

**ROADWAY
and
FOUNDATION
GEOTECHNICAL DESIGN REPORT
Ehrenberg Port of Entry
TRACS No. 010 LA 003 H6161 01C
Federal Aid No. IM-010-A(221)T**

**Prepared by:
Geotechnical Section
Materials Group
Arizona Department of Transportation**

July 24, 2014



206 S. 17th Ave.
Phoenix, AZ 85007
July 22, 2014

Subject:
Geotechnical Report
Ehrenberg Port of Entry
010 LA 003 H6161 01C

This report presents geotechnical recommendations for the Ehrenberg Port of Entry project. The project is located on Interstate 10 approximately 3 miles East of the Arizona/California border in La Paz County within the Yuma Construction District.

The geotechnical field investigations for the Ehrenberg Port of Entry have been conducted in two programs. The first program was completed in 2004 under seal of James Wilson, P.E. and is included in Appendix B. A second geotechnical field investigation program to confirm these recommendation was necessary due to building location and scope changes in the project. The results of the geotechnical investigation as well as design recommendations for the foundations and roadway approaches are presented in this report.

Should there be any questions regarding the contents of this report or its appropriate incorporation into designs, please do not hesitate to contact us.

Sincerely,



Brent M. Conner, P.E.
Geotechnical Planning Engineer

Reviewed by:

Jiann-Jong Liu, P.E.
Geotechnical Section Manager

TABLE OF CONTENTS

1.0	INTRODUCTION/SCOPE	1
2.0	REGIONAL SETTING	1
2.1.	Physiographic and Geologic Setting.....	1
2.2.	Seismicity	2
3.0	GEOTECHNICAL INVESTIGATION	2
3.1.	Field Investigation	2
3.2.	Laboratory Investigation	3
4.0	SITE CONDITIONS	3
4.1.	Topographic and Surface Conditions	3
4.2.	Subsurface Conditions	5
4.2.1.	Test Pit Locations (Roadway).....	5
4.2.2.	Borings (Structure).....	5
4.2.3.	Groundwater	5
5.0	ROADWAY RECOMMENDATIONS.....	5
5.1.	Pavement Design Information	5
5.2.	Roadway Excavation and Embankments	6
5.3.	Slopes and Earthwork Factors.....	6
5.4.	Pipe Design Information	6
5.5.	Water Requirements.....	6
5.6.	Borrow Information	7
5.7.	Aggregate Availability, Weight and Hauls.....	7
6.0	STRUCTURE RECOMMENDATIONS.....	7
6.1.	General.....	7
6.2.	Structural Excavation	7
6.3.	Material Properties	8
6.4.	Foundation Analysis	8
7.0	BORING AND TEST PIT LOG LIMITATIONS	8
8.0	REFERENCES	9

TABLES

Table 1. Test Methods Applied to Representative Soil Samples 3
Table 2. Slopes and Earthwork Factors 6
Table 3. Soil pH and Minimum Resistivity Results 6
Table 4. Recommended Soil Properties 8

APPENDICES

APPENDIX A – AECOM Data Report
APPENDIX B – ADOT Geotechnical Report 04-29
Dated August 31, 2004
APPENDIX C – Method Specification for Compaction of Native Soils

1.0 INTRODUCTION/SCOPE

This report presents geotechnical recommendations for the Ehrenberg Port of Entry project. The project is located on Interstate 10 in La Paz County approximately 3 miles East of the Arizona/California border in the Yuma District.

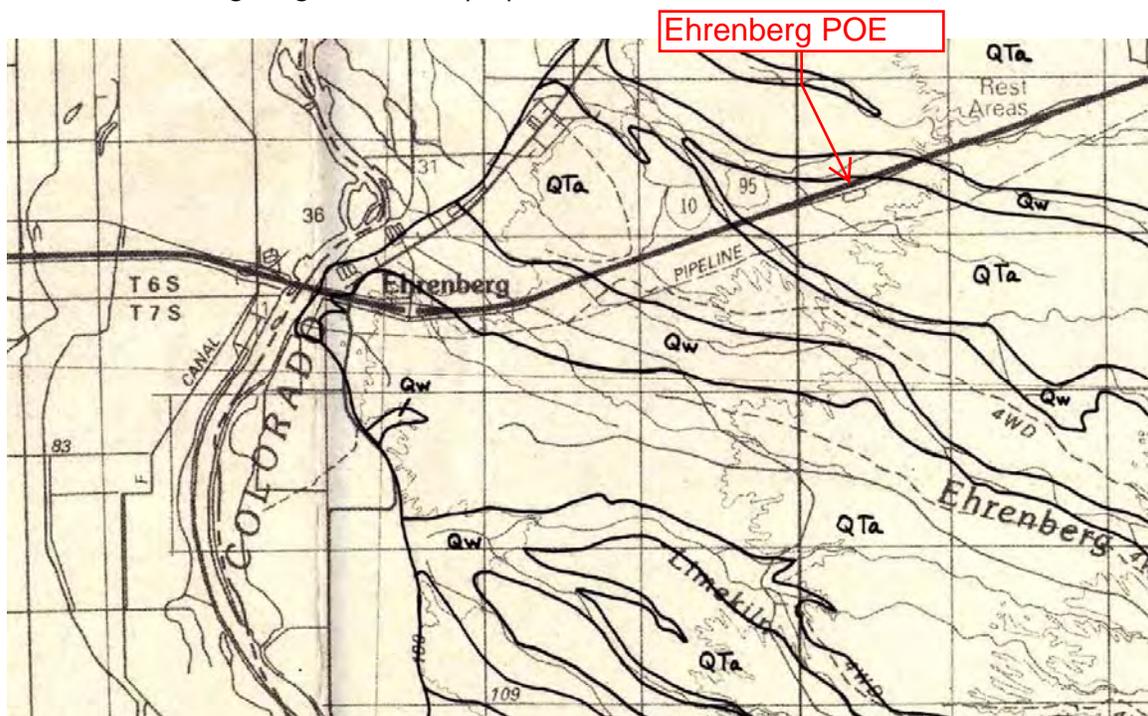
The proposed construction consists of a two-story inspection building, truck scale, water storage tanks, earth retaining walls, and approximately 22,000 SY of PCCP. The new construction is situated on a hill overlooking the existing port of entry facilities.

A large earthmoving operation will be the key component in the project's long-term performance. The native deposits will be difficult to test for in-place density due to the high percentage of coarse gravel particles. A method specification to assure adequate compaction of native site soils has been developed as part of this report.

2.0 REGIONAL SETTING

2.1. Physiographic and Geologic Setting

The project site is located on a deep alluvial fan (QTa) where deposits from the nearby Dome Rock Mountains have been transported via washes toward the Colorado River. The alluvial fan is reported by Tosdal (1989) to date from the middle Pleistocene to Latest Pliocene geologic period. Tosdal (1989) reports that the "Alluvial fan deposits consist of angular, poorly sorted gravel and sand derived from local mountains". The geologic map below from the US Geologic Service details the geologic unit at the proposed construction:



The alluvial deposits originate from the nearby Dome Rock Mountains. The Dome Rock Mountains are described by Tosdal (1989): “Volcanic rocks of the Dome Rock sequence are composed of Rhyolitic to Dacitic deposits, commonly referred to as Quartz Prophyry. They are foliated and metamorphosed to Green Schist and Lower Amphibolite Facies.”

The geotechnical investigation confirms the geologic mapping descriptions by Tosdal (1989). The project native soils consist of angular gravel and sand composed of Schist and Amphibolite.

2.2. Seismicity

AASHTO (2010) requires a seismic analysis based on earthquake ground motions that have a seven percent probability of exceedance in 75 years (Approximate 1000-Year Return Period). Based on the Site Class Definitions in Table 3.10.3.1-1 of AASHTO (2010), the project location is considered Site Class D. Using the program “Seismic Design Parameters” version 2.01 (USGS, 2008), the following parameters were derived:

- Horizontal Peak Ground Acceleration Coefficient (PGA) = 0.099g
- Horizontal Response Spectral Acceleration Coefficient at 0.2-sec return period (S_s) = 0.224g.
- Horizontal Response Spectral Acceleration Coefficient at 1.0-sec return period (S_1) = 0.136g.

