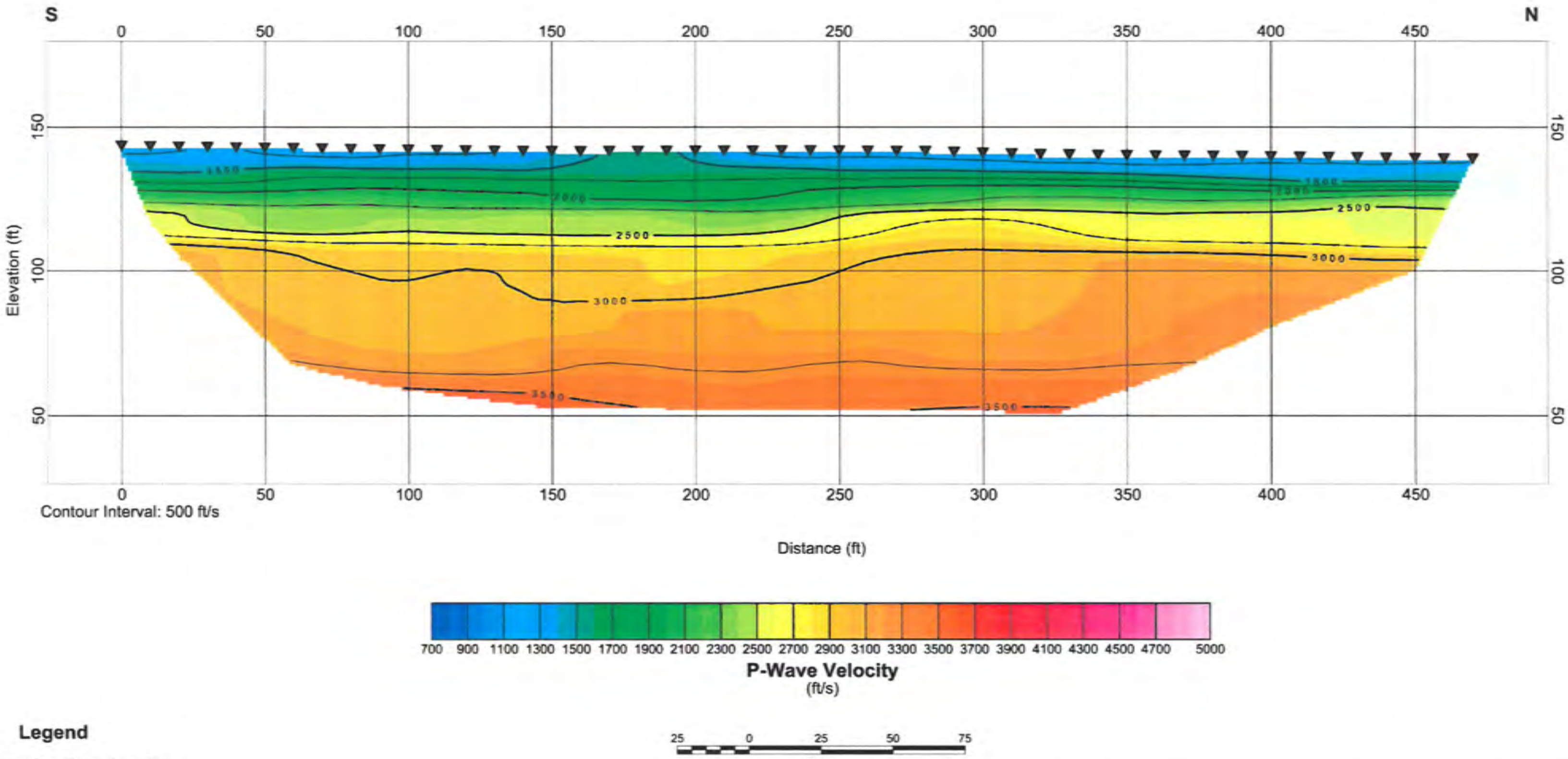


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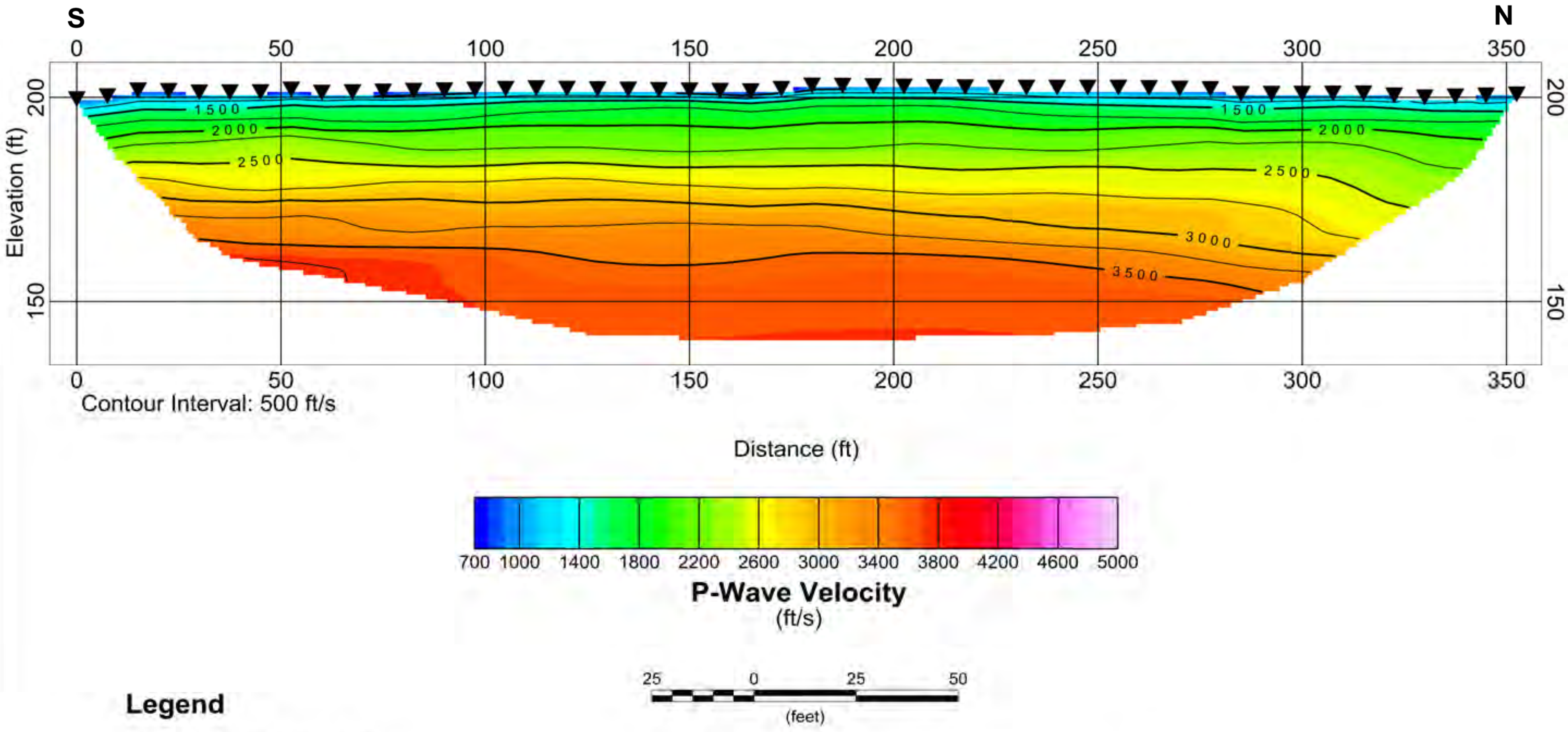
Figure 3

Line 2 P-Wave Seismic Tomography Model
GV Project Number 19201

Jefferson Street and 62nd Avenue
La Quinta, California

Prepared for NMG Geotechnical Inc.



Legend

▼ Geophone Locations

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Figure 4

Line 3 P-Wave Seismic Tomography Model
GV Project Number 19201

Jefferson Street and 62nd Avenue
La Quinta, California

Prepared for NMG Geotechnical Inc.

