



LAKE HAVASU CITY

Community Investment Department

**HAVASU 280 INFRASTRUCTURE CONSTRUCTION
PROJECT NO. PR2070
ADDENDUM NO. 1
July 13, 2016**

Attention is called to the following changes, additions, clarifications and/or deletions to the original solicitation and they shall be taken into account in preparing submissions:

There is no change in the opening date. **Submissions are due no later than 3:00 p.m., Arizona Time, July 27, 2016**, at the City Clerk's Office, 2330 McCulloch Blvd. N., Lake Havasu City, AZ 86403.

ITEM	ACTION	DESCRIPTION or ISSUE
1:00	CHANGE/ATTACHMENT	Replace SECTION 00310, BID SCHEDULE, in its entirety with the attached SECTION 00310-A.
2:00	QUESTIONS	All questions submitted in writing are attached with responses.
3:00	ATTACHMENT	Riviera Geotechnical Investigation
4:00	ATTACHMENT	Drainage Ditch Addition

DATE: July 13, 2016

BY: Kimberly Fiumara, Procurement Specialist

Submitted Bid Questions (Q) and Responses (R)

Q1. Can you please make the original PDF available so that I can trace the contours without mistake? Would it be possible to get CADD files of earthwork, or a vectorized PDF file for the subject project?

R1. *The original PDF's are available on Lake Havasu City's website via the following web address; <http://www.lhcaz.gov/community-investment/bids>. CADD files will be made available after award.*

Q2. Is the telephone line and water line going down the existing road getting abandoned or replaced?

R2. *As-built data is not available for these service lines, any required relocation will be considered incidental to the project.*

Q3. Will blasting be allowed?

R3. *Blasting should not be required.*

Q4. There is an existing manhole at STA 83+00 that needs to be lowered. Will there be a pay item for this?

R4. *The existing manhole shall be protected in place. It will not be adjusted as part of this project. No pay item will be added.*

Q5. Will culverts be installed in the drainage ditch in the ADOT ROW?

R5. *The project will stop at ADOT Right-of-Way which is at Station 84+24.00.*

Q6. Will there be a drainage structure to prevent the run off from the new road entering SR95?

R6. *Please see attached sketch for ditch addition.*

Q7. Can the excess material be stock piled on site?

R7. *Provisions for any excess material will be accommodated.*

Q8. Is there a soils report available?

R8. *See attached*

SECTION 00310-A

BID SCHEDULE
LAKE HAVASU CITY

HAVASU 280 INFRASTRUCTURE CONSTRUCTION
PR2070

Lake Havasu City Council
Lake Havasu City
2330 N. McCulloch Boulevard
Lake Havasu City, AZ 86403

The City Council:

Pursuant to request for bids to be opened the 27th day of July, 2016 at 3:00 P.M., Arizona Time, at Room 109 of Lake Havasu City Hall, for the above project, the Contractor proposes to complete work, including furnishing all labor and materials, per the Specifications and Plans at the Following prices.

This Schedule of Items and Prices shall be completed in ink or typed by the Bidding Contractor. In case of discrepancy between the word and figure amount description, the word description shall control extensions.

Prices must be entered for each item and the appropriate subtotal and total blank shall be filled out. Bid prices shall include sales tax and all other applicable taxes and fees.

Bidder agrees to perform all the necessary work to complete the **HAVASU 280 INFRASTRUCTURE CONSTRUCTION, Project No. PR2070.**

00310A-1

SECTION 00310-A

ITEM NO.	DESCRIPTION	Quantity	Unit	Unit Price (Word & Figure)	Total Amount
	Base Bid				
1	Mobilization, Bonds & Insurance	1	LS	\$	\$
2	Construction Staking	1	LS	\$	\$
3	Traffic Control	1	LS	\$	\$
4	Stormwater Pollution Prevention Plan	1	LS	\$	\$
5	Clearing & Grubbing	1	LS	\$	\$
6	Grading, Excavation and Embankment	86,000	CY	\$	\$
7	Riprap Protection	60	CY	\$	\$
8	36" HDPE Storm Drain	425	LF	\$	\$
9	Concrete Headwalls	4	EA	\$	\$
10	Trash Racks	2	EA	\$	\$
11	Aluminum Box Culvert	1	LS	\$	\$
12	Force Account	1	LS	\$10,000 Ten-Thousand Dollars	\$ 10,000.00
	Base Bid Total				\$
	Additive Alternates 1 thru 5				
13	Pad Site #1	1	LS	\$	\$
14	Pad Site #2	1	LS	\$	\$
15	Pad Site #3	1	LS	\$	\$
16	Pad Site #4	1	LS	\$	\$
17	ECO-EDUCATIONAL CENTER PAD	1	LS	\$	\$
	Base Bid Total + Additive Alternates				\$

The unit prices for **HAVASU 280 INFRASTRUCTURE CONSTRUCTION, Project No. PR2070**, shall include all labor, materials, water disposal, bailing, shoring, removal, disposal, overhead, profit, insurance, and all other related costs and work to cover the finished work of the several kinds called for. Changes in the Contract shall be processed in accordance with Paragraph 16 of the General Conditions.

Bidder understands that the Owner reserves the right to reject any or all Bids, or portions thereof, and to waive any informalities in the bidding.

The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of ninety (90) calendar days after the scheduled closing time for receiving Bids.

Upon receipt of written notice of the acceptance of this Bid, Bidder shall execute the formal Contract attached within 10 days and deliver a Performance Bond, Payment Bond, and Certificates of Insurance as required by Paragraph 25 of the General Conditions and the Special Provisions.

The Bid security attached in the sum of \$ _____ is to become the property of the Owner in the event the Contract and Bond(s) are not executed and provided within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Bidder hereby acknowledges receipt of the following Addenda: ____, ____, ____.

RESPECTFULLY SUBMITTED BY:

BY: _____

TITLE: _____

FIRM: _____

ADDRESS: _____

PHONE: _____ FAX _____

Seal - if Bid by a corporation

AZ Contractor's License No: _____ Type _____

** END OF SECTION **

**GEOTECHNICAL INVESTIGATION
THE RIVIERA
HIGHWAY 95 AND SWEETWATER ROAD
LAKE HAVASU CITY, ARIZONA
STI Project No. 07L128GE**

October 15, 2007

PREPARED FOR

**HAVASU RIVIERA, LLC
815 MANHATTAN AVENUE, #D
MANHATTAN BEACH, CALIFORNIA 90266**

PREPARED BY:

**Southwest Technologies, Inc.
2175 Kiowa Boulevard N. Unit 105-106
Lake Havasu City, Arizona 86403**

October 15, 2007
STI Project No. 07L128GE

Havasu Riviera, LLC
815 Manhattan Avenue, #D
Manhattan Beach, California 90266

Attention: Mr. Jim Komick, President

Subject: Report of Geotechnical Investigation for the proposed development of "The Riviera" (250 +/- acres) located off Highway 95 and Sweetwater Road in Lake Havasu City, Arizona.

Southwest Technologies, Inc. (STI) has completed subsurface investigation for the proposed referenced project. The purpose of the exploration was to evaluate the general subsurface conditions at the site and to present geotechnical design recommendations with regard to the soil supported components of the project. This report presents the results of our exploration, including review of the project information provided, a discussion of the site conditions, subsurface soils conditions and laboratory results, and presents our recommendations for foundation design and site preparation. Included in the Appendices are Boring Logs, Laboratory Test Results, Vicinity Map and Site Aerial Photographs.

We have appreciated the opportunity to have participated in this phase of your project. Should you have any questions concerning the contents of this report or any other matter, please do not hesitate to contact us at (928) 854-5060.

We look forward to servicing you in field monitoring and testing services during the construction phases of the project be provided by STI on behalf of the owner. This will help to assure that the construction operations are performed in accordance with the design recommendations presented in this report as well as those outlined in the project plans and specifications.

Sincerely,
Southwest Technologies, Inc.

Gerald Curry
President

Wayne Anderson P.E.
Principal Engineer

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APPENDIX A

Site Vicinity Map

Aerial photo

APPENDIX B

Boring Location Map

Boring Logs

Laboratory Test Results

1.0 Purpose of Services

The purpose of the report was to determine and evaluate the site conditions for the proposed development of "The Riviera" to be located on 250 +/- acres in the area of Highway 95 and Sweetwater Road in Lake Havasu City, Arizona, and to present general geotechnical and construction recommendations for foundations, slabs and other soil-supported components of the project.

- Site reconnaissance.
- Review construction information for the proposed building(s) as it relates to the geotechnical characteristics of the site.
- Explore the on site subsurface conditions by conducting Boring Locations.
- Perform laboratory testing on representative soil samples obtained in Boring Locations.
- Discuss geotechnical characteristics of the soils on site that could result in related design or construction problems.
- Provide recommendations for foundations design parameters, construction procedures
- Prepare this report presenting our findings, conclusions and recommendations.

2.0 General Site and Project Description

The subject site is 250 +/- acres and is located off Highway 95 and Sweetwater Road in Lake Havasu City, Arizona. At the time of our visit, the area proposed for improvements was observed to be uneven and areas of inaccessible rocky terrain with steep slopes and a wash traveling through the site from north to south. There are areas of heavy to moderate vegetation existing on site. Based on the information provided, the proposed project will consist of single family detached and attached homes multi-stories. The buildings will be constructed of wood framing on conventional reinforced concrete footing and reinforced concrete slab on grade. Access and parking will be asphaltic concrete over aggregate base material.

General construction and structural loading information was not available at the time of this report; however, we assume that maximum loads for the proposed construction will be relatively light (e.g., less than 2 kips per lineal foot wall loads and less than 80 kip column loads).

3.0 Site Summary

This report presents the results of the Subsurface Investigation for the development of the proposed project information provided to us, the field and laboratory test procedures utilized during this exploration, and presents our findings, conclusions, and recommendations for foundation design and site preparation.

The boring locations at the site generally encountered loose to very dense Sands with Silts and Sands and Gravels with various amounts of gravel sized materials, from the surface to a depths of 40 feet. The upper 10 to 12 inches of native soils on site were found to be in a dry and in loose to dense conditions, varying with the terrain locations on site. Based on the attached report the soils at the site are not suitable for the support of the proposed site improvements if they remain in current condition. These soils will need to be over excavated and blended with select materials, if needed, to comply specifically with Section 6.2.3 and conform with all of Section 6 of this report. If the recommendations are followed the foundation and slab support systems may be designed for an allowable bearing pressure of 2,500 pounds per square foot (psf).

These recommendations are part of a subsurface investigation report and do not stand-alone. More specific recommendations including foundation preparation, material recommendations and construction guidelines are included in this report.

Geotechnical engineering recommendations for support of building elements and pavements are presented in the following sections. These recommendations are based upon the results of the field and laboratory tests presented in Appendix B of this report.

4.0 FIELD INVESTIGATION & LABORATORY TESTING

4.1 Subsurface Exploration

The Boring Locations were excavated at the subject site utilizing a CME 850 track mounted drill rig. The boring locations were logged by a STI representative and excavated at the approximate locations shown on the Test Pit Location Map.

Twenty (20) boring locations were advanced at the site to depths of 40 feet below existing grade. Soil samples were collected at various intervals throughout the boring locations. Representative portions of the samples were sealed in plastic bags or plastic containers and returned to our laboratory.

Soil profiles were somewhat consistent and detailed descriptions are presented in the Boring Logs in Appendix B. The Boring at the site encountered loose to very dense Sands with Silts and Sand with Gravels from the surface to depths of 40 feet. The soils tested had in-situ moisture contents ranging from 0.4 to 8.6 percent. A remolded swell sample obtained from a bulk samples from Boring B-5 (13.5 – 15.0 feet) and B-19 (8.5 – 10 feet) showed a minimal swell (.04%) and (.05%) remolded at approximately 90 percent of the modified Proctor. The modified Proctor performed on the same bulk samples showed a maximum dry density of 131.0 pcf at 8.0 percent moisture and 122.0 pcf at 9.0 percent moisture. Details of the laboratory test results are presented in the Appendix B.

4.2 Laboratory Analyses

Laboratory testing on representative samples were ran to aid in classifying soils and to determine their engineering properties relative to this project. The tests performed included natural moisture content, remolded swell, sieve analysis, atterberg limits, and moisture/density relationship testing, etc. The results are presented in Appendix B. All laboratory testing was performed in accordance with ASTM procedures.

Samples were then classified in general accordance with the Unified Soil Classification System (USCS) by an experienced geotechnical representative. Field logs were prepared presenting a description of the soils encountered by the excavations. A log of each Boring Location is included in Appendix.

5.0 Site Conditions

5.1 Geology

The project is located at the base of alluvium material; the material is likely from erosion of the Tertiary/Cretaceous Age Volcanic/Sedimentary and Precambrian Age granitic bedrock of the Mohave Mountains to the east. The regional geology of the Mohave County area is comprised of Quaternary surficial deposits up to two million year old underlain by early proterozoic metamorphic igneous and sedimentary rocks which can dated to 1,600 million years ago. The river basin has been incising the basement rock and depositing sediment throughout the region. The Quaternary soils are unconsolidated coarse, poorly sorted, alluvial fan and eolian deposits. The metamorphic rocks are mostly granite and basalts that have been subject to low-grade metamorphism. The meta-sedimentary rock is primarily slates, devised from sandstone, with small garnet inclusions.

No calcareous sedimentary rock is evident in the area, therefore the presence of subterranean features such as sinkholes and/or caverns is not considered likely.

5.2 Groundwater

Groundwater was not encountered in any of the Boring Locations at the time of the investigation. Based on the review of the Arizona Water of Water Resource (ADWR) the general water table is well below the 100 +/- feet of native elevations. The groundwater depth may fluctuate during seasonal changes and the varying elevations at the site. The groundwater should not be a concern in development of the proposed project.

5.3 Regional Seismicity

The site is situated in an area of active and potentially active tectonic faults. No known active or potentially active tectonic faults are shown crossing the site on published maps, nor were any faults observed during our field evaluation. It is reasonable to assume that structures built in this area will be subject to at least several seismic events during their life; for structures designed based in accordance with the 2003 International Building Code (IBC), the following criteria will apply. For seismic design purposes the project is classified as Site Class D.

If a seismic event were to occur on any major fault, intense ground shaking could be induced to this general area. Potential damage to any settlement sensitive structures would likely be greatest from the vibrations and impelling force caused by the inertia of the structures mass than that created from secondary seismic constraints. Considering the subsurface soil conditions and local seismicity, it is estimated that the site has a very low risk associated with the potential for these phenomenon to occur; and adversely affect surface improvements. These potential risks are no greater at this site than they are for other structures and improvements developed on the alluvial materials in this vicinity.

6.0 Grading

6.1 Stripping and Grubbing

The site to be graded shall be cleared of all vegetation and roots removed from the subsurface. All exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

6.2 Grading Recommendations

All grading should conform to the Maricopa Association of Governments (MAG) Standards, 2003 International Building Code and appendixes except where specifically superseded in the text of this report. Prior to the grading all organic debris should be removed, drain systems, slopes, and the general grading procedures of the contractor should be observed and the fill tested by a Southwest Technologies, Inc.

If any unusual or unexpected conditions are uncovered in the field, this office should be contacted for review and if warranted, modified and/or additional recommendations will be offered.

The recommended site grading procedures are intended to provide support for the building elements and pavement sections constructed on engineered fills. The following recommendations are presented for site grading within and extending a minimum 5 feet beyond the proposed building area and within exterior slab and pavement areas.

Based on a review of the Test Pit logs and our site reconnaissance, removals/processing should be accomplished to a minimum depth of four (4) feet in the building areas. The bottom of the over-excavation shall be scarified, moisture conditioned and re-compacted. Building foundations shall rest on a minimum of 36 inches (including the scarification) of engineered fill. The soils supporting parking and driveway areas will need to be removed to a minimum depth of 24 inches and the areas compacted in accordance with this section. If the left in place soils can be scarified to encounter a competent layer below, they may be processed in place; otherwise, they should be removed to competent material prior to placing fill. Locally deeper removals may be necessary based on the conditions exposed. Any depressions or excavations existing created at the site from the clearing operations should be widened as necessary to accommodate compaction equipment for placing fill.

With the rough terrain at the site, grading will encounter major cut/fill areas. Removals in these areas may be extremely difficult with modern equipment. Use of heavier equipment and/or explosives may be required.

Due to the inaccessibility of portions of the site, additional recommendations may be required when access is possible. It is believed, based on review of available geological maps and our knowledge of the area, that the soil type and conditions are reasonably consistent to those found in our borings.

All excavations required to completely remove surface and sub-surface elements of the existing structures and related facilities shall be backfilled in accordance with the requirements of this report.

Any engineered fills or backfill materials placed beneath the foundations, slab and pavements should meet the requirements of Section 6.3.2 and should be moisture conditioned at the above optimum moisture content and compacted to a minimum of 95 percent of the "Modified Proctor" maximum dry density (ASTM D-1557).

6.3 Excavations

All footing trench excavations should be observed by a representative of this office prior to placing reinforcement. Footing trench spoil and any excess soils generated from utility trench excavations should be compacted to a minimum relative compaction of 90 percent if not removed from the site.

Considering the nature of the onsite soils, it should be anticipated that caving or sloughing could be a factor in subsurface excavations. Shoring or excavating the trench walls at the angle of repose (typically 25 to 45 degrees) may be necessary and should be anticipated in non-cemented soils. All excavations should be observed by one of our representatives and conform to national and local safety codes. Shallow trenching and excavations for utilities can be accomplished utilizing conventional equipment. Trench walls may remain in a near-vertical slope for short periods of time. If utility trenches extend to a depth of 5 feet below construction grade, the contractor should develop a trench safety program to protect personnel entering the excavations. Trench safety should conform to OSHA safety guidelines and other applicable industry standards. Backfill of trenches, excluding pipe bedding and pipe zone materials, should utilize processed and compacted on-site soils to provide more uniform support conditions and reduce potential differential settlement/expansion problems.

6.3.1 On-Site Materials

Soils within the area typically maintain a corrosive potential to concrete and metal; therefore, materials selected for construction purposes should be resistant to corrosion. Where permitted by building code PVC pipe should be utilized, along with the use of sulfate resistant concrete (Type II with Fly Ash or Type V Portland Cement or equivalent for negligible sulfate exposure conditions) for all concrete mixtures. All concrete should be designed, mixed, placed, finished, and cured in accordance with the guidelines presented by the Portland Cement Association (PCA) and the American Concrete Institute (ACI). The on-site Sandy soils such as encountered by the Test Pits are not acceptable for use as fill in the building areas. The excess of these materials can be removed from the site or placed in areas, such as landscaping. Materials used within one foot of the floor slab should conform to the requirements of Section 6.2.

6.3.2 Import Materials

Structural or engineered fill is any fill material that supports building(s), pavements, or other structures. Engineered fill materials, whether obtained on-site or from an off-site source, must be approved by the geotechnical engineer and meet the following requirements. All fill material should be free of organic materials, vegetation, debris and other deleterious material and meet the following requirements:

100 percent passing 6" sieve
No more than 30 percent passing # 200 sieve
Swell potential less than 3.0 percent*

A sample of the import material or questionable materials found on site, should be submitted to our office prior to grading so that proper laboratory testing can be performed to verify that the material for import is compatible with onsite soils.

6.3.3 Road and Base Course Materials

Base course material used beneath interior slabs and pavements should be well-graded sand and gravel materials meeting the MAG Standards and compacted to 100 percent of ASTM-1557.

6.4 Earthwork Balance

The volume change of excavated materials upon compaction as engineered fill is anticipated to vary with material type and location. It is anticipated that the alluvial materials will subside approximately 0.05 to 0.10 foot due to soil consolidation and the static and dynamic loading conditions created by earthwork equipment.

It should be noted that the shrinkage/bulking factors are estimates only, based on preliminary data. Final earthwork balance factors could vary. In this regard, it is recommended that balance areas be reserved where grades could be adjusted up or down near the completion of grading in order to accommodate any yardage imbalance for the project.

Using the following parameters may approximate the overall earthwork shrinkage:

Topsoil (upper 12 inches)	10% to 15% shrinkage
Alluvium	5% to 10% shrinkage

6.5 Construction Observations and Recommendations

We recommend that site preparation and foundation construction activities be observed and/or tested by a Southwest Technologies representative working under the direction of the project geotechnical engineer. This representative would have at least the following duties:

- Observe and document that any existing surficial vegetation and other deleterious materials have been removed from the site as required above in Section 6.2.
- Observe and approve the exposed subgrade soils under the building and pavement areas as outlined above.
- Approve any material used as engineered fill in building and pavement areas to document that it meets the requirements outlined above before placement.
- Monitor the progress of filling and compaction operations including performing field density tests on each lift of engineered fill or per every 2,000 square foot of fill area.
- Monitor footing excavation operations to document that the foundations are bearing on soils prepared as recommended in this report. For footings bearing in engineered fill, document that compaction requirements are fulfilled as required above.
- Provide a final report documenting on-site activities, site progress and that the above requirements have been fulfilled.

7.0 Floor Slabs and Foundation Recommendations

7.1 Concrete Slab Design:

The soils onsite were found to have a moderate to severe corrosive potential to concrete and metal; however, materials selected for construction purposes should be resistant to corrosion. Where permitted by building code PVC pipe should be utilized. We recommend the use of sulfate resistant concrete (Type II with Fly Ash or Type V Portland Cement or equivalent for negligible sulfate exposure conditions) for all concrete mixtures. All concrete should be designed, mixed, placed, finished, and cured in accordance with the guidelines presented by the Portland Cement Association (PCA) and the American Concrete Institute (ACI).

The potential for swell of the Sandy soils on site is anticipated to be low. We recommend that a minimum of 4-inches of clean granular material meeting MAG Stander be placed beneath the concrete slab to serve as a leveling base and aid in curing process of the concrete.

A vapor barrier (plastic) should be placed over the granular materials and a minimum 2 inch thickness of sand placed on the visqueen. The visqueen should be adequately capped to provide a continuous water protection barrier. A modulus of subgrade reaction "k" of 150 pounds per cubic inch (pci) may be used for design of slabs supported using these materials.

7.2 Foundation Design

All footing excavations should be level and clean of all loose or disturbed materials and inspected by a qualified representative of the geotechnical engineer. Engineering analysis performed and the recommendations offered below have been prepared assuming that the maximum service loads for the proposed construction will be relatively light and that the recommended earthwork is performed. Recommendations for foundation design and construction are presented below. The specific criteria to be used should be verified upon evaluation of the proposed buildings, structural loads, expansion, and chemical testing performed after grading is complete. The bearing values indicated are for the total dead weight plus frequently applied live loads and may be increased by one third for short duration loading which includes the effects of wind or seismic forces. When combining passive pressure and friction for lateral resistance, the passive component should be reduced by one third.

In areas where remedial work has been performed in accordance with this report, exterior and interior footings should be founded at a minimum depth of 12 inches (low expansive conditions) below the lowest adjacent ground surface. Continuous wall footings should be reinforced, at a minimum, near the top one-third and the bottom one-third of the footing. Specific reinforcing requirements for strip and/or spread footings should be designed by the project's structural engineer. All footings should maintain a minimum horizontal distance of seven feet from the outside bottom edge of the footing to the face of an adjacent descending slope.

Strip footings should have a minimum width of one foot and spread (ie column) footings should have a minimum soil to concrete area of four square feet. Increases are allowed for the bearing capacity at a rate of 250 pounds per square foot for each additional foot of depth into the recommended bearing material, up to a maximum outlined.

The following bearing values are presented for use on this project:

Footing Depth Below Finished Grade (ft.)	Allowable Bearing Capacity (psf)
1.0	2,000

1.5	2,250
2.0	2,500

7.3 Lateral Design

For shallow foundations bearing on compacted fill.

The friction resistance and the passive pressure may be combined without reduction in determining the total lateral resistance.

The following lateral resistance criteria are recommended:

Passive pressure.....250 psf/ft
Coefficient of friction, passive.....0.30

7.3.1.1 Cantilevered Walls

The following designs are based walls with no surcharges, level backfill and free from any surface water.

Passive pressures for Shallow Foundations:

Walls 250 psf
Columns..... 350psf

Active pressures:

Clean granular Import materials..... 30psf
Native soils (i.e. native)..... 35psf
Compacted native soils..... 35psf

7.3.2 Retaining Block Wall Design

The design parameters provided below assume that low expansive soils are used to backfill any retaining walls. If expansive soils are used to backfill the walls, increased active and at-rest earth pressures will need to be utilized for design. Building walls, below grade, should be water-proofed or damp-proofed, depending on the degree of moisture protection desired.

Design

Preliminary analysis indicates that an allowable bearing value of 2,000 pounds per square foot may be used for design of footings which maintain a minimum width of 12 inches and a minimum depth of at least 12 inches into the properly compacted fill or processed and compacted alluvial materials. The bearing value may be increased by one-third for seismic or other temporary loads. A bearing value increase of 250 psf is allowed for each additional foot of width or depth to a maximum of 2,500 psf without

further geotechnical review.

When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

All Foundations should maintain a minimum 7 foot horizontal set back from the base of the footing and any adjacent descending slope.

7.3.3 Wall Foundation Construction

The following preliminary foundation design and construction recommendations are for walls constructed on low expansive soils. Assuming a minimum load of 500 pounds per lineal foot, footings should be founded at a minimum depth of 12 inches below the lowest adjacent grade. Reinforcement of the stem wall and footing shall be designed by the structural engineer.

The walls should use both vertical and horizontal reinforcement and be designed to resist the effects a two-way 1/400 angular distortion would impart on a wall. Soil moisture conditioning is recommended for these soils and the moisture content of the subgrade materials should be equal to or greater than optimum moisture content to a depth of 15 inches prior to pouring the footing.

7.3.4 Restrained Walls

Any retaining walls that will be restrained prior to placing and compacting backfill material, or that have reentrant or male corners, should be designed for at-rest equivalent fluid pressures of 60 pcf, plus any applicable surcharge loading. For areas of male or reentrant corners, the restrained wall design should extend a minimum distance of four times the height of the wall laterally from the corner.

7.3.5 Backfill and Drainage for Walls

All retaining walls should be provided with an adequate back drain and outlet system (a minimum 1 outlet per 10 feet of wall) to prevent buildup of hydrostatic pressures and be designed in accordance with minimum standards presented herein. Gravel used in back drain systems should be a minimum of 12 inches of 3/8 to 1 1/2 inch clean crushed rock wrapped in filter fabric that extends to within 18 inches of the surface. The surface of the backfill should be sealed by pavement or the top 18 inches compacted with native low permeability soil. Proper surface drainage should also be provided.

7.4 Asphaltic Concrete Pavements

Pavement sections presented below are based on medium to heavy trucks. The standard duty pavement is based off of 15 equivalent 18-kips ESAL and based off 40,000 pounds per sq. ft. with R-value of 30, and assumed traffic index(s). These preliminary pavement sections are presented for planning purposes only and should be verified based on specific laboratory testing performed subsequent to rough grading of the site. When the R-values exceed an R-value of 30, the pavement design defaults to the minimum pavement sections provided. However, when the R-value falls below 30, the pavement section needs to be designed by the projects soil engineer.

ASSUMED TRAFFIC RIGHT-OF-WAY	SUBGRADE R-VALUE	ASPHALT CONCRETE THICKNESS (inches)	AGGREGATEN BASE THICKNESS (inches)
Traffic Lanes TI=5.0	30	3.0	6.0
Truck Traffic TI=6.5	30	3.0	10.0

All section changes should be properly transitioned. If adverse conditions are encountered during the preparation of subgrade materials, special construction methods may need to be employed. All subgrade materials should be compacted to a minimum relative compaction of 95 percent of ASTM D 1557 Modified Proctor. The aggregate base should be compacted to a minimum relative compaction of 100 percent of ASTM D 1557 method (MAG). The recommended pavement sections provided above are meant as minimums. If thinner or highly variable pavement sections are constructed, increased maintenance and repair should be expected. Positive site drainage should be maintained at all times.

If planters or landscaping are adjacent to paved areas, measures should be taken to minimize the potential for water to enter the pavement section. If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases beyond that intended, as reflected by the traffic index(s) used for design, increased maintenance and repair could be required for the pavement section. Asphalt concrete and aggregate base material should conform to the requirements presented in this report. Pavement installation should be carried out under

applicable portions of MAG Standards.

8.0 IMPROVEMENT CRITERIA

8.1 Site Improvements

As is commonly known, expansive soils are problematic with respect to the design, construction and long term performance of concrete flatwork. Due to the nature of concrete flatwork, it is essentially impossible to totally mitigate the effects of soil expansion. Typical measures to control soil expansion for structures include; low expansive soil caps, deepened foundation system, increased structural design, and soil presaturation. As they are generally not cost effective, these measures are very seldom utilized for flatwork because it is less costly to simply replace any damaged or distressed sections than to "structurally" design them. Even if "structural" design parameters are applied to flatwork construction, there would still be relative movements between adjoining types of structures and other improvements (e.g., curb and sidewalk).

This is particularly true, as the level of care during construction of flatwork is often not as meticulous as that for structures. Unfortunately, it is fairly common practice for flatwork to be poured on subgrade soils which have been allowed to dry out since site grading. Generally after flatwork construction is completed, landscape irrigation begins, utility lines are pressurized, and drainage systems are utilized; presenting the potential for water to enter the dry subgrade soils, causing the soil to expand. Recommendations for exterior concrete flatwork design and construction can be provided upon request. If, in the future, any additional improvements are planned for the site, recommendations concerning the geological or geotechnical aspects of design and construction of said improvements could be provided upon request. This office should be notified in advance of any fill placement, grading, or trench backfilling after rough grading has been completed. This includes any grading, utility trench and retaining wall backfills.

8.2 Landscape Planting

Water has been shown to weaken the inherent strength of all engineered and natural materials. Graded slopes constructed within and utilizing onsite materials would be acceptable to erosive. Eroded debris may be minimized and surficial slope stability enhanced by establishing and maintaining a suitable vegetation cover as soon as possible after construction. Compaction to the face of fill slopes would tend to minimize short term erosion until vegetation is established. Plants selected for landscaping should be light weight, deep rooted types which require little water and are capable of surviving the prevailing climate.

From a geotechnical standpoint leaching is not recommended for establishing landscaping. If the surface soils are processed for the purpose of adding amendments, they should be recompacted to 95 percent compaction. Only the amount of irrigation necessary to sustain plant life should be provided. Over watering the landscape areas could adversely affect proposed site improvements. We recommend that any proposed open bottom planter areas adjacent to the structure be eliminated for a minimum distance of 5 feet and desert landscape using xeriscape technology be used outside of this buffer zone. As an alternative, closed bottom type planters could be utilized. An outlet, placed in the bottom of the planter, could be installed to direct drainage away from structures or any exterior concrete flatwork. Irrigation timers should be adjusted on a monthly basis in accordance with the local Water Authority/Water District's posted "Watering Schedule" for a low use condition.

8.3 Utility Trench Backfill

Considering the overall nature of the soil encountered onsite, it should be anticipated that materials will need to be imported to the site for use as pipe bedding and pipe zone material. The onsite soils will meet specifications for selected and granular trench backfill. Utility trench backfill should be placed to the following standards: All trench backfill should be brought to near optimum moisture content and then compacted to obtain a minimum relative compaction of 90 percent of the laboratory standard. Compaction testing and observation, along with probing should be performed to verify the desired results. Sand backfill, unless excavated from the trench, should not be used adjacent to perimeter footings or in trenches on slopes. Compaction testing and observation, along with probing, should be performed to verify the desired results.

8.4 Drainage

Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond and/or seep into the ground. Pad drainage should be directed toward the street or other approved area.

Roof gutters and down spouts should be considered to control roof drainage. Down spouts should outlet onto paved areas or a minimum of five feet from proposed structures or into a subsurface drainage system. Areas of seepage may develop due to irrigation or heavy rainfall. Minimizing irrigation will lessen this potential. If areas of seepage develop, recommendations for minimizing this effect could be provided upon request.

9.0 PLAN REVIEW

Final grading, foundation, and improvement plans should be submitted to this office for review and comment as they become available, to minimize any misunderstandings between the plans and recommendations presented herein. In addition, foundation excavations and earthwork construction performed on the site should be observed and tested by this office. If conditions are found to differ substantially from those stated, appropriate recommendations would be offered at that time.

10.0 LIMITATIONS

The soil conditions presented in this report are based on an interpolation of the subsurface conditions based on the data obtained from the limited test pits excavated at the subject site. Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions between the borings will be different from those at the specific test pit locations. In addition, it is possible that the conditions discovered in the field will be different from those anticipated by the designer or contractor, or that construction activities may alter the soil conditions at the site.

The nature and extent of variations across the site may not become evident until construction commences. Therefore, the geotechnical engineer should be made aware of any variations or differences from the results presented in this report. The analyses and recommendations submitted in this report are based on our understanding of the above described project information and on our interpretation of the data collected from the site and laboratory tests performed during this subsurface exploration.

Our recommendations are based on our previous experience with similar subsurface conditions encountered at other sites under similar loading conditions. The recommendations apply only to the specific project discussed in this report. If information in this report is incorrect or if additional information becomes available, we should be contacted immediately so that we can review our recommendations.

The materials encountered on the project site and utilized in our laboratory study are believed representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during mass grading. Site conditions may vary due to seasonal changes or other factors. Southwest Technologies, Inc. assumes no responsibility or liability for work, testing, or recommendations performed or provided by others. Since our study is based upon the site materials observed, selective laboratory testing and engineering analysis, the conclusions and recommendations are professional opinions. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

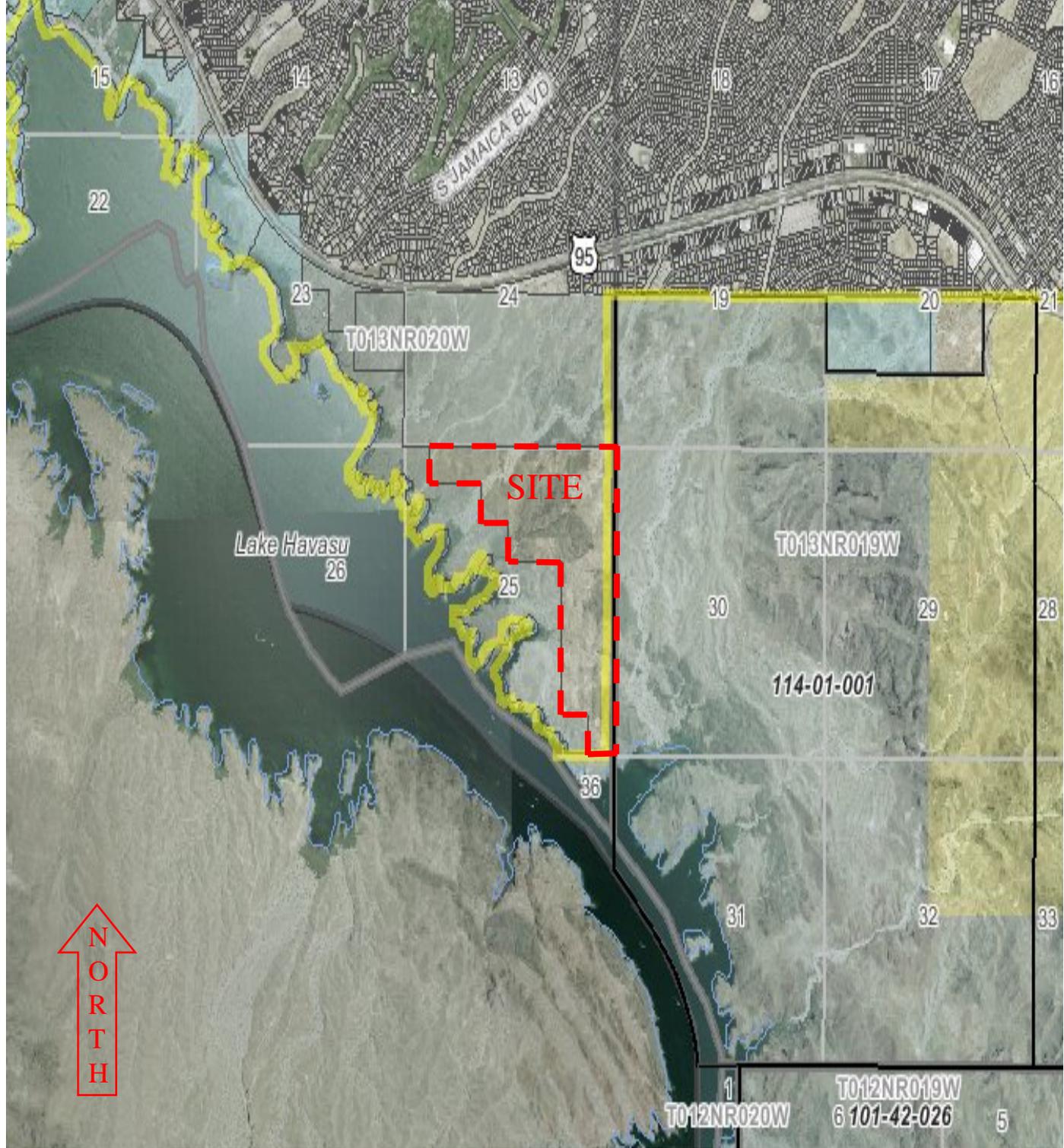
The opportunity to be of service is greatly appreciated. If you have any questions concerning this report or if we may be of further assistance, please do not hesitate to contact the undersigned.

Respectfully submitted,
Southwest Technologies, Inc.