The Horizontal Peak Ground Acceleration Coefficient modified by the short period site factor = $A_s = 0.158g$, the Horizontal Response Spectral Acceleration Coefficient at 0.2-sec return period modified by the short term site factor = $S_{D5} = 0.358g$, and the Horizontal Response Spectral Acceleration Coefficient at 1.0-sec return period modified by the long term site factor = $S_{D1} = 0.308g$. Since S_{D1} is greater than 0.25 but less than 0.40, the site is classified as Seismic Hazard Zone III. The site requires an analysis for liquefaction. The groundwater table is deeper than 50 feet below the existing ground surface including considerations for seasonal, historic and possible future rises in groundwater elevation. The project foundations are not susceptible to liquefaction.

3.0 GEOTECHNICAL INVESTIGATION

3.1. Field Investigation

The 2014 field investigation consisted of 5 test pits, 6 borings for the inspection building, and 4 borings for the earth retaining walls.. The layout is included in Appendix A. More specifically, the investigation consisted of the following:

- Five (5) test pits were excavated along the proposed alignment to determine pavement subgrade support values, corrosion potential, and excavation characteristics. Test pits were excavated to 5.0 feet.. The materials encountered were logged by ADOT extensions of staff hired through the Engineering Consultant Section. Bulk samples were obtained and field moisture was measured at selected locations. The test pit (subgrade) logs are presented in Appendix A, and present material descriptions based on field classifications.

- Six (6) boreholes were drilled to a depth of 20 feet below existing ground surface elevation to define the subsurface properties at the proposed inspection station building. Bore holes were logged by consultant extension of staff, AECOM. The logs are included as part of Appendix A.
- Four (4) drill borings were drilled to a depth of 15 feet below existing ground surface to define the subsurface properties at the proposed earth retaining walls. Bore holes were logged by consultant extension of staff, AECOM. The logs are included as part of Appendix A

3.2. Laboratory Investigation

Soil and rock samples obtained from the test pits were transported to AMRL accredited laboratories.

Select samples were tested in general conformance with the procedures listed in Table 1.

Table 1: Test Methods Applied to Representative Soil and Rock Samples

Geotechnical Test	Test Procedure
Sieve (Grain Size) Analysis	ARIZ 201c
Atterberg Limits (Plasticity)	AASHTO T 89 and T 90
R-Value (Subgrade Support)	AASHTO T 190
Moisture Content of Soils	AASHTO T265
Maximum Density and Optimum Moisture of Soils	ARIZ 225a
pH and Minimum Resistivity of Soils	ARIZ 236b
Sulfate and Chloride in Soils	ARIZ 736a and 733a

A summary of all laboratory test results is presented in Appendix A.

4.0 SITE CONDITIONS

4.1. Topographic and Surface Conditions

The location of the inspection building, truck scales, and water storage tanks is located on the hill south and overlooking the existing inspection station building. Elevation difference between the proposed new buildings and the existing building is approximately 10-15 feet. A earth retaining wall is planned on the North edge of the project to provide pavement support and stabilization of the slope. The terrain at the proposed building site has deeply incised erosional channels as shown in the photos below:



The photo above is located near one of the Inspection Building boring locations. Note the erosional channel present at the site of the building.

The photo below is located South of the proposed building site looking toward the existing Port of Entry facilities. A large erosional channel bisects the proposed building pad.



4.2. Subsurface Conditions

4.2.1. Test Pit Locations (Roadway)

All test pits excavated to determine subgrade support information were excavated to a depth of five feet below ground surface. Native site soils consisted of silty sands, gravels and cobbles with no to low plasticity. Detailed descriptions and test results for materials obtained from the test pits are presented in Appendix A.

4.2.2. Borings (Structure)

Six (6) borings were advanced to a depth of 20 feet below ground surface elevation in order to obtain soil properties for design of the Inspection Building and associated structural foundations.

Four (4) borings were advanced to a depth of 15 feet below ground surface elevation in order to obtain soil properties for design of the earth retaining wall. The elevation difference between the existing inspection station and the proposed inspection station.

General descriptions of the materials encountered are as follows (from AECOM, 2014),(see Appendix A).

All drill borings encountered soils of similar physical properties. No fill or man-made deposits were encountered. Drainage channels have been carved by erosional water flows through the native site soils.

Detailed boring logs, soil and rock descriptions, and test results for materials obtained from the borings are presented in Appendix A.

4.2.3. Groundwater

Groundwater was not encountered in any of the test pits or drill borings. The Arizona Department of Water Resources well registry shows well number 628104, which was constructed prior to 1982, at the Ehrenberg Port of Entry. This well has a reported groundwater elevation of 197 feet below ground surface. A second well located at the Ehrenberg Rest Area with well number 628121, constructed in 1968, has a reported groundwater elevation of 313 feet below ground surface.

5.0 ROADWAY RECOMMENDATIONS

5.1. Pavement Design Information

The native project site soils are consistent in physical properties testing. TP1 recorded an R-Value of 62. TP3 recorded an R-Value of 66. These values are consistent with all of the projects' native soils. The project native soils do not have swelling potential. Native soils, when

compacted per the method specification included in Appendix C, will provide excellent pavement support.

5.2. Roadway Excavation and Embankments

Native soils will be difficult to test for in-place density due to a high percentage of coarse gravels and cobbles. A method specification utilizing vibratory compaction equipment should be utilized to assure adequate compaction. A method specification is included in Appendix C and should be utilized to assure compaction of all project soils.

5.3. Slopes and Earthwork Factors

Recommendations for maximum slope ratios and earthwork factors are presented in Table 3. The ground compaction factor should be applied to embankment areas outside the limits of the existing pavement section. Benching into existing embankments with existing slopes steeper than 5:1 should be performed in accordance with Section 203-10.03 (A) of the Standard Specifications (ADOT, 2008).

Table 3: Slopes and Earthwork Factors

Station	Ground Compaction (feet)	Shrink/Swell Factor	Maximum Slope Ratio
Entire Project	0.10	5% Shrink	Permanent cut and fill slopes shall be constructed no steeper than 2:1 (H:V)

5.4. Pipe Design Information

Material obtained from three of the roadway test pits were tested for pH and Minimum Resistivity with the following results.

Table 4: Soil pH and Minimum Resistivity Results

TEST HOLE	STA	DEPTH (feet)	pH	Minimum Resistivity (ohm-cm)
1	12+00	0.0 - 5.0	8.1	670
2	18+50	0.0 - 5.0	8.2	1,010
5	40+00	0.0 - 5.0	8.4	1,010

5.5. Water Requirements

Approximately 65 gallons of water per cubic yard may be estimated for compaction of base and subgrade materials. This is considerably higher than the amount calculated based on the difference between in-situ and optimum compaction moisture content and includes a conservative overrun for losses due to seepage, evaporation, inadequate mixing, spillage, etc. Precipitation before and/or during construction may also reduce the required amount of water significantly.

5.6. Borrow Information

No borrow is anticipated for this project.

5.7. Aggregate Availability, Weight and Hauls

No source of aggregate material will be designated. A Materials Pavement Design Report will be prepared under separate cover for this project that contains estimated haul distances, unit weights and asphalt content for asphaltic concrete materials that can be used for estimating purposes.

6.0 STRUCTURE RECOMMENDATIONS

6.1. General

The location of the proposed inspection building, truck scales and water storage tanks is situated on a hill overlooking the existing Port of Entry buildings. The native soils are deeply incised by erosional channels. Native soils contain a high percentage of coarse gravels and occasional cobbles making them difficult to test for in-place density. A method specification is included in Appendix C and should be utilized to determine acceptability of compaction effort.

To provide a uniform foundation for the proposed inspection building and associated structures, the top three feet of the building pads should be composed of engineered fill compacted meeting the requirements of the Method Specification included in Appendix C.

The foundations for the truck scales are planned to be constructed a minimum of 5 feet below existing site grades. Native soils below the truck scale foundations should be moisture conditioned and compacted prior to placement of formwork for footings.

All foundation elements should be moisture conditioned, compacted and inspected by the Geotechnical Engineer of Record prior to placement of formwork.

6.2. Structural Excavation

Spread footings shall be founded on compacted native soils. All footings shall be moisture conditioned, compacted and inspected by the Geotechnical Engineer of Record prior to placement of forms.

All excavations should be performed per the latest OSHA standards for excavation. Site soils should be classified as Type C as outlined in the OSHA specifications.