APPENDIX F

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-1
Depth (in): 279.6 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/9/2021
Date Presoak: 8/10/2021
Date Tested: 8/10/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
6:57	2	2	253.8	266.4	12.6	378.0
6:59						
7:02	2	7	258.0	267.0	9.0	270.0
7:04						
7:05	2	10	267.0	272.8	5.8	174.0
7:07						
7:10	5	18	254.4	273.6	19.2	230.4
7:15						
7:18	5	26	253.2	272.4	19.2	230.4
7:23						
7:25	5	33	254.4	271.6	17.2	206.4
7:30						
7:34	5	42	252.6	271.2	18.6	223.2
7:39						
7:42	5	50	253.2	270.0	16.8	201.6
7:47						
7:50	5	58	252.6	271.2	18.6	223.2
7:55						
7:58	5	66	252.6	270.6	18.0	216.0
8:03						
8:06	5	74	253.2	271.2	18.0	216.0
8:11						
8:14	5	82	253.8	269.4	15.6	187.2
8:19						
8:22	5	90	252.6	269.4	16.8	201.6
8:27						
8:30	5	98	252.0	268.8	16.8	201.6
8:35						
8:39	5	107	252.6	268.4	15.8	189.6
8:44						

Initial Height of Water (Ho) = 27
Final Height of Water (Hf) = 11.2
Change in Height Over Time (ΔH) = 15.8
Average Head Over Time (Havg) = 19.1

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 18.0 in./hr.

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-2
Depth (in): 279.6 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/9/2021
Date Presoak: 8/10/2021
Date Tested: 8/10/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
10:13 10:18	5	5	229.2	268.4	39.2	470.4
10:22 10:27	5	14	229.8	268.2	38.4	460.8
10:30 10:35	5	22	231.6	268.8	37.2	446.4
10:38 10:43	5	30	232.2	268.2	36.0	432.0
10:46 10:51	5	38	230.4	266.8	36.4	436.8
10:55 11:00	5	47	231.0	267.0	36.0	432.0
11:03 11:08	5	55	230.4	266.4	36.0	432.0
11:12 11:17	5	64	243.6	267.0	23.4	280.8
11:21 11:26	5	73	232.8	269.4	36.6	439.2
11:29 11:34	5	81	238.8	265.8	27.0	324.0
11:36 11:41	5	88	237.0	268.8	31.8	381.6
11:45 11:50	5	97	232.8	267.6	34.8	417.6
11:53 11:58	5	105	230.4	267.0	36.6	439.2

Initial Height of Water (Ho) = 49.2
Final Height of Water (Hf) = 12.6
Change in Height Over Time (ΔH) = 36.6
Average Head Over Time (Havg) = 30.9

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 26.7 in./hr.

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-3
Depth (in): 236.4 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/10/2021
Date Presoak: 8/12/2021
Date Tested: 8/12/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
11:28 11:33	5	5	187.2	222.0	34.8	417.6
11:35 11:40	5	12	189.0	224.0	35.0	420.0
11:42 11:47	5	19	187.2	224.2	37.0	444.0
11:50 11:55	5	27	187.2	224.3	37.1	445.2
11:57 12:02	5	34	186.0	224.4	38.4	460.8
12:04 12:09	5	41	187.2	224.0	36.8	441.6
12:12 12:17	5	49	187.2	225.5	38.3	459.6
12:19 12:24	5	56	187.2	224.0	36.8	441.6
12:27 12:32	5	64	187.2	224.3	37.1	445.2
12:34 12:39	5	71	187.2	224.0	36.8	441.6
12:42 12:47	5	79	187.2	224.2	37.0	444.0
12:50 12:55	5	87	187.2	223.7	36.5	438.0

Initial Height of Water (Ho) = 49.2
Final Height of Water (Hf) = 12.7
Change in Height Over Time (ΔH) = 36.5
Average Head Over Time (Havg) = 30.95

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 26.6 in./hr.

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-4
Depth (in): 295.2 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/10/2021
Date Presoak: 8/12/2021
Date Tested: 8/12/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
6:21 6:24	3	3	264.0	287.6	23.6	472.0
6:27 6:30	3	9	260.4	287.4	27.0	540.0
6:33 6:36	3	15	259.8	288.0	28.2	564.0
6:39 6:42	3	21	260.4	287.4	27.0	540.0
6:45 6:48	3	27	262.2	288.0	25.8	516.0
7:00 7:03	3	42	265.2	288.0	22.8	456.0
7:06 7:09	3	48	262.2	287.4	25.2	504.0
7:14 7:17	3	56	263.4	287.0	23.6	472.0
7:20 7:23	3	62	261.0	286.8	25.8	516.0
7:26 7:29	3	68	262.8	287.5	24.7	494.0
7:33 7:36	3	75	264.0	287.4	23.4	468.0
7:39 7:42	3	81	263.4	288.0	24.6	492.0
7:45 7:48	3	87	264.0	287.8	23.8	476.0
7:51 7:54	3	93	263.4	288.6	25.2	504.0
7:57 8:00	3	99	264.6	288.6	24.0	480.0
8:04 8:07	3	106	266.4	288.5	22.1	442.0
8:10 8:13	3	112	270.0	288.0	18.0	360.0
8:16 8:19	3	118	262.2	286.8	24.6	492.0
8:22 8:25	3	124	261.6	286.2	24.6	492.0
8:28 8:31	3	130	260.4	286.4	26.0	520.0

Initial Height of Water (Ho) = 34.8
Final Height of Water (Hf) = 8.8
Change in Height Over Time (ΔH) = 26
Average Head Over Time (Havg) = 21.8

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 43.7 in./hr.

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-5
Depth (in): 355.8 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/10/2021
Date Presoak: 8/12/2021
Date Tested: 8/12/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
9:16 9:19	3	3	331.2	349.8	18.6	372.0
9:22 9:25	3	9	327.6	348.5	20.9	418.0
9:28 9:31	3	15	326.4	348.6	22.2	444.0
9:33 9:36	3	20	327.6	348.6	21.0	420.0
9:39 9:42	3	26	331.2	349.8	18.6	372.0
9:45 9:48	3	32	328.8	349.8	21.0	420.0
9:52 9:55	3	39	333.6	348.0	14.4	288.0
9:58 10:01	3	45	326.4	348.8	22.4	448.0
10:04 10:07	3	51	324.0	334.8	10.8	216.0
10:10 10:15	5	59	318.0	338.6	20.6	247.2
10:18 10:23	5	67	318.0	337.6	19.6	235.2
10:27 10:32	5	76	318.0	336.4	18.4	220.8
10:35 10:40	5	84	318.0	337.0	19.0	228.0
10:43 10:48	5	92	318.0	338.4	20.4	244.8
10:50 10:55	5	99	318.0	339.8	21.8	261.6
10:58 11:03	5	107	318.0	340.8	22.8	273.6

Initial Height of Water (Ho) = 37.8
Final Height of Water (Hf) = 15
Change in Height Over Time (ΔH) = 22.8
Average Head Over Time (Havg) = 26.4

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 19.3 in./hr.

APPENDIX G

APPENDIX G

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 Geotechnical Consultant: Prior to commencement of work, the owner shall employ a geotechnical consultant. The geotechnical consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.