Gerald W. Curry
President

Wayne Anderson, P.E.
Principal Engineer

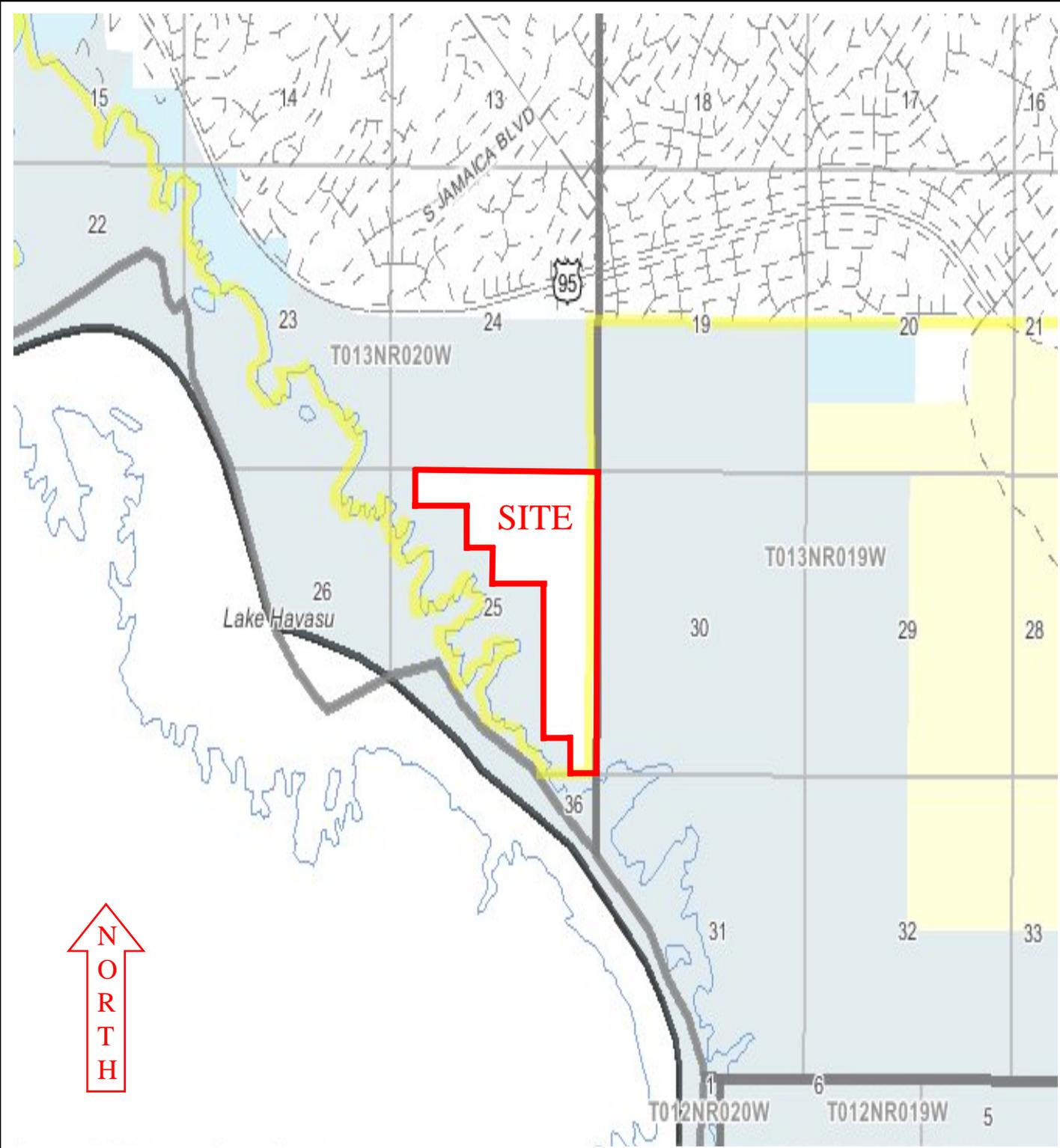
APPENDIX A



PROJECT NAME:
The Riviera
Highway 95 and Sweetwater Road
Lake Havasu City, Arizona

Aerial Photograph

STI PROJECT NO. 07L128GE

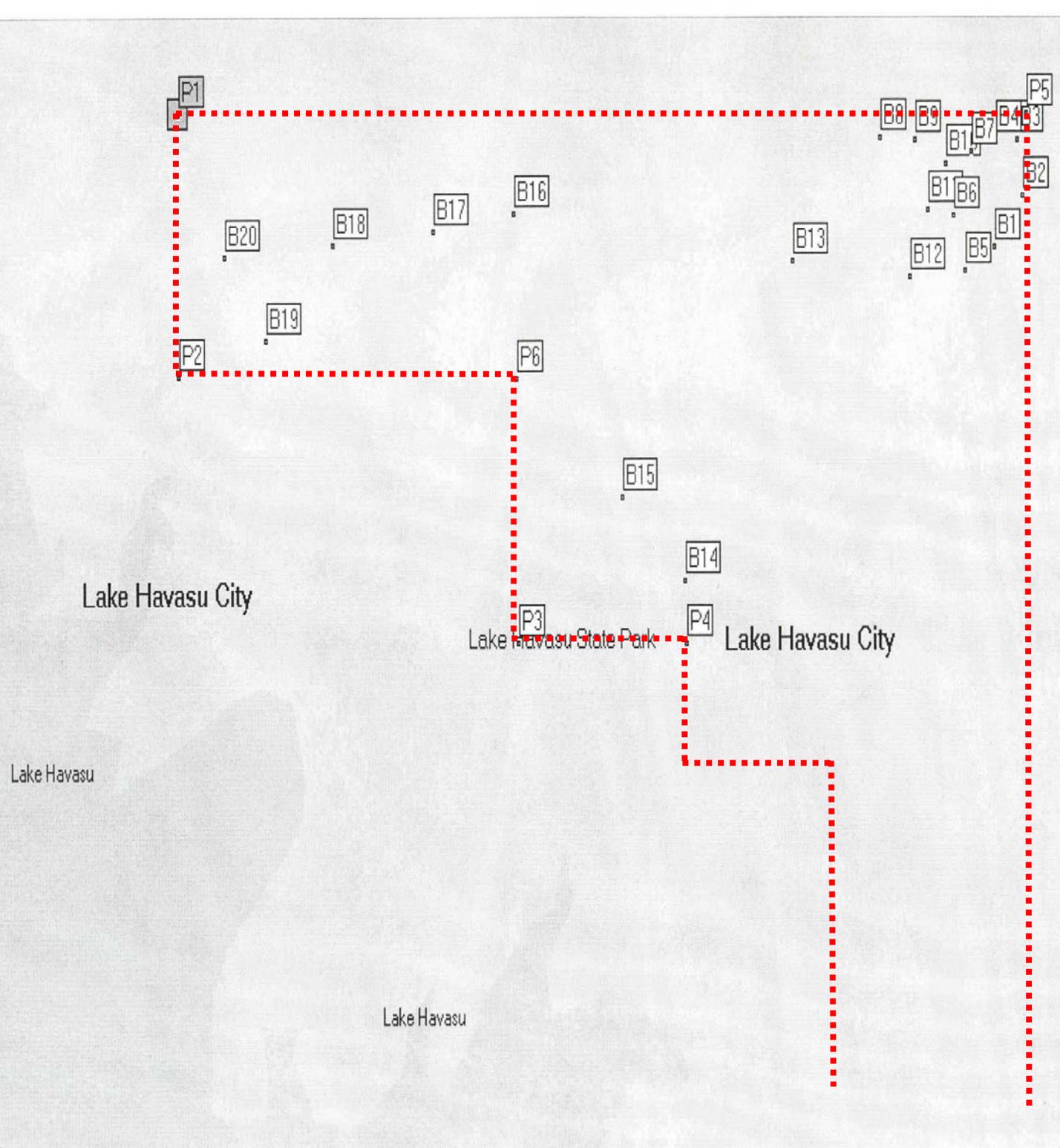


PROJECT NAME:
The Riviera
Highway 95
Lake Havasu City, Arizona

Vicinity Map

STI PROJECT NO. 07L128GE

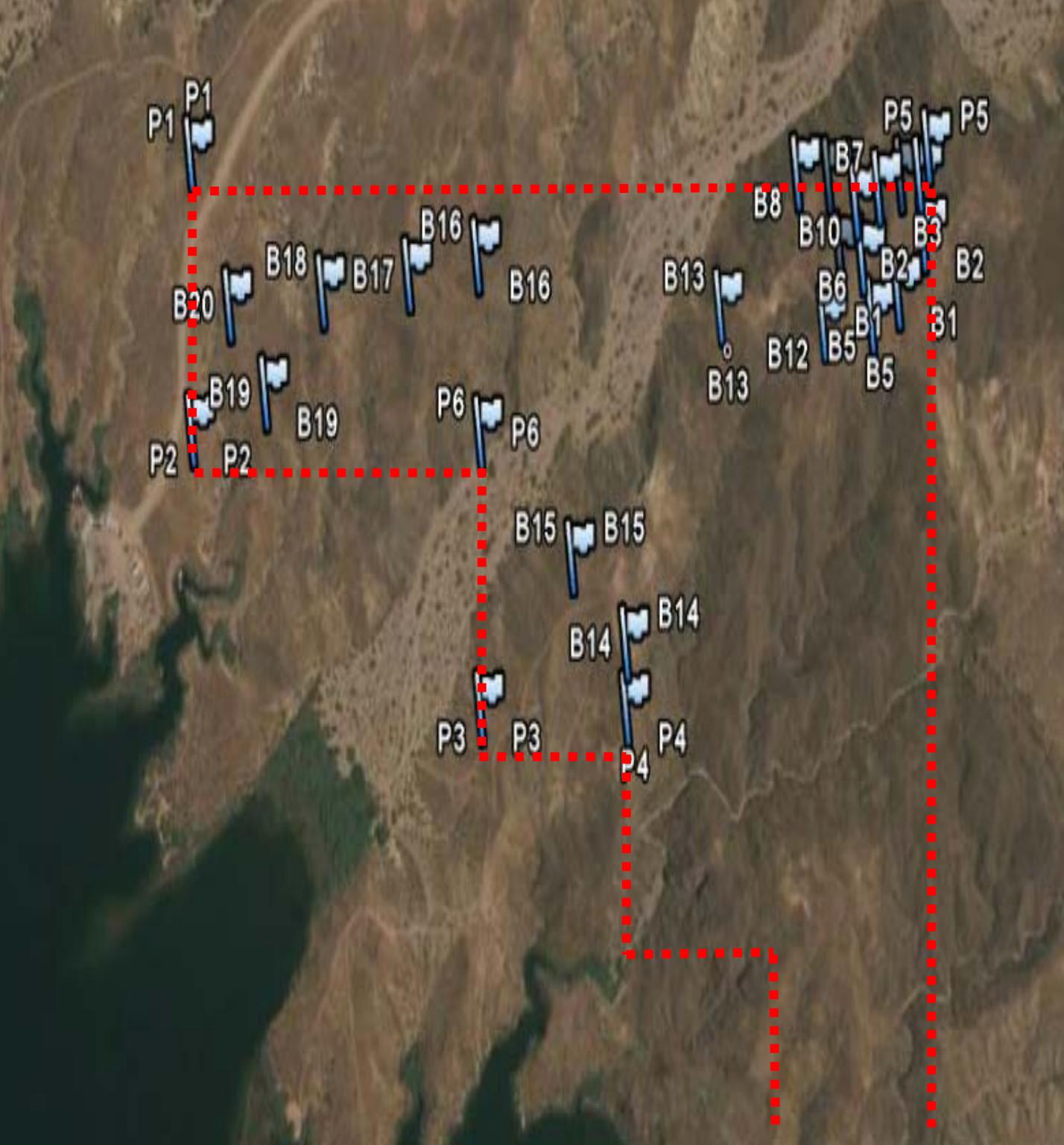
APPENDIX B



PROJECT NAME:
 The Riviera
 Highway 95
 Lake Havasu City, Arizona

Test Pit Location Map

STI PROJECT NO. 07L128GE



PROJECT NAME:	<i>Boring Locations GPS</i>
The Riviera Highway 95	
Lake Havasu City, Arizona	STI PROJECT NO. 07L128GE

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-2
 SHEET 2 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 9/26/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				10	0.9	SP SM	SAND; Tan, Dry, With Silt and Gravel, Medium Dense	
5			14					
6			15					
7								
8								
9				5	6.4	ML	GRAVELLY SILT; Light Brown, Slightly Moist, Very Stiff	
10			7					
11			10					
12								
13								
14				10	3.7	ML	SILT; Light Brown, Slightly Moist, Hard	
15			21					
16			28					
17								
18								
19				13	4.2	SM	SILTY SAND; Light Brown, Slightly Moist, With Gravel, Very Dense	
20			35					
21			29					
22								
23							BORING REFUSED @ 23 FEET	
24								
25								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-4
 SHEET 4 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 9/26/2007

DEPTH (FT)	SAMPLES				DRY UNIT WT. (pcf)	MOI- STURE (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				4				
5				8	1.4	SM	SILTY SAND ; Light Brown, Slightly Moist, With Gravel, Medium Dense	
6				9				
7								
8								
9				3				
10				3	0.7	SP SM	SAND ; Tan, Dry, With Silt, Loose	
11				5				
12								
13								
14				50-5"				
15					3.7	SM	SILTY SAND ; Light Brown, Slightly Moist, With Gravel, Very Dense	
16								
17							<i>BORING REFUSED @ 16 FEET</i>	
18								
19								
20								
21								
22								
23								
24								
25								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-6
 SHEET 6 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 9/26/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				2	0.8	GP GM	GRAVEL ; Light Brown, Dry, With Silt and Sand, Medium Dense	
5			7					
6			9					
7								
8								
9				4	0.1	SM	SILTY SAND ; Light Brown, Dry, Medium Dense	
10			7					
11			14					
12								
13								
14				3	0.8	SP SM	SAND ; Tan, Dry, With Silt, Medium Dense	
15			5					
16			6					
17								
18								
19				4			LOST SAMPLE	
20			5					
21			7					
22								
23								
24				2	1.2	SP	SAND ; Tan, Dry, With Gravel, Medium Dense	
25			10					
			17					
BORING REFUSED @ 25 FEET								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-7
 SHEET 7 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 9/26/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				6		0.5	SP SM	SAND; Tan, Dry, With Silt and Gravel, Dense
5				17				
6				16				
7								
8								
9				4		0.3	GP	GRAVEL; Light Brown, Dry, With Sand, Medium Dense
10				6				
11				5				
12								
13								
14				5				LOST SAMPLE
15				7				
16				8				
17								
18								
19				5		0.4	SP SM	SAND; Tan, Dry, With Silt, Medium Dense
20				9				
21				12				
22								
23								
24				2		0.5	SP	SAND; Tan, Dry, Medium Dense
25				9				
25				12				

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-10
 SHEET 11 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 9/27/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				1				
5				2	1.7	SP SM	SAND; Tan, Slightly Moist, With Silt and Gravel, Loose	
6				8				
7								
8								
9				3				
10				2	0.8	SP	SAND; Tan, Dry, With Gravel, Loose	
11				7				
12								
13								
14				3				
15				4			LOST SAMPLE	
16				4				
17								
18								
19				1				
20				2	0.8	SP SM	SAND; Tan, Dry, With Silt, Loose	
21				3				
22								
23								
24				1				
25				2			LOST SAMPLE	
25				2				

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-10
 SHEET 12 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 9/27/2007

DEPTH (FT)	SAMPLES				DRY UNIT WT. (pcf)	MOI STURE (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
26								
27								
28								
29				2				
30				50-4"	0.6	SP SM	SAND; Tan, Dry, With Silt and Gravel, Very Dense	
31							<i>BORING REFUSED @ 31 Feet</i>	
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-11
 SHEET 13 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 9/27/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				6		0.8	SP SM	SAND; Tan, Dry, With Silt and Gravel, Very Dense
5				12				
6								
7								
8								
9				2		0.9	SP SM	SAND; Tan, Dry, With Silt, Medium Dense
10				9				
11								
12								
13								
14				3		0.8	SP SM	SAND; Tan, Dry, With Silt, Very Dense
15				4				
16								
17								
18								
19				4		0.8	SP SM	SAND; Tan, Dry, With Silt, Medium Dense
20				6				
21								
22								
23								
24				6		1.7	SM	SILTY SAND; Light Brown, Slightly Moist, Medium Dense
25				6				
				9				

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-12
 SHEET 15 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 9/27/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				8	1.3	SM	SILTY SAND ; Light Brown, Dry, With Gravel, Medium Dense	
5			12					
6			12					
7								
8								
9				2	0.9	SP SM	SAND ; Tan, Dry, With Silt and Gravel, Medium Dense	
10			4					
11			13					
12								
13								
14				6	8.6	SM	SILTY SAND ; Light Brown, Moist, Medium Dense	
15			11					
16			12					
17								
18								
19				2			LOST SAMPLE	
20			4					
21			9					
22								
23								
24				2	8	SM	SILTY SAND ; Light Brown, Moist, Dense	
25			10					
			39					
BORING REFUSED @ 25 FEET								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-13
 SHEET 16 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 10/1/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1							NO SAMPLE	
2								
3							BORING REFUSED @ 2.5 FEET	
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-14
 SHEET 17 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 10/1/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1							NO SAMPLE	
2								
3							<i>BORING REFUSED @ 3 FEET</i>	
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-15
 SHEET 18 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 10/1/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				7				
5				4	0.4	GW	GRAVEL ; Light Brown, Dry, With Sand, Medium Dense	
6				6				
7								
8								
9				3				
10				50-3"	0.6	SM	SILTY SAND ; Light Brown, Dry, With Gravel, Very Dense	
11								
12							BORING REFUSED @ 12 FEET	
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-17
 SHEET 20 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 10/2/2007

DEPTH (FT)	SAMPLES				DRY UNIT WT. (pcf)	MOI STU RE (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				3				
5				4	3.4	SM	SILTY SAND; Light Brown, Slightly Moist, With Gravel, Medium Dense	
6								
7								
8							BORING REFUSED @ 8 FEET	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

SOIL BORING LOG

PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-18
 SHEET 21 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 10/2/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				1				
5				2	0.8	SP	SAND; Tan, Dry, Loose	
6								
7								
8								
9				16				
10				50-5"	1.3	SM	SILTY SAND; Light Brown, Dry, With Gravel, Very Dense	
11								
12								
13								
14				5				
15				14	0.9	GP GM	GRAVEL; Light Brown, Dry, With Silt and Sand, Very Dense	
16							<i>BORING REFUSED @ 16 FEET</i>	
17								
18								
19								
20								
21								
22								
23								
24								
25								

SOIL BORING LOG

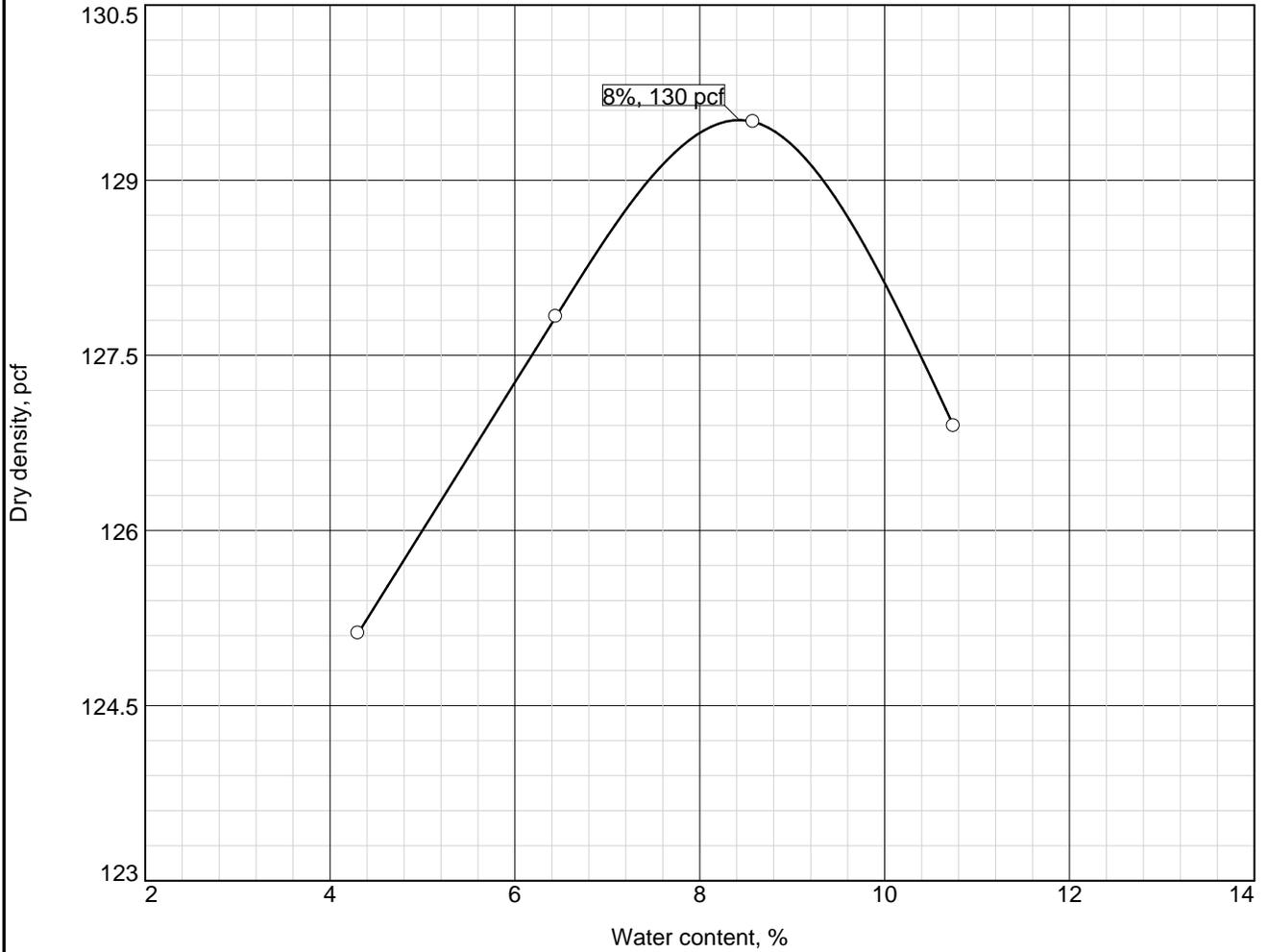
PROJECT: The Riviera
 LOCATION: Lake Havasu City, Arizona
 CLIENT: Havasu Riviera, LLC

BORING NO: B-19
 SHEET 22 OF 23
 SAMPLE METHOD: Drilling Rig

PROJECT: 07L128GE
 EXCAVATION
 DATE: 10/2/2007

D E P T H (FT)	SAMPLES				DRY UNIT WT. (pcf)	M O I S T U R E (%)	U S C S	MATERIAL DESCRIPTION AND COMMENTS
	B U L K	S P T	R I N G	B L O W S				
1								
2								
3								
4				2	0.4	SP	SAND; Tan, Dry, Loose	
5			3					
6			3					
7								
8								
9				3	0.7	SP	SAND; Tan, Dry, With Gravel, Loose	
10			3					
11			5					
12								
13								
14				2	2.4	SM	SILTY SAND; Light Brown, Slightly Moist, With Gravel, Medium Dense	
15			5					
16			7					
17								
18								
19				28	3.4	SM	SILTY SAND; Light Brown, Slightly Moist, With Gravel, Very Dense	
20			50-5"					
21								
22							BORING REFUSED @ 22 FEET	
23								
24								
25								

COMPACTION TEST REPORT

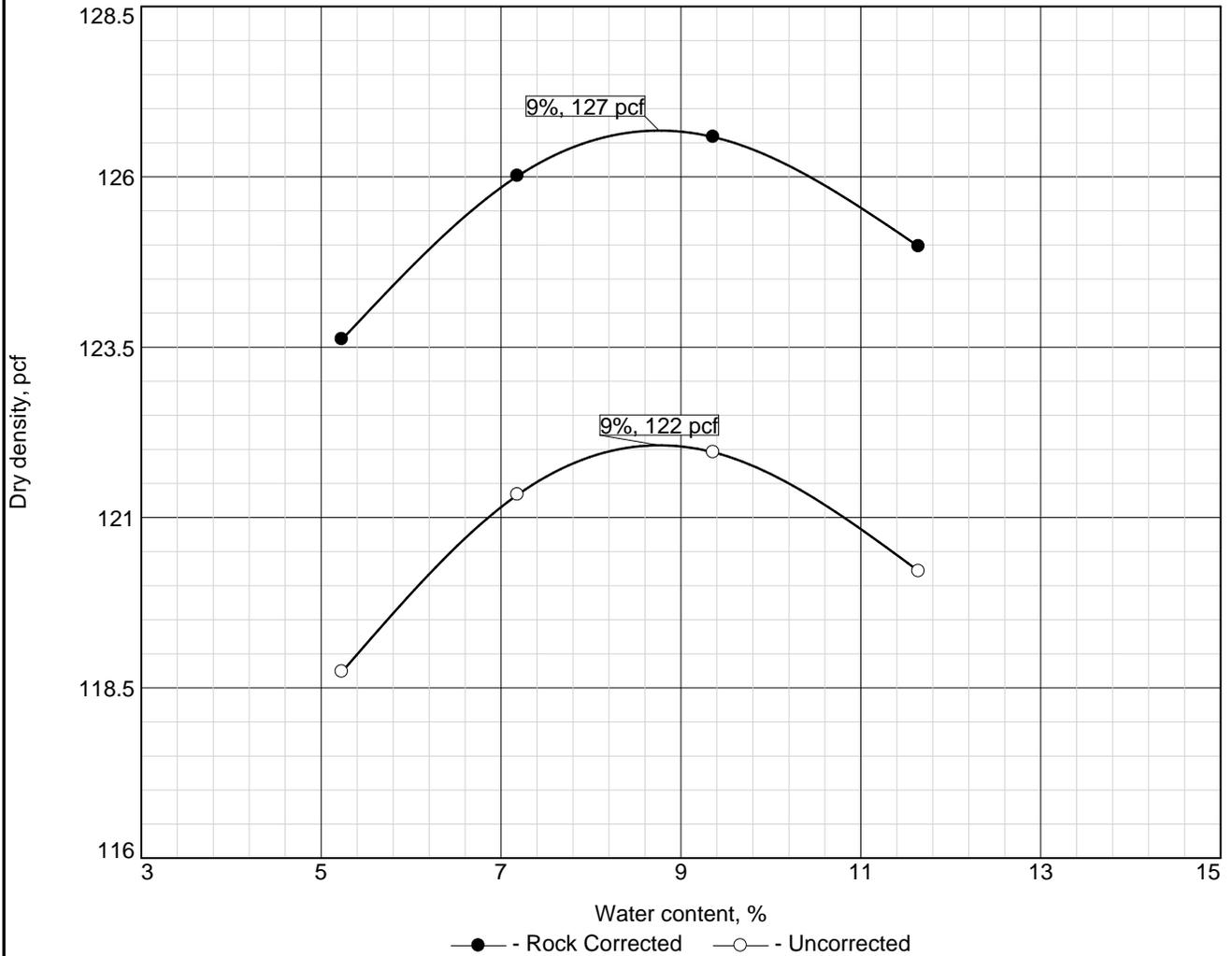


Test specification: ASTM D 1557-91 Procedure C Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
13.5 - 15 Feet	SP	A-3					0.0	2.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 130 pcf Optimum moisture = 8 %	Poorly Graded Sand
Project No. 07L128GE Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona ○ Location: Boring B-5 (13.5-15) Depth: 13.5 - 15 Feet <b style="text-align: center;">SOUTHWEST TECHNOLOGIES, INC. <b style="text-align: center;">Lake Havsu, AZ	Remarks: <div style="text-align: right;">Figure</div>

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure C Modified
 Oversize corr. applied to each test point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
8.5 - 10 Feet	SP	A-1-a					14.7	3.1

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 127 pcf	122 pcf	Poorly Graded Sand with Gravel
Optimum moisture = 9 %	9 %	

Project No. 07L128GE **Client:** Havasu Riviera, LLC
Project: The Riviera
 Lake Havasu City, Arizona
 ○ **Location:** Boring B-19 (8.5-10) **Depth:** 8.5 - 10 Feet

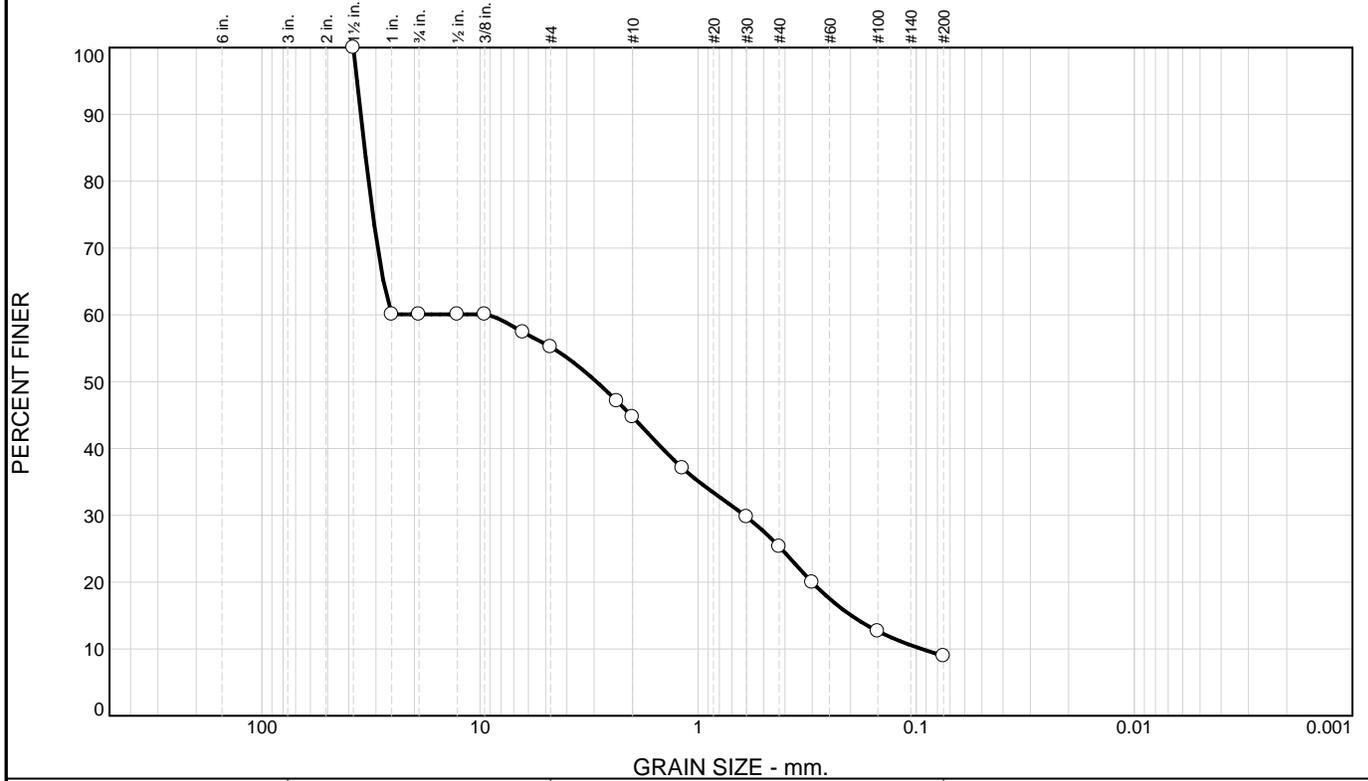
SOUTHWEST TECHNOLOGIES, INC.

Lake Havsu, AZ

Remarks:

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	39.9	4.9	10.5	19.4	16.4	8.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	60.1		
3/4"	60.1		
1/2"	60.1		
3/8"	60.1		
1/4"	57.4		
#4	55.2		
#8	47.1		
#10	44.7		
#16	37.1		
#30	29.8		
#40	25.3		
#50	20.0		
#100	12.7		
#200	8.9		

Material Description

Poorly Graded Sand with Silt and Gravel

PL= NP **Atterberg Limits** LL= PI=

Coefficients

D₈₅= 33.8281 D₆₀= 9.2505 D₅₀= 2.9269
D₃₀= 0.6129 D₁₅= 0.1983 D₁₀= 0.0945
C_u= 97.85 C_c= 0.43

USCS= SP-SM **Classification** AASHTO=

Remarks

* (no specification provided)

Location: Boring B-1 (3.5-5)
Depth: 3.5 - 5 Feet

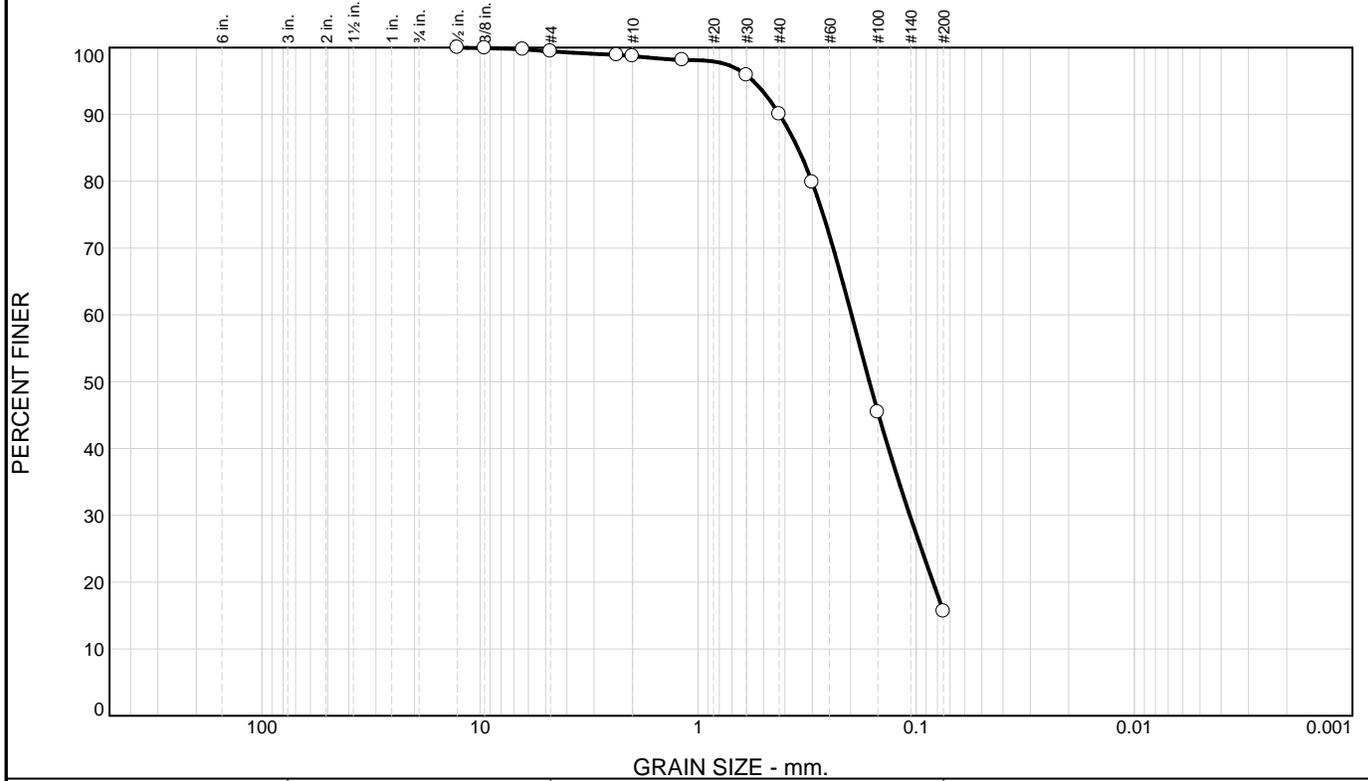
Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
---	---

Figure

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	0.7	8.7	74.4	15.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	99.9		
1/4"	99.7		
#4	99.4		
#8	98.9		
#10	98.7		
#16	98.1		
#30	95.9		
#40	90.0		
#50	79.8		
#100	45.4		
#200	15.6		

Material Description

Silty Sand

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 0.3493 D₆₀= 0.1980 D₅₀= 0.1640
D₃₀= 0.1070 D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

* (no specification provided)