6.3. Material Properties

The following properties were used for analysis of spread footings foundations.

Table 6: Recommended Native Soil Properties

Layer Name	Depth	Unit Weight (pcf)	Friction Angle	Cohesion (psf)
Native Soils	0 – 20 feet below footing	125	38	0

6.4 Foundation Analysis

The project foundation design is based on ADOT's Geotechnical Report No. 04-29 dated August 31, 2004. The design recommendations contained in that report have been reviewed and confirmed for the foundation design included in the project plans developed by Jacobs and GLA. Over-excavation and recompaction of the top three feet of the building pads is required to assure uniformity of support for the building slabs and foundations. All footing excavations shall be moisture conditioned, compacted and inspected by the Geotechnical Engineer of Record prior to placement of forms.

7.0 BORING AND TEST PIT LOG LIMITATIONS

1. General soil and rock (where encountered) strata descriptions and indicated boundaries are based on engineering interpretation of available subsurface information by the geotechnical engineer and may not reflect actual variation in subsurface conditions between borings/test pits and samples. The location of contacts between strata shown on the logs are generally approximate, and changes between material types may be gradual rather than abrupt. Classification of soil materials is in general accordance with ASTM D2488 and is based on field observation unless accompanied by mechanical analysis.
2. The observed water levels and/or moisture conditions indicated on the logs are as recorded at the time of exploration. These water levels and/or moisture conditions may vary considerably, with time, according to the prevailing climate, rainfall or other factors and are otherwise dependent upon the duration of and methods used in the exploration program.
3. Sound engineering judgment was exercised in preparing the subsurface information presented on the boring and subgrade logs. This information was prepared and is intended for design and preliminary quantity estimate purposes. Its presentation on the plans or elsewhere is for the purpose of providing intended users with access to the same information as the State and its designers. This subsurface information interpretation is presented in good faith and is not intended as a substitute for personal investigation, independent interpretations or judgment of the contractor or other users of this report.
4. A 140-lb. hammer, 30-inch free-fall, was used to drive both the 2-inch O.D. Standard

Penetration Test (SPT) split-spoon sampler (ASTM D 1586) and the 3-inch O.D. ring-lined sampler.

5. Additional limitations are included as part of Appendix E.

8.0 REFERENCES

American Association of State Highway and Transportation Officials (AASHTO), 2011. Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 31st. Edition. Washington, D.C.

American Association of State Highway and Transportation Officials (AASHTO), 2010. LRFD Bridge Design Specifications, Fifth Edition. Washington, D.C.

Arizona Department of Transportation (ADOT), 2011, Materials Testing Manual, Sampling and Testing Procedures. Phoenix, AZ.

http://www.azdot.gov/Highways/Materials/QA/QA_Manuals/index.asp

Arizona Department of Transportation (ADOT), 2008, Standard Specifications for Road and Bridge Construction. Phoenix, AZ.

Arizona Department of Transportation (ADOT), 2010. Geotechnical Design Policy SF-2, Limiting Eccentricity Criteria for Spread Footings based on Load and Resistance Factor Design (LRFD) Methodology. Memorandum from N.H. Wetz, J.D. Wilson, A. Islam, and N. Viboolmate to J. Lawson and J. Nehme, Dated December 1, 2010. Phoenix, AZ.

http://www.azdot.gov/Highways/Materials/Geotech_Design/Policy.asp

Arizona Department of Water Resources (ADWR), 2011, GWSI – Groundwater Site Inventory.

<http://gisweb.azwater.gov/waterresourcedata/GWSI.aspx>

Tosdal, R.M., Hazel, G.B., and Wright, J.E. 1989, Jurassic Geology of the Sonoran Desert Region, Southern Arizona and Southeastern California. Arizona Geologic Society Digest 17, P. 397-434.

United States Geological Survey (USGS), 2008. Seismic Design Parameters, Version 6.10. AASHTO Guide Specifications for LRFD Seismic Bridge Design.

<http://earthquake.usgs.gov/hazards/designmaps/aashtocd.php>

APPENDIX A
AECOM Data Report

**EHRENBERG PORT OF ENTRY RECONSTRUCTION
MILEPOST 3.62
EHRENBERG, ARIZONA
TRACS NO. 010 LA 003 H6161 01G**

DATA REPORT

Prepared for:

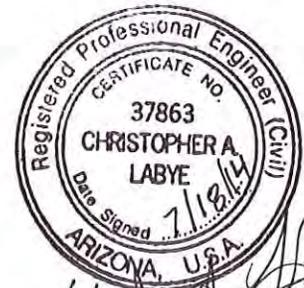
Arizona Department of Transportation

By

AECOM

**2325 East Camelback Road, Suite 200
Phoenix, AZ 85016**

July 2014



Handwritten signature
Expires 9-30-14

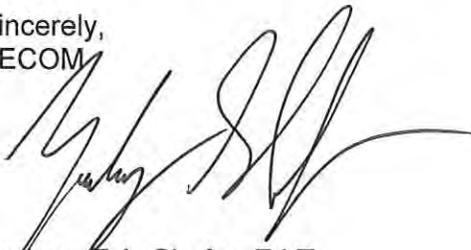
July 18, 2014

Mr. Brent Conner
Arizona Department of Transportation
Materials Group – Geotechnical Design Section
1221 North 21st Avenue
Phoenix, Arizona 85009Re: Data Report
Ehrenberg Port of Entry
Milepost 3.62
Ehrenberg, Arizona
TRACS NO. 010 LA 003 H6161 01G
On-Call Contract 2011-013.01, Task # 5
AECOM Project No. 60316352

Dear Mr. Conner:

AECOM Technical Services, Inc. (AECOM) is pleased to present this Data Report to the Arizona Department of Transportation (ADOT) Materials Geotechnical Design Section for the above referenced project. This report details our scope of work, and includes the results of our investigation, to be used by ADOT Materials for the preparation of the geotechnical report for the proposed port of entry project.

We appreciate the opportunity to provide geotechnical services through our On-call Contract. Should you have any questions concerning this report, please contact the undersigned.

Sincerely,
AECOMZachery T.A. Shafer, E.I.T.
Geotechnical Designer

Reviewed by:

Christopher A. Labye, P.E.
Geotechnical Engineercc: Steve Haire, ADOT Materials Geotechnical Design (PDF)
File 60316352 500

TABLE OF CONTENTS

1.0 INTRODUCTION.....2
2.0 FIELD & LABORATORY INVESTIGATION2

TABLES

Table 2-1: Percolation Drill Hole Summary3

APPENDICES

Appendix A Test Boring and Test Pit Logs, Site Plan, Hitlist
Appendix B Laboratory Test Results



1.0 INTRODUCTION

This Data Report is submitted subsequent to an investigation performed by AECOM for the reconstruction of the existing Ehrenberg Port of Entry (POE) located in Ehrenberg, Arizona. The project is located at I-10 milepost (MP) 3.62.

The project will construct auxiliary lanes along eastbound I-10, an access road (Ramp A), drainage improvements (including a retention basin), and a new POE building.

It is understood that the final geotechnical and pavement reports will be prepared by ADOT Materials based on information provided in this report.

2.0 FIELD & LABORATORY INVESTIGATION

A total of 10 test borings, by AECOM, were performed for the planned POE reconstruction. Seven borings (WBH1, WBH3, WBH5, and WBH7) were advanced at the proposed retaining wall locations, six borings (BBH1 through BBH6) were advanced at the proposed new POE building, and one boring (P1) was advanced at a proposed retention basin. The borings were drilled to depths ranging from 5.0 to 21.0 feet, using a CME-850 track-mounted drill rig utilizing a hollow stem auger, owned and operated by Yellow Jacket, Inc. of Phoenix, Arizona. A hitlist sheet (Table A-1) presents a summary of the test borings completed for this investigation. The borings were advanced by either 6-5/8 or 18 inch outside diameter hollow stem auger. Logs of the test borings completed as well as a Site Plan (Figures A-1 and A-2), which indicate the test locations and depths, are included in Appendix A. In addition, boring BBH4 was relocated approximately 30 feet to the southeast corner of the new proposed Port of Entry building due to access on the site. This is indicated in Figure A-2.