4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

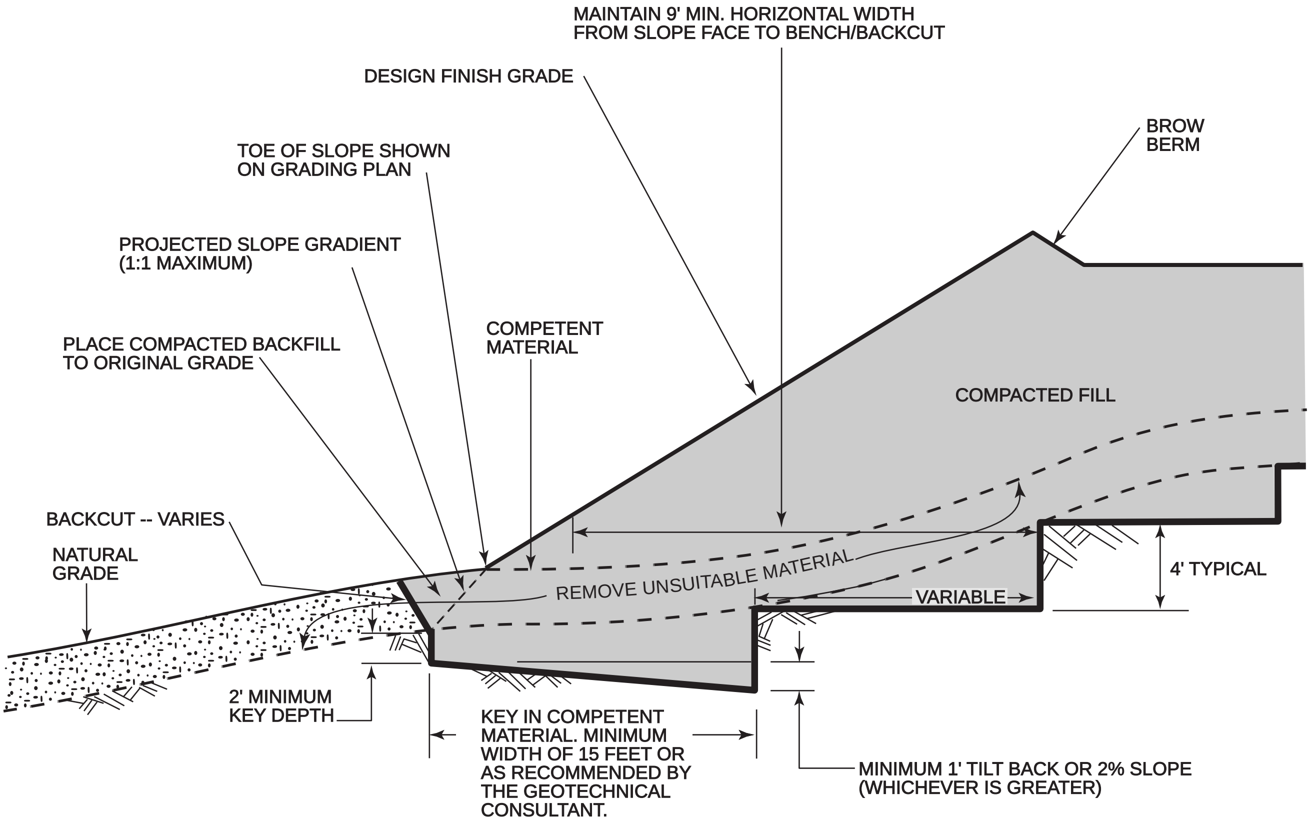
7.2 Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum 90 percent of maximum from 1 foot above the top of the conduit to the surface, except in traveled ways (see Section 7.6 below).

7.3 Jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

7.6 Trench backfill in the upper foot measured from finish grade within existing or future traveled way, shoulder, and other paved areas (or areas to receive pavement) should be placed to a minimum 95 percent relative compaction.

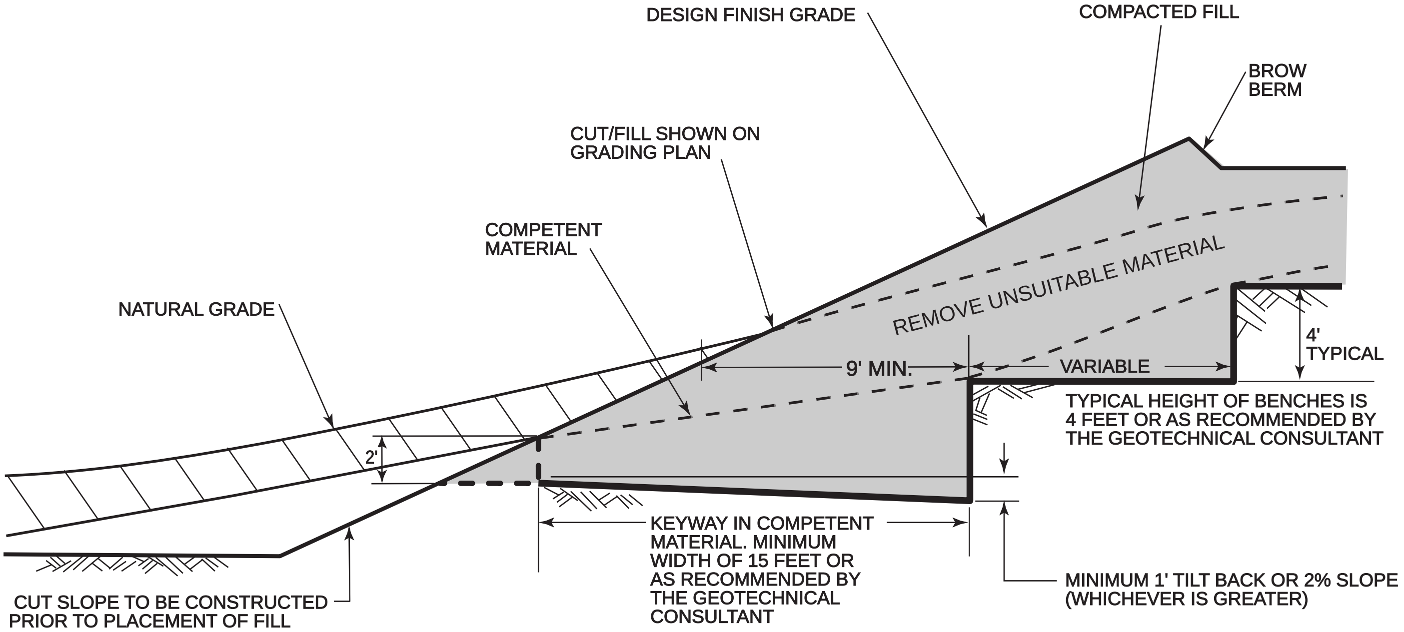


NOTE: BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE SOIL ENGINEER. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIAL RECOMMENDATIONS WILL BE PROVIDED BY THE GEOTECHNICAL ENGINEER.

FIGURE 1

TYPICAL FILL KEY ABOVE NATURAL SLOPE
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.



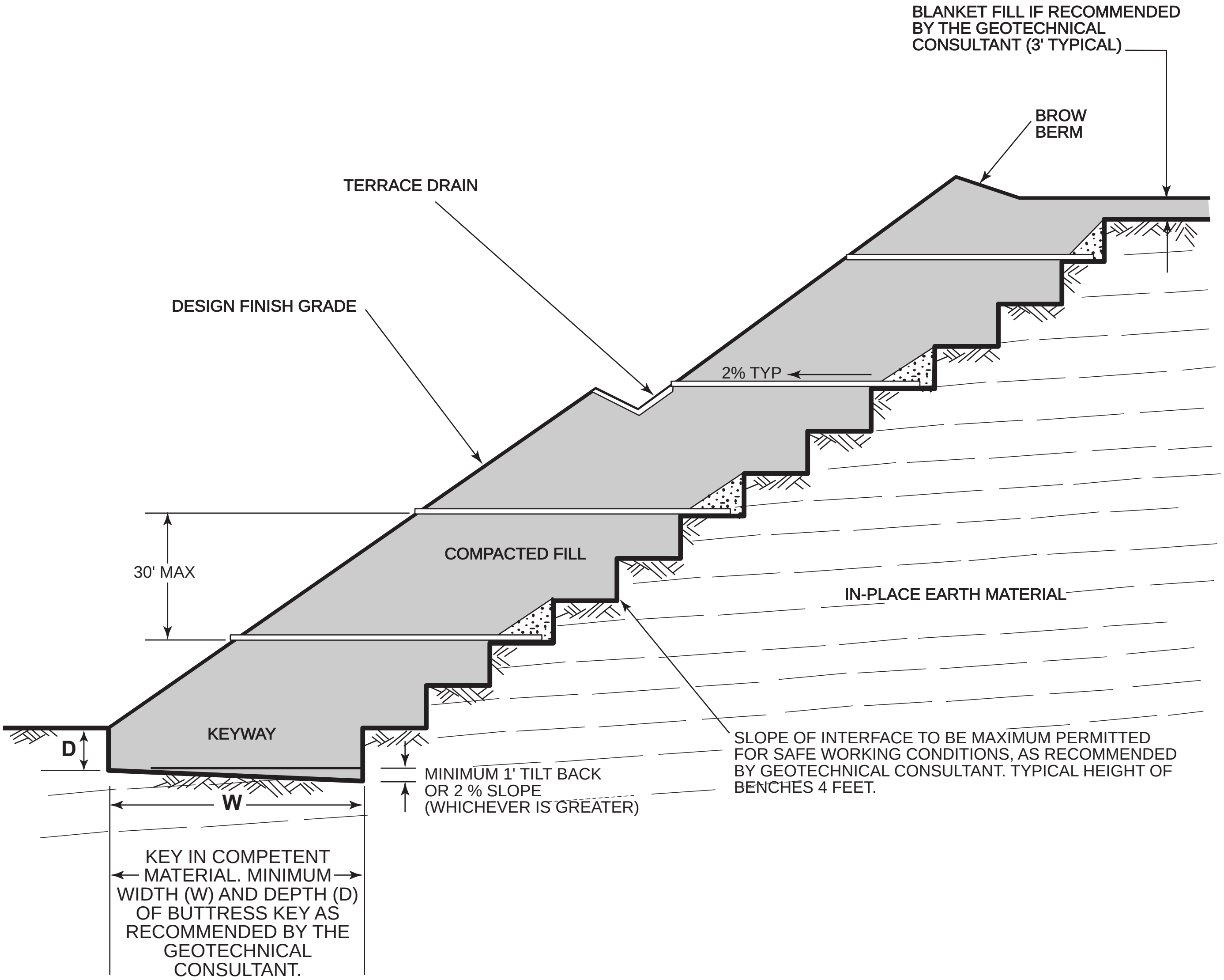
NOTE: THE FILL PORTION OF THE SLOPE SHALL BE COMPACTED AS STATED IN THE PROJECT SPECIFICATIONS.