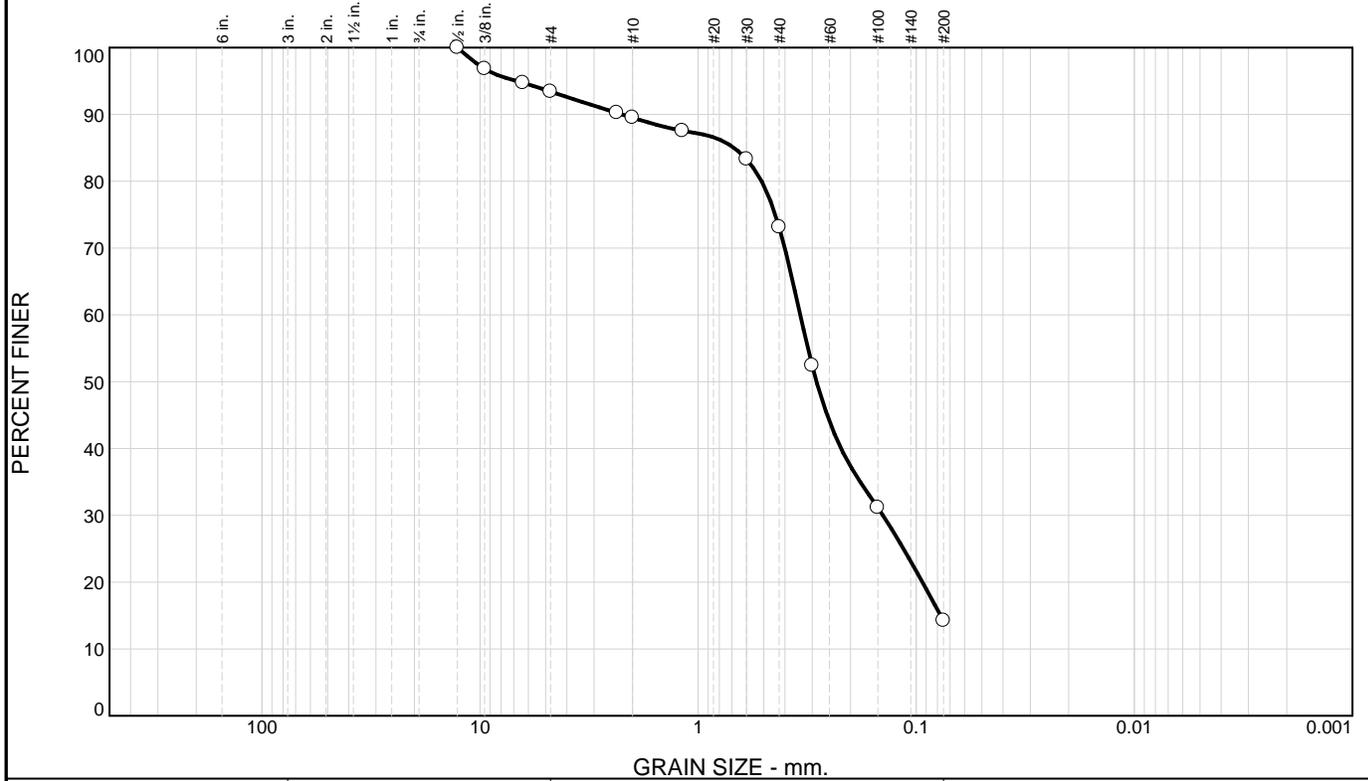
Location: Boring B-1 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.6	3.9	16.4	58.9	14.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	96.8		
1/4"	94.7		
#4	93.4		
#8	90.2		
#10	89.5		
#16	87.5		
#30	83.3		
#40	73.1		
#50	52.4		
#100	31.1		
#200	14.2		

Material Description

Silty Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 0.6852 D₆₀= 0.3404 D₅₀= 0.2865
 D₃₀= 0.1422 D₁₅= 0.0773 D₁₀=
 C_u=

Classification
 USCS= SM AASHTO= A-2-4(0)

Remarks

* (no specification provided)

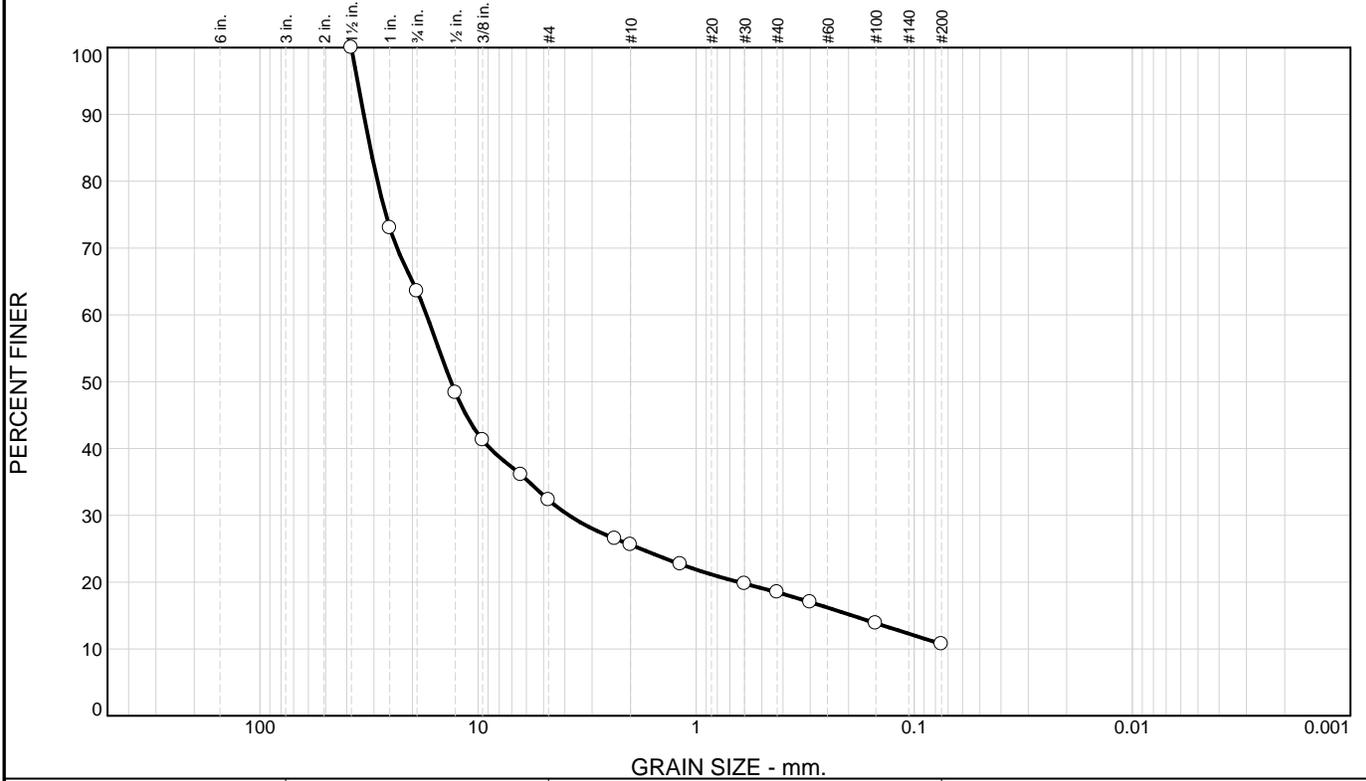
Location: Boring B-1 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	36.5	31.2	6.7	7.1	7.8	10.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	73.0		
3/4"	63.5		
1/2"	48.3		
3/8"	41.3		
1/4"	36.1		
#4	32.3		
#8	26.5		
#10	25.6		
#16	22.7		
#30	19.8		
#40	18.5		
#50	17.0		
#100	13.9		
#200	10.7		

Material Description

Poorly Graded Gravel with Silt and Sand

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 31.1737 D₆₀= 17.2295 D₅₀= 13.3190
D₃₀= 3.8318 D₁₅= 0.1927 D₁₀=
C_u= C_c=

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

* (no specification provided)

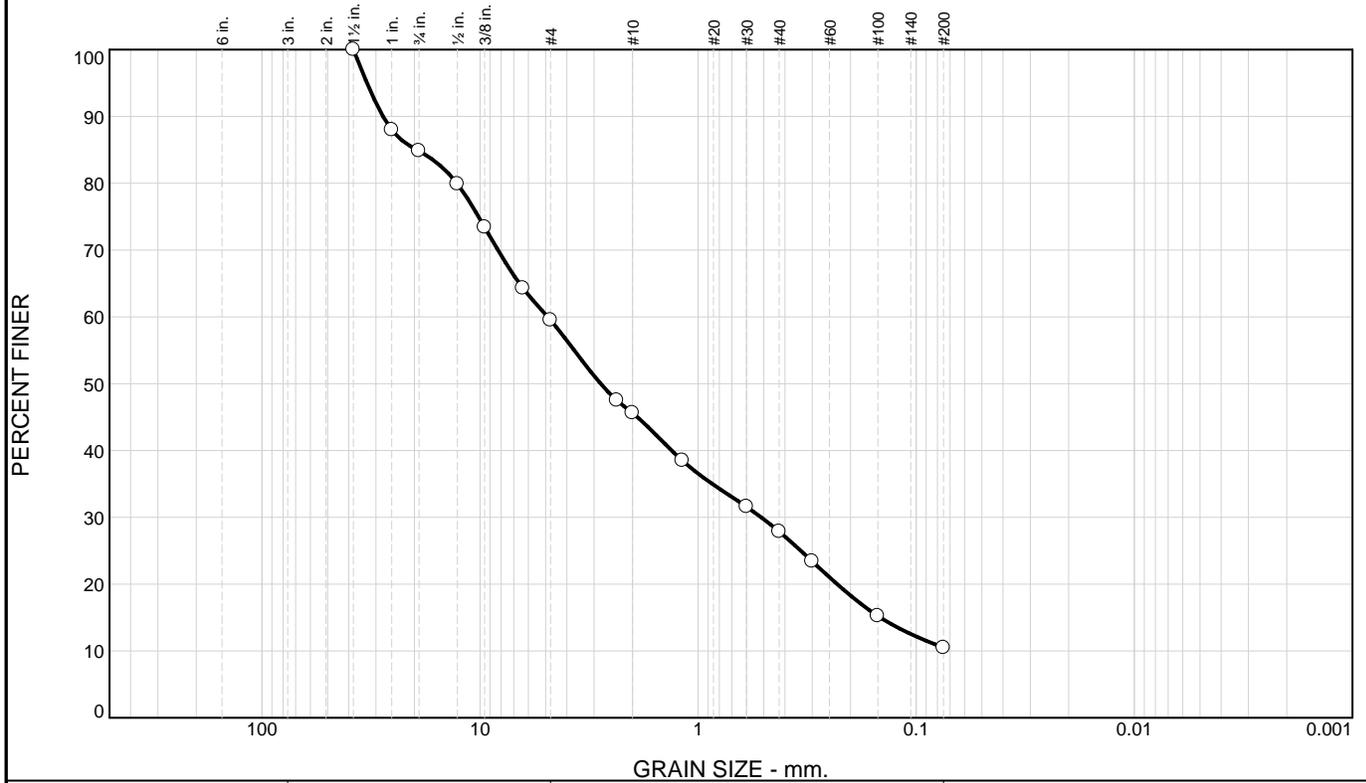
Location: Boring B-1 (18.5-20)
Depth: 18.5 - 20 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.2	25.3	13.9	17.7	17.4	10.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	88.0		
3/4"	84.8		
1/2"	79.9		
3/8"	73.4		
1/4"	64.3		
#4	59.5		
#8	47.5		
#10	45.6		
#16	38.5		
#30	31.6		
#40	27.9		
#50	23.4		
#100	15.2		
#200	10.5		

Material Description

Poorly Graded Sand with Silt and Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 19.4789 D₆₀= 4.8978 D₅₀= 2.7987
D₃₀= 0.5141 D₁₅= 0.1461 D₁₀=
C_u= C_c=

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

* (no specification provided)

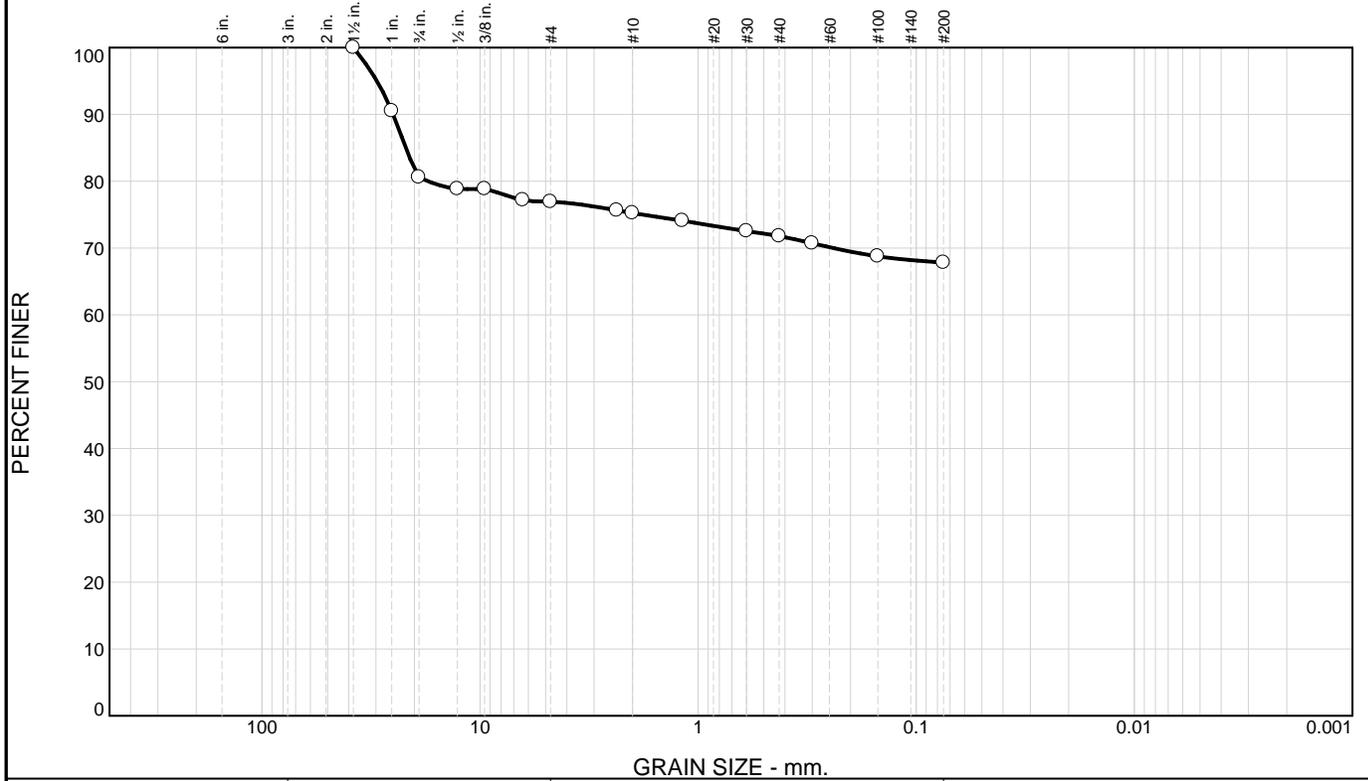
Location: Boring B-2 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.4	3.7	1.7	3.4	4.0	67.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	90.5		
3/4"	80.6		
1/2"	78.8		
3/8"	78.8		
1/4"	77.2		
#4	76.9		
#8	75.6		
#10	75.2		
#16	74.1		
#30	72.5		
#40	71.8		
#50	70.7		
#100	68.8		
#200	67.8		

Material Description

Gravelly Silt

PL= NP **Atterberg Limits** LL= 0 PI= NP

D₈₅= 21.8952 **Coefficients** D₆₀= D₅₀=

D₃₀= D₁₅= D₁₀=

C_u= C_c=

USCS= ML **Classification** AASHTO= A-4(0)

Remarks

* (no specification provided)

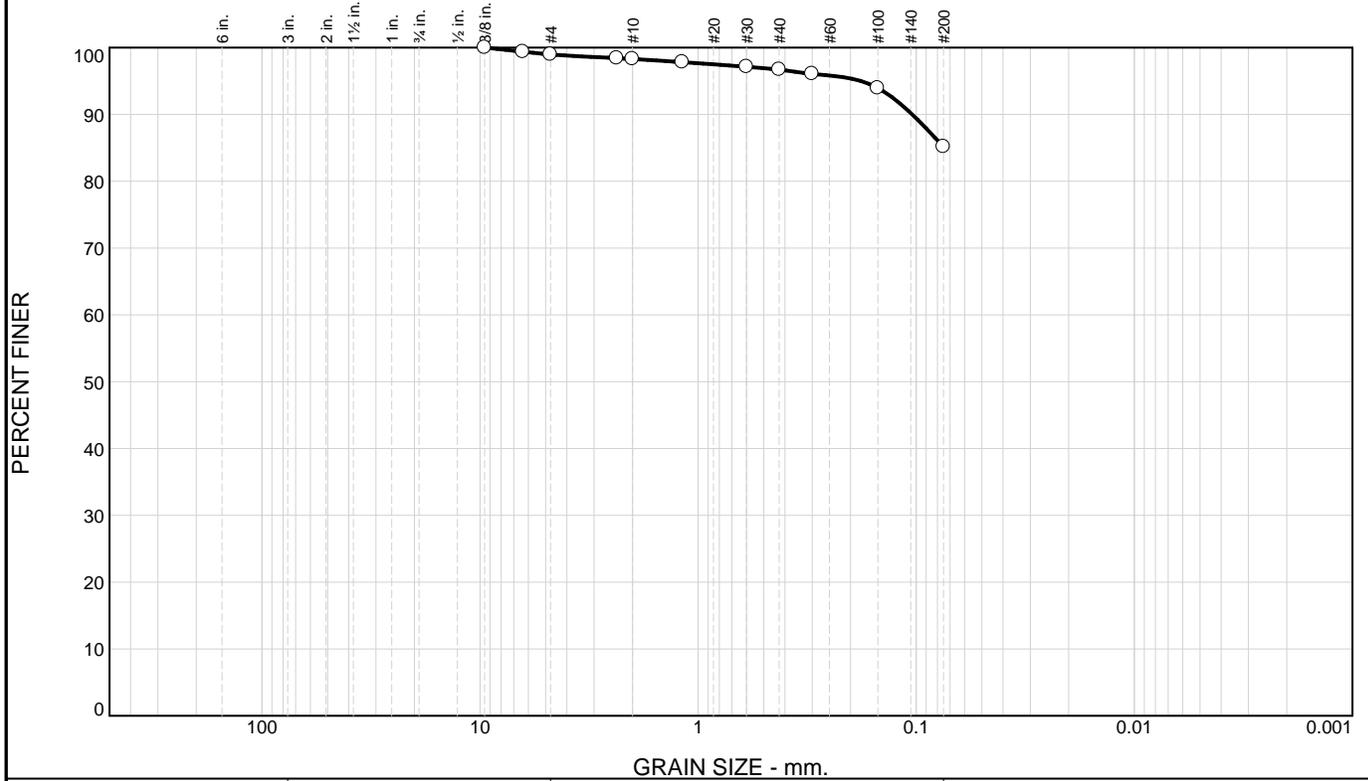
Location: Boring B-2 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	0.7	1.6	11.5	85.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
1/4"	99.4		
#4	99.0		
#8	98.4		
#10	98.3		
#16	97.8		
#30	97.1		
#40	96.7		
#50	96.1		
#100	93.9		
#200	85.2		

Material Description

Silt

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

* (no specification provided)

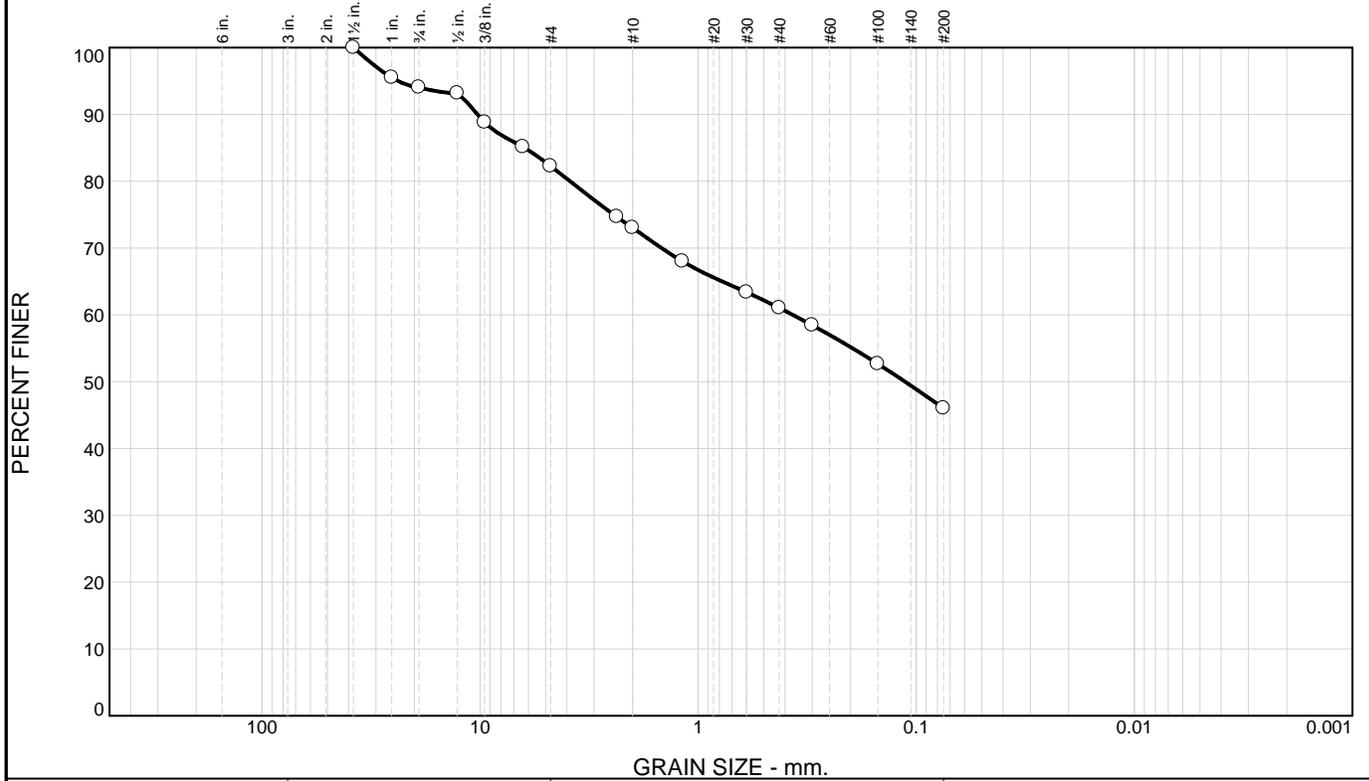
Location: Boring B-2 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.0	11.7	9.3	12.0	15.0	46.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	95.5		
3/4"	94.0		
1/2"	93.2		
3/8"	88.8		
1/4"	85.1		
#4	82.3		
#8	74.7		
#10	73.0		
#16	68.0		
#30	63.4		
#40	61.0		
#50	58.4		
#100	52.7		
#200	46.0		

Material Description

Silty Sand with Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

D₈₅= 6.2495 **Coefficients** D₆₀= 0.3683 D₅₀= 0.1127

D₃₀= D₁₅= D₁₀=

C_u= C_c=

USCS= SM **Classification** AASHTO= A-4(0)

Remarks

* (no specification provided)

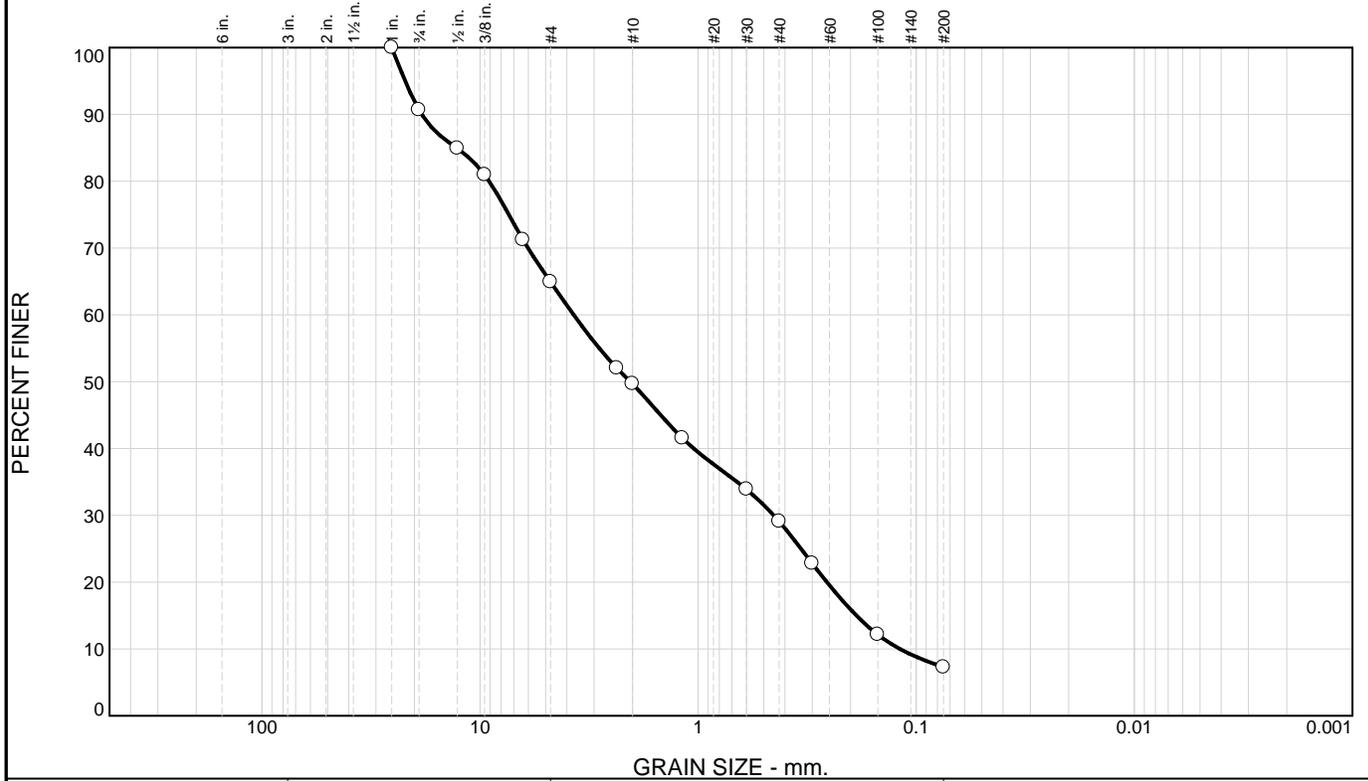
Location: Boring B-2 (18.5-20)
Depth: 18.5 - 20 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.3	25.8	15.2	20.6	21.8	7.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	90.7		
1/2"	84.9		
3/8"	80.9		
1/4"	71.2		
#4	64.9		
#8	52.0		
#10	49.7		
#16	41.5		
#30	33.9		
#40	29.1		
#50	22.8		
#100	12.1		
#200	7.3		

Material Description

Poorly Graded Sand with Silt and Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 12.8201 D₆₀= 3.7195 D₅₀= 2.0475
D₃₀= 0.4502 D₁₅= 0.1881 D₁₀= 0.1189
C_u= 31.29 C_c= 0.46

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

* (no specification provided)

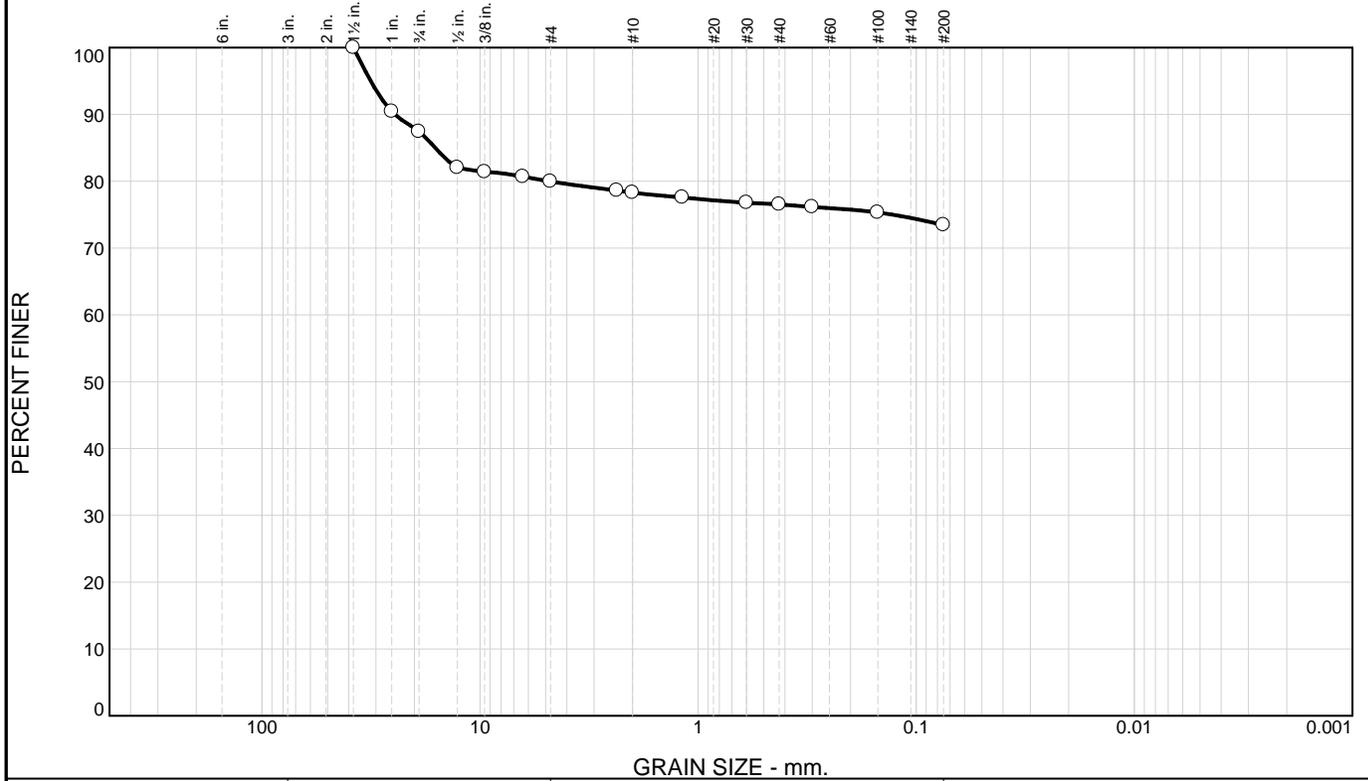
Location: Boring B-3 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.6	7.4	1.7	1.8	3.0	73.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	90.4		
3/4"	87.4		
1/2"	82.0		
3/8"	81.4		
1/4"	80.7		
#4	80.0		
#8	78.6		
#10	78.3		
#16	77.6		
#30	76.8		
#40	76.5		
#50	76.1		
#100	75.3		
#200	73.5		

Material Description

Silt with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 16.0454 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= ML AASHTO= A-4(0)

Remarks

* (no specification provided)

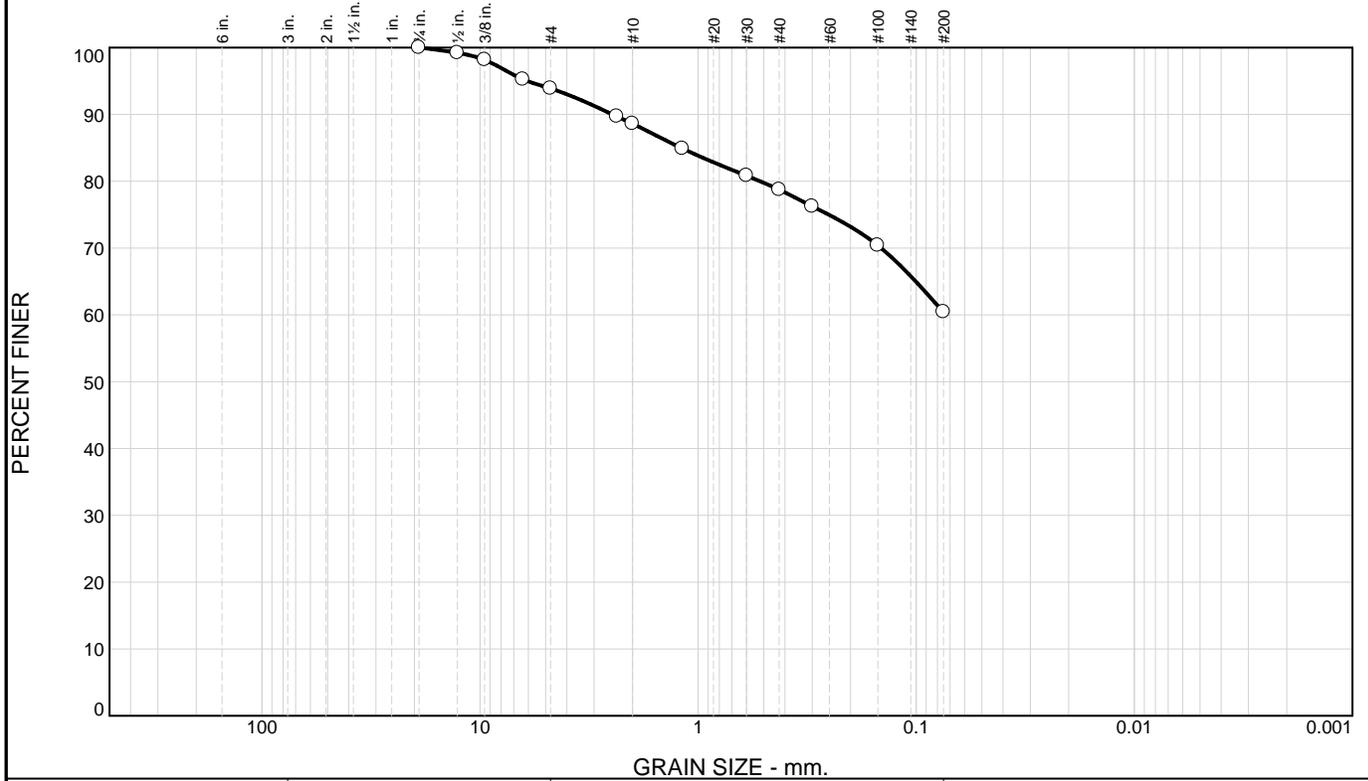
Location: Boring B-3 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.1	5.3	9.9	18.3	60.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	99.2		
3/8"	98.2		
1/4"	95.2		
#4	93.9		
#8	89.7		
#10	88.6		
#16	84.9		
#30	80.8		
#40	78.7		
#50	76.2		
#100	70.4		
#200	60.4		

Material Description

Sandy Silt

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 1.1993 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= ML AASHTO= A-4(0)

Remarks

* (no specification provided)

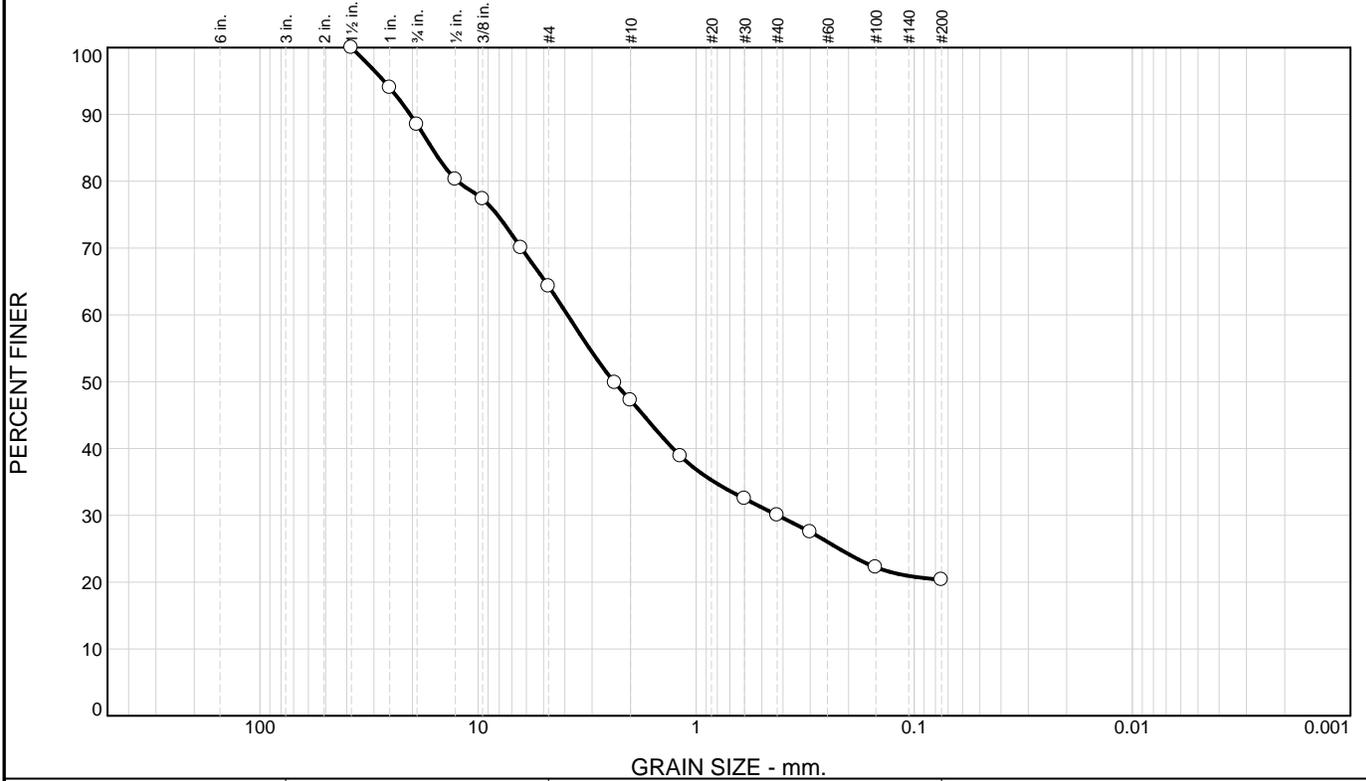
Location: Boring B-3 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.5	24.2	17.1	17.2	9.6	20.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	94.0		
3/4"	88.5		
1/2"	80.3		
3/8"	77.3		
1/4"	70.0		
#4	64.3		
#8	49.8		
#10	47.2		
#16	38.9		
#30	32.5		
#40	30.0		
#50	27.5		
#100	22.2		
#200	20.4		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 16.3011 D₆₀= 3.8890 D₅₀= 2.3830
 D₃₀= 0.4241 D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