Standard penetration test (SPT) samples were taken at approximate intervals of five feet within the test borings. In addition to SPT samples, relatively undisturbed open-end ring samples were obtained at selected depths in the borings for specialized testing and/or for the determination of in-situ soil density. One sample from each of the five test pits were provided to ADOT materials for sulfate and chloride testing. The retrieved samples were utilized for laboratory testing or saved for future observation.

The field investigation for this project included a total of five test pits (TP1 through TP5) advanced to depths ranging from 4 to 5 feet to address culverts, detention basins, and pavement subgrade conditions. A hitlist sheet (Table A-1) presents a summary of the test pits completed for this investigation. The test pits were excavated by a CASE 850 backhoe using a 24-inch steel bucket, owned and operated by Nelson Digging Services, LLC of Parker, Arizona. TP4 needed to be relocated to 145' right of the centerline of I-10 eastbound due to asphalt concrete covering the original location. All materials collected from the field investigation were utilized for laboratory testing or saved for future observation.

In addition, one boring (P1) was advanced to a depth of 5 feet within the proposed detention basin. A falling head percolation test was performed by AECOM to further investigate subsurface drainage conditions within the proposed detention basin. The time to drain a volume of water over a given area of soil was recorded until stable readings were obtained. Test data is tabulated on the log for the percolation boring. The test was conducted within a 12-inch diameter solid Schedule 40 PVC casing seated to a depth of five feet below existing grade. Table 2-1 summarizes the results of the percolation test from the percolation boring.

Table 2-1: Percolation Drill Hole Summary

Percolation ID	Stabilized Percolation Rate (minutes per inch)
P1	0.2

Laboratory testing was performed by ATL inc. (ATL), as directed by AECOM, on selected samples obtained from the test borings and test pits. The tests performed include moisture content, sieve analysis, Atterberg limits (plasticity index), R-value, standard Proctor, direct shear, unit weight, pH, and resistivity. Soluble chloride and sulfate concentration testing will be conducted by ADOT Materials and the results will be summarized by ADOT in the final reports. The results of the laboratory tests are presented in Appendix B.

APPENDIX A –TEST BORING AND TEST PIT LOGS, SITE PLAN, HITLIST

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. WBH1
 Date(s): 06/25/2014
 Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA
 Surface Elevation:
 Location: Ramp 'A' Cst &
 Sta 21+00, 190' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
							Dry Density (pcf)	Moisture Content (%)
	5			S(4-12-11)		<p>SILTY SAND WITH GRAVEL (SM) Trace coarse to fine subangular gravel, predominantly fine subrounded sand, no cementation, no plasticity, light brown to tan, dry, medium dense</p> <p>Note: Decrease in coarse gravel at 10.0' bgs Decrease in relative density to loose at 10.0' bgs</p>		
	10			S(1-4-6)				
	15			A(14'-15') R(9-23-41)		<p>POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Trace fine subangular gravel, predominantly fine to medium subrounded sand, no cementation, no plasticity, light brown to tan, dry, very dense</p> <p>Drilling stopped at 15.0' bgs Sampling stopped at 16.0' bgs</p>		2.0
	20							

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION
 AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. WBH3

Date(s): 06/25/2014

Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 24+00, 190' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS		
							Dry Density (pcf)	Moisture Content (%)	
	5			S(30-10-15)		<p>POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Predominantly fine round to subrounded sand, few fine subangular gravel, no cementation, no plasticity, light brown to tan, dry, medium dense</p> <p><i>Note: Increase in relative density to dense at 10.0' bgs</i></p> <p><i>Note: Increase in moisture at 15.0' bgs</i> Decrease in gravel at 15.0' bgs Decrease in relative density to medium dense at 15.0' bgs</p>			
	10			A(9'-10') R(6-16-20)				121.7	3.5
	15			S(4-11-13)					1.0
	20					<p>SILTY SAND WITH GRAVEL (SM) Predominantly fine round to subrounded sand, few fine subangular gravel, no cementation, no plasticity, light brown to tan, dry, medium dense</p> <p><i>Drilling stopped at 14.5' bgs</i> <i>Sampling stopped at 16.0' bgs</i></p>			

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION
 AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. WBH5

Date(s): 06/25/2014

Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 27+00, 210' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
							Dry Density (pcf)	Moisture Content (%)
	5			S(7-16-18)		<p>WELL GRADED GRAVEL WITH SILT & SAND (GW-GM)</p> <p>Some fine subrounded sand, predominantly fine to coarse subangular gravel, no cementation, no plasticity, light brown to tan, dry, dense</p> <p>Note: Increase in coarse gravel at 10.0' bgs</p> <p>Decrease in relative density to medium dense at 10.0' bgs</p>		
	10			S(7-13-11)				
	15			A(14' -15') R(17-23-40)		<p>POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM)</p> <p>Some fine subrounded sand, predominantly fine to coarse subangular gravel, no cementation, no plasticity, light brown to tan, dry, dense</p> <p>Drilling stopped at 15.0' bgs</p> <p>Sampling stopped at 16.0' bgs</p>		1.5
	20							

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION
 AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. WBH7

Date(s): 06/25/2014

Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 30+00, 210' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
							Dry Density (pcf)	Moisture Content (%)
	5			S(7-11-13)				
	10			A(9'-10') R(8-22-37)		Note: Increase in relative density to dense at 10.0' bgs Note: Decrease in relative density to dense at 15.0' bgs Increase in moisture at 15.0' bgs		1.4
	15			S(10-19-21)				2.6
	20				Drilling stopped at 14.5' bgs Sampling stopped at 16.0' bgs			

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. BBH1

Date(s): 06/25/2014

Rig & Boring Type: CME 850 w/6^{5/8}" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 26+90, 160' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
							Dry Density (pcf)	Moisture Content (%)
	5			S(5-9-10)		<p>POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Trace subrounded fine gravel, predominantly fine subrounded sand, no cementation, no plasticity, tan, dry, medium dense</p> <p>Note: Increase in fine gravel at 10.0' bgs Increase in relative density to dense at 10.0' bgs</p> <p>Note: Color tan to grayish at 15.0' bgs Increase in relative density to very dense at 15.0' bgs</p>		0.5
	10			S(10-20-25)				
	15			S(8,50/6")				
	20			A(19'-20') R(14-24-47)		<p>WELL GRADED GRAVEL WITH SAND (GW) Some fine to medium subrounded sand, predominantly fine subrounded gravel, no cementation, no plasticity, tan, dry, very dense</p> <p>Drilling stopped at 19.5' bgs Sampling stopped at 21.0' bgs</p>		0.6
	25							

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. BBH2

Date(s): 06/26/2014

Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 27+65, 160' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS		
							Dry Density (pcf)	Moisture Content (%)	
	5		◆	S(5-9-8)		<p>POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Few subangular fine to coarse gravel, predominantly fine subrounded sand, no cementation, no plasticity, light brown, dry, medium dense</p> <p>Note: Increase in relative density to very dense at 10.0' bgs</p> <p>Note: No recovery at 15.0' bgs</p> <p>Note: Increase in coarse gravel at 20.0' bgs</p>			
	10		◆	S(7-24,50/5")					0.4
	15		⊗	A(14' -15') R(50/5")					0.7
	20		◆	S(16,50/6")					
	25					Drilling stopped at 19.5' bgs Sampling stopped at 21.0' bgs			

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION
 AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. BBH3

Date(s): 06/26/2014

Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 27+45, 125' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
							Dry Density (pcf)	Moisture Content (%)
	5			S(2-7-10)		<p>POORLY GRADED SAND WITH SILT (SP-SM)</p> <p>Trace fine subangular gravel, predominantly fine subrounded sand, no cementation, no plasticity, brown to light brown, dry, medium dense</p> <p>Note: Decrease in coarse gravel at 10.0' bgs</p> <p>Note: Increase in relative density to very dense at 20.0' bgs</p>		1.0
	10			S(3-9-15)				
	15			S(9-12-13)				
	20			A(19'-20') R(6-21-37)				1.4
	25					<p>Drilling stopped at 20.0' bgs</p> <p>Sampling stopped at 21.0' bgs</p>		