FIGURE 2

TYPICAL FILL ABOVE CUT SLOPE
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.

8/03 TYP FILL ABOVE CUT SLOPE.ai

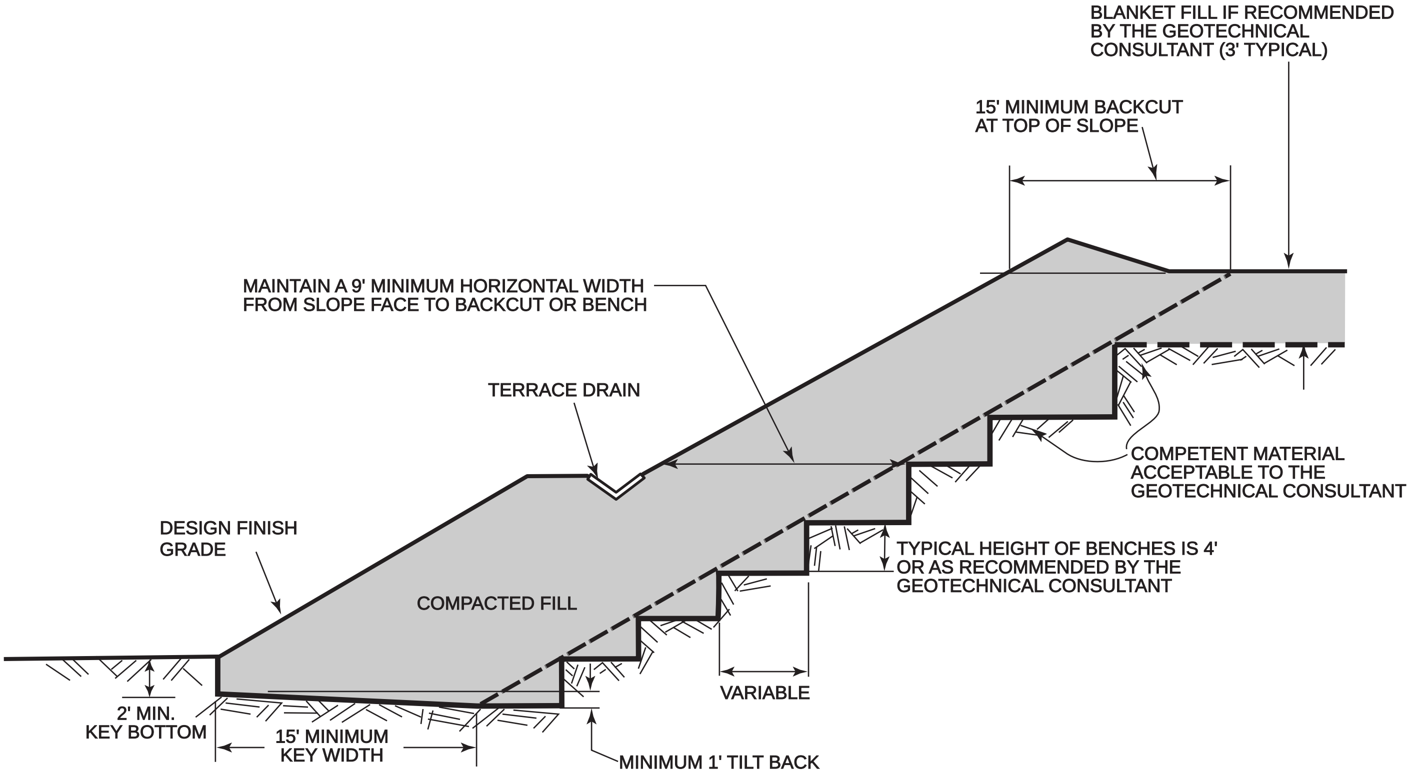


NOTE: SUBDRAIN DETAILS, SEE FIGURE 5.

FIGURE 3

TYPICAL BUTTRESS FILL
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.

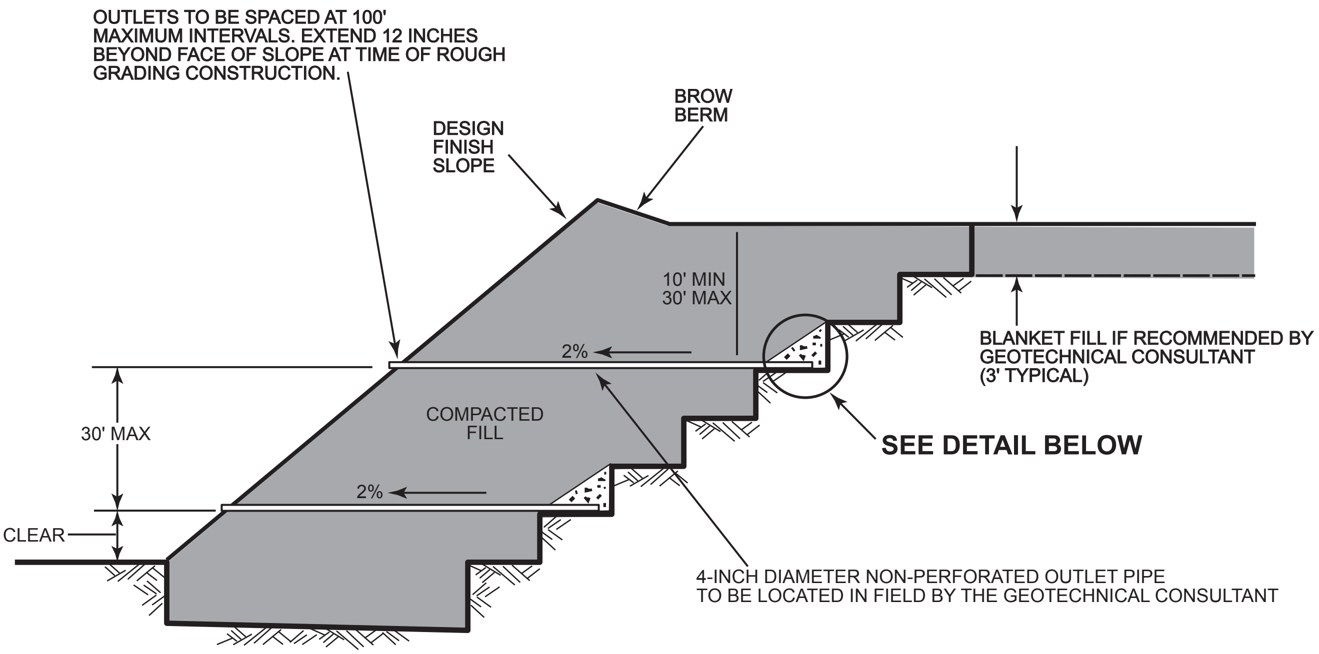


NOTE:
SEE FIGURE 5 FOR TYPICAL SUBDRAIN DETAILS FOR STABILIZATION FILLS

FIGURE 4

TYPICAL STABILIZATION FILL
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.