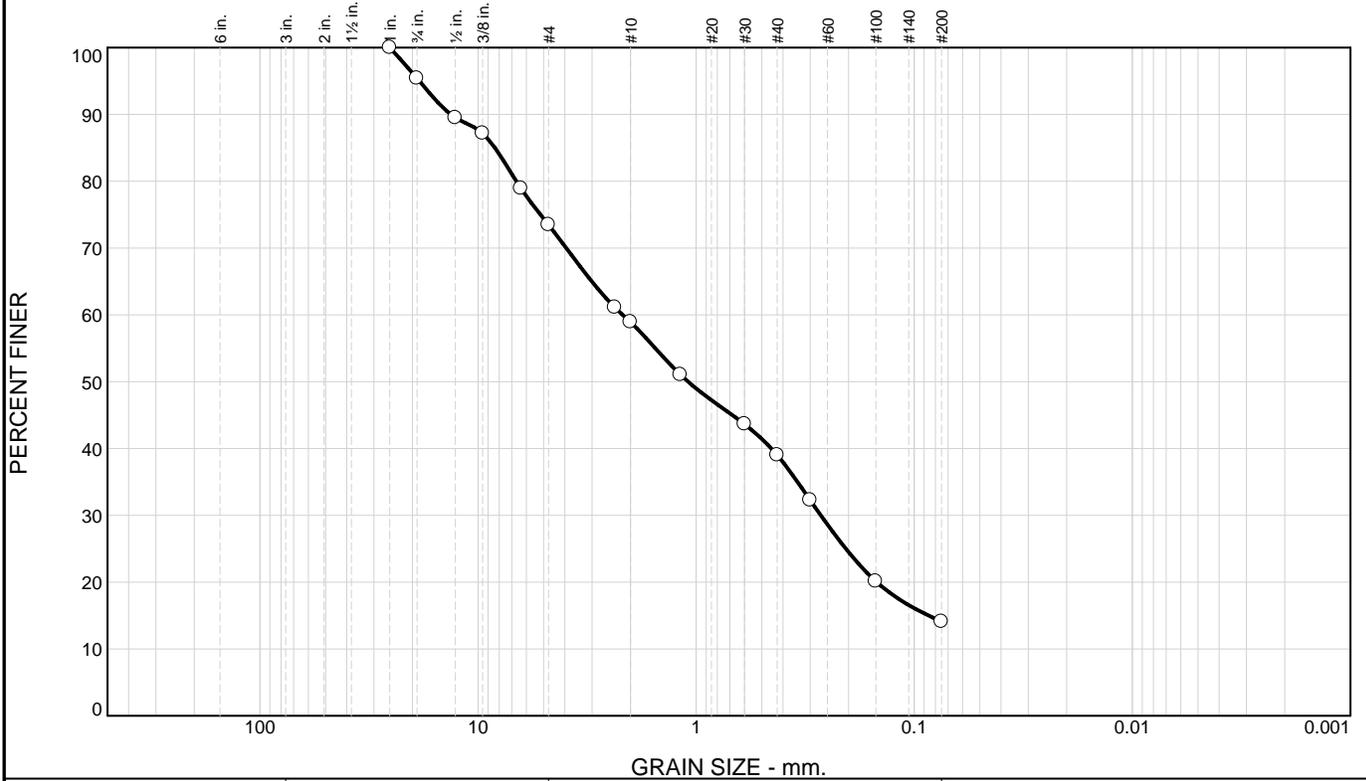
Location: Boring B-3 (18.5-20)
Depth: 18.5 - 20 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.6	21.9	14.6	19.9	24.9	14.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	95.4		
1/2"	89.5		
3/8"	87.2		
1/4"	78.9		
#4	73.5		
#8	61.1		
#10	58.9		
#16	51.0		
#30	43.6		
#40	39.0		
#50	32.3		
#100	20.1		
#200	14.1		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 8.3670 D₆₀= 2.1712 D₅₀= 1.0895
 D₃₀= 0.2683 D₁₅= 0.0859 D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

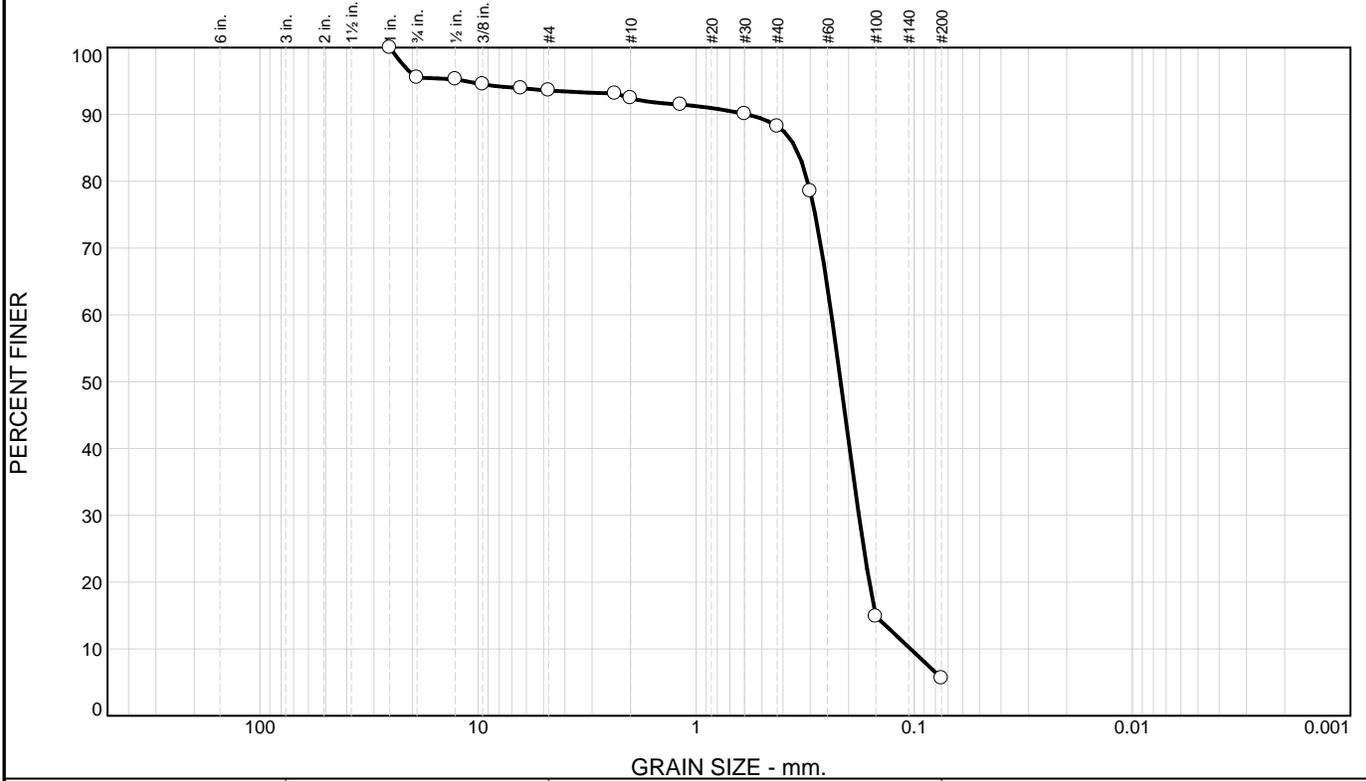
Location: Boring B-4 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.5	1.9	1.2	4.2	82.6	5.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	95.5		
1/2"	95.3		
3/8"	94.5		
1/4"	93.9		
#4	93.6		
#8	93.1		
#10	92.4		
#16	91.5		
#30	90.1		
#40	88.2		
#50	78.5		
#100	14.9		
#200	5.6		

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= 0 PI= NP

Coefficients

D₈₅= 0.3496 D₆₀= 0.2396 D₅₀= 0.2174
D₃₀= 0.1794 D₁₅= 0.1503 D₁₀= 0.1040
C_u= 2.30 C_c= 1.29

Classification

USCS= SP-SM AASHTO= A-3

Remarks

* (no specification provided)

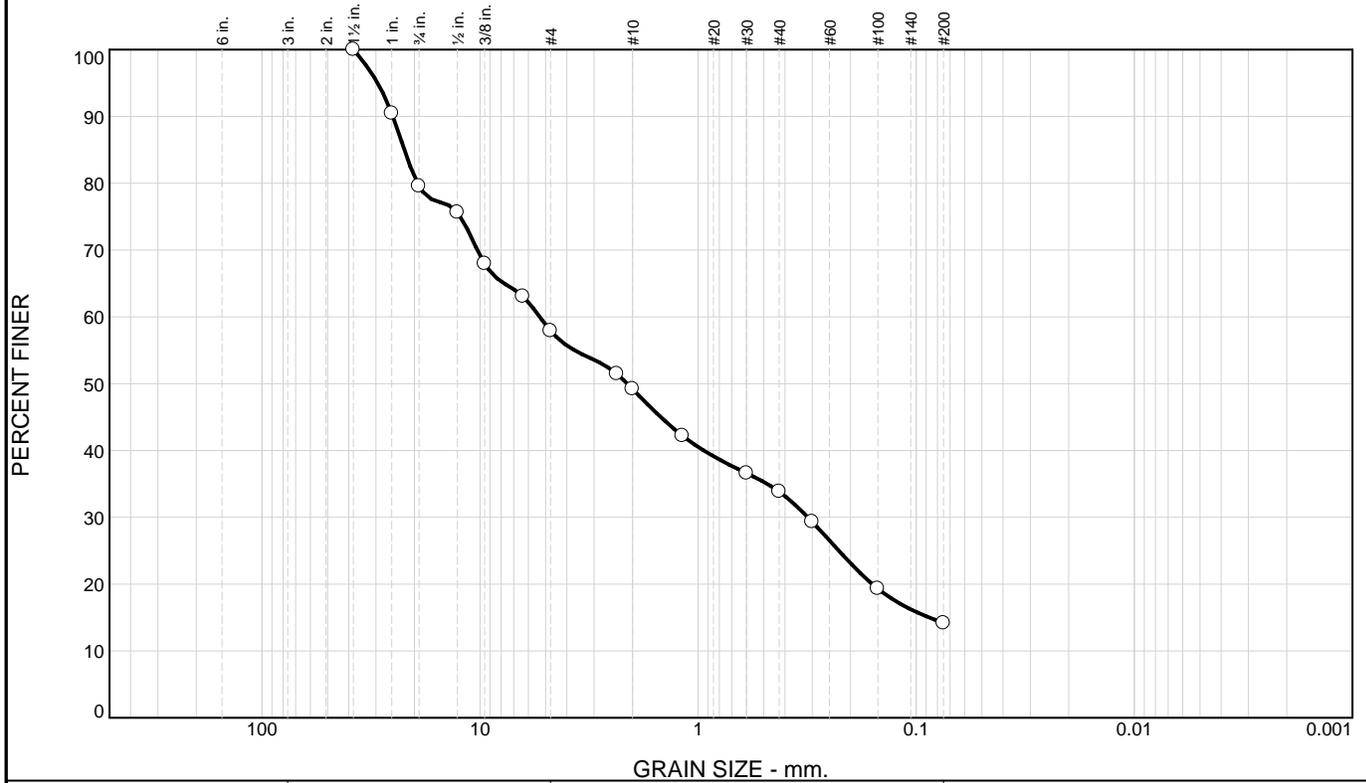
Location: Boring B-4 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.4	21.7	8.7	15.4	19.6	14.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	90.4		
3/4"	79.6		
1/2"	75.6		
3/8"	67.9		
1/4"	63.1		
#4	57.9		
#8	51.5		
#10	49.2		
#16	42.2		
#30	36.6		
#40	33.8		
#50	29.3		
#100	19.3		
#200	14.2		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 22.2309 D₆₀= 5.3282 D₅₀= 2.1137
 D₃₀= 0.3142 D₁₅= 0.0870 D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

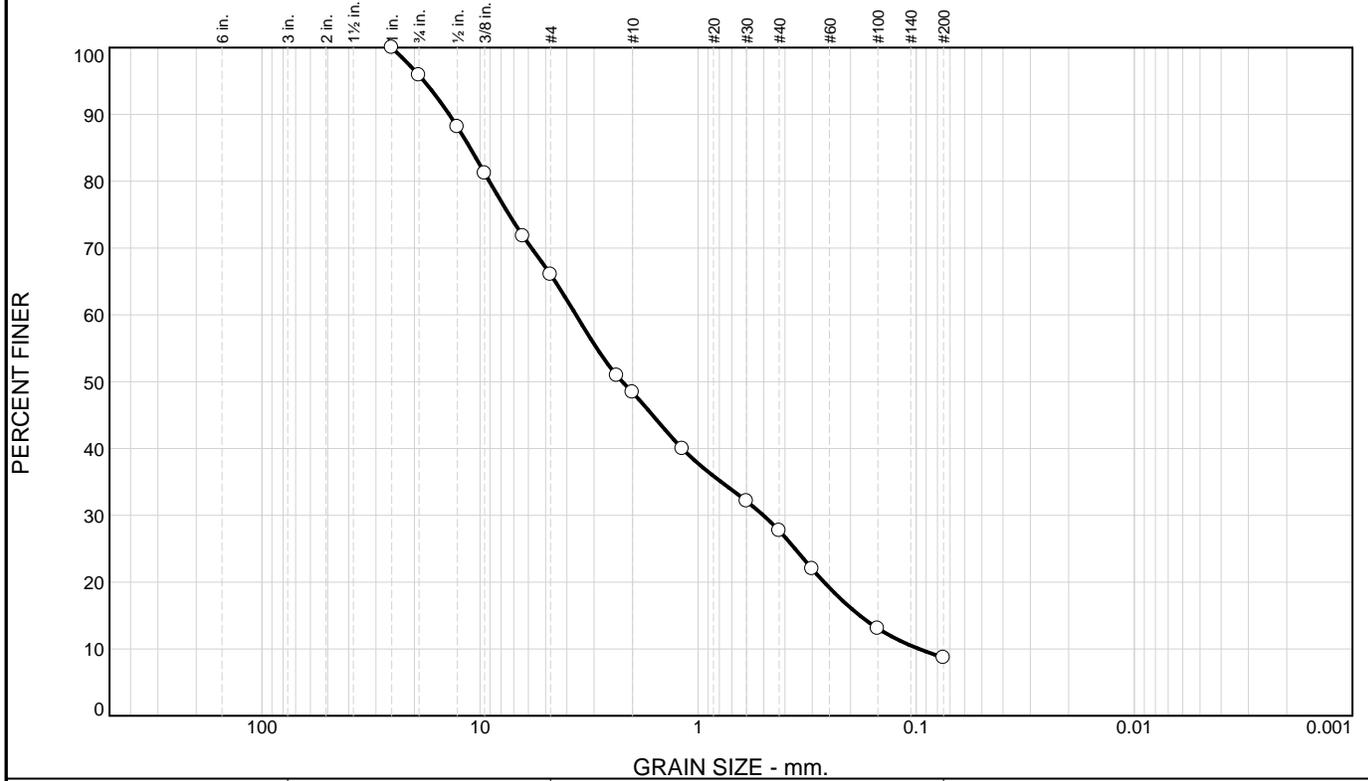
Location: Boring B-4 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.1	29.9	17.6	20.7	19.0	8.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	95.9		
1/2"	88.1		
3/8"	81.2		
1/4"	71.8		
#4	66.0		
#8	50.9		
#10	48.4		
#16	39.9		
#30	32.1		
#40	27.7		
#50	22.0		
#100	13.1		
#200	8.7		

Material Description

Poorly Graded Sand with Silt and Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 11.1180 D₆₀= 3.6311 D₅₀= 2.2277
 D₃₀= 0.5023 D₁₅= 0.1814 D₁₀= 0.0969
 C_u= 37.48 C_c= 0.72

Classification
 USCS= SP-SM AASHTO= A-1-a

Remarks

* (no specification provided)

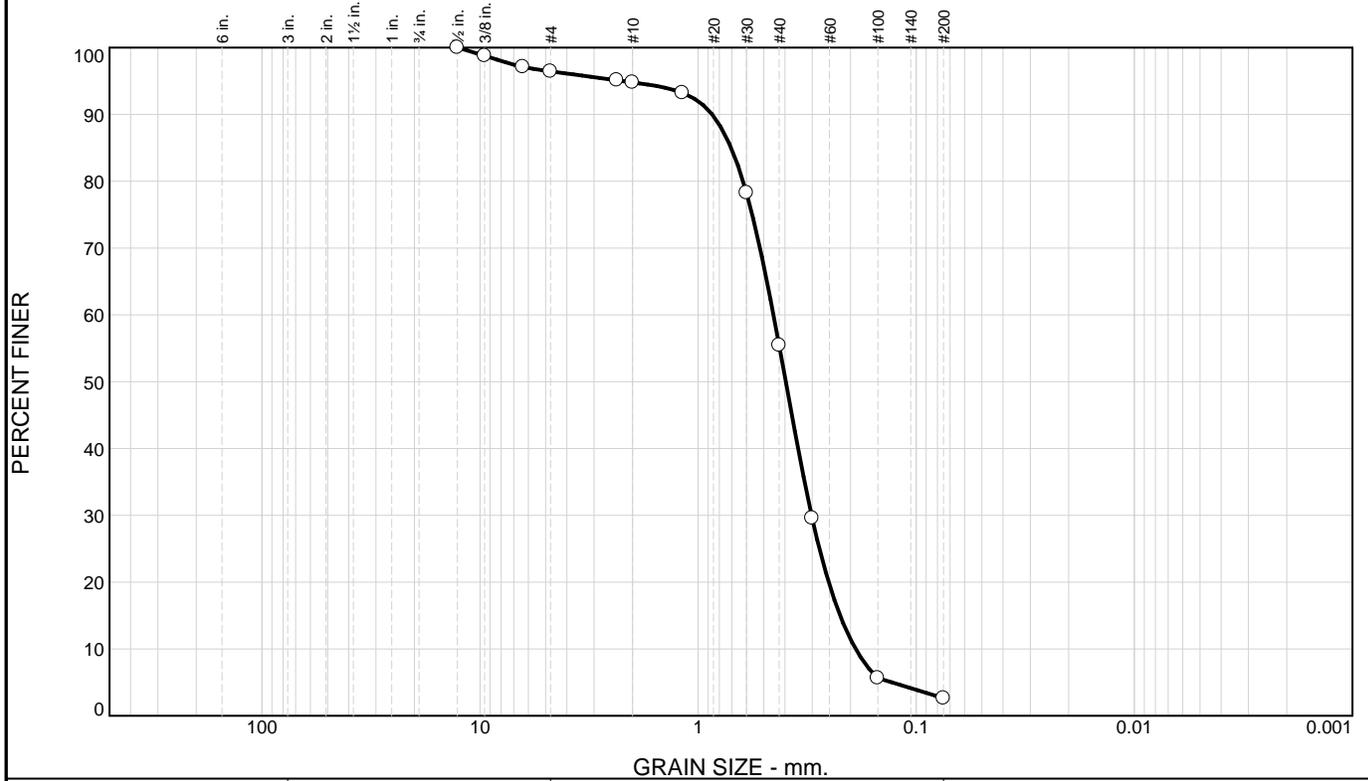
Location: Boring B-5 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	1.6	39.4	52.8	2.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	98.8		
1/4"	97.1		
#4	96.4		
#8	95.1		
#10	94.8		
#16	93.2		
#30	78.2		
#40	55.4		
#50	29.6		
#100	5.6		
#200	2.6		

Material Description

Poorly Graded Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 0.7060 D₆₀= 0.4514 D₅₀= 0.3962
 D₃₀= 0.3021 D₁₅= 0.2234 D₁₀= 0.1896
 C_u= 2.38 C_c= 1.07

Classification
 USCS= SP AASHTO= A-3

Remarks

* (no specification provided)

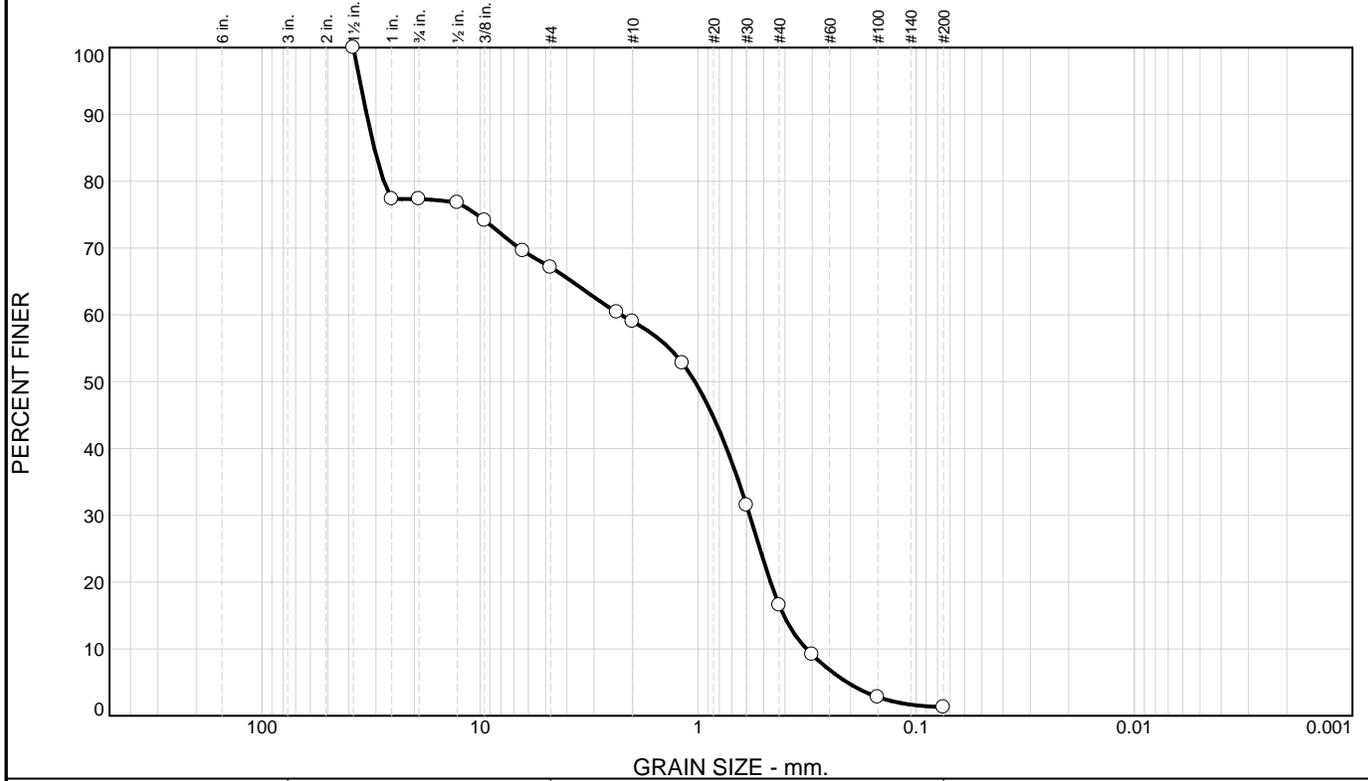
Location: Boring B-5 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	22.7	10.2	8.1	42.5	15.2	1.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	77.3		
3/4"	77.3		
1/2"	76.8		
3/8"	74.1		
1/4"	69.6		
#4	67.1		
#8	60.4		
#10	59.0		
#16	52.8		
#30	31.5		
#40	16.5		
#50	9.1		
#100	2.8		
#200	1.3		

Material Description

Poorly Graded Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 30.5515 D₆₀= 2.2560 D₅₀= 1.0342
 D₃₀= 0.5802 D₁₅= 0.4048 D₁₀= 0.3185
 C_u= 7.08 C_c= 0.47

Classification
 USCS= SP AASHTO= A-1-b

Remarks

* (no specification provided)

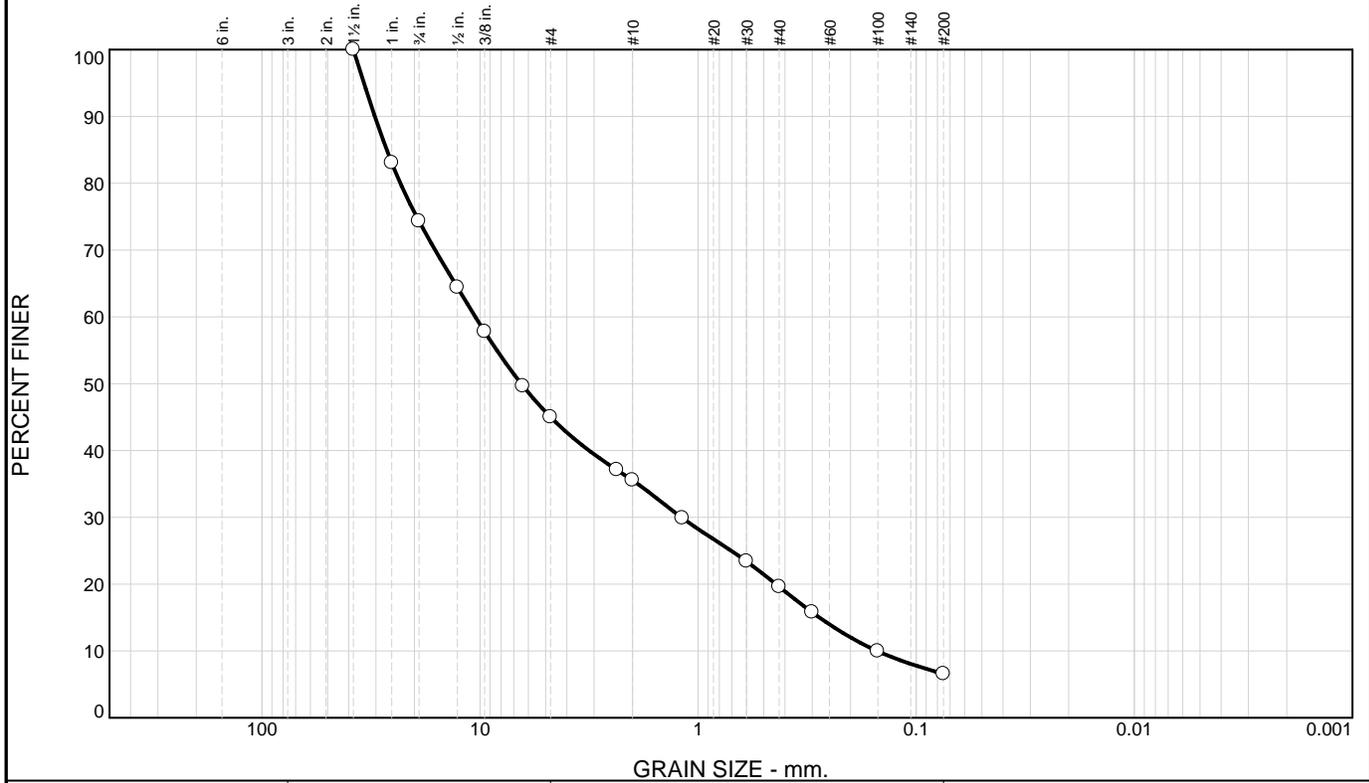
Location: Boring B-5 (18.5-20)
Depth: 18.5 - 20 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	25.7	29.3	9.5	15.9	13.0	6.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	83.0		
3/4"	74.3		
1/2"	64.4		
3/8"	57.8		
1/4"	49.7		
#4	45.0		
#8	37.1		
#10	35.5		
#16	29.9		
#30	23.4		
#40	19.6		
#50	15.8		
#100	9.9		
#200	6.6		

Material Description

Poorly Graded Gravel with Silt and Sand

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 26.7911 D₆₀= 10.5139 D₅₀= 6.4746
D₃₀= 1.1935 D₁₅= 0.2779 D₁₀= 0.1513
C_u= 69.51 C_c= 0.90

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

* (no specification provided)

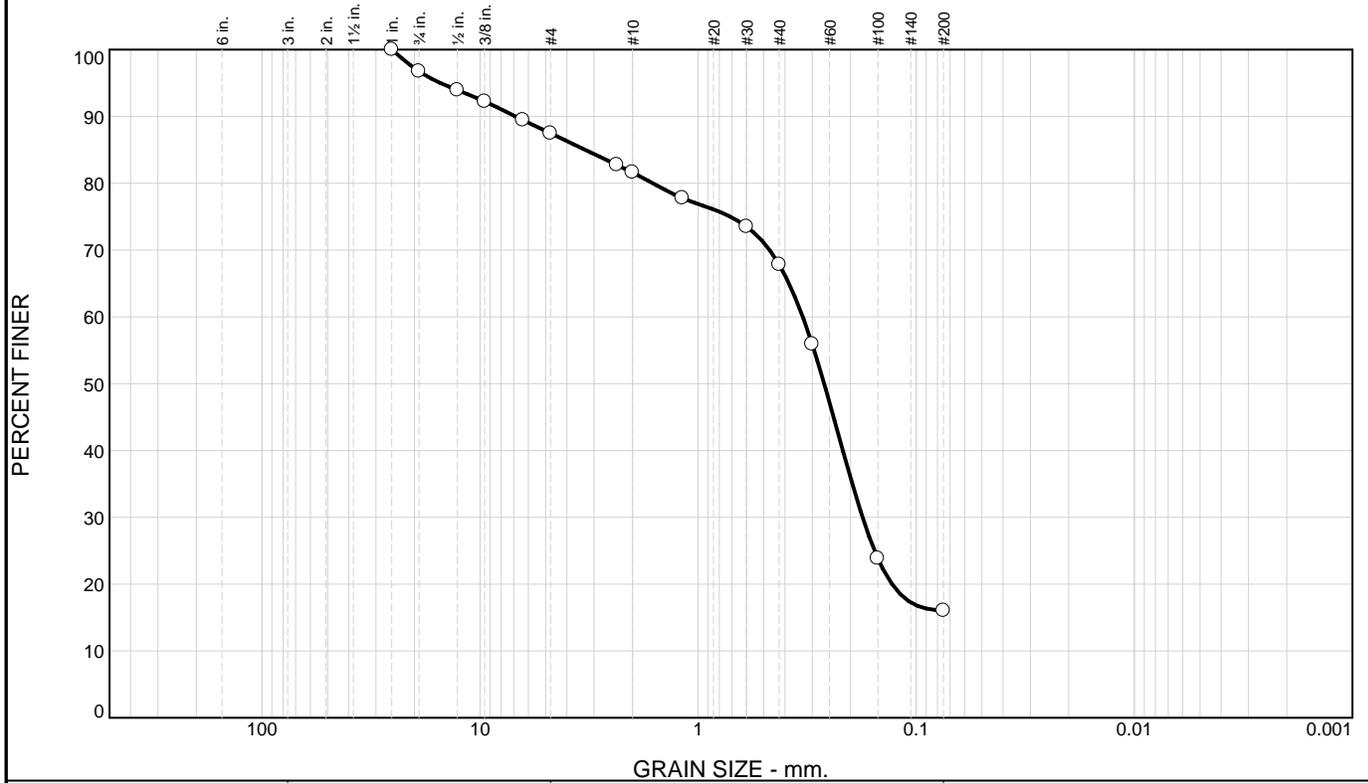
Location: Boring B-6 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.3	9.2	5.9	13.8	51.8	16.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	96.7		
1/2"	93.9		
3/8"	92.2		
1/4"	89.4		
#4	87.5		
#8	82.7		
#10	81.6		
#16	77.8		
#30	73.5		
#40	67.8		
#50	55.9		
#100	23.8		
#200	16.0		

Material Description

Silty Sand

PL= NP **Atterberg Limits** LL= 0 PI= NP

D₈₅= 3.2977 **Coefficients** D₆₀= 0.3314 D₅₀= 0.2644

D₃₀= 0.1762 D₁₅= D₁₀=

C_u= C_c=

USCS= SM **Classification** AASHTO= A-2-4(0)

Remarks

* (no specification provided)

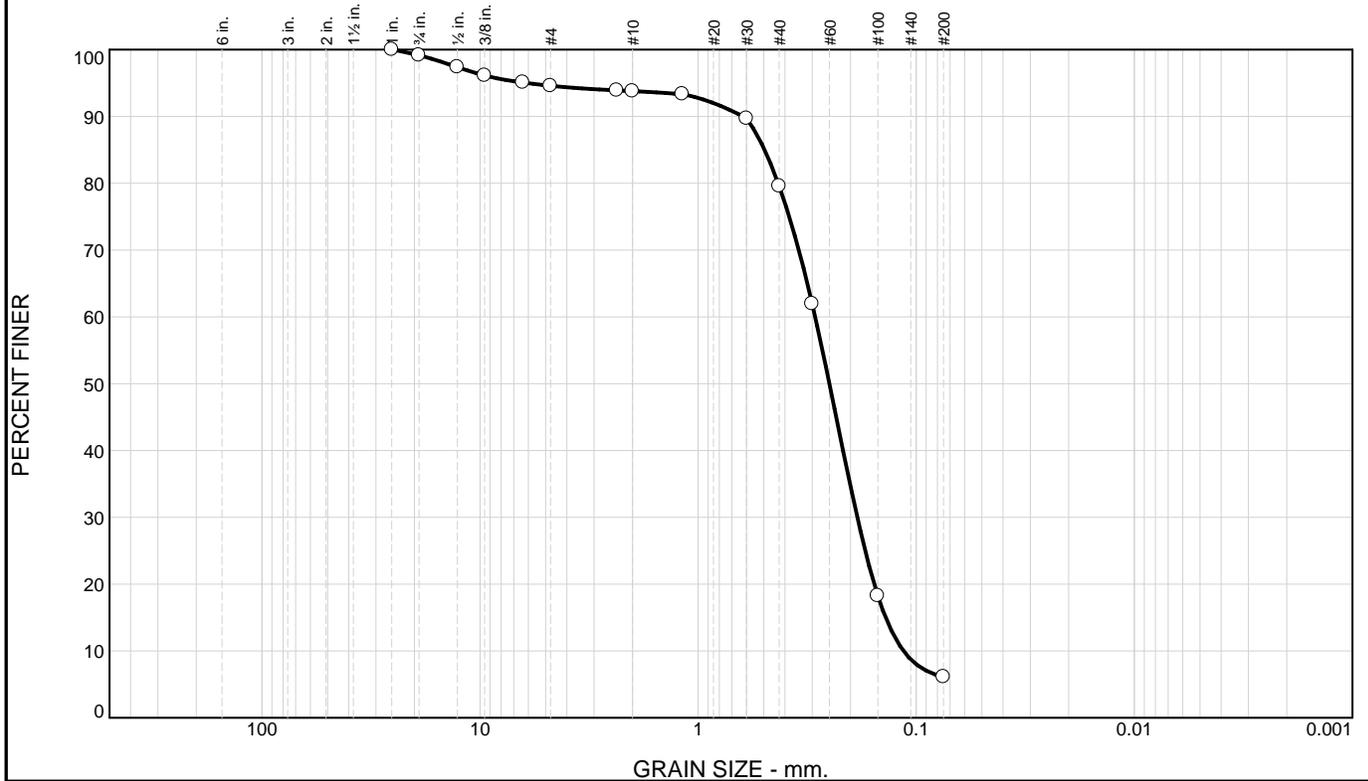
Location: Boring B-6 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.9	4.5	0.8	14.2	73.5	6.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	99.1		
1/2"	97.4		
3/8"	96.1		
1/4"	95.1		
#4	94.6		
#8	93.9		
#10	93.8		
#16	93.3		
#30	89.7		
#40	79.6		
#50	62.0		
#100	18.2		
#200	6.1		

Material Description

Poorly Graded Sand with Silt

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 0.4959 D₆₀= 0.2908 D₅₀= 0.2502
 D₃₀= 0.1862 D₁₅= 0.1382 D₁₀= 0.1145
 C_u= 2.54 C_c= 1.04

Classification
 USCS= SP-SM AASHTO= A-3

Remarks

* (no specification provided)

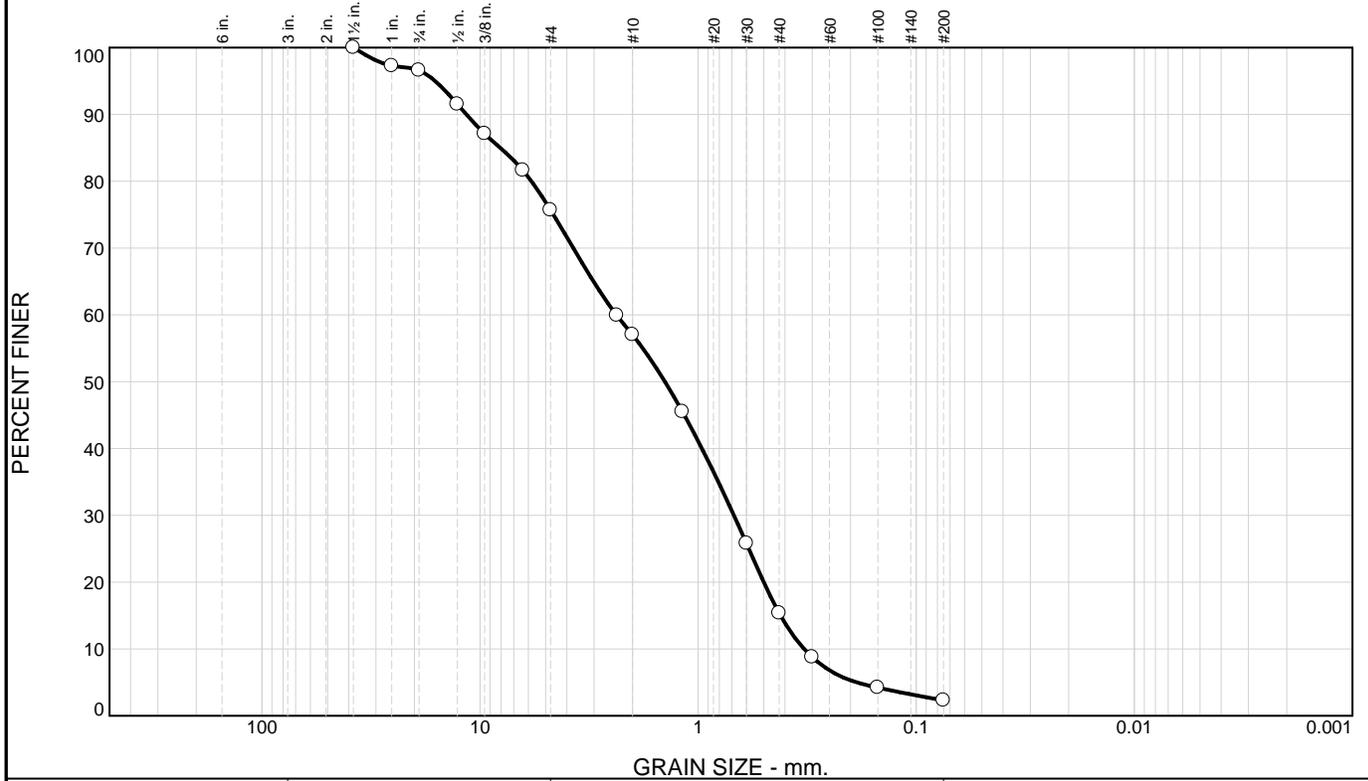
Location: Boring B-6 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	20.9	18.7	41.7	13.0	2.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	97.3		
3/4"	96.6		
1/2"	91.5		
3/8"	87.1		
1/4"	81.6		
#4	75.7		
#8	59.9		
#10	57.0		
#16	45.5		
#30	25.8		
#40	15.3		
#50	8.8		
#100	4.2		
#200	2.3		