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. BBH4

Date(s): 06/26/2014

Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 27+90, 20' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS		
							Dry Density (pcf)	Moisture Content (%)	
	5			S(7-9-12)		<p>WELL GRADED GRAVEL WITH SILT & GRAVEL (SW-SM)</p> <p>Few fine to coarse sand, predominantly fine subangular gravel, no cementation, no plasticity, tan, dry, medium dense</p> <p>Note: Increase in coarse sand & fine gravel at 10.0' bgs</p> <p>Note: Increase in relative density to very dense at 15.0' bgs</p>			
	10			S(6-8-8)					1.4
	15			S(14-32-35)					
	20			A(19'-20') R(17,50/6")		<p>POORLY GRADED SAND WITH SILT & GRAVEL (SP)</p> <p>Few fine to coarse sand, predominantly fine subangular gravel, no cementation, no plasticity, tan, dry, medium dense</p> <p>Drilling stopped at 20.0' bgs</p> <p>Sampling stopped at 21.0' bgs</p>	121.7	2.9	
	25								

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION
 AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. BBH5

Date(s): 06/26/2014

Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 26+85, 30' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
							Dry Density (pcf)	Moisture Content (%)
	5			S(4-9-19)		<p>POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Few subangular fine to coarse gravel, predominantly fine to medium subrounded sand, no cementation, no plasticity, tan, dry, medium dense</p> <p><i>Notes: Increase in relative density to dense at 10.0' bgs</i></p> <p><i>Notes: No recovery in 15.0' to 15.5' sample</i> Increase in relative density to very dense at 15.0' bgs</p> <p><i>Notes: Decrease in relative density to dense at 20.0' bgs</i></p>		
	10			S(9-12-19)				
	15			A(14'-15') R(9-19-32)			0.9	
	20			S(9-15-26)				
	25				<p>Drilling stopped at 19.5' bgs</p> <p>Sampling stopped at 21.0' bgs</p>			

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION
 AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

BORING LOG NO. BBH6

Date(s): 06/26/2014

Rig & Boring Type: CME 850 w/6⁵/₈" OD HSA

Surface Elevation:

Location: Ramp 'A' Cst &
 Sta 26+80, 150' Lt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Penetration Rate (Min./Ft)	Sample Interval	Sample Type & (Blowcounts)	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
							Dry Density (pcf)	Moisture Content (%)
	5			S(4-8-5)		WELL GRADED SAND WITH SILT & GRAVEL (SW-SM) Few subangular fine gravel, predominantly fine subrounded sand, no cementation, no plasticity, tan, dry, medium dense		
	10			S(4-16-40)		Notes: Increase in coarse sand at 10.0' bgs Increase in relative density to very dense at 10.0' bgs		
	15			A(14'-15') R(9-10-15)		Notes: Decrease in coarse sand at 15.0' bgs Decrease in relative density to medium dense at 15.0' bgs		1.0
	20			S(16-27-32)		SILTY SAND WITH GRAVEL (SM) Some fine subangular gravel, predominantly fine subrounded sand, no cementation, no plasticity, tan, dry, very dense		1.2
	25					Drilling stopped at 19.5' bgs Sampling stopped at 21.0' bgs		

Sample Type
 S-Split Spoon
 R-Ring Sampler
 A-Drill Cuttings
 HQ-Wireline Core

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

TEST PIT NO. TP1

Date(s): 06/24/2014
 Backhoe/Trackhoe Type: Case 580 24" Bucket
 Surface Elevation:
 Location: Ramp 'A' Cst &
 Sta 12+00, 40' Rt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Sample Interval	Sample Type	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
						Dry Density (pcf)	Moisture Content (%)
	1				POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Few subrounded, fine to coarse gravel, predominantly fine subrounded to rounded sand, no cementation, no plasticity, brown to light brown, dry		
	2						
	3						1.6
	4						
	5						
					Excavation stopped at 5.0' bgs		

Sample Type
 D-DISTURBED BULK SAMPLE

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

TEST PIT NO. TP2
 Date(s): 06/24/2014
 Backhoe/Trackhoe Type: Case 580 24" Bucket
 Surface Elevation:
 Location: I-10 Cst @
 Sta 177+50, 200' Rt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Sample Interval	Sample Type	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
						Dry Density (pcf)	Moisture Content (%)
	1				POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Some rounded to subrounded, fine to coarse gravel, few rounded cobbles, predominantly fine sand, no cementation, no plasticity, light brown to tan, dry		
	2						
	3						1.0
	4						
	5						
					Excavation stopped at 5.0' bgs		

Sample Type
 D-DISTURBED BULK SAMPLE

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

TEST PIT NO. TP3
 Date(s): 06/24/2014
 Backhoe/Trackhoe Type: Case 580 24" Bucket
 Surface Elevation:
 Location: Ramp 'A' Cst &
 Sta 25+00, &

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Sample Interval	Sample Type	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
						Dry Density (pcf)	Moisture Content (%)
	1				POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Few subrounded fine gravel, predominantly fine, subrounded sand, no cementation, no plasticity, brown to light brown, dry		
	2						
	3						0.8
	4						
	5						
					Excavation stopped at 5.0' bgs		

Sample Type
 D-DISTURBED BULK SAMPLE

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

TEST PIT NO. TP4
 Date(s): 06/24/2014
 Backhoe/Trackhoe Type: Case 580 24" Bucket
 Surface Elevation:
 Location: I-10 Cst @
 Sta 191+00, 145' Rt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Sample Interval	Sample Type	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
						Dry Density (pcf)	Moisture Content (%)
	1				POORLY GRADED SAND WITH SILT & GRAVEL (SP-SM) Few subrounded to subangular fine gravel, predominantly fine subrounded sand, no cementation, no plasticity, brown, dry		
	2						
	3						2.9
	4						
	5						
					Excavation stopped at 5.0' bgs		

Sample Type
 D-DISTURBED BULK SAMPLE

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

Project Name: Ehrenberg POE
 Location: Ehrenberg, AZ
 Project Number: 60316352
 Logged By: Z. Shafer

TEST PIT NO. TP5

Date(s): 06/24/2014
 Backhoe/Trackhoe Type: Case 580 24" Bucket
 Surface Elevation:
 Location: Ramp 'A' Cst &
 Sta 40+00, 30' Rt

Groundwater		
Depth	Hour	Date
None	N/A	N/A

Elev (ft)	Depth (ft)	Sample Interval	Sample Type	Graphical Log	MATERIAL CLASSIFICATION & USCS	LABORATORY ANALYSIS	
						Dry Density (pcf)	Moisture Content (%)
	1				SILTY SAND WITH GRAVEL (SM) Few subangular to subrounded, fine to coarse gravel, predominantly fine subrounded sand, no cementation, no plasticity, light brown to tan, dry		
	2						
	3						1.5
	4						
	5						
					Excavation stopped at 5.0' bgs		

Sample Type
 D-DISTURBED BULK SAMPLE

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
 2325 E. Camelback Rd, Suite 200
 Phoenix, Arizona 85016
 T 602.337.2700 F 602.337.2620