OUTLETS TO BE SPACED AT 100' MAXIMUM INTERVALS. EXTEND 12 INCHES BEYOND FACE OF SLOPE AT TIME OF ROUGH GRADING CONSTRUCTION.

BLANKET FILL IF RECOMMENDED BY GEOTECHNICAL CONSULTANT (3' TYPICAL)

SEE DETAIL BELOW

4-INCH DIAMETER NON-PERFORATED OUTLET PIPE TO BE LOCATED IN FIELD BY THE GEOTECHNICAL CONSULTANT

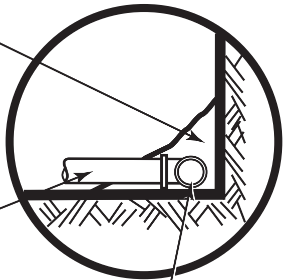
DETAIL

FILTER MATERIAL - MINIMUM OF THREE CUBIC FEET PER FOOT OF PIPE. SEE FILTER MATERIAL SPECIFICATION.

ALTERNATE: IN LIEU OF FILTER MATERIAL, THREE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE GRAVEL SPECIFICATION, AND FIGURE 6 FOR FILTER FABRIC SPECIFICATION

"GRAVEL" TO CONSIST OF 1/2" TO 1" CRUSHED ROCK PER STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.



OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW

MINIMUM 4-INCH DIAMETER SCHEDULE 40 ASTM D1527 OR D1785 OR SDR 35 ASTM D2751 OR D 3034. FOR FILL DEPTH OF 90 FEET OR GREATER, USE ONLY SCHEDULE 40 OR EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT.

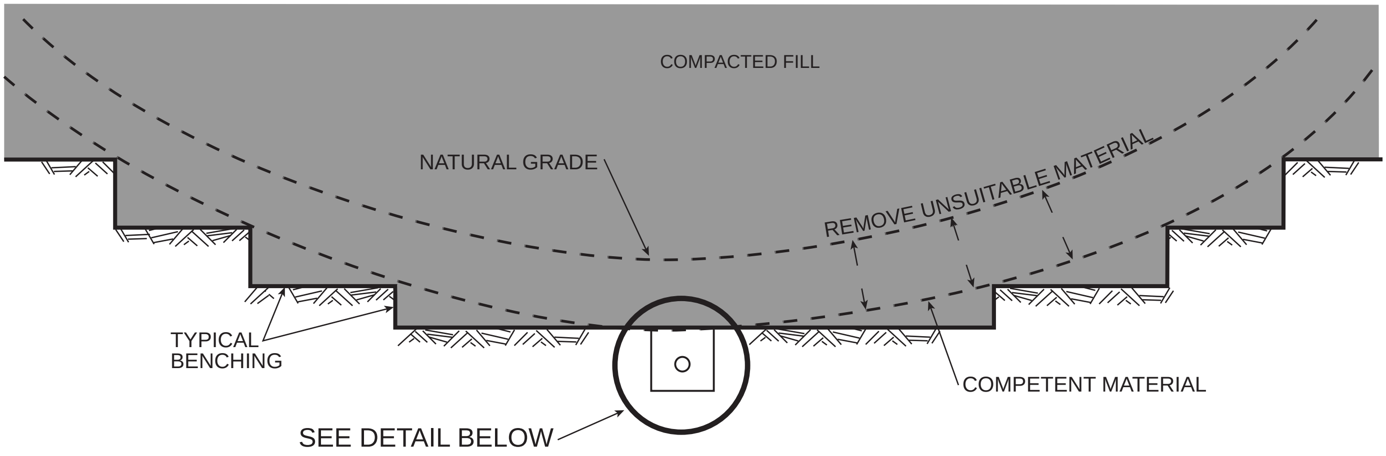
SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOTE:
TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

FIGURE 5

TYPICAL STABILIZATION AND BUTTRESS FILL SUBDRAINS
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.



FILTER FABRICS SHALL BE PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL CONFORMING TO THE FOLLOWING:

1) GRAB TENSILE STRENGTH. POUNDS, MIN. ASTM D 4632..90

2) ELONGATION, AT PEAK LOAD, PERCENT, MIN. ASTM D 4632..50

3) PUNCTURE STRENGTH, LBS., MIN. ASTM D 3787..45

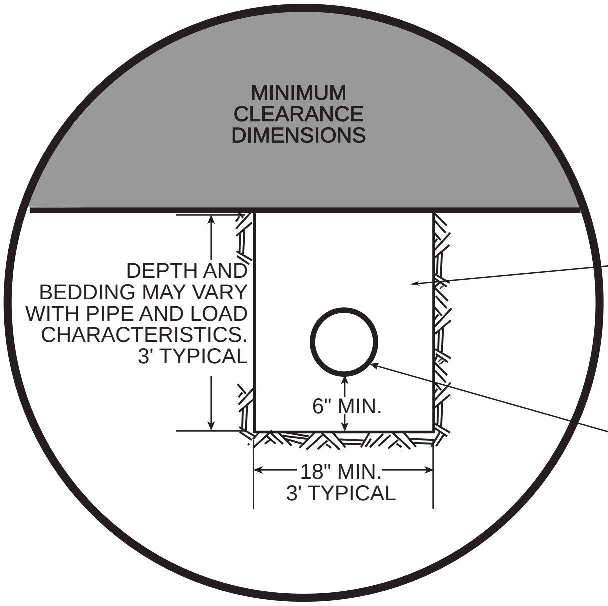
4) COEFFICIENT OF WATER PERMITTIVITY, 1/SEC. ASTM D 4491...>0.7

5) BURST STRENGTH, P.S.I., MIN. ASTM D 3786..180

NOTES: DOWNSTREAM 20' OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL

PIPE SHALL BE A MINIMUM OF 4-INCH DIAMETER. FOR RUNS OF 500 FEET OR MORE, USE 6-INCH DIAMETER PIPE, OR AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT

DETAIL



FILTER MATERIAL - MINIMUM OF NINE CUBIC FEET PER FOOT OF PIPE. SEE FIGURE 5 FOR FILTER MATERIAL SPECIFICATIONS.

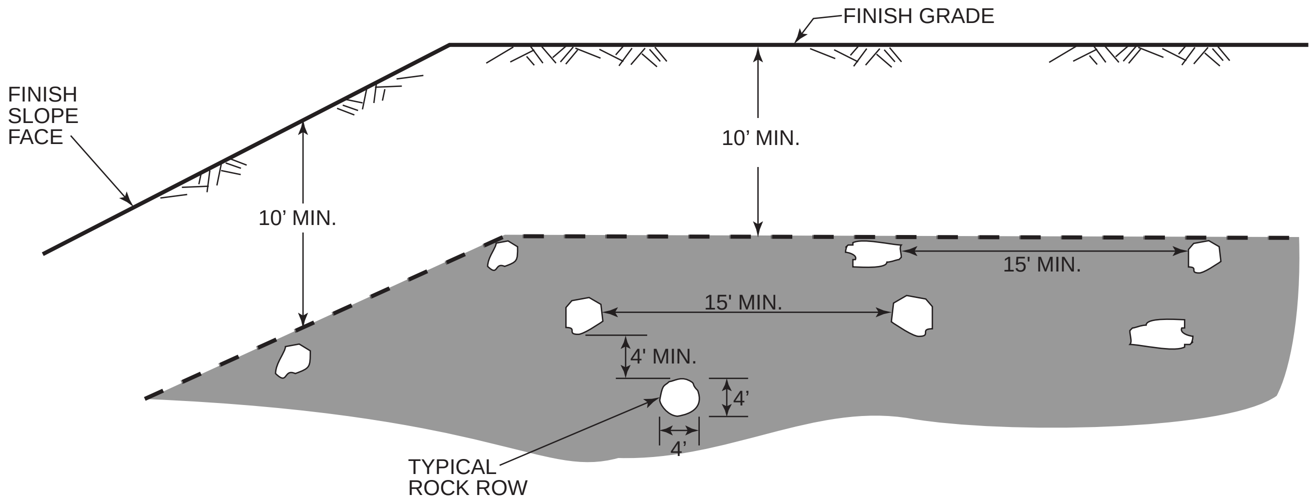
ALTERNATE: IN LIEU OF FILTER MATERIAL, NINE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE FIGURE 5 TO GRAVEL SPECIFICATION. SEE ABOVE FOR FILTER FABRIC SPECIFICATION. FILTER FABRIC SHALL BE LAPPED MINIMUM OF 12 INCHES ON ALL JOINTS.