Material Description

Poorly Graded Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 8.0903 D₆₀= 2.3719 D₅₀= 1.4207
 D₃₀= 0.6856 D₁₅= 0.4192 D₁₀= 0.3267
 C_u= 7.26 C_c= 0.61

Classification
 USCS= SP AASHTO= A-1-b

Remarks

* (no specification provided)

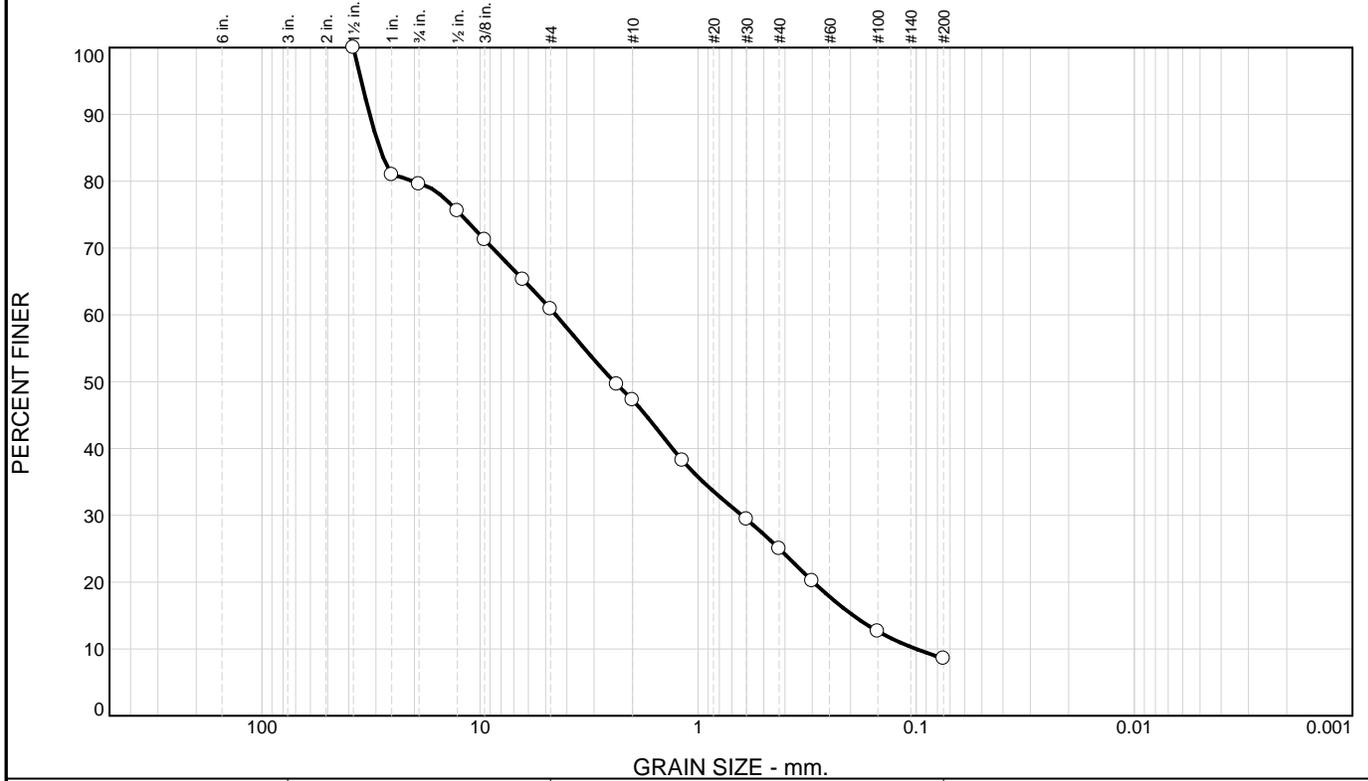
Location: Boring B-6 (23.5-25)
Depth: 23.5 - 25 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.4	18.7	13.6	22.3	16.4	8.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	80.9		
3/4"	79.6		
1/2"	75.5		
3/8"	71.2		
1/4"	65.3		
#4	60.9		
#8	49.6		
#10	47.3		
#16	38.2		
#30	29.4		
#40	25.0		
#50	20.2		
#100	12.6		
#200	8.6		

Material Description

Poorly Graded Sand with Silt and Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 28.8607 D₆₀= 4.4995 D₅₀= 2.4253
D₃₀= 0.6306 D₁₅= 0.1942 D₁₀= 0.1001
C_u= 44.97 C_c= 0.88

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

* (no specification provided)

Location: Boring B-7 (3.5-5)
Depth: 3.5 - 5 Feet

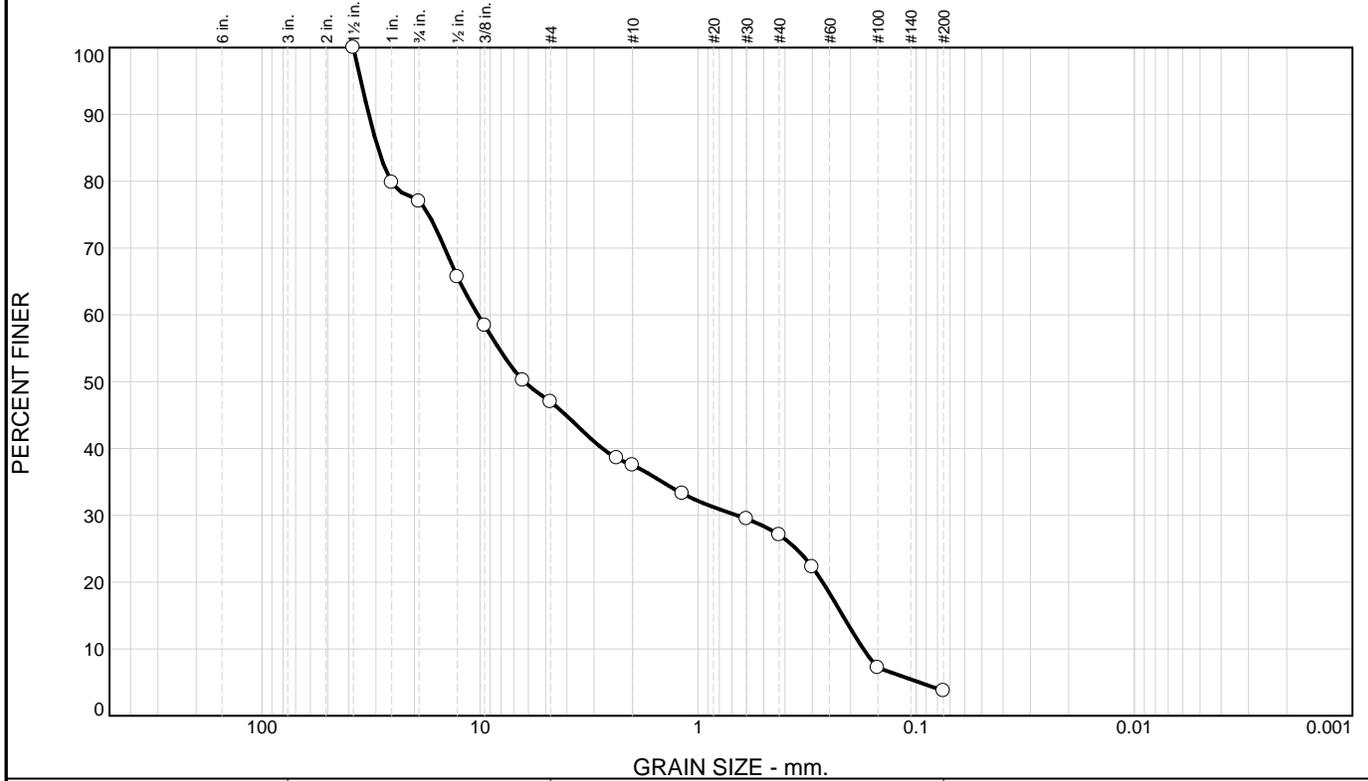
Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
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Figure

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.0	30.0	9.5	10.4	23.4	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	79.8		
3/4"	77.0		
1/2"	65.7		
3/8"	58.4		
1/4"	50.2		
#4	47.0		
#8	38.6		
#10	37.5		
#16	33.2		
#30	29.5		
#40	27.1		
#50	22.3		
#100	7.2		
#200	3.7		

Material Description

Poorly Graded Gravel with Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 29.3894 D₆₀= 10.2121 D₅₀= 6.2580
 D₃₀= 0.6658 D₁₅= 0.2172 D₁₀= 0.1748
 C_u= 58.43 C_c= 0.25

Classification
 USCS= GP AASHTO= A-1-a

Remarks

* (no specification provided)

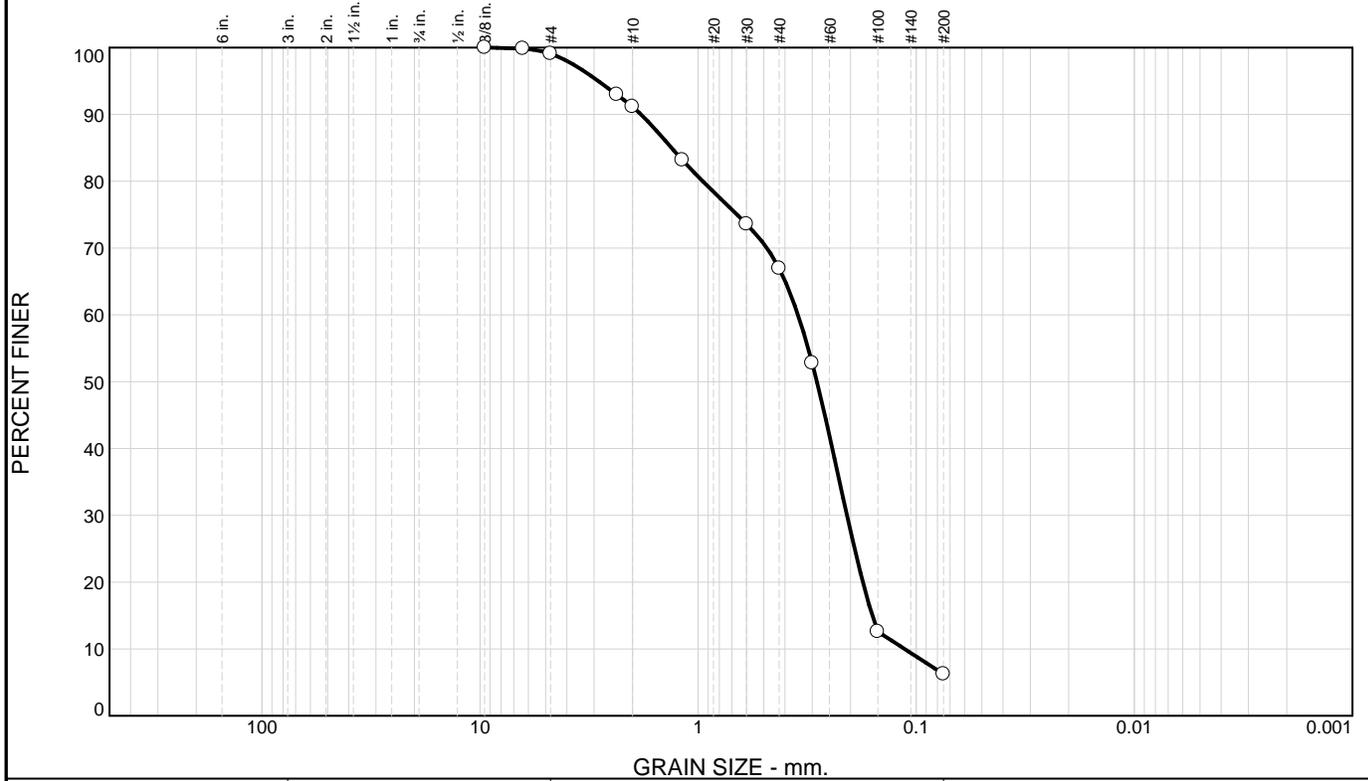
Location: Boring B-7 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	8.0	24.2	60.7	6.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
1/4"	99.8		
#4	99.1		
#8	92.9		
#10	91.1		
#16	83.1		
#30	73.6		
#40	66.9		
#50	52.8		
#100	12.6		
#200	6.2		

Material Description

Poorly Graded Sand with Silt

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 1.3254 D₆₀= 0.3485 D₅₀= 0.2854
 D₃₀= 0.2078 D₁₅= 0.1589 D₁₀= 0.1131
 C_u= 3.08 C_c= 1.09

Classification
 USCS= SP-SM AASHTO= A-3

Remarks

* (no specification provided)

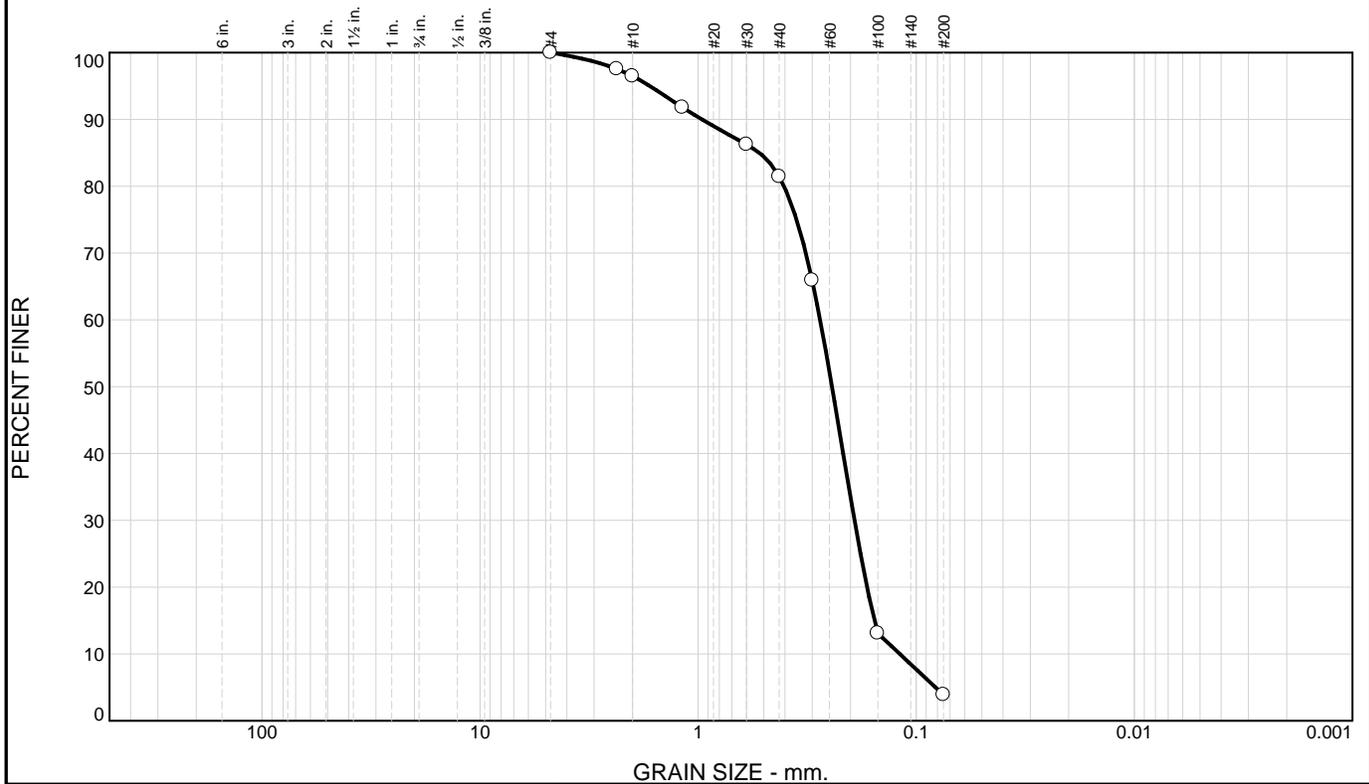
Location: Boring B-7 (18.5-20)
Depth: 18.5 - 20 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.5	15.1	77.5	3.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	97.5		
#10	96.5		
#16	91.8		
#30	86.2		
#40	81.4		
#50	65.9		
#100	13.1		
#200	3.9		

Material Description

Poorly Graded Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 0.5238 D₆₀= 0.2759 D₅₀= 0.2434
 D₃₀= 0.1919 D₁₅= 0.1553 D₁₀= 0.1190
 C_u= 2.32 C_c= 1.12

Classification
 USCS= SP AASHTO= A-3

Remarks

* (no specification provided)

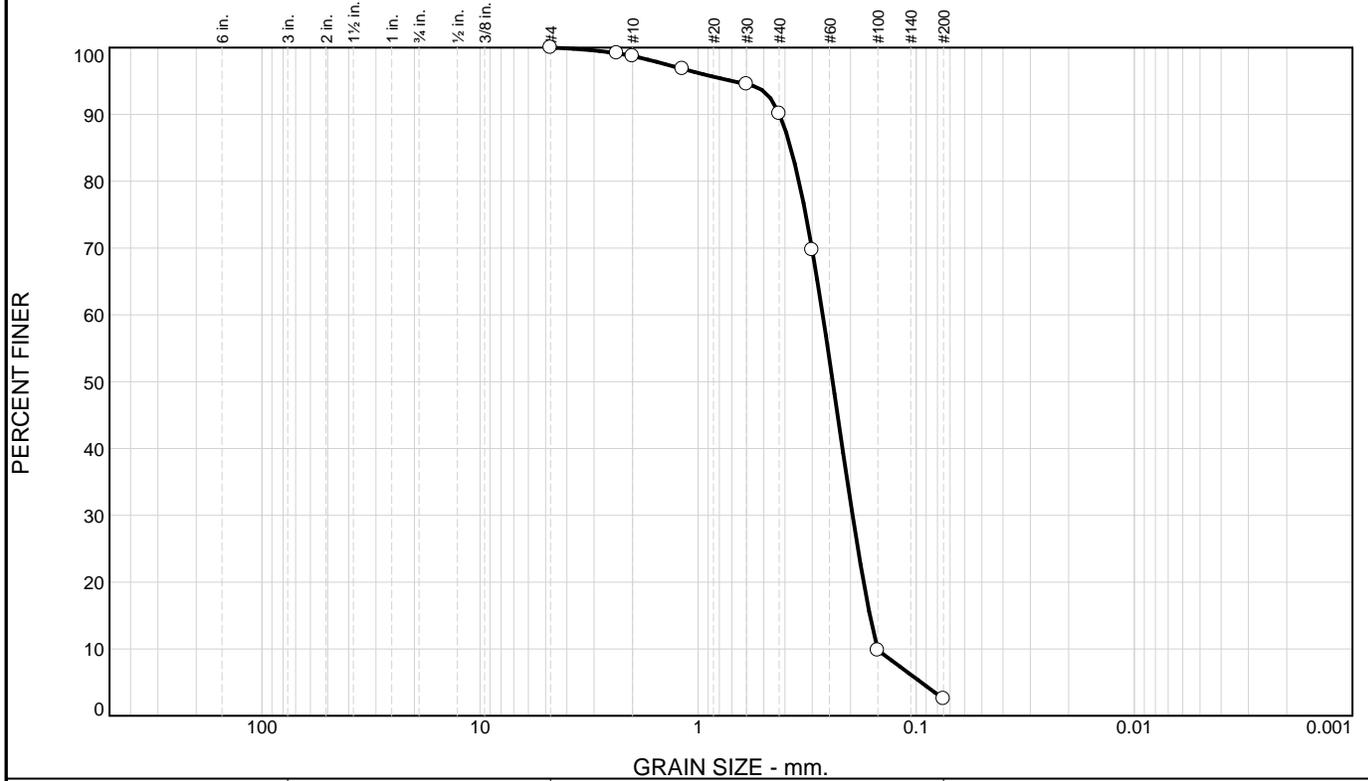
Location: Boring B-7 (23.5-25)
Depth: 23.5 - 25 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.3	8.6	87.6	2.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.1		
#10	98.7		
#16	96.8		
#30	94.5		
#40	90.1		
#50	69.7		
#100	9.8		
#200	2.5		

Material Description

Poorly Graded Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 0.3763 D₆₀= 0.2684 D₅₀= 0.2415
 D₃₀= 0.1959 D₁₅= 0.1630 D₁₀= 0.1505
 C_u= 1.78 C_c= 0.95

Classification
 USCS= SP AASHTO= A-3

Remarks

* (no specification provided)

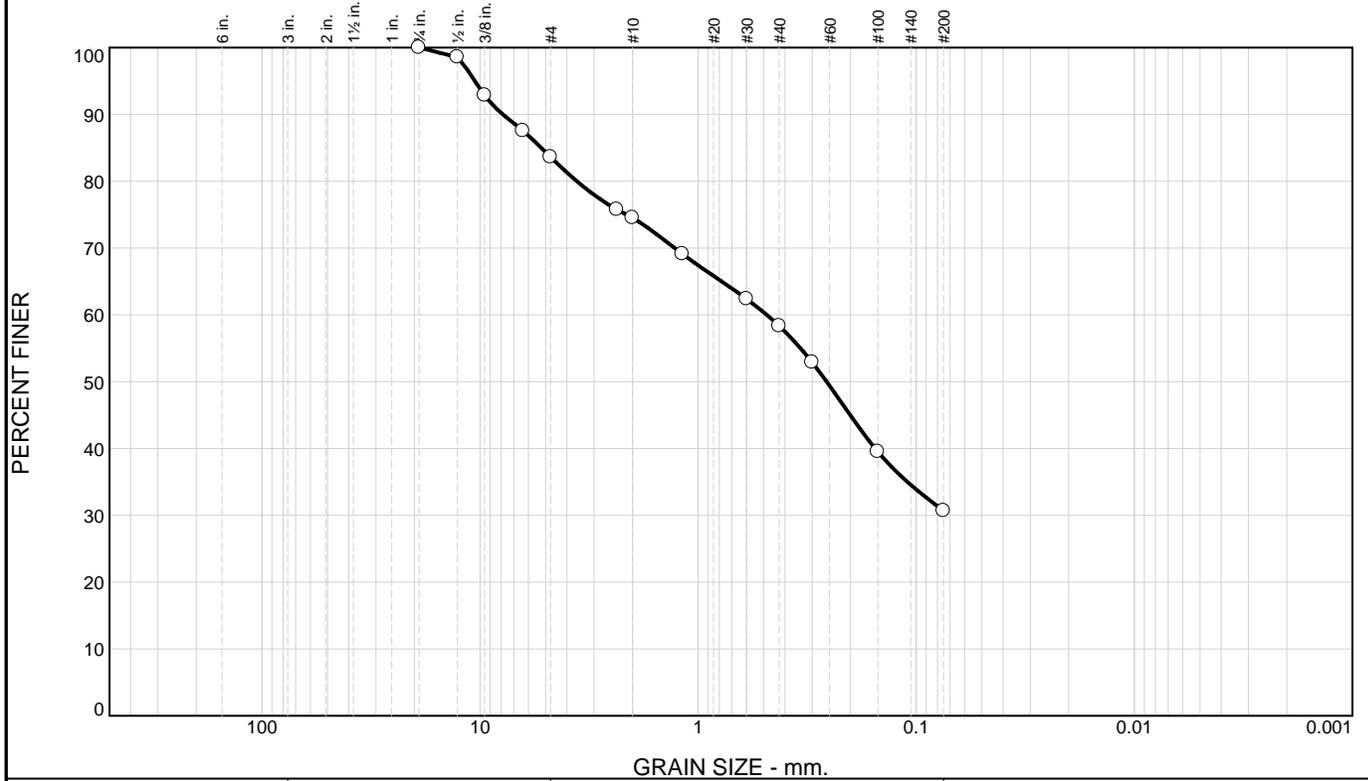
Location: Boring B-7 (28.5-30)
Depth: 28.5 - 30 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	16.4	9.1	16.2	27.6	30.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	98.5		
3/8"	92.9		
1/4"	87.5		
#4	83.6		
#8	75.8		
#10	74.5		
#16	69.1		
#30	62.4		
#40	58.3		
#50	52.9		
#100	39.5		
#200	30.7		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 5.2447 D₆₀= 0.4848 D₅₀= 0.2576
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-2-4(0)

Remarks

* (no specification provided)

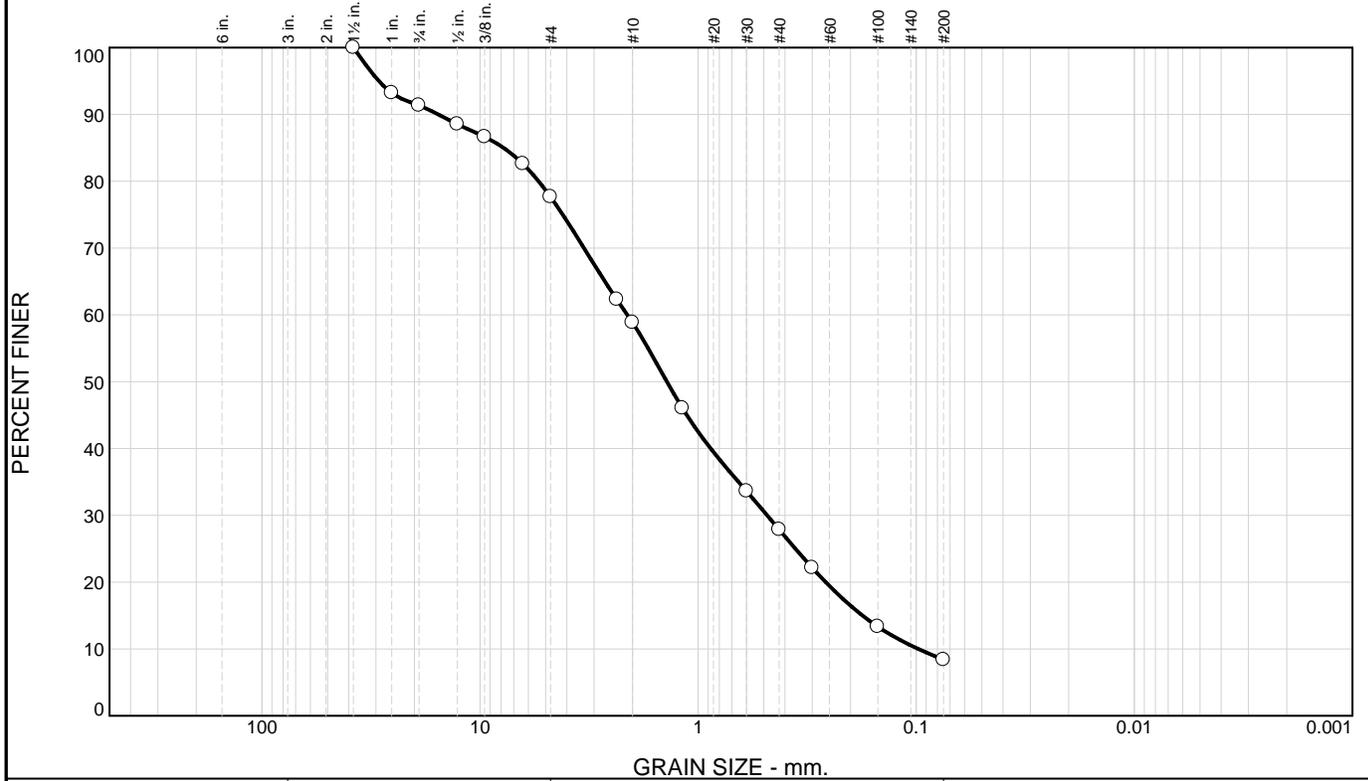
Location: Boring B-8 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/4/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.7	13.7	18.7	31.0	19.5	8.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	93.2		
3/4"	91.3		
1/2"	88.5		
3/8"	86.6		
1/4"	82.6		
#4	77.6		
#8	62.3		
#10	58.9		
#16	46.0		
#30	33.6		
#40	27.9		
#50	22.1		
#100	13.3		
#200	8.4		

Material Description

Well Graded Sand with Silt and Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 7.8087 D₆₀= 2.1112 D₅₀= 1.3914
D₃₀= 0.4828 D₁₅= 0.1764 D₁₀= 0.0977
C_u= 21.61 C_c= 1.13

Classification

USCS= SW-SM AASHTO= A-1-b

Remarks

* (no specification provided)

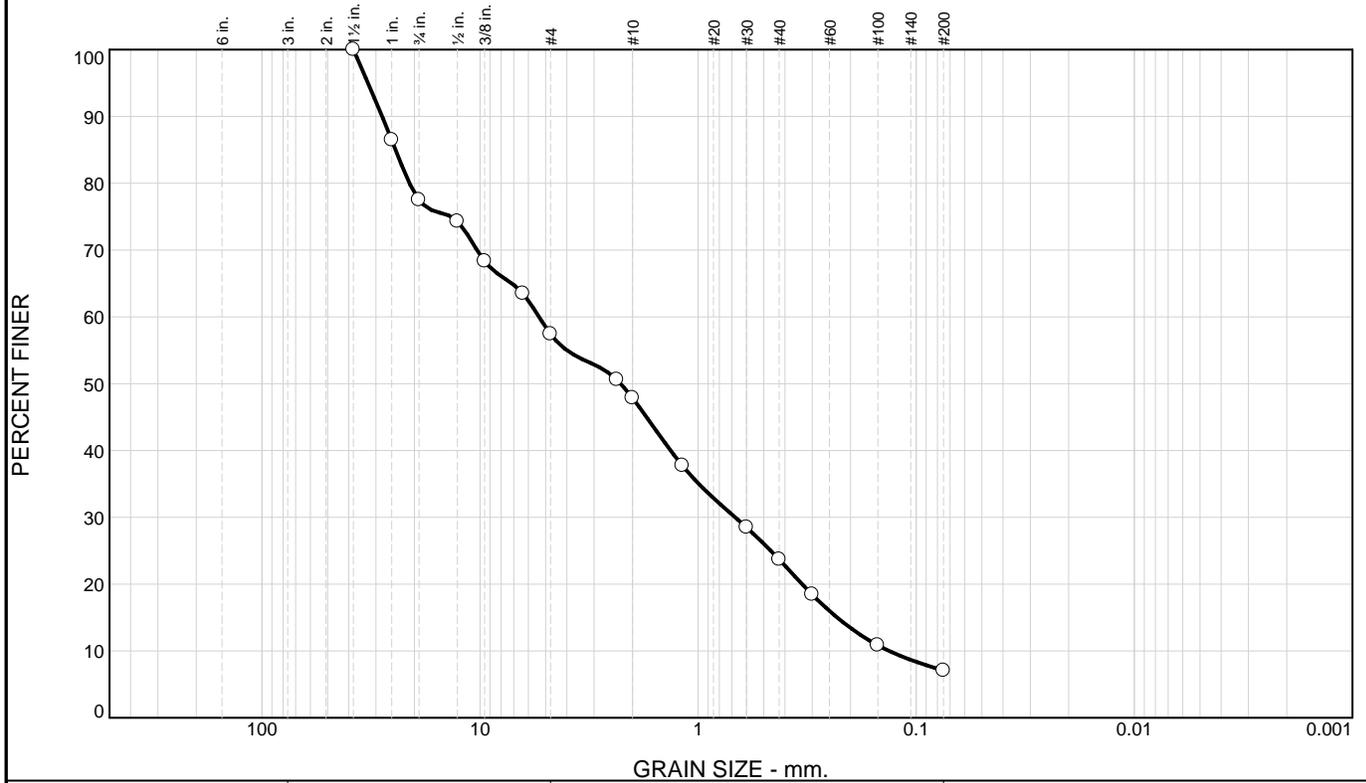
Location: Boring B-9 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	22.5	20.1	9.6	24.1	16.7	7.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	86.4		
3/4"	77.5		
1/2"	74.3		
3/8"	68.3		
1/4"	63.5		
#4	57.4		
#8	50.6		
#10	47.8		
#16	37.7		
#30	28.5		
#40	23.7		
#50	18.4		
#100	10.9		
#200	7.0		

Material Description

Poorly Graded Sand with Silt and Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 24.4030 D₆₀= 5.3674 D₅₀= 2.2659
 D₃₀= 0.6766 D₁₅= 0.2304 D₁₀= 0.1331
 C_u= 40.32 C_c= 0.64

Classification
 USCS= SP-SM AASHTO= A-1-a

Remarks

* (no specification provided)

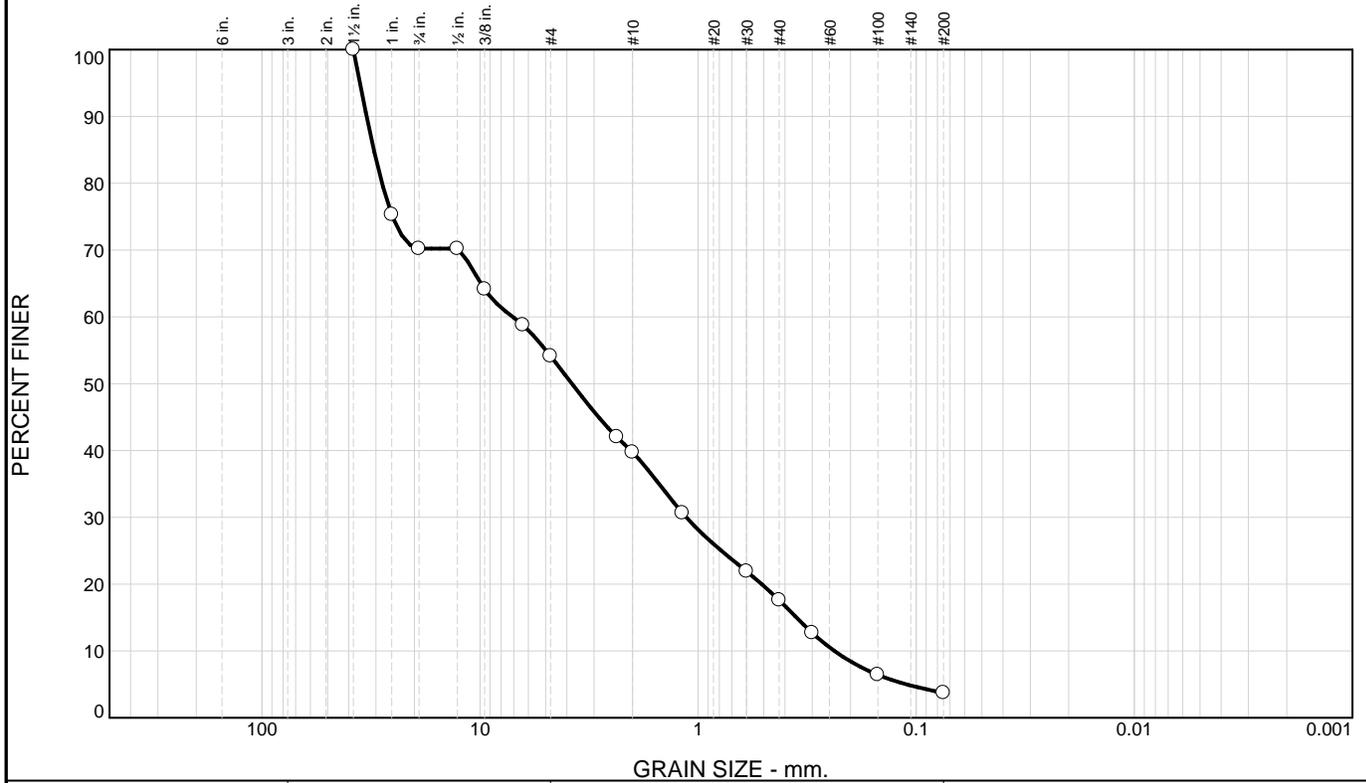
Location: Boring B-10 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	29.8	16.1	14.4	22.1	13.9	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	75.3		
3/4"	70.2		
1/2"	70.2		
3/8"	64.1		
1/4"	58.8		
#4	54.1		
#8	42.0		
#10	39.7		
#16	30.6		
#30	21.9		
#40	17.6		
#50	12.7		
#100	6.4		
#200	3.7		

Material Description

Poorly Graded Sand with Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 30.6733 D₆₀= 7.0763 D₅₀= 3.7917
D₃₀= 1.1332 D₁₅= 0.3540 D₁₀= 0.2372
C_u= 29.83 C_c= 0.76

USCS= SP **Classification** AASHTO= A-1-a

Remarks

* (no specification provided)