www.aecom.com

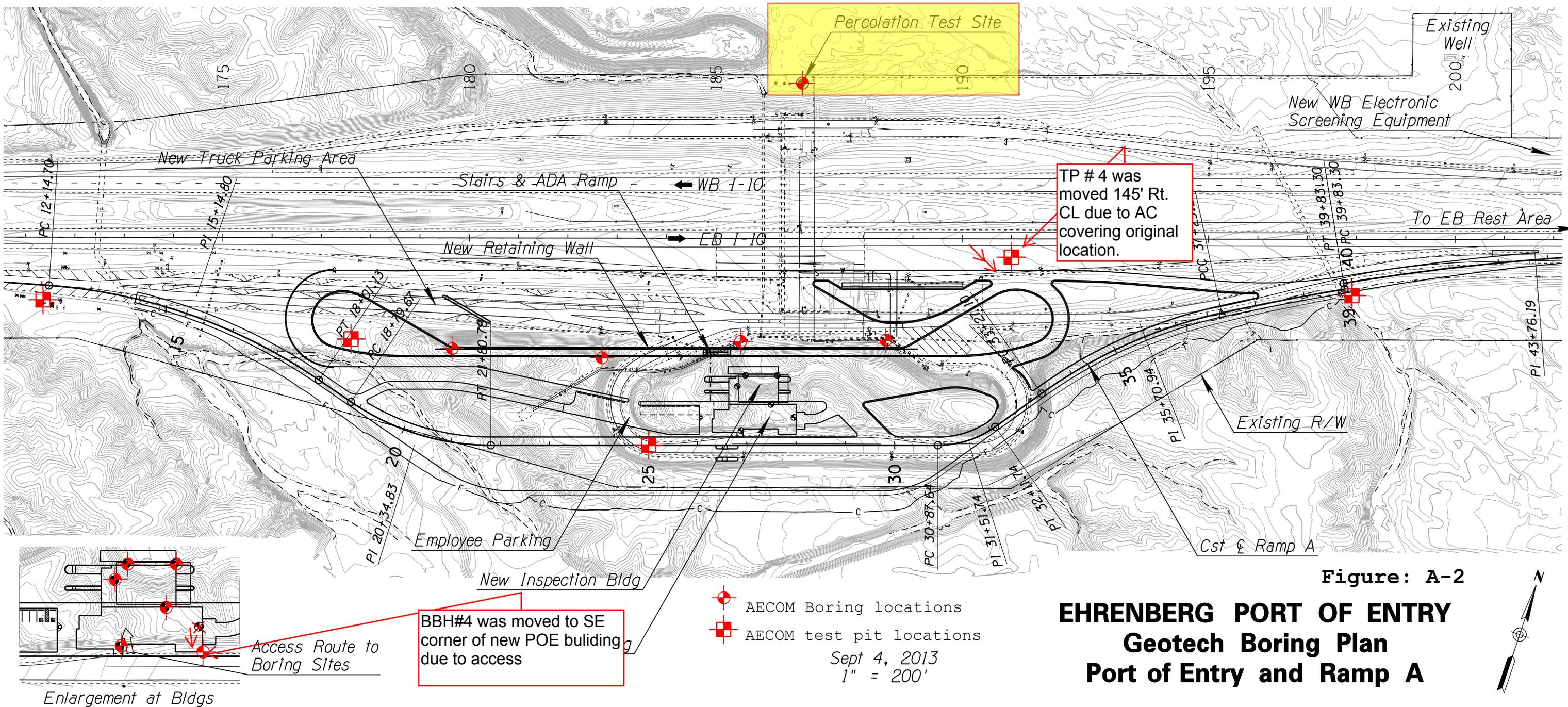
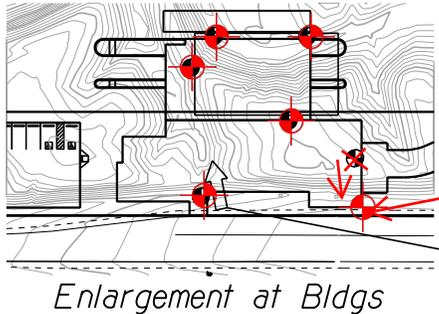


Figure: A-2
EHRENBERG PORT OF ENTRY
Geotech Boring Plan
Port of Entry and Ramp A

- AECOM Boring locations
 - AECOM test pit locations
- Sept 4, 2013
 1" = 200'



Access Route to Boring Sites

BBH#4 was moved to SE corner of new POE building due to access

TP # 4 was moved 145' Rt. CL due to AC covering original location.

Percolation Test Site

Existing Well

New WB Electronic Screening Equipment

New Truck Parking Area

Stairs & ADA Ramp

WB I-10

LB I-10

New Retaining Wall

To EB Rest Area

Existing R/W

Employee Parking

New Inspection Bldg

Cst & Ramp A

Enlargement at Bldgs

APPENDIX B – LABORATORY TEST RESULTS



QA/QC ENGINEERING CONSULTANTS
GEOTECHNICAL • CIVIL • ENVIRONMENTAL

July 17, 2014

Mr. Zachary Shafer
AECOM
2325 East Camelback Rd, Suite 200
Phoenix, Arizona 85016

Subject: Quality Control Report No. 1 – Period Ending: 7/16/14
ADOT ECS On-Call Ehrenberg, H616101D- Materials Testing
ATL Job No. 213020-03

Mr. Shafer,

Please find enclosed the update Data Summary Reports for Quality Control Testing performed to date on the above referenced project. Copies of field reports are furnished to the onsite project representative at the time of inspection and testing. All field reports are reviewed by ATL Engineers prior to presentation in this report. The Data Summary Reports present the tabulation of field and laboratory test results.

Activities inspected during this reporting period are outlined as follows:

Laboratory Tests:

Samples dropped off at ATL Lab for testing (Lab Number 14-0175 thru 14-0203)

Non Conformance Reports (NCR):

Field and Laboratory data provided in this report is **information only**, pending receipt of project plans and specifications/requirements. Laboratory results have not been verified with project specifications. We are unable to determine conformance.

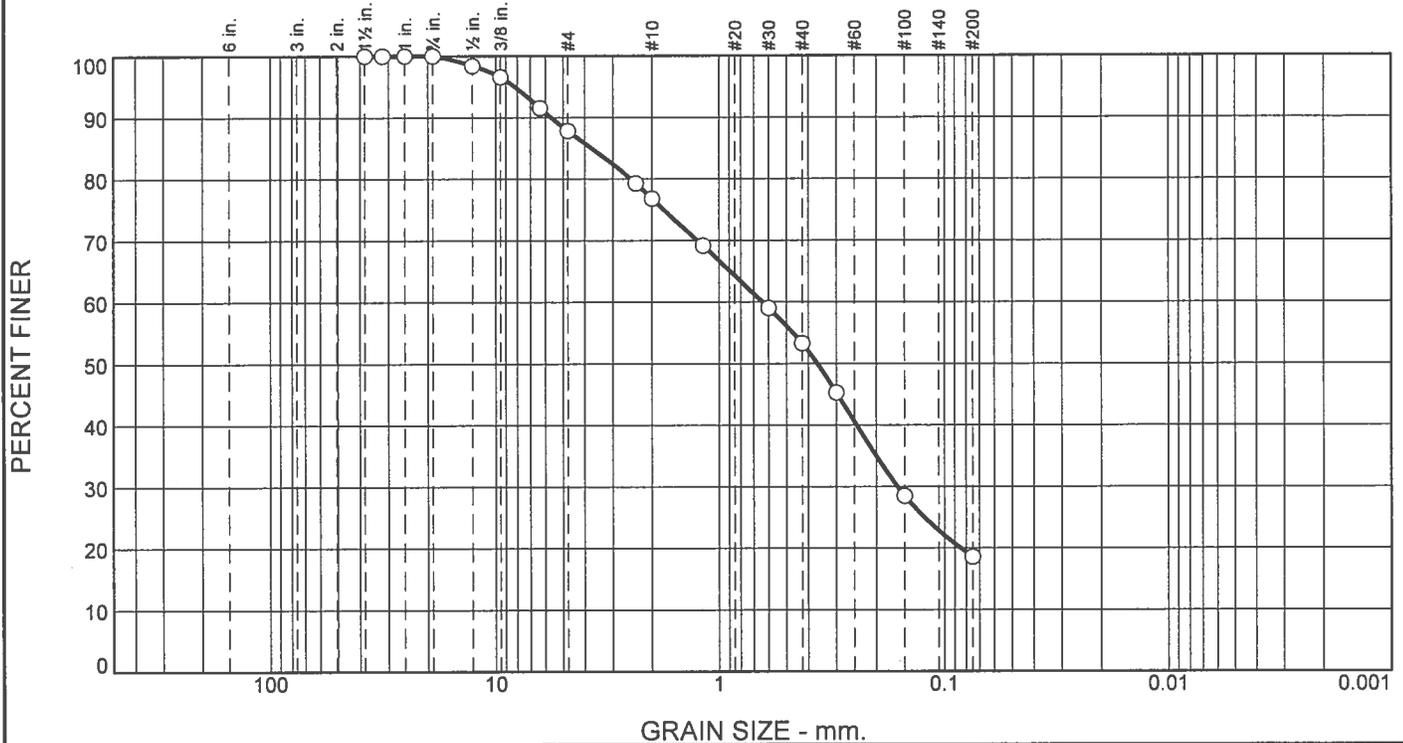
All Reports have been reviewed and have gone through ATL's Quality Control process.