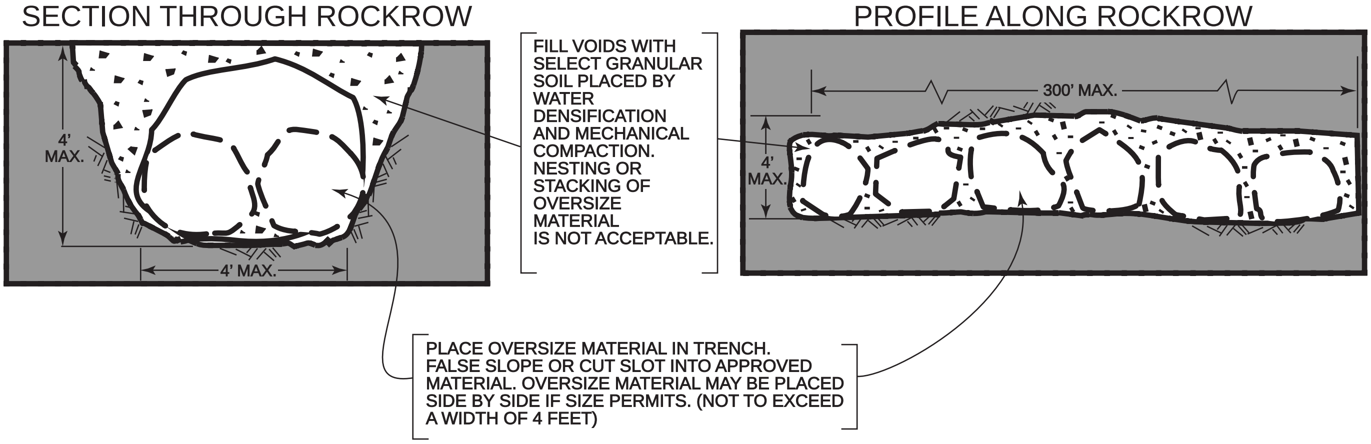
MINIMUM 4 INCH DIAMETER SCHEDULE 40 ASTM D 1527, OR D 1785, OR SDR 35 ASTM 2751 OR D 3034. FOR FILL DEPTH OF 90 FEET OR GREATER, USE ONLY SCHEDULE 40 OR APPROVED EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE.

FIGURE 6

TYPICAL CANYON SUBDRAIN
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.





FILL VOIDS WITH SELECT GRANULAR SOIL PLACED BY WATER DENSIFICATION AND MECHANICAL COMPACTION. NESTING OR STACKING OF OVERSIZE MATERIAL IS NOT ACCEPTABLE.

PLACE OVERSIZE MATERIAL IN TRENCH. FALSE SLOPE OR CUT SLOT INTO APPROVED MATERIAL. OVERSIZE MATERIAL MAY BE PLACED SIDE BY SIDE IF SIZE PERMITS. (NOT TO EXCEED A WIDTH OF 4 FEET)

NOTES:

A) OVERSIZED ROCK IS DEFINED AS LARGER THAN 12" IN SIZE (IN GREATEST DIMENSION).

B) SPACE BETWEEN ROCKROWS SHOULD BE ONE EQUIPMENT WIDTH OR A MINIMUM OF 15 FEET.

C) THE WIDTH AND HEIGHT OF THE ROCKROW SHALL BE LIMITED TO FOUR FEET AND THE LENGTH LIMITED TO 300 FEET UNLESS APPROVED OTHERWISE BY THE GEOTECHNICAL CONSULTANT. OVERSIZE SHOULD BE PLACED WITH FLATEST SIDE ON THE BOTTOM.

D) OVERSIZE MATERIAL EXCEEDING FOUR FEET MAY BE PLACED ON AN INDIVIDUAL BASIS IF APPROVED BY THE GEOTECHNICAL CONSULTANT.

E) FILLING OF VOIDS WILL REQUIRE SELECT GRANULAR SOIL (SE > 20, OR LESS THAN 20 PERCENT FINES) AS APPROVED BY THE GEOTECHNICAL CONSULTANT. VOIDS IN THE ROCKROW TO BE FILLED BY WATER DENSIFYING GRANULAR SOIL INTO PLACE ALONG WITH MECHANICAL COMPACTION EFFORT.

F) IF APPROVED BY THE GEOTECHNICAL CONSULTANT, ROCKROWS MAY BE PLACED DIRECTLY ON COMPETENT MATERIALS OR BEDROCK, PROVIDED ADEQUATE SPACE IS AVAILABLE FOR COMPACTION.

G) THE FIRST LIFT OF MATERIAL ABOVE THE ROCKROW SHALL CONSIST OF GRANULAR MATERIAL AND SHALL BE PROOF-ROLLED WITH A D-8 OR LARGER DOZER OR EQUIVALENT.

H) ROCKROWS NEAR SLOPES SHOULD BE ORIENTED PARALLEL TO SLOPE FACE.

I) NESTING OR STACKING OF ROCKS IS NOT ACCEPTABLE.