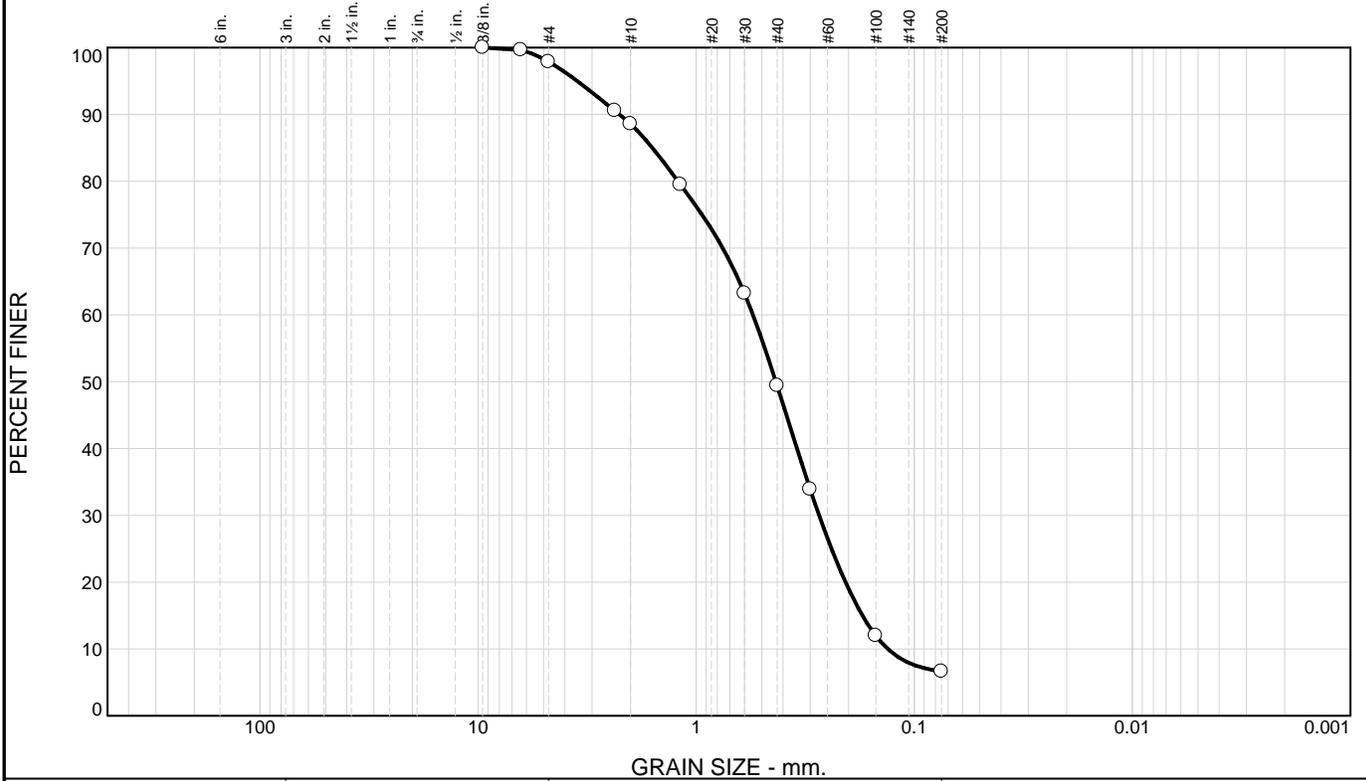
Location: Boring B-10 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	9.3	39.2	42.8	6.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
1/4"	99.6		
#4	97.9		
#8	90.5		
#10	88.6		
#16	79.5		
#30	63.2		
#40	49.4		
#50	33.9		
#100	12.0		
#200	6.6		

Material Description

Poorly Graded Sand with Silt

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 1.5885 D₆₀= 0.5489 D₅₀= 0.4309
 D₃₀= 0.2731 D₁₅= 0.1728 D₁₀= 0.1321
 C_u= 4.15 C_c= 1.03

Classification
 USCS= SP-SM AASHTO= A-1-b

Remarks

* (no specification provided)

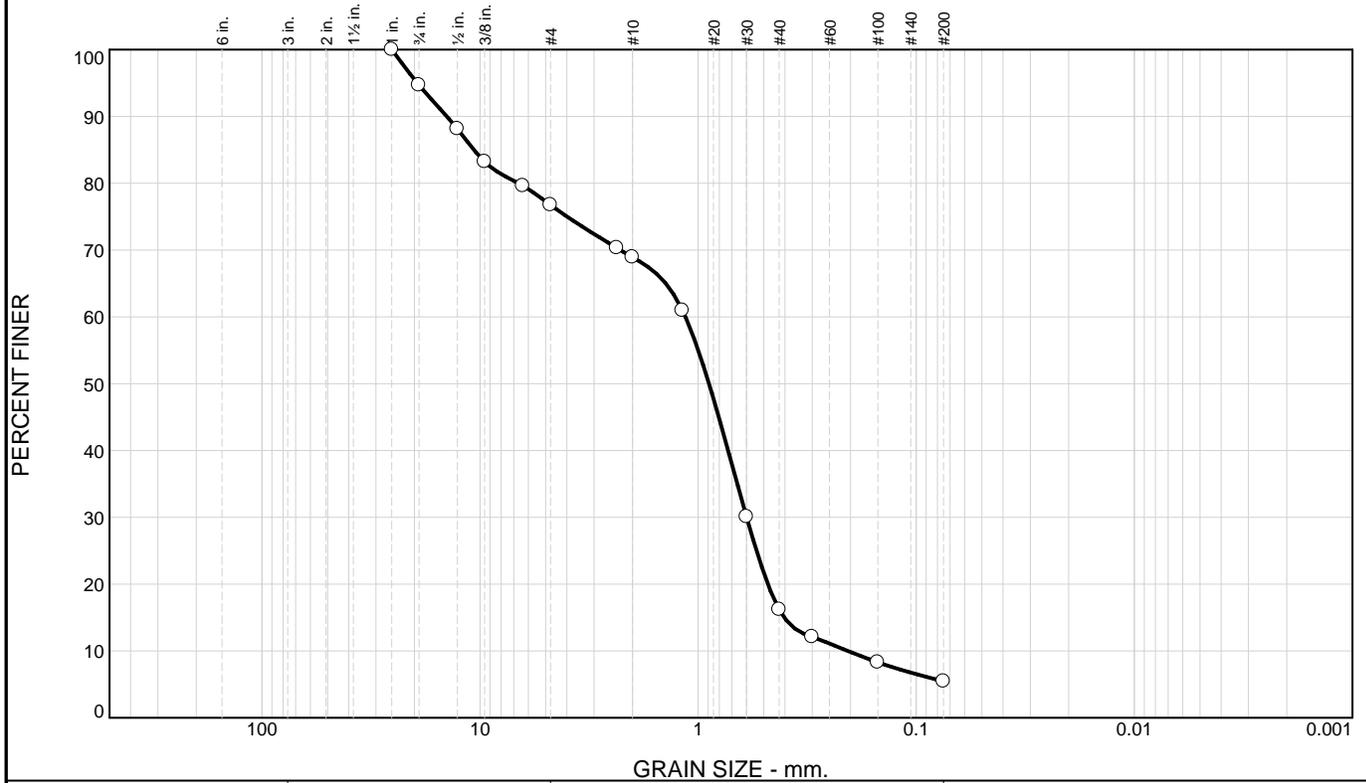
Location: Boring B-10 (18.5-20)
Depth: 18.5 - 20 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.3	18.0	7.8	52.7	10.7	5.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	94.7		
1/2"	88.1		
3/8"	83.2		
1/4"	79.6		
#4	76.7		
#8	70.3		
#10	68.9		
#16	60.9		
#30	30.1		
#40	16.2		
#50	12.1		
#100	8.3		
#200	5.5		

Material Description

Poorly Graded Sand with Silt and Gravel

Atterberg Limits

PL= NP LL= 0 PI= NP

Coefficients

D₈₅= 10.6786 D₆₀= 1.1442 D₅₀= 0.8918
 D₃₀= 0.5990 D₁₅= 0.4030 D₁₀= 0.2058
 C_u= 5.56 C_c= 1.52

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

* (no specification provided)

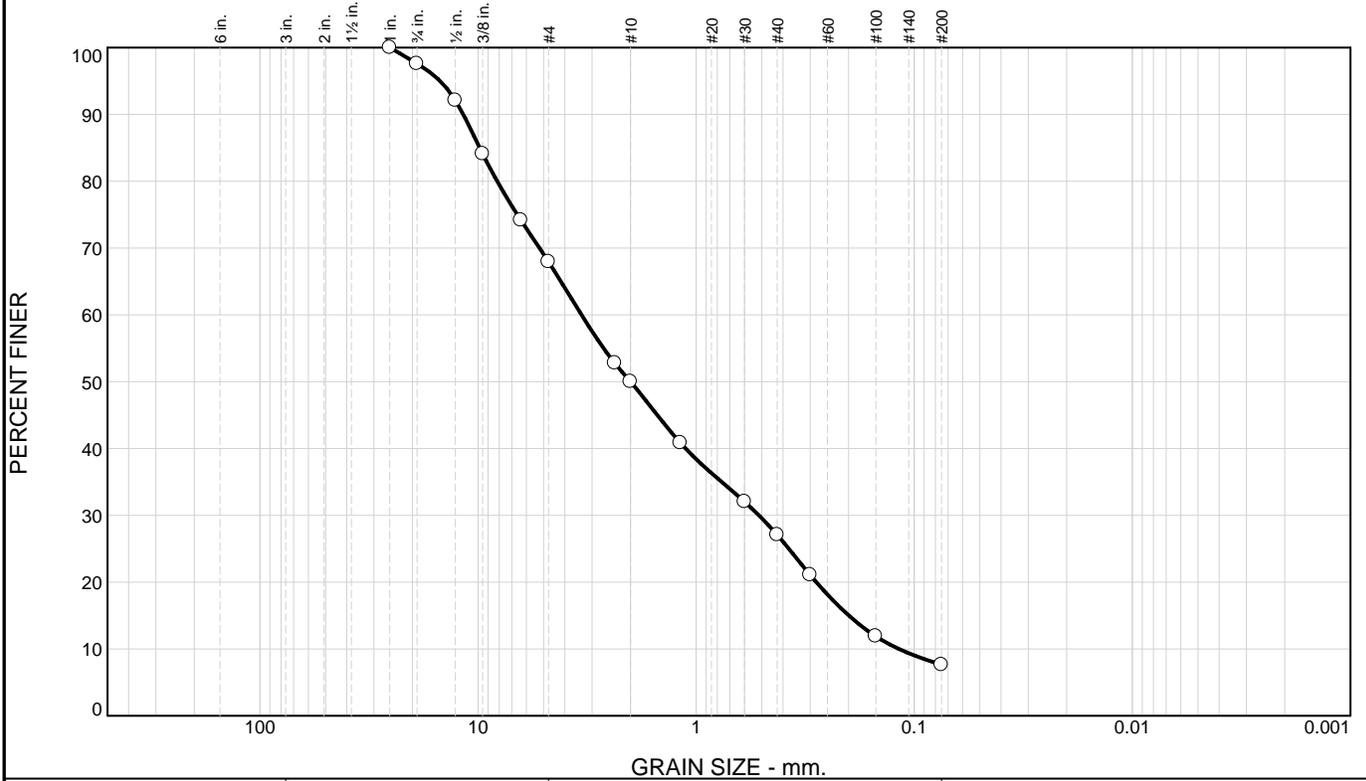
Location: Boring B-10 (28.5-30)
Depth: 28.5 - 30 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.4	29.7	17.9	22.9	19.5	7.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	97.6		
1/2"	92.1		
3/8"	84.1		
1/4"	74.1		
#4	67.9		
#8	52.8		
#10	50.0		
#16	40.8		
#30	32.0		
#40	27.1		
#50	21.1		
#100	11.9		
#200	7.6		

Material Description

Poorly Graded Sand with Silt and Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 9.8288 D₆₀= 3.3527 D₅₀= 2.0000
D₃₀= 0.5157 D₁₅= 0.1994 D₁₀= 0.1176
C_u= 28.51 C_c= 0.67

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

* (no specification provided)

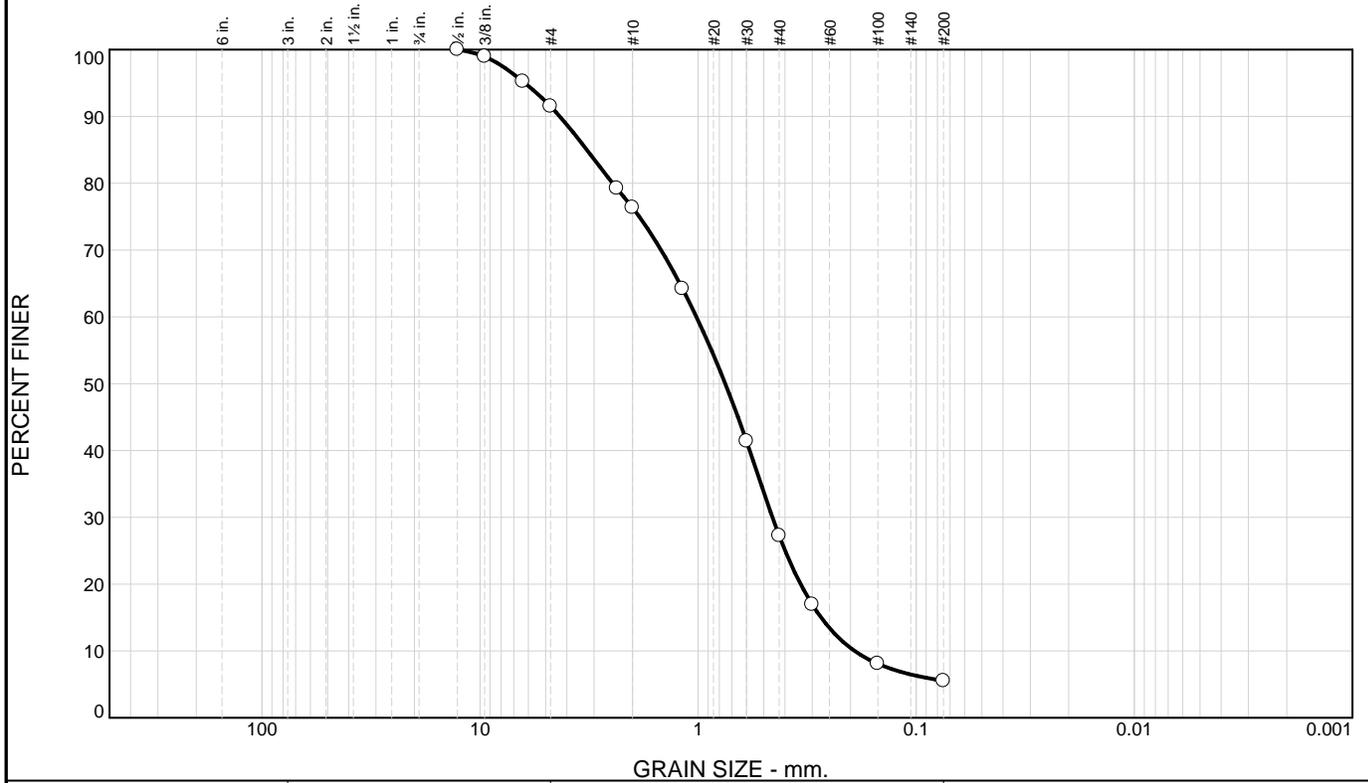
Location: Boring B-11 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.5	15.2	49.1	21.7	5.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	98.9		
1/4"	95.2		
#4	91.5		
#8	79.2		
#10	76.3		
#16	64.2		
#30	41.4		
#40	27.2		
#50	17.0		
#100	8.1		
#200	5.5		

Material Description

Poorly Graded Sand with Silt

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 3.2403 D₆₀= 1.0186 D₅₀= 0.7508
 D₃₀= 0.4565 D₁₅= 0.2731 D₁₀= 0.1918
 C_u= 5.31 C_c= 1.07

Classification
 USCS= SP-SM AASHTO= A-1-b

Remarks

* (no specification provided)

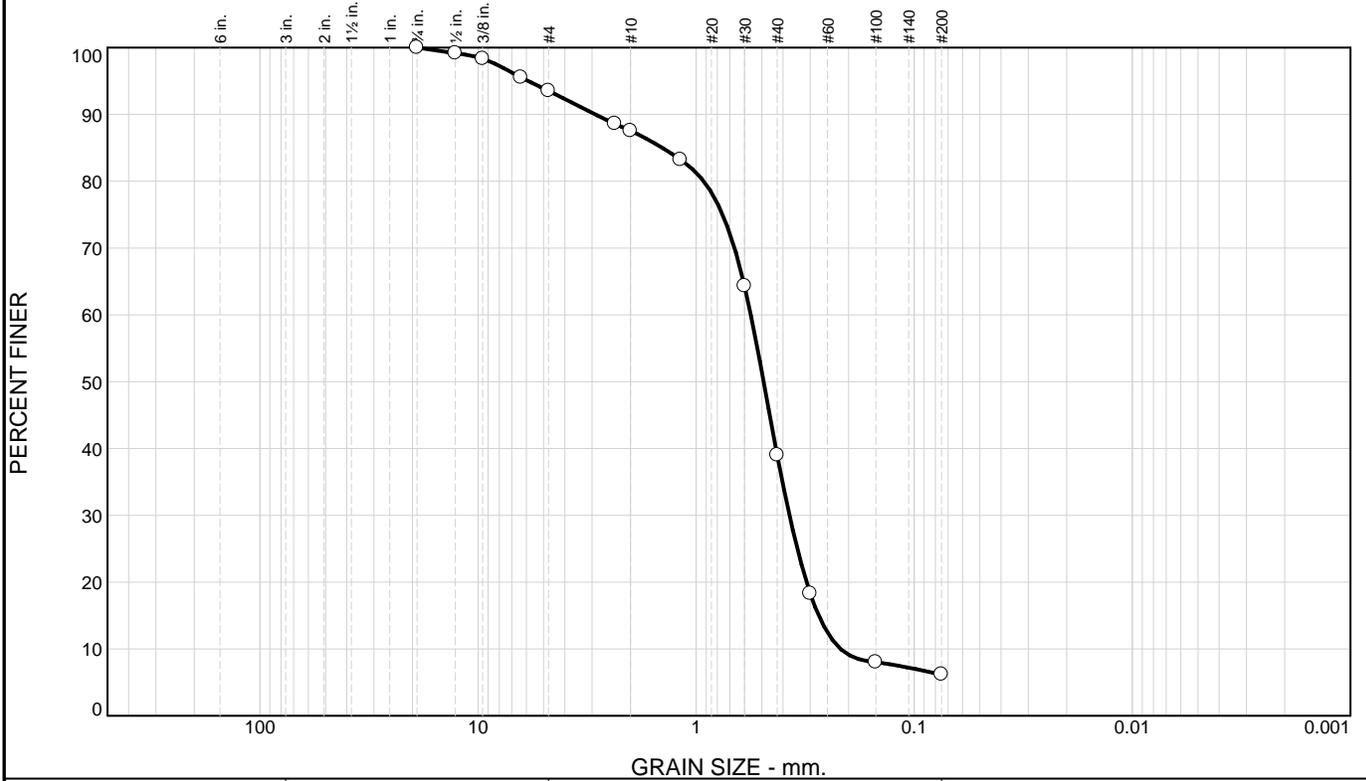
Location: Boring B-11 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.5	6.0	48.5	32.8	6.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	99.2		
3/8"	98.3		
1/4"	95.5		
#4	93.5		
#8	88.6		
#10	87.5		
#16	83.2		
#30	64.3		
#40	39.0		
#50	18.3		
#100	8.0		
#200	6.2		

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= 0 PI= NP

Coefficients

D₈₅= 1.4297 D₆₀= 0.5614 D₅₀= 0.4905
D₃₀= 0.3732 D₁₅= 0.2743 D₁₀= 0.2176
C_u= 2.58 C_c= 1.14

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

* (no specification provided)

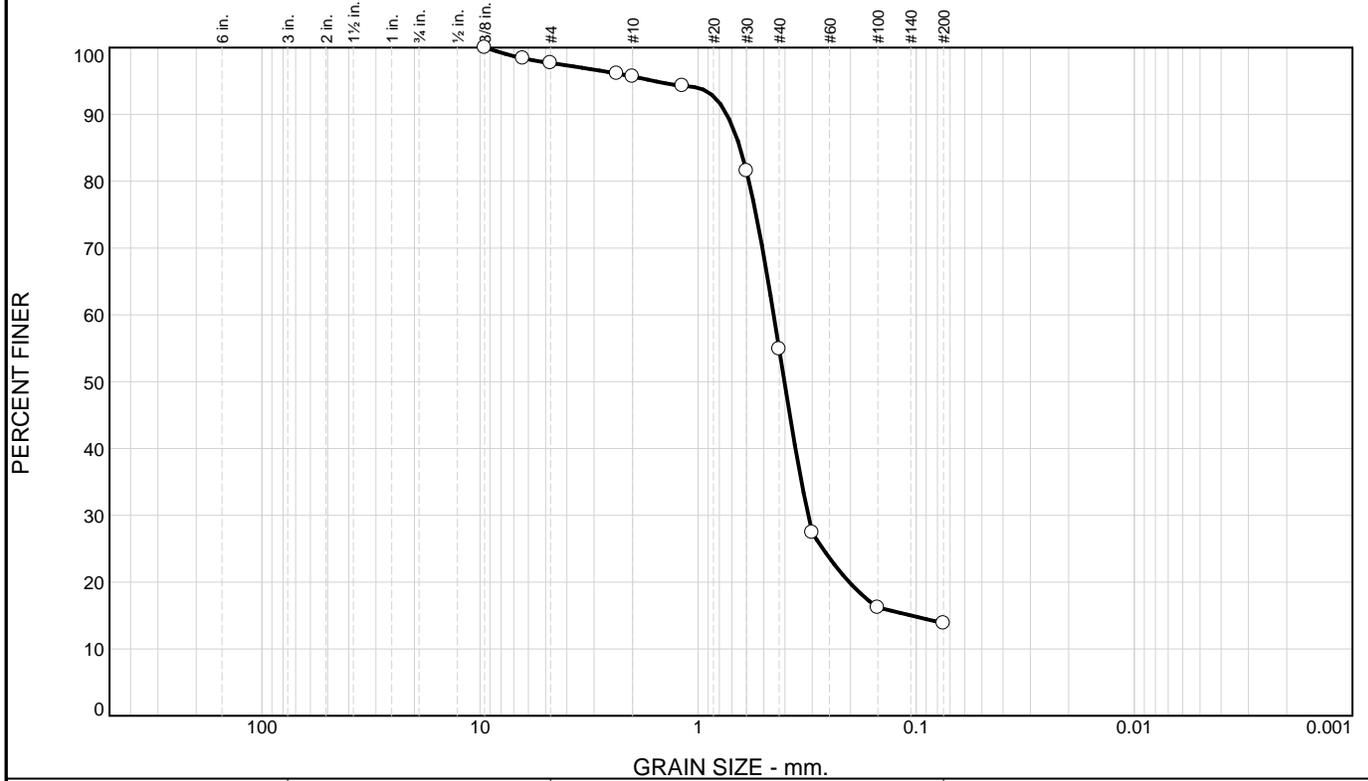
Location: Boring B-11 (18.5-20)
Depth: 18.5 - 20 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	2.0	40.8	41.1	13.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
1/4"	98.4		
#4	97.7		
#8	96.1		
#10	95.7		
#16	94.3		
#30	81.5		
#40	54.9		
#50	27.4		
#100	16.2		
#200	13.8		

Material Description

Silty Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 0.6422 D₆₀= 0.4504 D₅₀= 0.4022
 D₃₀= 0.3129 D₁₅= 0.1054 D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-2-4(0)

Remarks

* (no specification provided)

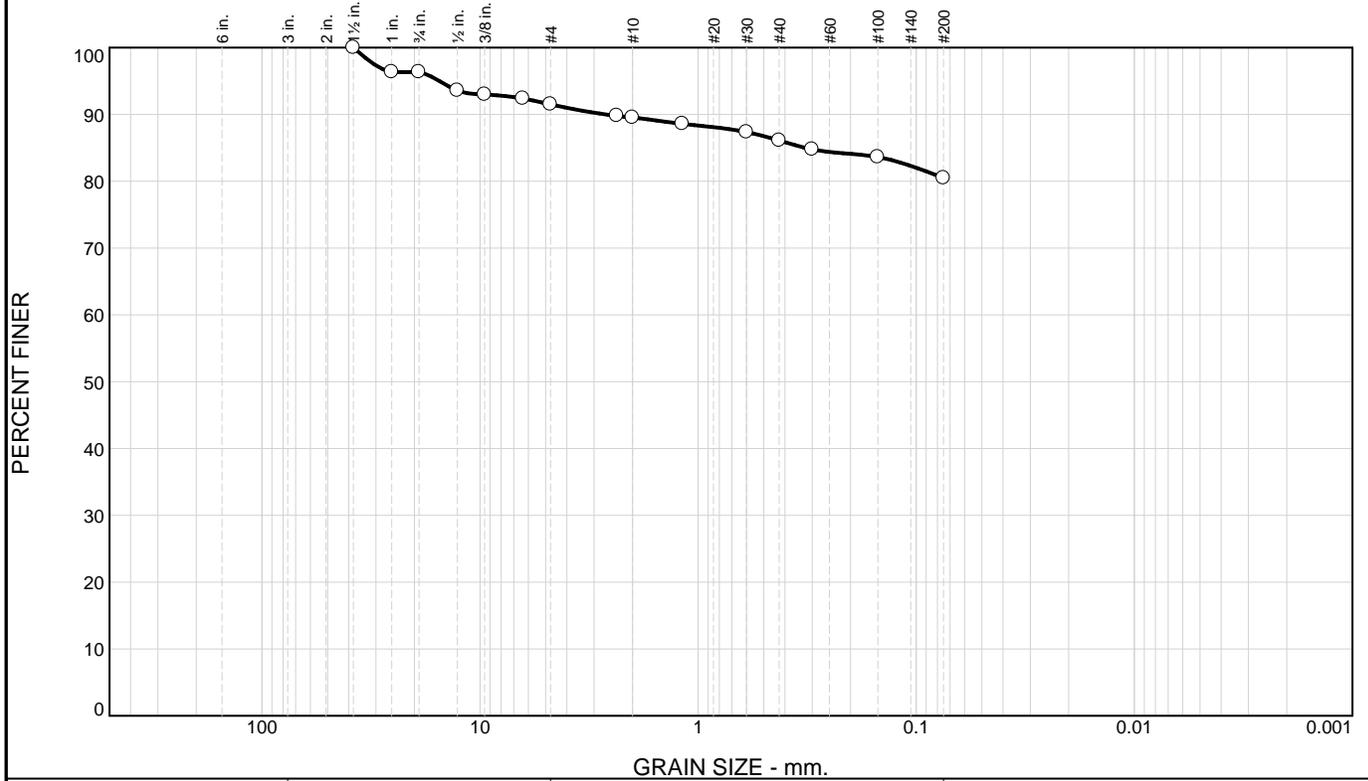
Location: Boring B-11 (23.5-25)
Depth: 23.5 - 25 Feet

Date: 10/08/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.7	4.8	2.0	3.4	5.6	80.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	96.3		
3/4"	96.3		
1/2"	93.6		
3/8"	93.0		
1/4"	92.4		
#4	91.5		
#8	89.8		
#10	89.5		
#16	88.6		
#30	87.3		
#40	86.1		
#50	84.8		
#100	83.6		
#200	80.5		

Material Description

Silt with Sand

PL= NP **Atterberg Limits** LL= 0 PI= NP

D₈₅= 0.3235 **Coefficients** D₆₀= D₅₀=

D₃₀= D₁₅= D₁₀=

C_u= C_c=

USCS= ML **Classification** AASHTO= A-4(0)

Remarks

* (no specification provided)

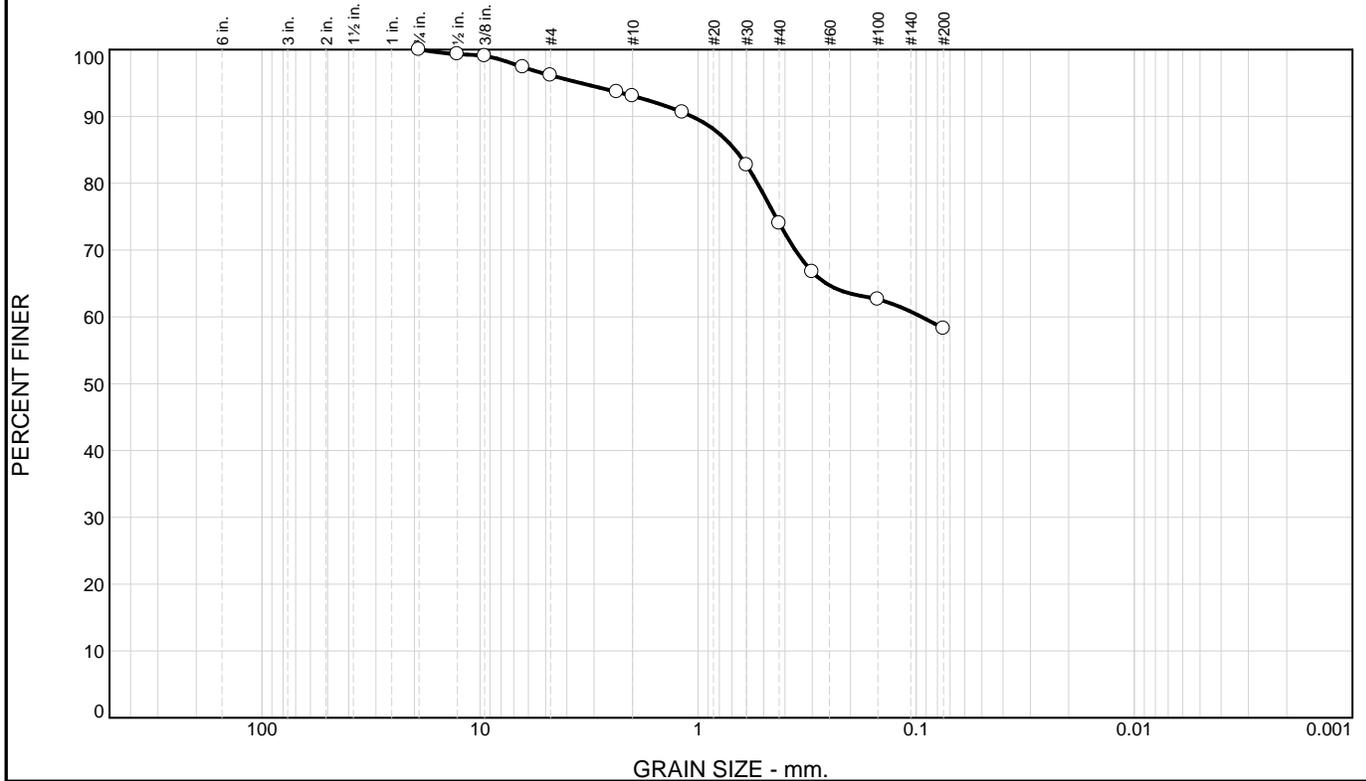
Location: Boring B-11 (28.5-30)
Depth: 28.5 - 30 Feet

Date: 10/08/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.9	3.0	19.1	15.7	58.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	99.3		
3/8"	99.0		
1/4"	97.4		
#4	96.1		
#8	93.7		
#10	93.1		
#16	90.6		
#30	82.7		
#40	74.0		
#50	66.7		
#100	62.6		
#200	58.3		

Material Description

Sandy Silt

PL= NP **Atterberg Limits** LL= 0 PI= NP

D₈₅= 0.6758 **Coefficients** D₆₀= 0.0946 D₅₀=

D₃₀= D₁₅= D₁₀=

C_u= C_c=

USCS= ML **Classification** AASHTO= A-4(0)

Remarks

* (no specification provided)

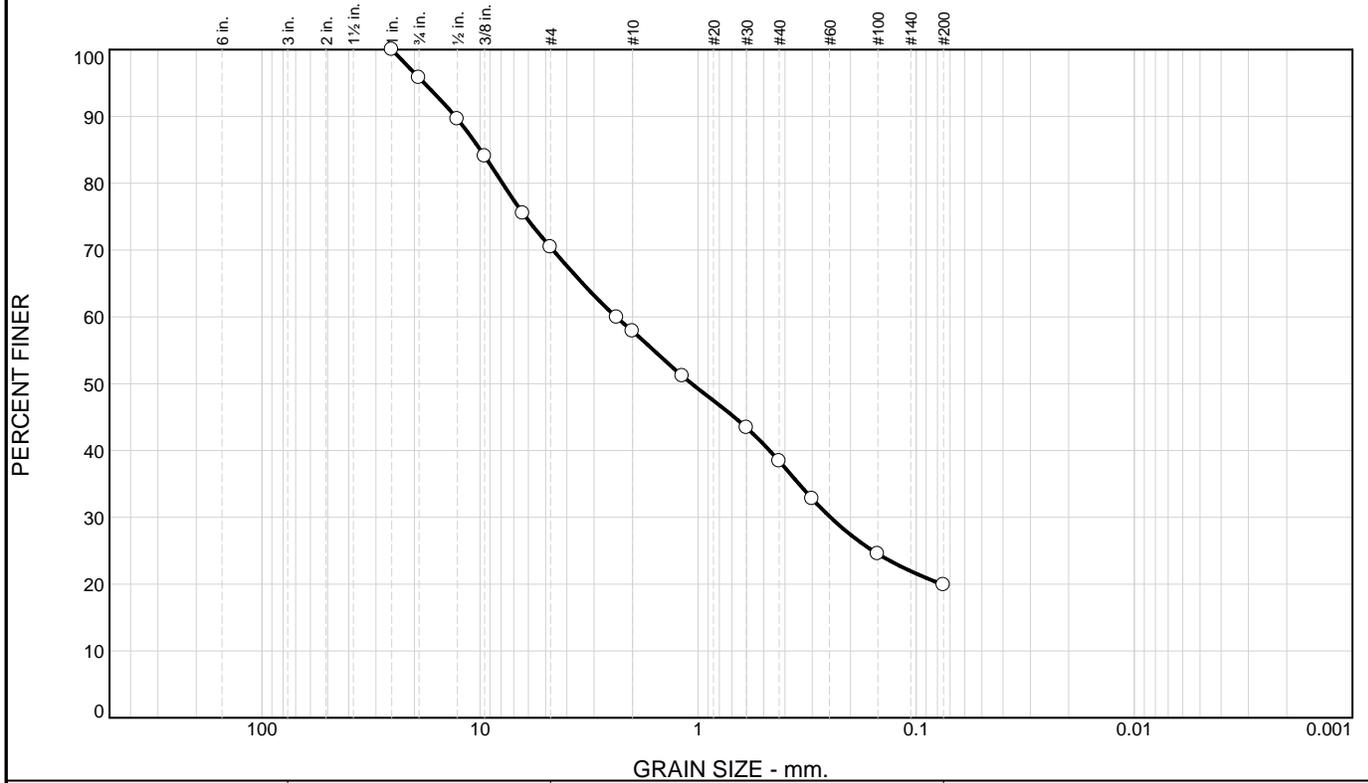
Location: Boring B-11 (33.5-35)
Depth: 33.5 - 35 Feet

Date: 10/08/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.2	25.4	12.5	19.5	18.5	19.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	95.8		
1/2"	89.6		
3/8"	84.1		
1/4"	75.5		
#4	70.4		
#8	59.9		
#10	57.9		
#16	51.1		
#30	43.4		
#40	38.4		
#50	32.8		
#100	24.5		
#200	19.9		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 9.9687 D₆₀= 2.3779 D₅₀= 1.0705
 D₃₀= 0.2474 D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

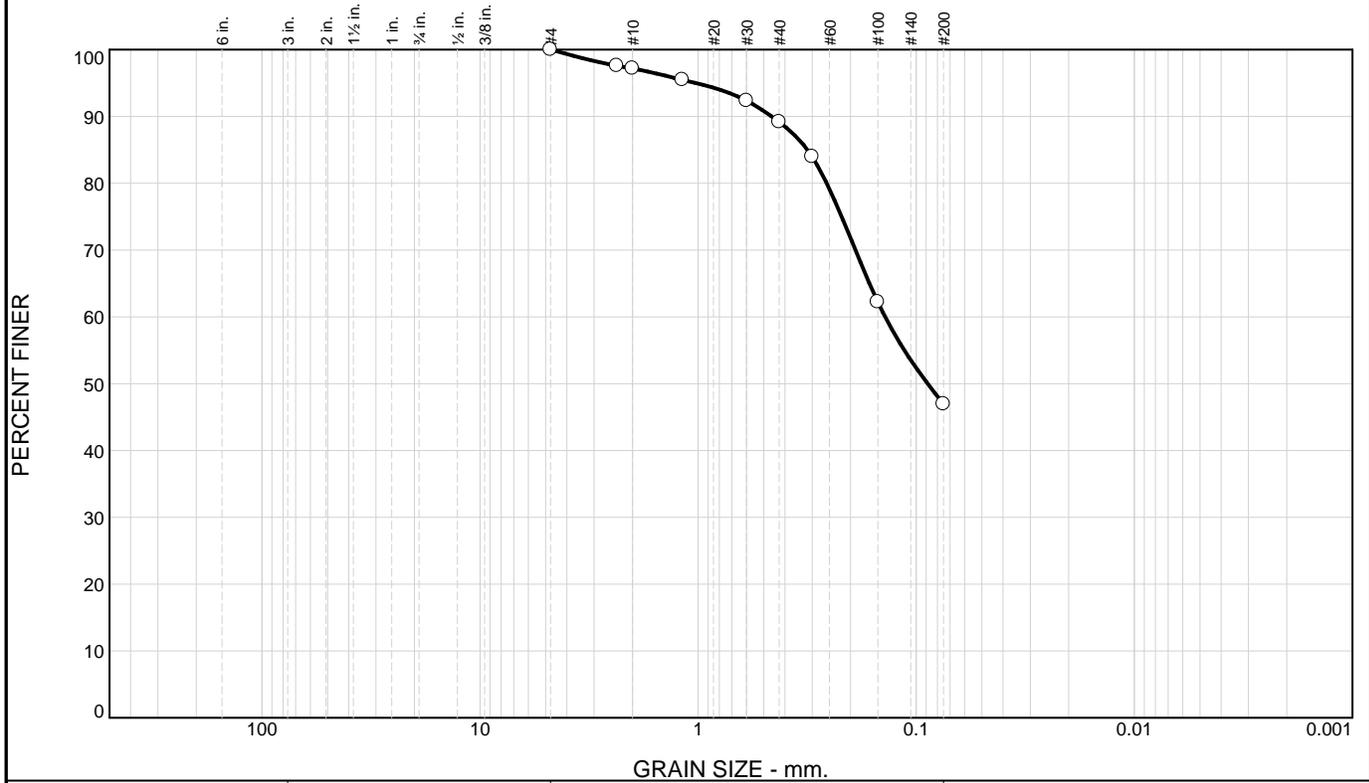
Location: Boring B-12 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	2.8	8.1	42.1	47.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	97.6		
#10	97.2		
#16	95.5		
#30	92.4		
#40	89.1		
#50	84.0		
#100	62.2		
#200	47.0		