If you have any questions, please do not hesitate to contact the undersigned

Respectfully submitted,

Andrew Capper
Lab Supervisor

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	12	11	24	34	19	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	100		
3/4"	100		
1/2"	98		
3/8"	97		
1/4"	92		
#4	88		
#8	79		
#10	77		
#16	69		
#30	59		
#40	53		
#50	45		
#100	28		
#200	19		

* (no specification provided)

Material Description

Silty Sand
Moisture Content: 2.1%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 5.6485 D₈₅= 3.7223 D₆₀= 0.6402
D₅₀= 0.3646 D₃₀= 0.1614 D₁₅=
D₁₀= C_u= C_c=

Remarks

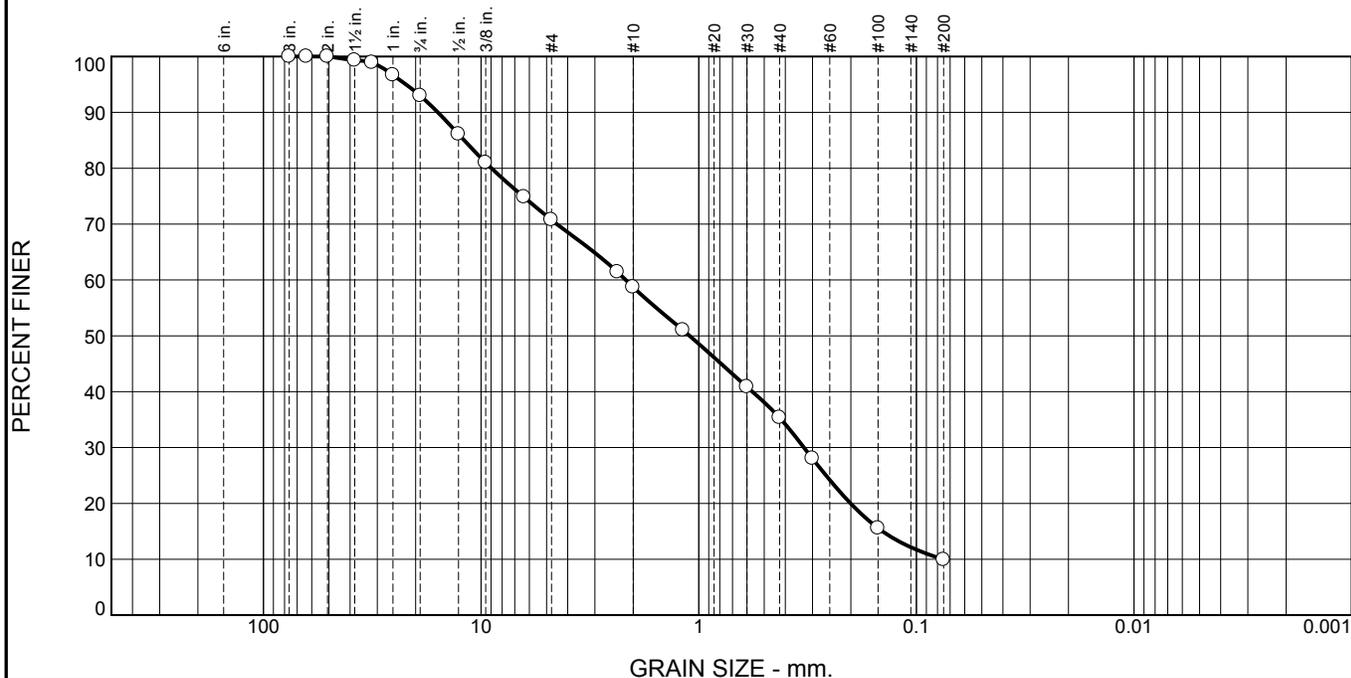
Date Received: 6-30-14 Date Tested: 7-3-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: Lab Supervisor

Source of Sample: WBH1 @ 9.5' - 11.0'
Sample Number: 14-0175

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	7	22	12	24	25	10	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	100		
1.5"	99		
1.25"	99		
1"	97		
3/4"	93		
1/2"	86		
3/8"	81		
1/4"	75		
#4	71		
#8	61		
#10	59		
#16	51		
#30	41		
#40	35		
#50	28		
#100	16		
#200	9.9		

* (no specification provided)

Material Description

Poorly graded Sand with Silt and Gravel
Moisture Content: 2.0%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 15.8031 D₈₅= 11.9682 D₆₀= 2.1663
D₅₀= 1.1019 D₃₀= 0.3285 D₁₅= 0.1432
D₁₀= 0.0760 C_u= 28.50 C_c= 0.66

Remarks

Date Received: 6-27-14 Date Tested: 7-3-14
Tested By: J. Alcanterra
Checked By: A. capper
Title: Lab Supervisor

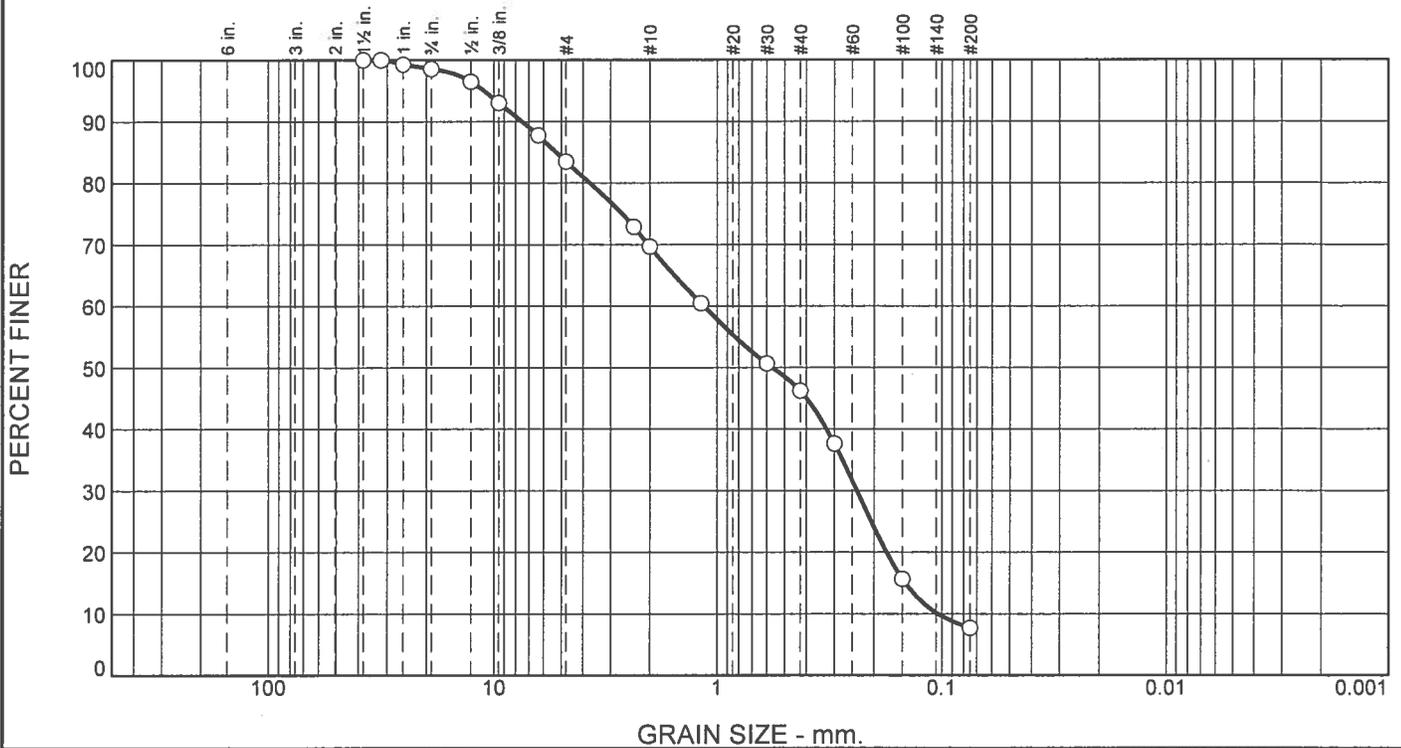
Source of Sample: WBH 1 @ 14.0' - 15.0'
Sample Number: 14-0176

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
--	--

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	16	13	24	38	8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	99		
3/4"	99		
1/2"	97		
3/8"	93		
1/4"	88		
#4	83		
#8	73		
#10	70		
#16	60		
#30	51		
#40	46		
#50	38		
#100	16		
#200	7.7		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 1.5%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 7.5118 D₈₅= 5.2699 D₆₀= 1.1471
D₅₀= 0.5669 D₃₀= 0.2384 D₁₅= 0.1455
D₁₀= 0.1042 C_u= 11.01 C_c= 0.48