FIGURE 7

TYPICAL OVERSIZE ROCK PLACEMENT METHOD MINIMUM STANDARD GRADING DETAIL FOR STRUCTURAL FILL

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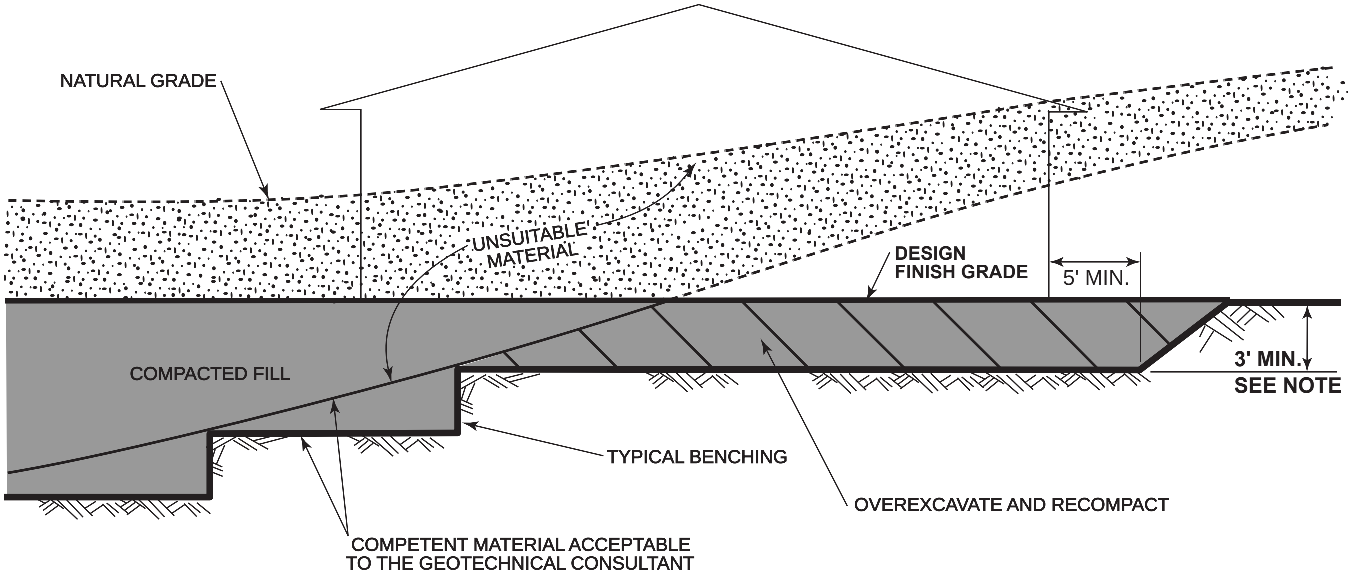
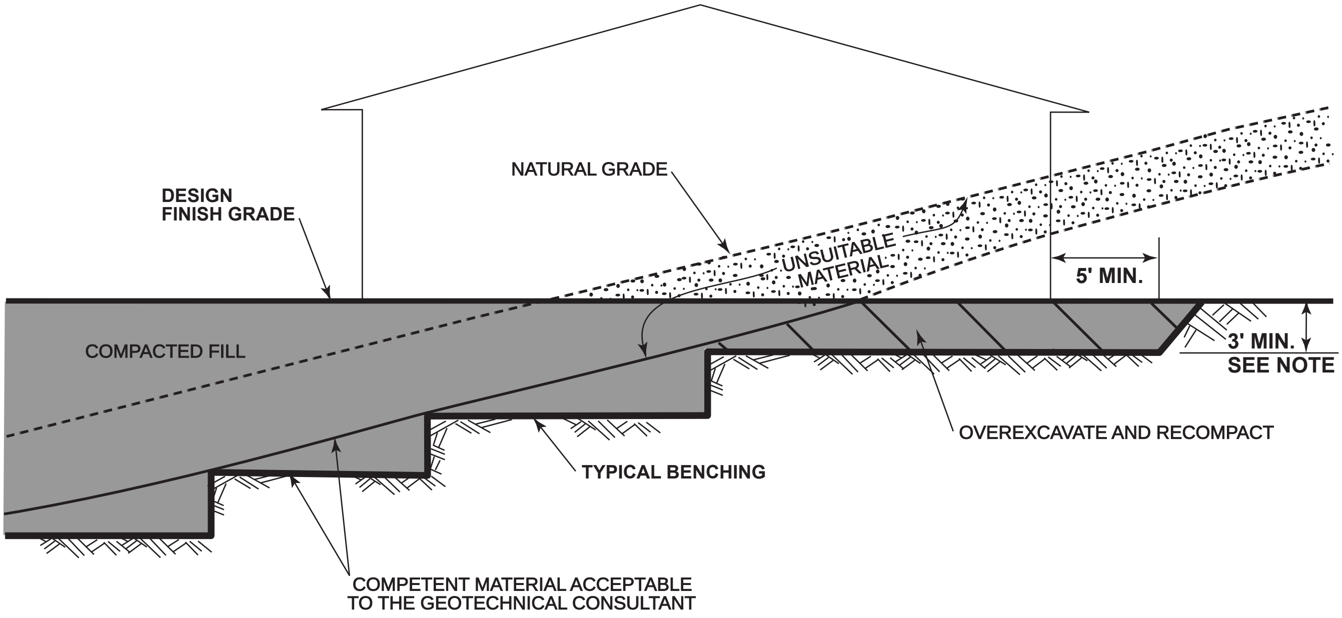
CUT LOT



CUT FILL LOT (TRANSITION)



NOTE: DEEPER THAN THE 3-FOOT OVEREXCAVATION MAY BE RECOMMENDED BY THE GEOTECHNICAL CONSULTANT IN STEEP TRANSITIONS.

FIGURE 8

TYPICAL OVEREXCAVATION OF DAYLIGHT LINE
MINIMUM STANDARD GRADING DETAILS

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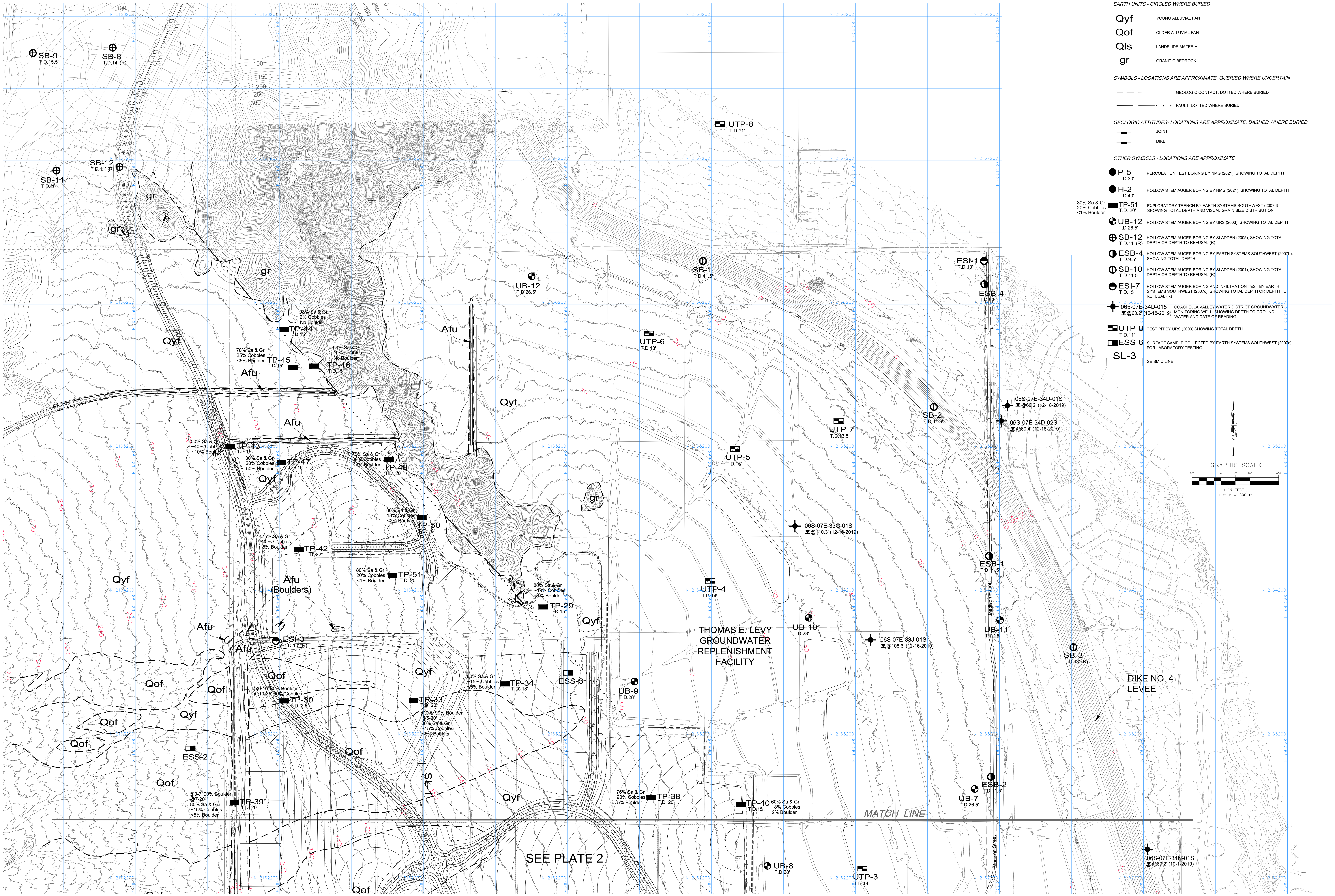