Material Description

Silty Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 0.3156 D₆₀= 0.1388 D₅₀= 0.0886
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-4(0)

Remarks

* (no specification provided)

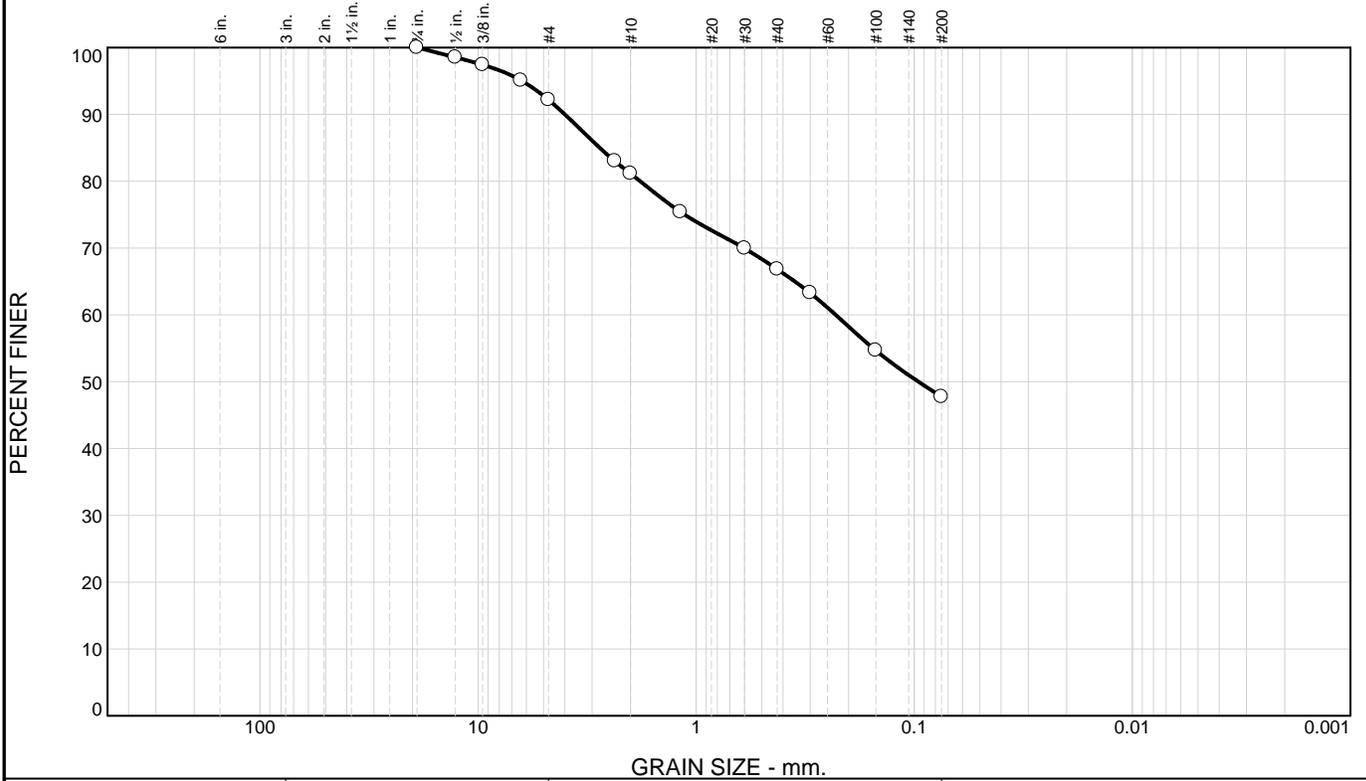
Location: Boring B-12 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.8	11.1	14.3	19.1	47.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	98.5		
3/8"	97.4		
1/4"	95.1		
#4	92.2		
#8	83.0		
#10	81.1		
#16	75.4		
#30	69.9		
#40	66.8		
#50	63.3		
#100	54.7		
#200	47.7		

Material Description

Silty Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 2.7674 D₆₀= 0.2292 D₅₀= 0.0958
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-4(0)

Remarks

* (no specification provided)

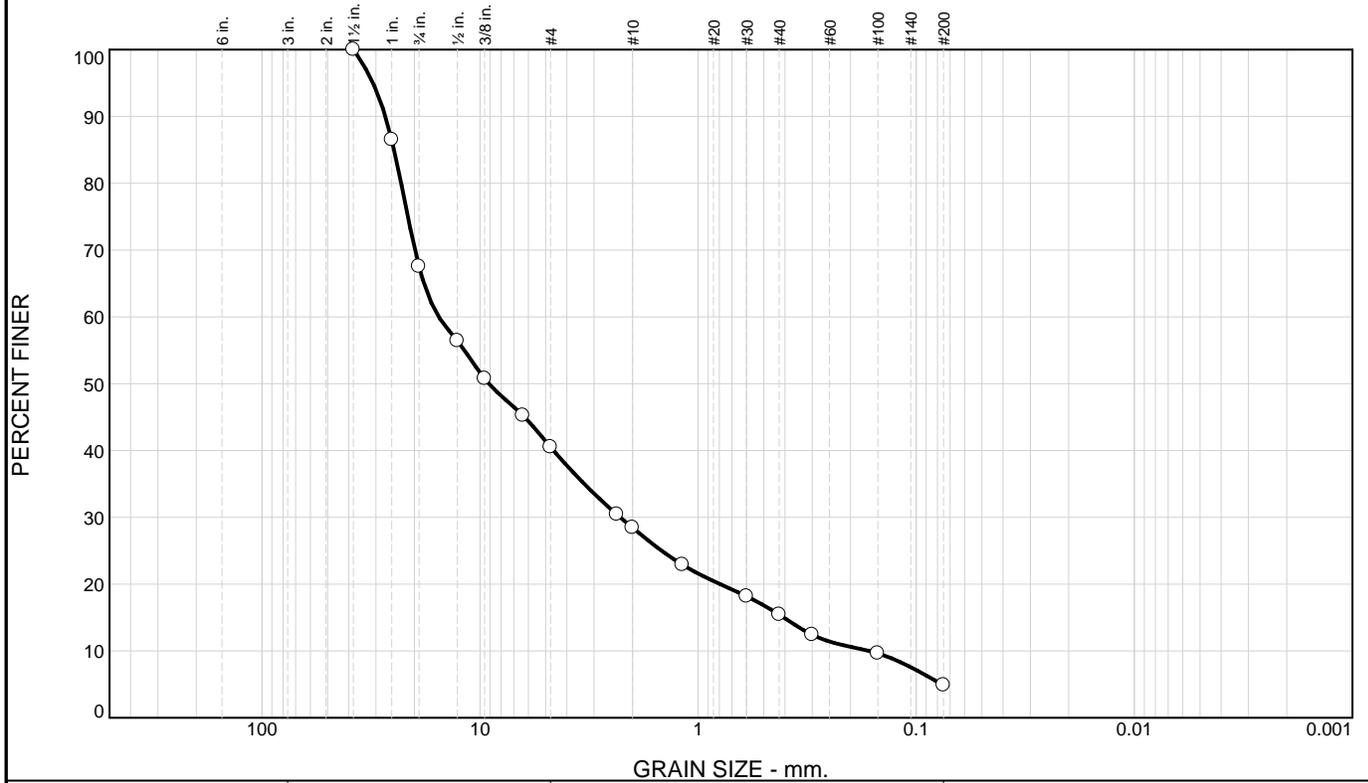
Location: Boring B-12 (23.5-25)
Depth: 23.5 - 25 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	32.5	27.0	12.0	13.1	10.5	4.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	86.5		
3/4"	67.5		
1/2"	56.4		
3/8"	50.7		
1/4"	45.2		
#4	40.5		
#8	30.4		
#10	28.5		
#16	22.9		
#30	18.2		
#40	15.4		
#50	12.4		
#100	9.6		
#200	4.9		

Material Description

Well Graded Gravel with Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 24.7814 D₆₀= 15.4618 D₅₀= 9.1082
 D₃₀= 2.2773 D₁₅= 0.4049 D₁₀= 0.1646
 C_u= 93.93 C_c= 2.04

Classification
 USCS= GW AASHTO= A-1-a

Remarks

* (no specification provided)

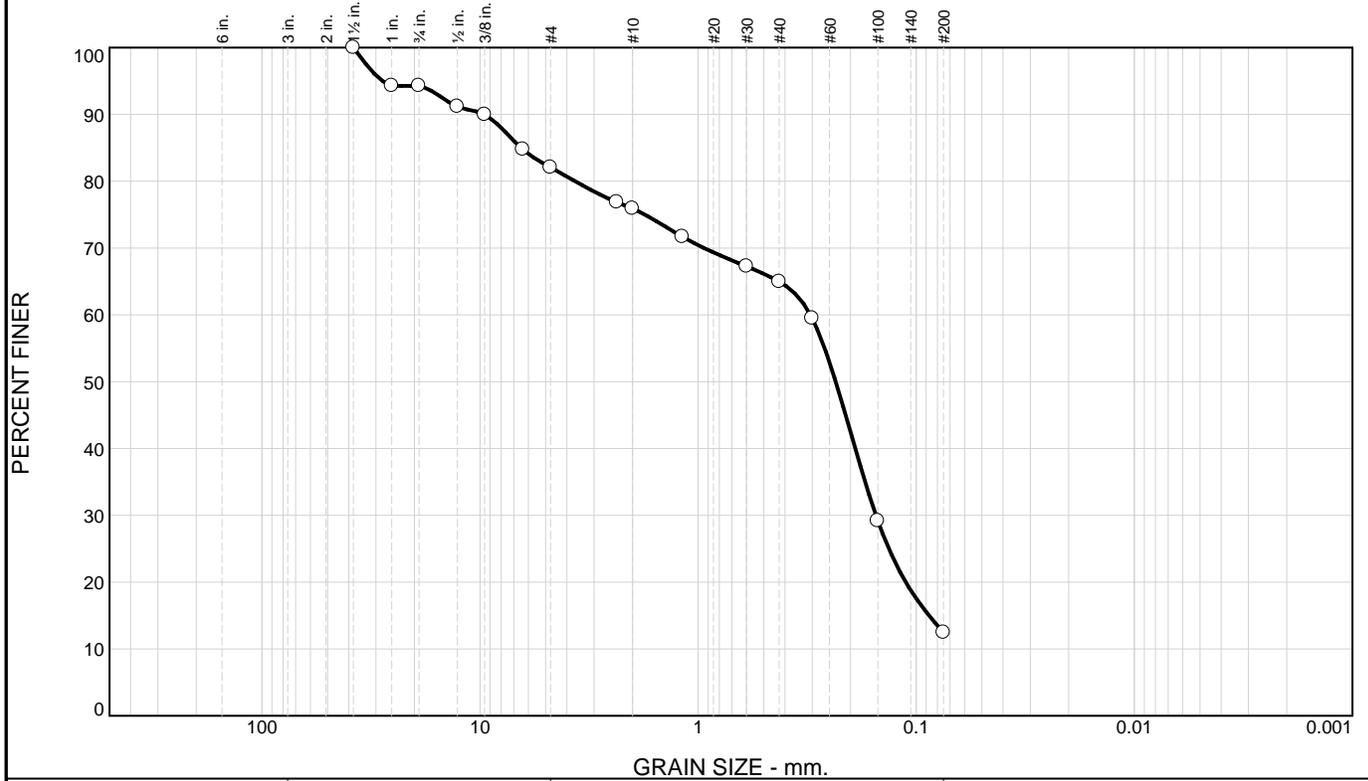
Location: Boring B-15 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/08/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.7	12.2	6.2	10.9	52.5	12.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	94.3		
3/4"	94.3		
1/2"	91.2		
3/8"	90.0		
1/4"	84.7		
#4	82.1		
#8	76.9		
#10	75.9		
#16	71.7		
#30	67.2		
#40	65.0		
#50	59.5		
#100	29.2		
#200	12.5		

Material Description

Silty Sand with Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 6.4820 D₆₀= 0.3057 D₅₀= 0.2341
D₃₀= 0.1531 D₁₅= 0.0873 D₁₀=
C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

* (no specification provided)

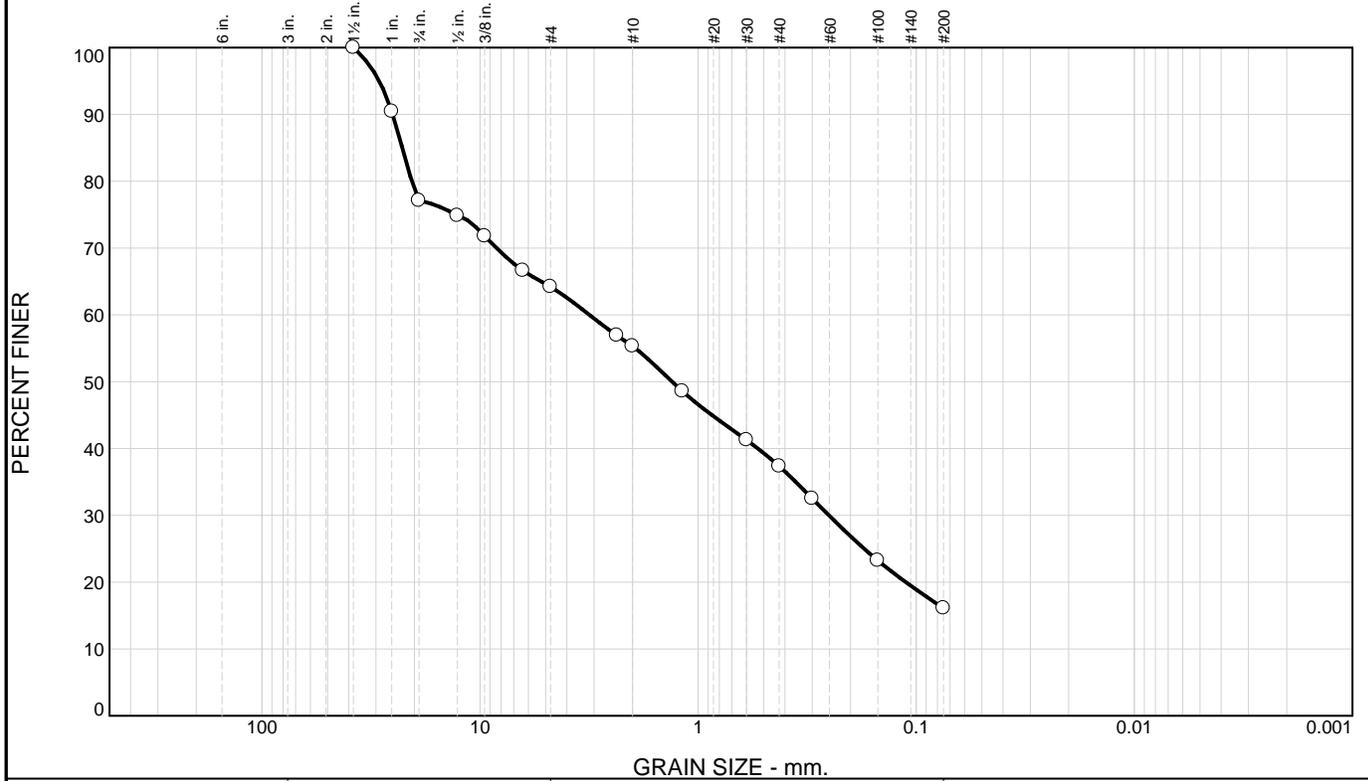
Location: Boring B-15 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/08/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	22.9	12.9	8.9	18.0	21.2	16.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	90.4		
3/4"	77.1		
1/2"	74.8		
3/8"	71.8		
1/4"	66.6		
#4	64.2		
#8	56.9		
#10	55.3		
#16	48.6		
#30	41.3		
#40	37.3		
#50	32.5		
#100	23.2		
#200	16.1		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 22.7339 D₆₀= 3.1534 D₅₀= 1.3172
 D₃₀= 0.2515 D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

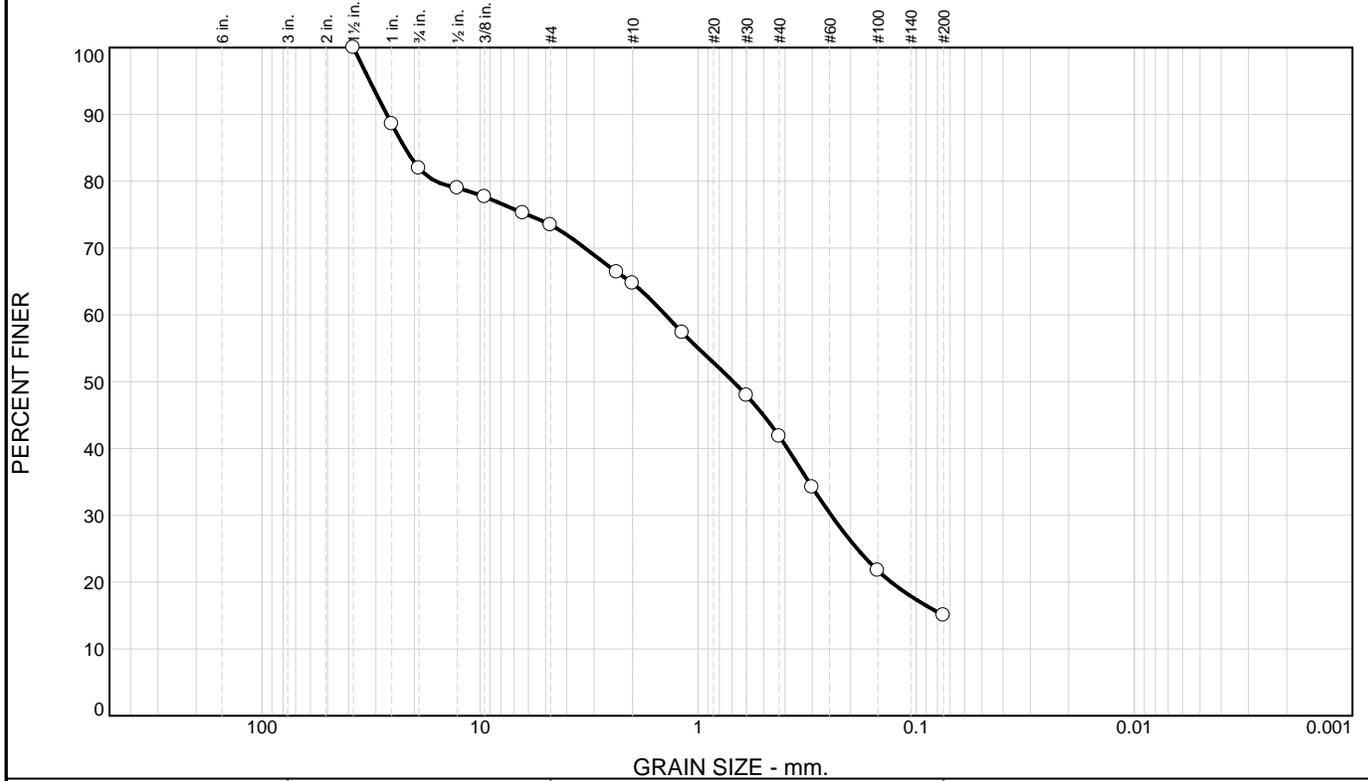
Location: Boring B-16 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/08/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.0	8.5	8.8	22.9	26.8	15.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	88.6		
3/4"	82.0		
1/2"	79.0		
3/8"	77.6		
1/4"	75.2		
#4	73.5		
#8	66.4		
#10	64.7		
#16	57.3		
#30	47.9		
#40	41.8		
#50	34.2		
#100	21.7		
#200	15.0		

Material Description

Silty Sand with Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

D₈₅= 22.1173 **Coefficients** D₆₀= 1.4126 D₅₀= 0.6903

D₃₀= 0.2453 D₁₅= D₁₀=

C_u= C_c=

USCS= SM **Classification** AASHTO= A-1-b

Remarks

* (no specification provided)

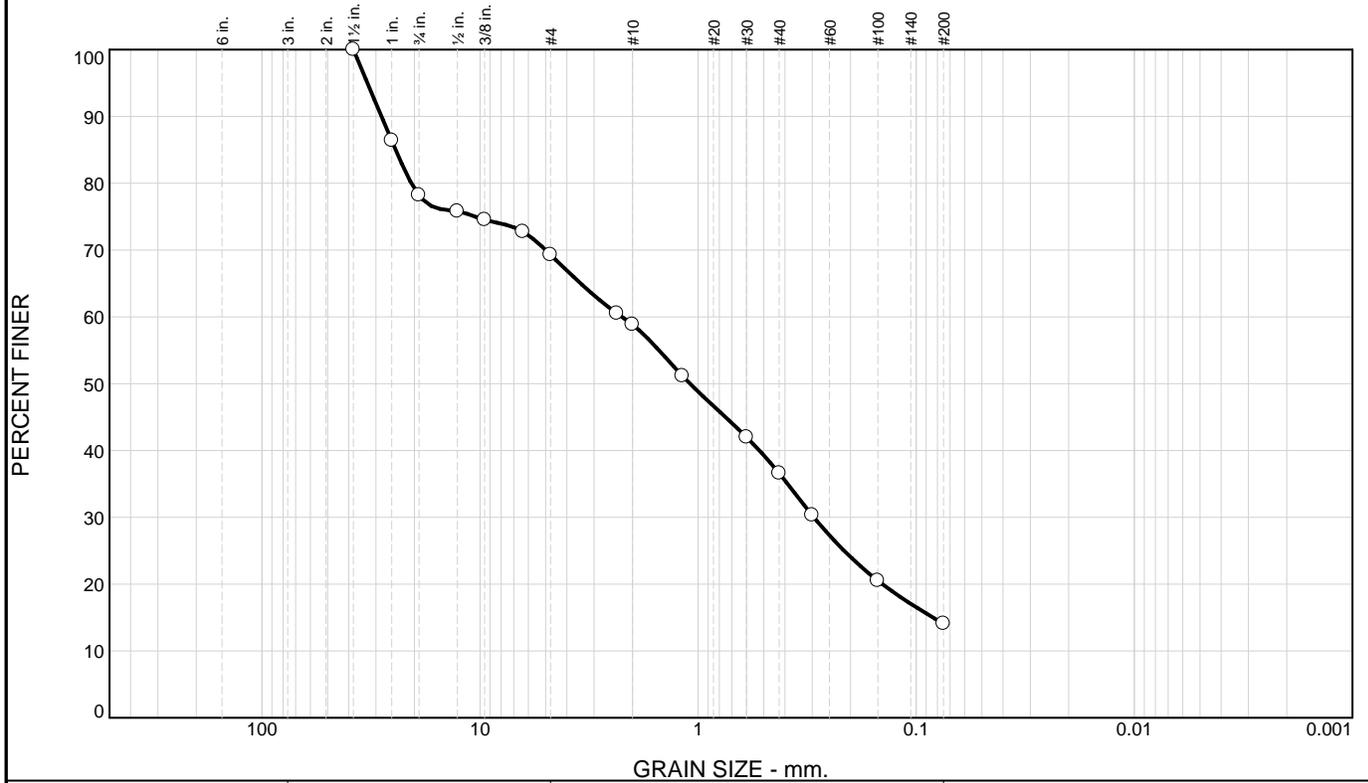
Location: Boring B-16 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.8	8.9	10.5	22.2	22.5	14.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	86.4		
3/4"	78.2		
1/2"	75.8		
3/8"	74.5		
1/4"	72.7		
#4	69.3		
#8	60.5		
#10	58.8		
#16	51.2		
#30	42.0		
#40	36.6		
#50	30.3		
#100	20.5		
#200	14.1		

Material Description

Silty Sand with Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

Coefficients

D₈₅= 24.3761 D₆₀= 2.2380 D₅₀= 1.0898
D₃₀= 0.2948 D₁₅= 0.0837 D₁₀=
C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

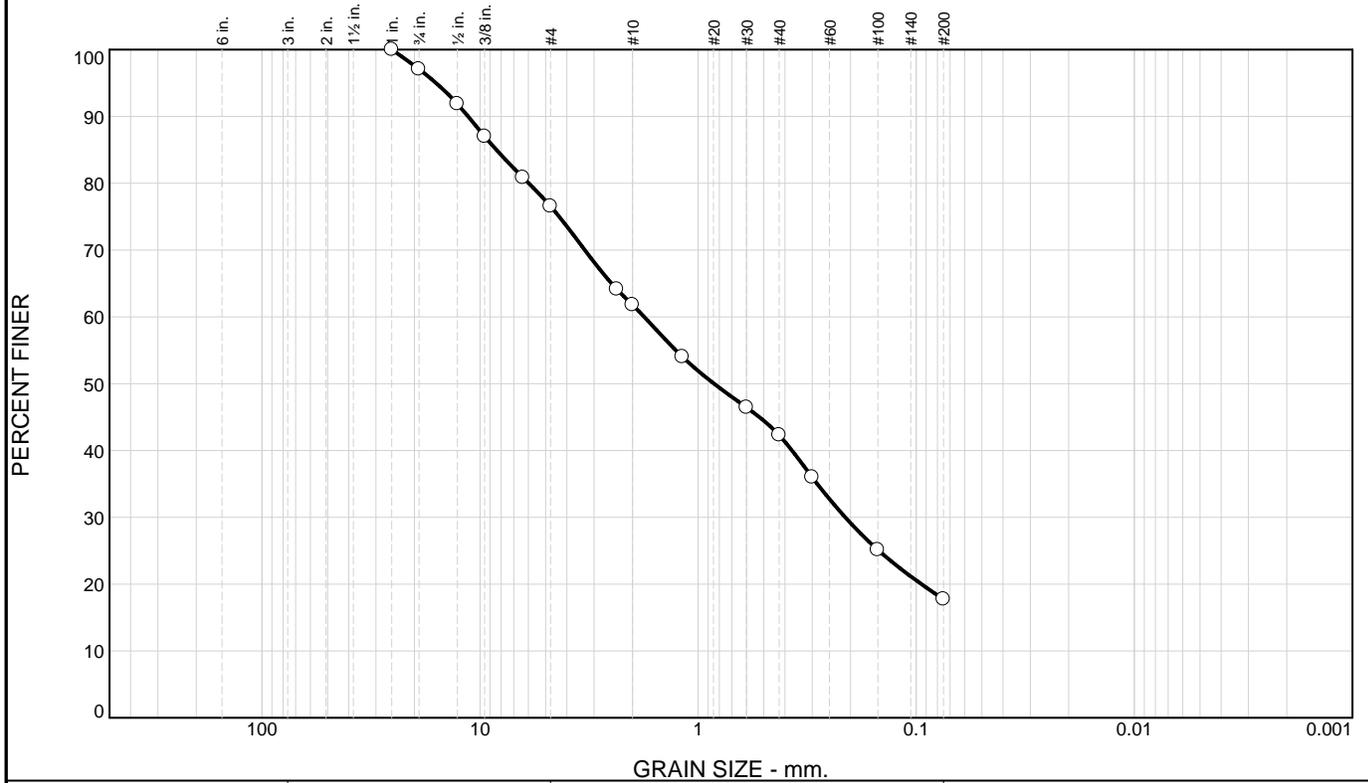
Location: Boring B-16 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.9	20.6	14.7	19.5	24.6	17.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	97.1		
1/2"	91.9		
3/8"	87.0		
1/4"	80.8		
#4	76.5		
#8	64.1		
#10	61.8		
#16	54.0		
#30	46.4		
#40	42.3		
#50	36.0		
#100	25.1		
#200	17.7		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 8.4189 D₆₀= 1.7693 D₅₀= 0.8459
 D₃₀= 0.2116 D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

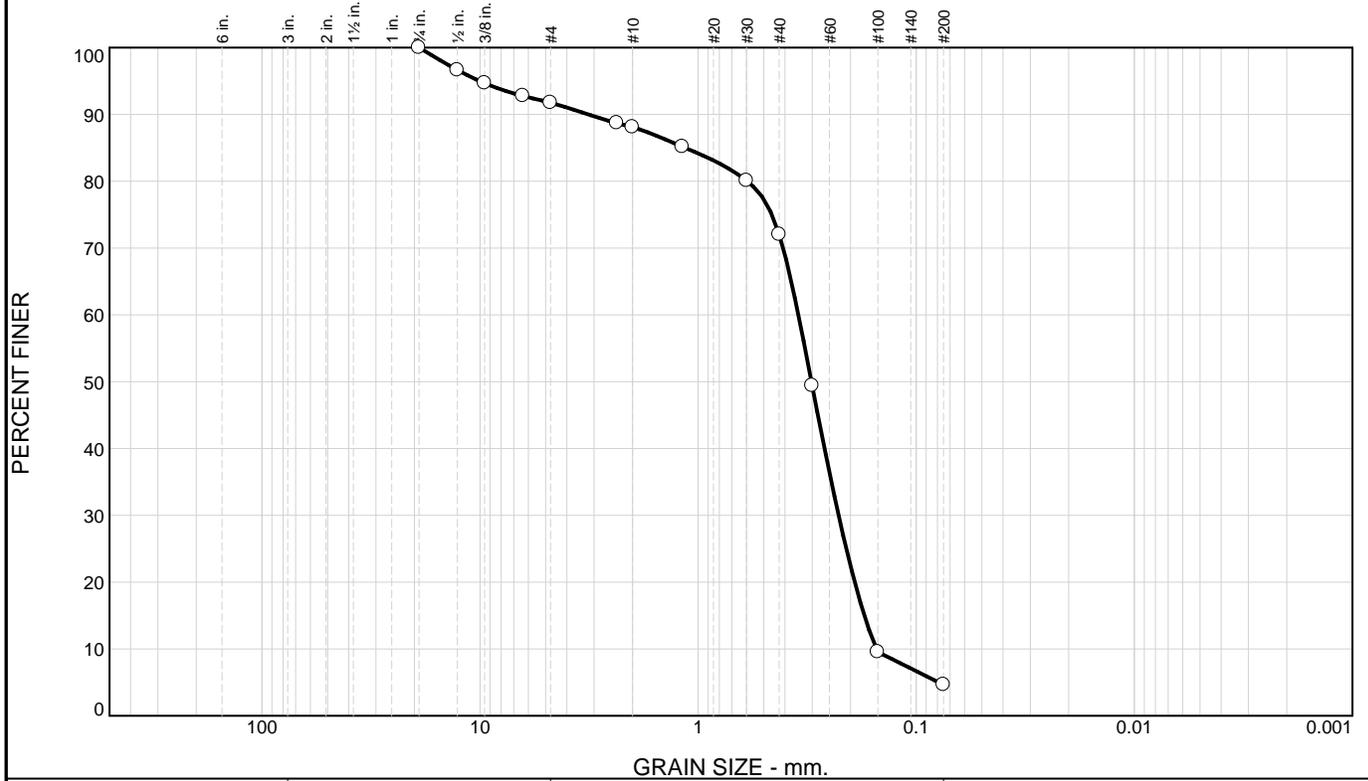
Location: Boring B-17 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.3	3.6	16.1	67.4	4.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	96.6		
3/8"	94.7		
1/4"	92.8		
#4	91.7		
#8	88.7		
#10	88.1		
#16	85.2		
#30	80.1		
#40	72.0		
#50	49.4		
#100	9.5		
#200	4.6		

Material Description

Poorly Graded Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 1.1499 D₆₀= 0.3471 D₅₀= 0.3025
 D₃₀= 0.2269 D₁₅= 0.1729 D₁₀= 0.1522
 C_u= 2.28 C_c= 0.98

Classification
 USCS= SP AASHTO= A-3

Remarks

* (no specification provided)

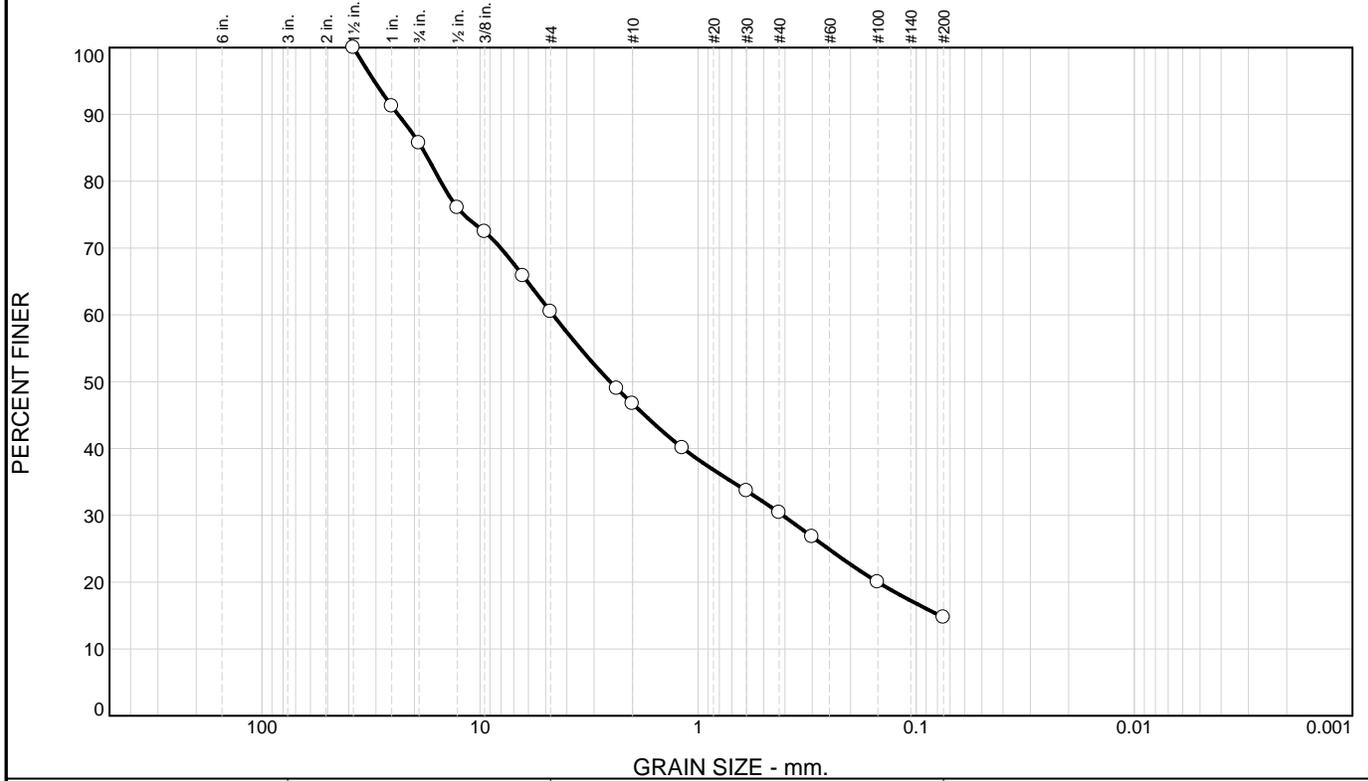
Location: Boring B-18 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.3	25.2	13.8	16.3	15.7	14.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	91.2		
3/4"	85.7		
1/2"	76.0		
3/8"	72.4		
1/4"	65.8		
#4	60.5		
#8	49.0		
#10	46.7		
#16	40.1		
#30	33.7		
#40	30.4		
#50	26.8		
#100	20.0		
#200	14.7		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 18.4710 D₆₀= 4.6245 D₅₀= 2.5321
 D₃₀= 0.4095 D₁₅= 0.0779 D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-a

Remarks

* (no specification provided)