LEGEND

EARTH UNITS - CIRCLED WHERE BURIED

Qyf	YOUNG ALLUVIAL FAN
Qof	OLDER ALLUVIAL FAN
Qls	LANDSLIDE MATERIAL
gr	GRANITIC BEDROCK

SYMBOLS - LOCATIONS ARE APPROXIMATE, QUERIED WHERE UNCERTAIN

— — — — · · · · ·	GEOLOGIC CONTACT, DOTTED WHERE BURIED
—— ——• • •	FAULT, DOTTED WHERE BURIED

GEOLOGIC ATTITUDES- LOCATIONS ARE APPROXIMATE, DASHED WHERE BURIED

▬	JOINT
═	DIKE

OTHER SYMBOLS - LOCATIONS ARE APPROXIMATE

● P-5 T.D.30'	PERCOLATION TEST BORING BY NMG (2021), SHOWING TOTAL DEPTH
● H-2 T.D.40'	HOLLOW STEM AUGER BORING BY NMG (2021), SHOWING TOTAL DEPTH
80% Sa & Gr 20% Cobbles <1% Boulder ▬ TP-51 T.D. 20'	EXPLORATORY TRENCH BY EARTH SYSTEMS SOUTHWEST (2007d) SHOWING TOTAL DEPTH AND VISUAL GRAIN SIZE DISTRIBUTION
◕ UB-12 T.D.26.5'	HOLLOW STEM AUGER BORING BY URS (2003), SHOWING TOTAL DEPTH
⊕ SB-12 T.D.11' (R)	HOLLOW STEM AUGER BORING BY SLADDEN (2005), SHOWING TOTAL DEPTH OR DEPTH TO REFUSAL (R)
◐ ESB-4 T.D.9.5'	HOLLOW STEM AUGER BORING BY EARTH SYSTEMS SOUTHWEST (2007b), SHOWING TOTAL DEPTH
⦶ SB-10 T.D.11.5'	HOLLOW STEM AUGER BORING BY SLADDEN (2001), SHOWING TOTAL DEPTH OR DEPTH TO REFUSAL (R)
◒ ESI-7 T.D.15'	HOLLOW STEM AUGER BORING AND INFILTRATION TEST BY EARTH SYSTEMS SOUTHWEST (2007c), SHOWING TOTAL DEPTH OR DEPTH TO REFUSAL (R)
✦ 065-07E-34D-015 ▼@60.2' (12-18-2019)	COACHELLA VALLEY WATER DISTRICT GROUNDWATER MONITORING WELL, SHOWING DEPTH TO GROUND WATER AND DATE OF READING
▚ UTP-8 T.D.11'	TEST PIT BY URS (2003) SHOWING TOTAL DEPTH
◧ ESS-6	SURFACE SAMPLE COLLECTED BY EARTH SYSTEMS SOUTHWEST (2007c) FOR LABORATORY TESTING
SL-3	SEISMIC LINE

PLATE 1

PRELIMINARY GEOTECHNICAL MAP
TRAVERTINE DEVELOPMENT
CITY OF LA QUINTA, CALIFORNIA

Project No.:18186-01 By:SBK/TW
Project Name:Hofmann/Travertine
Date: 8/27/2021 SCALE: 1" = 200'

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Drawing: P:\2018\18186-01 TRG LaQuinta Travertine\Drafting_WIP\Pla

SEE PLATE 1

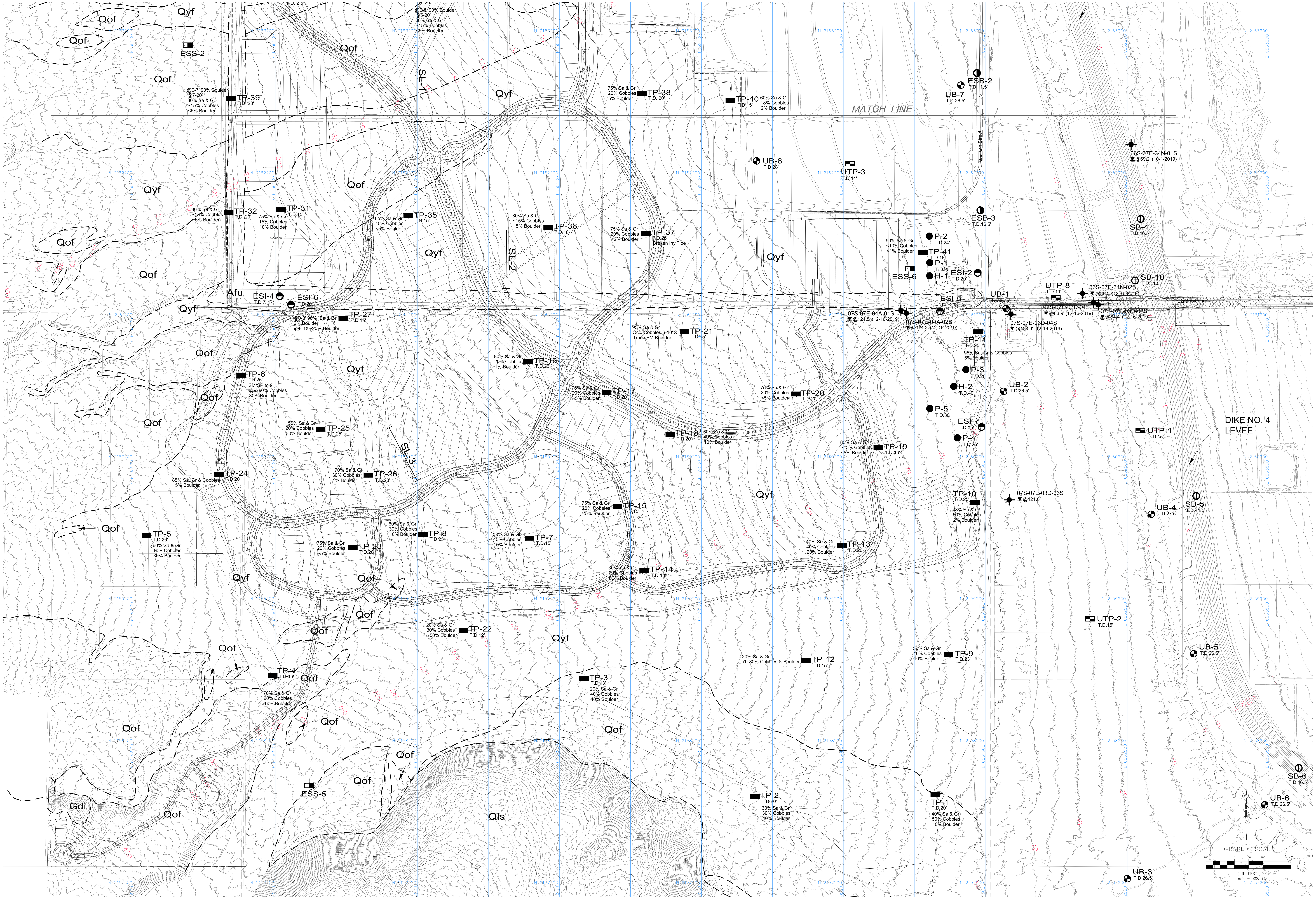

PLATE 2

Project No.:18186-01 By:SBK/TW
Project Name:Hofmann/Travertine
Date: 8/27/2021 SCALE: 1" = 200'

NMG
Geotechnical, Inc.

Drawing: P:\2018\18186-01 TRG LaQuinta Travertine

APPROXIMATE ROCK DISTRIBUTION MAP
TRAVERTINE DEVELOPMENT
CITY OF LA QUINTA, CALIFORNIA

Project No.:18186-01 By:SBK/TW
Project Name:Hofmann/La Quinta Travertine
Date: 8/27/21 SCALE: 1" = 200'

NMG
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PLATE 3

LEGEND

SYMBOLS - LOCATIONS ARE APPROXIMATE, QUERIED WHERE UNCERTAIN

80% Sa & Gr 20% Cobbles <1% Boulder ▬ TP-51 T.D. 20'	EXPLORATORY TRENCH SHOWING TOTAL DEPTH AND VISUAL GRAIN SIZE DISTRIBUTION
4% B	AVERAGE PERCENTAGE OF BOULDERS (OVERSIZE) IN ALLUVIAL FAN DEPOSITS
▬	APPROXIMATE LIMITS OF BOULDER PERCENTAGE AREAS

NOTE: BOULDERS (OVERSIZE) ARE GRANITIC AND METAMORPHIC MATERIAL THAT IS GREATER THAN 12 INCHES IN THE MAXIMUM DIAMETER