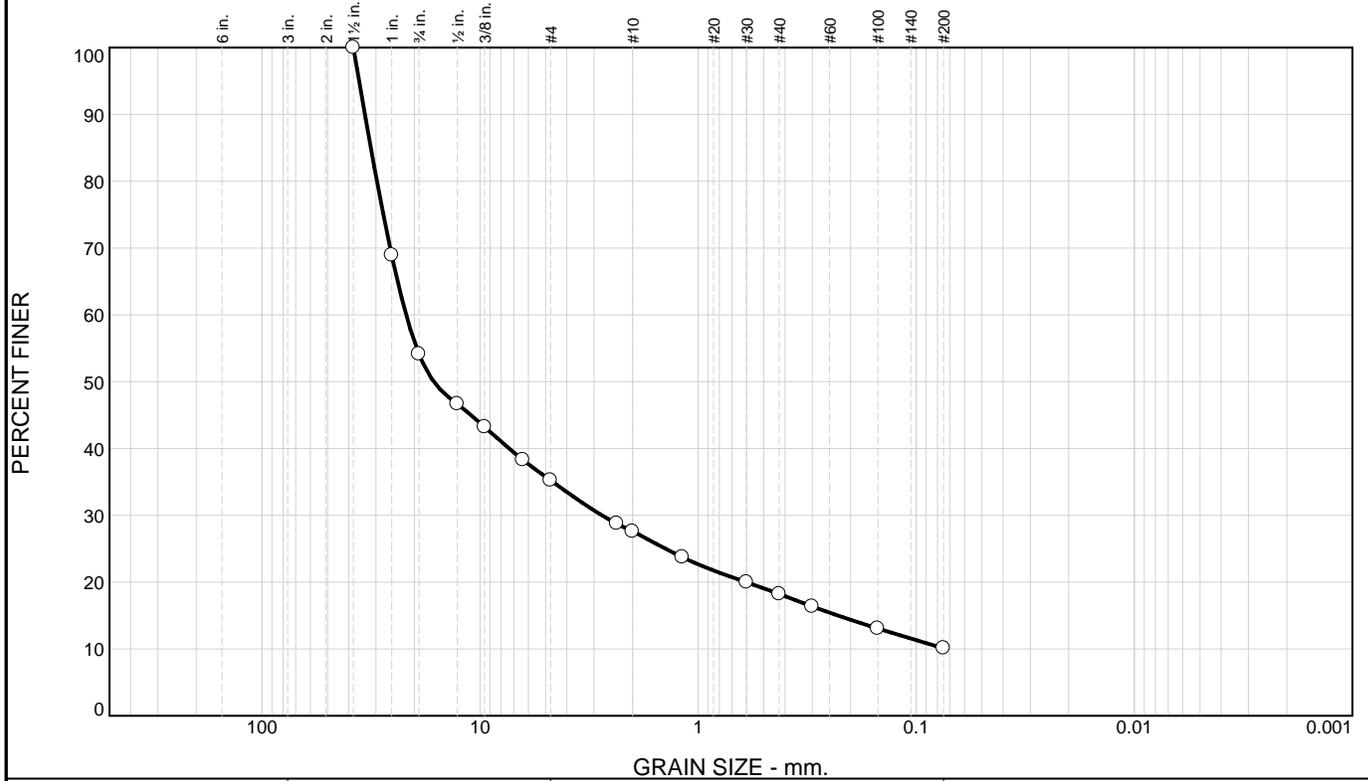
Location: Boring B-18 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	45.9	18.9	7.6	9.4	8.1	10.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	68.9		
3/4"	54.1		
1/2"	46.7		
3/8"	43.2		
1/4"	38.3		
#4	35.2		
#8	28.7		
#10	27.6		
#16	23.7		
#30	20.0		
#40	18.2		
#50	16.4		
#100	13.1		
#200	10.1		

Material Description

Poorly Graded Gravel with Silt and Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 31.6669 D₆₀= 21.8173 D₅₀= 16.3108
 D₃₀= 2.7624 D₁₅= 0.2287 D₁₀=
 C_u= C_c=

Classification
 USCS= GP-GM AASHTO= A-1-a

Remarks

* (no specification provided)

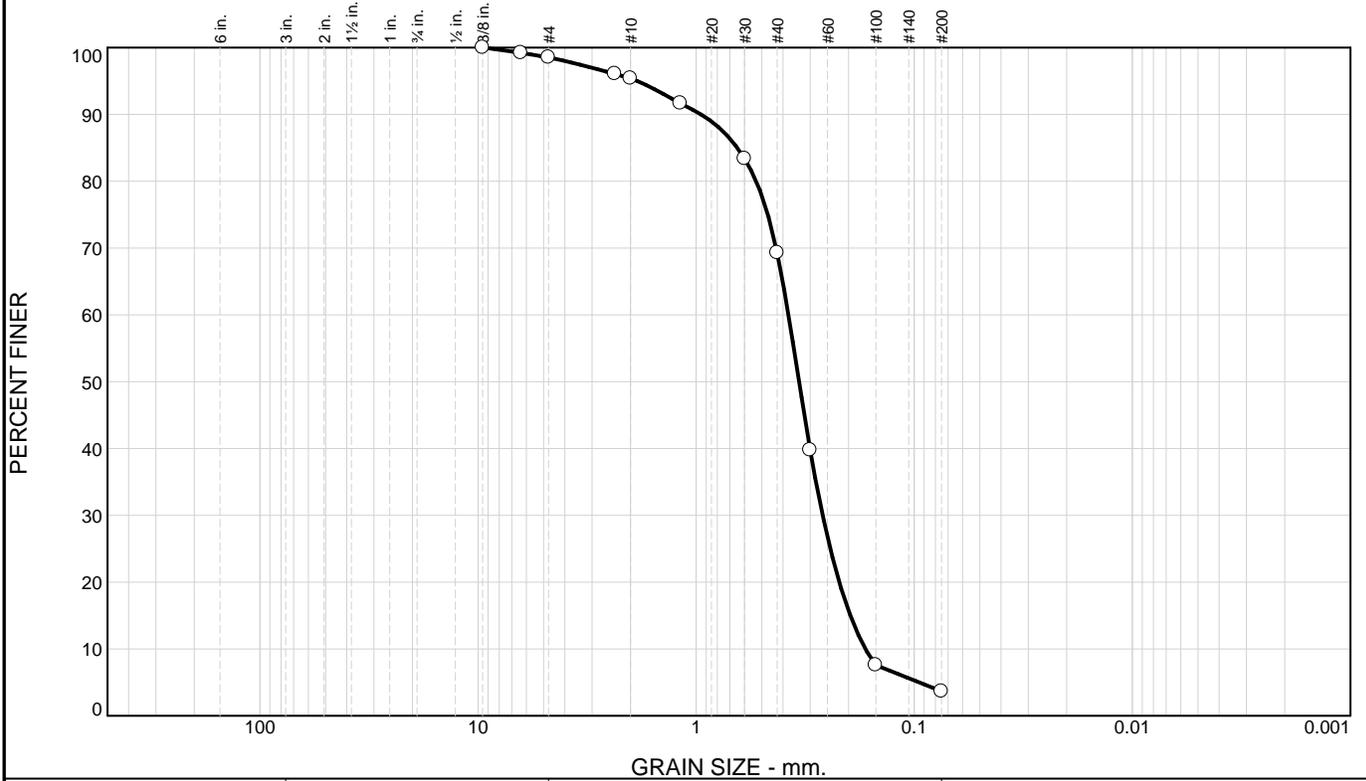
Location: Boring B-18 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	3.1	26.1	65.6	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
1/4"	99.2		
#4	98.5		
#8	96.1		
#10	95.4		
#16	91.7		
#30	83.4		
#40	69.3		
#50	39.8		
#100	7.6		
#200	3.7		

Material Description

Poorly Graded Sand

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 0.6479 D₆₀= 0.3774 D₅₀= 0.3373
 D₃₀= 0.2630 D₁₅= 0.1963 D₁₀= 0.1674
 C_u= 2.25 C_c= 1.09

Classification
 USCS= SP AASHTO= A-3

Remarks

* (no specification provided)

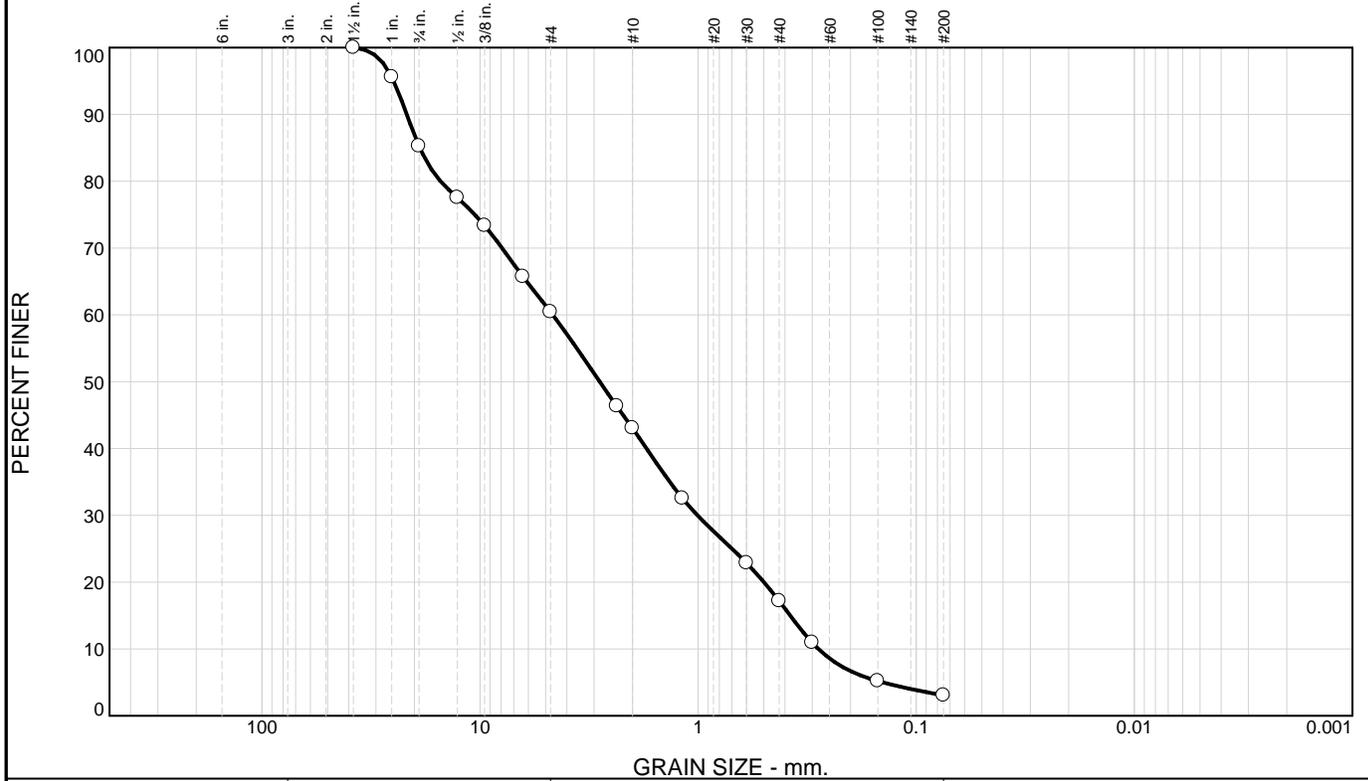
Location: Boring B-19 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/08/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.7	24.9	17.4	25.8	14.1	3.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	95.6		
3/4"	85.3		
1/2"	77.5		
3/8"	73.3		
1/4"	65.7		
#4	60.4		
#8	46.3		
#10	43.0		
#16	32.5		
#30	22.9		
#40	17.2		
#50	10.9		
#100	5.2		
#200	3.1		

Material Description

Poorly Graded Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 18.9000 D₆₀= 4.6417 D₅₀= 2.8260
 D₃₀= 1.0074 D₁₅= 0.3782 D₁₀= 0.2811
 C_u= 16.51 C_c= 0.78

Classification
 USCS= SP AASHTO= A-1-a

Remarks

* (no specification provided)

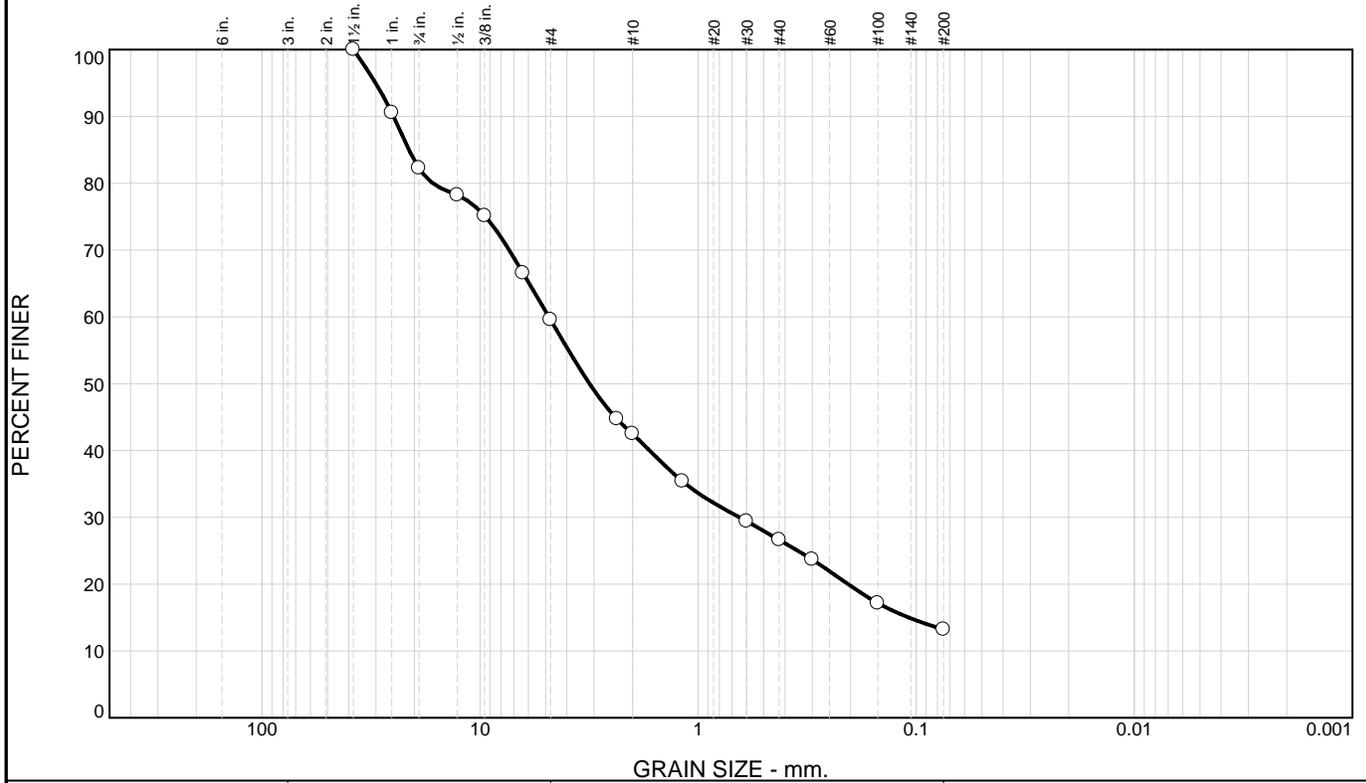
Location: Boring B-19 (8.5-10)
Depth: 8.5 - 10 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE
Figure	

Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.8	22.6	17.1	15.9	13.4	13.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	90.6		
3/4"	82.2		
1/2"	78.2		
3/8"	75.1		
1/4"	66.6		
#4	59.6		
#8	44.7		
#10	42.5		
#16	35.4		
#30	29.4		
#40	26.6		
#50	23.7		
#100	17.2		
#200	13.2		

Material Description

Silty Sand with Gravel

PL= NP **Atterberg Limits** LL= 0 PI= NP

D₈₅= 21.1871 **Coefficients** D₆₀= 4.8355 D₅₀= 3.1481

D₃₀= 0.6467 D₁₅= 0.1082 D₁₀=

C_u= C_c=

USCS= SM **Classification** AASHTO= A-1-a

Remarks

* (no specification provided)

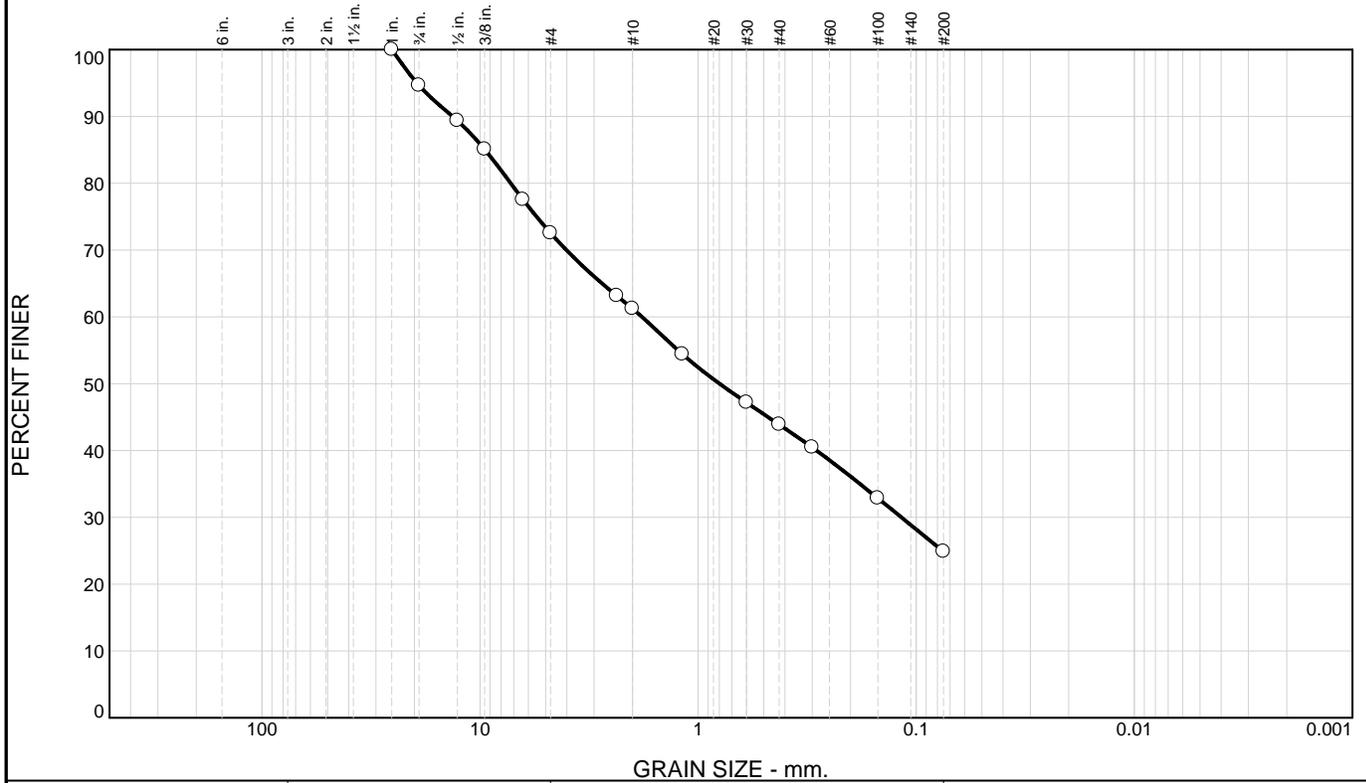
Location: Boring B-19 (13.5-15)
Depth: 13.5 - 15 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.4	22.1	11.3	17.3	19.0	24.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	94.6		
1/2"	89.4		
3/8"	85.1		
1/4"	77.5		
#4	72.5		
#8	63.1		
#10	61.2		
#16	54.4		
#30	47.2		
#40	43.9		
#50	40.5		
#100	32.8		
#200	24.9		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= 0 PI= NP

Coefficients
 D₈₅= 9.4910 D₆₀= 1.8109 D₅₀= 0.7976
 D₃₀= 0.1170 D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

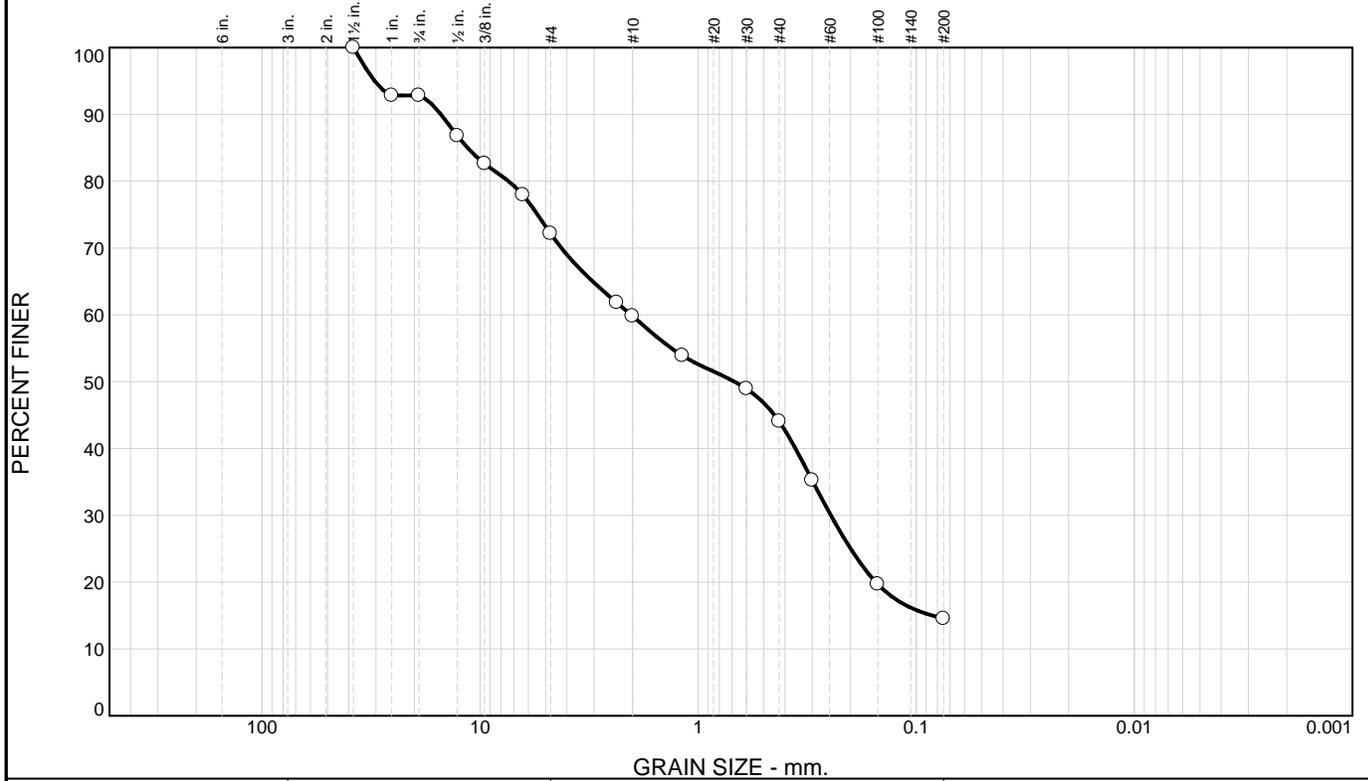
Location: Boring B-19 (18.5-20)
Depth: 18.5 - 20 Feet

Date: 10/08/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.2	20.6	12.4	15.7	29.6	14.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	92.8		
3/4"	92.8		
1/2"	86.8		
3/8"	82.6		
1/4"	77.9		
#4	72.2		
#8	61.8		
#10	59.8		
#16	53.9		
#30	48.9		
#40	44.1		
#50	35.2		
#100	19.7		
#200	14.5		

Material Description

Silty Sand with Gravel

Atterberg Limits
 PL= NP LL= PI=

Coefficients
 D₈₅= 11.4116 D₆₀= 2.0311 D₅₀= 0.6809
 D₃₀= 0.2464 D₁₅= 0.0845 D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks

* (no specification provided)

Location: Boring B-20 (3.5-5)
Depth: 3.5 - 5 Feet

Date: 10/5/07

SOUTHWEST TECHNOLOGIES, INC. Lake Havasu, AZ	Client: Havasu Riviera, LLC Project: The Riviera Lake Havasu City, Arizona Project No: 07L128GE	Figure
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Tested By: LM **Checked By:** WA

LABORATORY TEST REPORT

October 5, 2007
STI Project No.07L128GE

Client: Havasu Riviera, LLC
815 Manhattan Avenue, #D
Manhattan Beach, CA 90266

Attention: Mr. Jim Komick, President

Project: The Riviera
Highway 95 and Sweetwater Road
Lake Havasu City, Arizona

Reviewed By: Mr. Wayne Anderson, PE

RESISTIVITY AND Ph TEST

<u>Sample I.D.</u>	<u>Minimum Resistivity Ohms per cu. Cm.</u>	<u>PH</u>
B-5 (13.5'-15')	933	8.36
B-19 (8.5'-10')	1334	8.58

REMOLDED SWELL TEST

SAMPLE TYPE: Bulk Sample from Boring #5 (13.5'-15')
Bulk Sample from Boring #19 (8.5'-10')

MATERIAL TYPE: Poorly Graded Sand (SP)
Poorly Graded Sand With Gravel (SP)

SAMPLED BY: R. King

TESTED BY: RK/STI

TEST DATE: October 15, 2007

SUMMARY OF TEST RESULTS				
<u>SAMPLE LOCATION</u>	<u>DRY DENSITY</u>	<u>INITIAL MOISTURE CONTENT</u>	<u>SURCHARGE PRESSURE</u>	<u>SWELL UPON SOAKING</u>
Bulk Sample B-5(13.5'-15')	110.3pcf	6.5%	60psf	.04%
Bulk Sample B-19(8.5'-10')	103.0pcf	6.5%	60psf	.05%

REMOLDED SWELL TEST

The Riviera
Highway 95 and Sweetwater Road
Lake Havasu City, Arizona
STI Project No. 07L128GE



Collape Potential of Soils

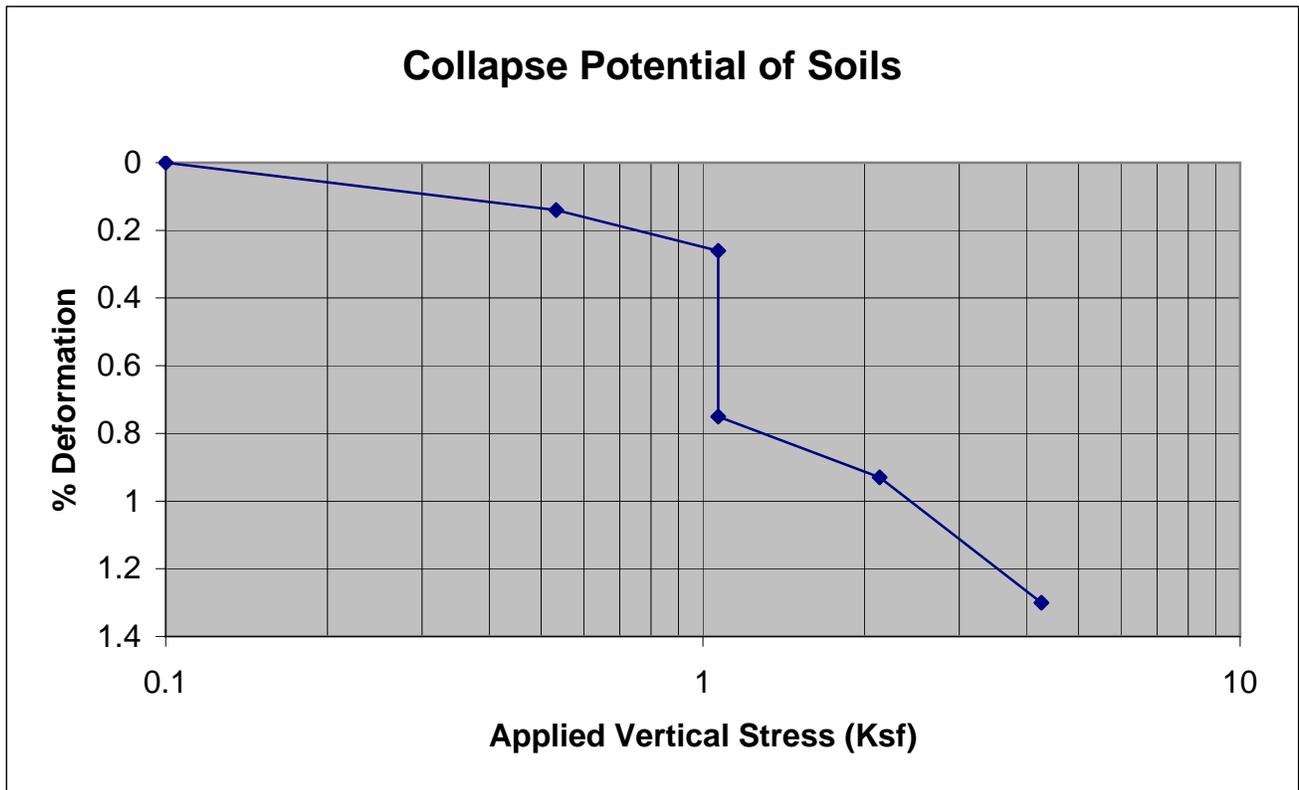
Client: <u>Havasu Riviera, LLC</u>	Project No.: <u>07L128GE</u>
Project: <u>The Riviera</u>	Lab No.: _____
Location: <u>Highway 95</u>	Date Received: <u>9/26/07</u>
<u>Lake Havasu City, Arizona</u>	Test Dates: <u>10/15/07</u>
Material: <u>Poorly Graded Sand (SP)</u>	
Material Source: <u>Boring #5 (13.5'-15')</u>	
Sampled By: <u>RK/STI</u>	
Sample Date: <u>9/26/2007</u>	
Submitted By: <u>RK/STI</u>	

Sample Data

Wet Unit Weight (pcf): **116.9**
 Moisture Content: **0.5%**
 Dry Unit Weight (pcf): **116.3**

Sample Information:

Diameter (in): 2.414
 Height (in): 1
 Weight of Soil (g): 140





Collape Potential of Soils

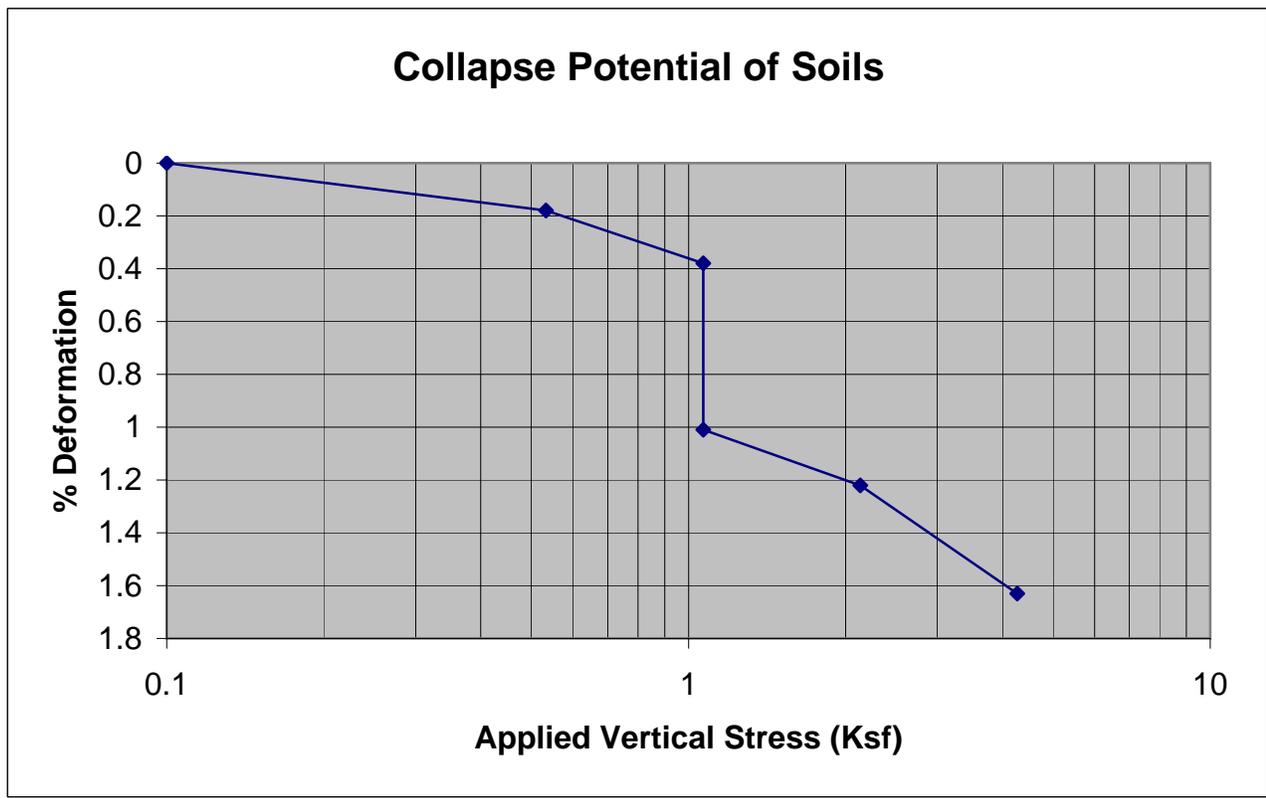
Client: <u>Havasu Riviera, LLC</u>	Project No.: <u>07L128GE</u>
Project: <u>The Riviera</u>	Lab No.: _____
Location: <u>Highway 95</u>	Date Received: <u>10/2/07</u>
<u>Lake Havasu City, Arizona</u>	Test Dates: <u>10/15/07</u>
Material: <u>Poorly Graded Sand (SP)</u>	
Material Source: <u>Boring #19 (8.5'-10')</u>	
Sampled By: <u>RK/STI</u>	
Sample Date: <u>10/2/2007</u>	
Submitted By: <u>RK/STI</u>	

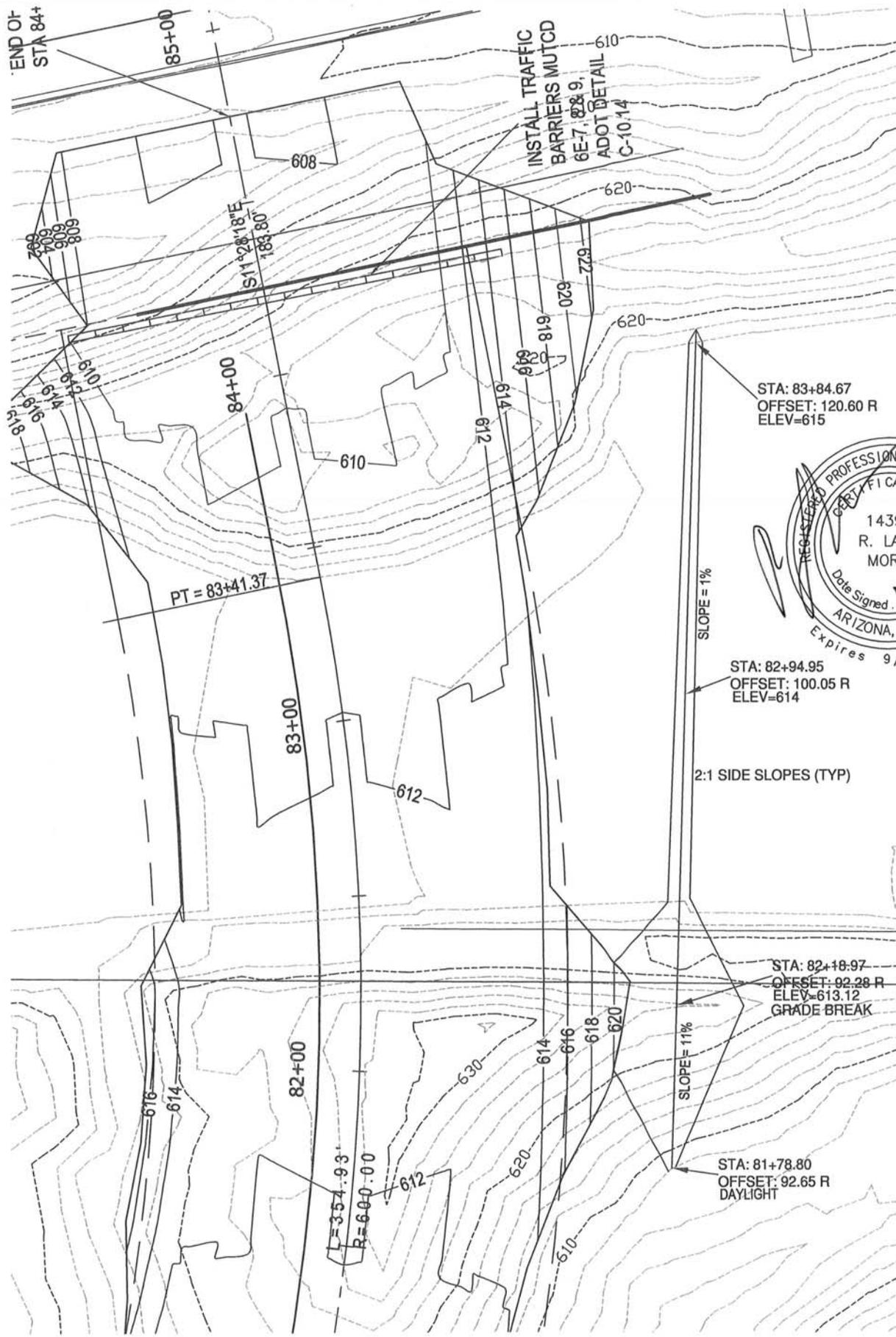
Sample Data

Wet Unit Weight (pcf): **109.6**
 Moisture Content: **0.5%**
 Dry Unit Weight (pcf): **109.0**

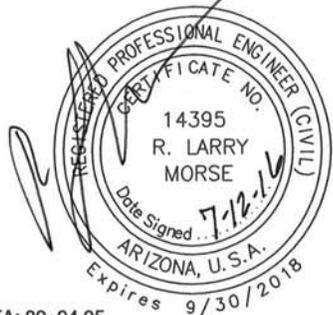
Sample Information:

Diameter (in): 2.414
 Height (in): 1
 Weight of Soil (g): 140





SCALE:
1"=40'



STA: 83+84.67
OFFSET: 120.60 R
ELEV=615

STA: 82+94.95
OFFSET: 100.05 R
ELEV=614

2:1 SIDE SLOPES (TYP)

STA: 82+18.97
OFFSET: 02.28 R
ELEV=613.12
GRADE BREAK

STA: 81+78.80
OFFSET: 92.65 R
DAYLIGHT

HAVASU 280
MARINA/RIVIERA ACCESS
ADDENDUM 1, DRAINAGE DITCH ADDITION

ARQ ENGINEERING LLC
Engineering and Survey
4440 HIGHWAY 95, SUITE A
FORT MOHAVE, ARIZONA 86429
PHONE: (928) 758-3333
FAX: (928) 758-8654