Remarks

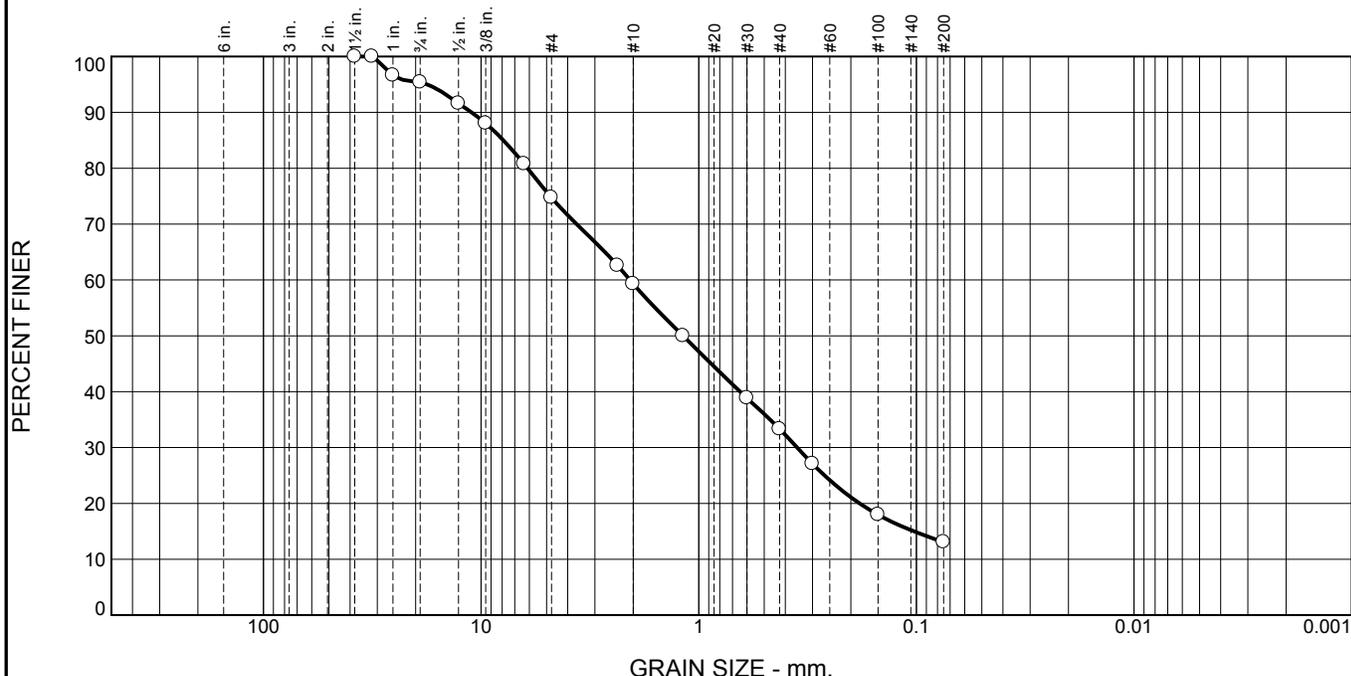
Date Received: 6-27-14 Date Tested: 7-3-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: WBH 3 @ 9.0' - 10.0'
Sample Number: 14-0177

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03 Figure
--	--

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	5	20	16	26	20	13	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	97		
3/4"	95		
1/2"	92		
3/8"	88		
1/4"	81		
#4	75		
#8	63		
#10	59		
#16	50		
#30	39		
#40	33		
#50	27		
#100	18		
#200	13		

Material Description

Silty Sand with gravel
Moisture Content: 1.0%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 11.0771 D₈₅= 7.8961 D₆₀= 2.0725
D₅₀= 1.1807 D₃₀= 0.3532 D₁₅= 0.1026
D₁₀= C_u= C_c=

Remarks

Date Received: 6-27-14 Date Tested: 7-3-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

* (no specification provided)

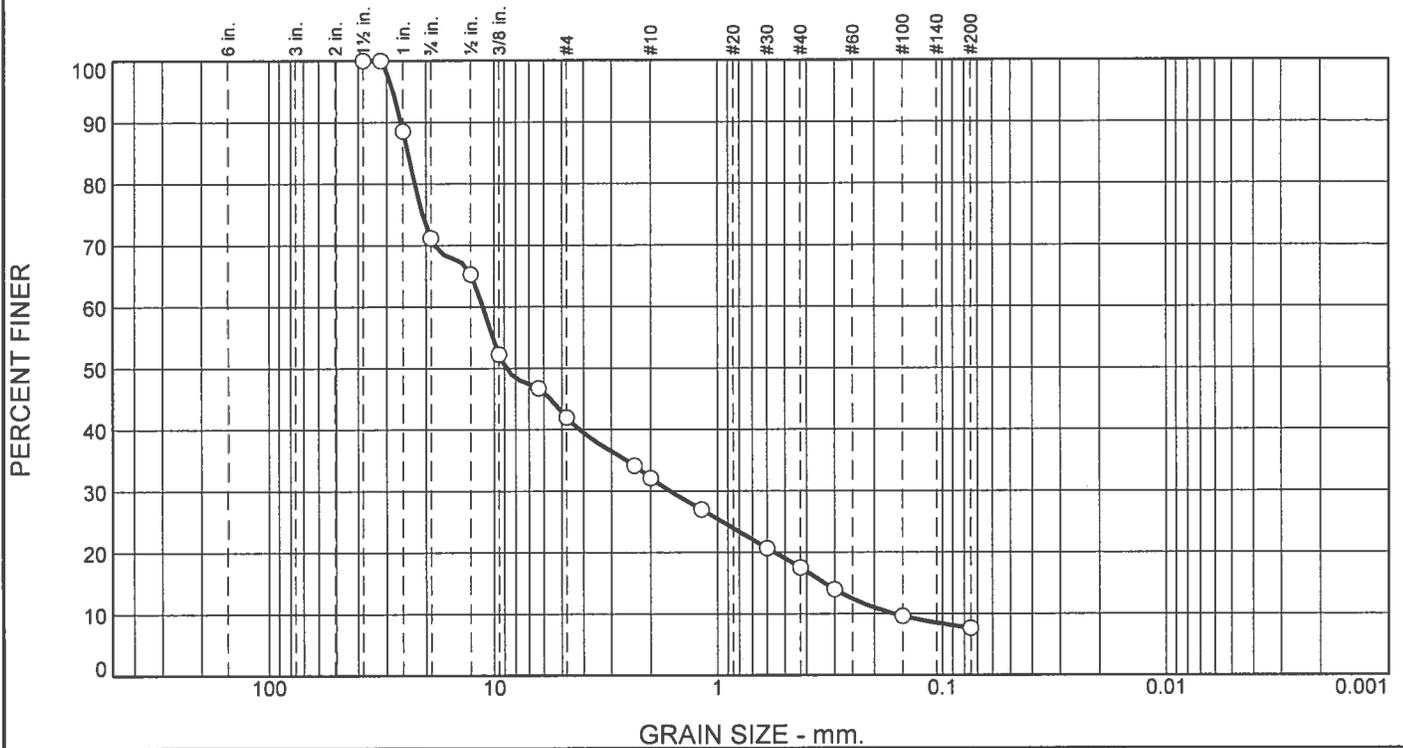
Source of Sample: WBH 3 @ 14.5' - 16.0'
Sample Number: 14-0178

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
--	--

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	29	29	10	14	10	8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	89		
3/4"	71		
1/2"	65		
3/8"	52		
1/4"	47		
#4	42		
#8	34		
#10	32		
#16	27		
#30	21		
#40	18		
#50	14		
#100	10		
#200	7.7		

* (no specification provided)

Material Description

Well Graded gravel with Silt and Sand
Moisture Content: 0.2%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= GW-GM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 25.9437 D₈₅= 24.1373 D₆₀= 11.2181
D₅₀= 8.8314 D₃₀= 1.6382 D₁₅= 0.3331
D₁₀= 0.1641 C_u= 68.36 C_c= 1.46

Remarks

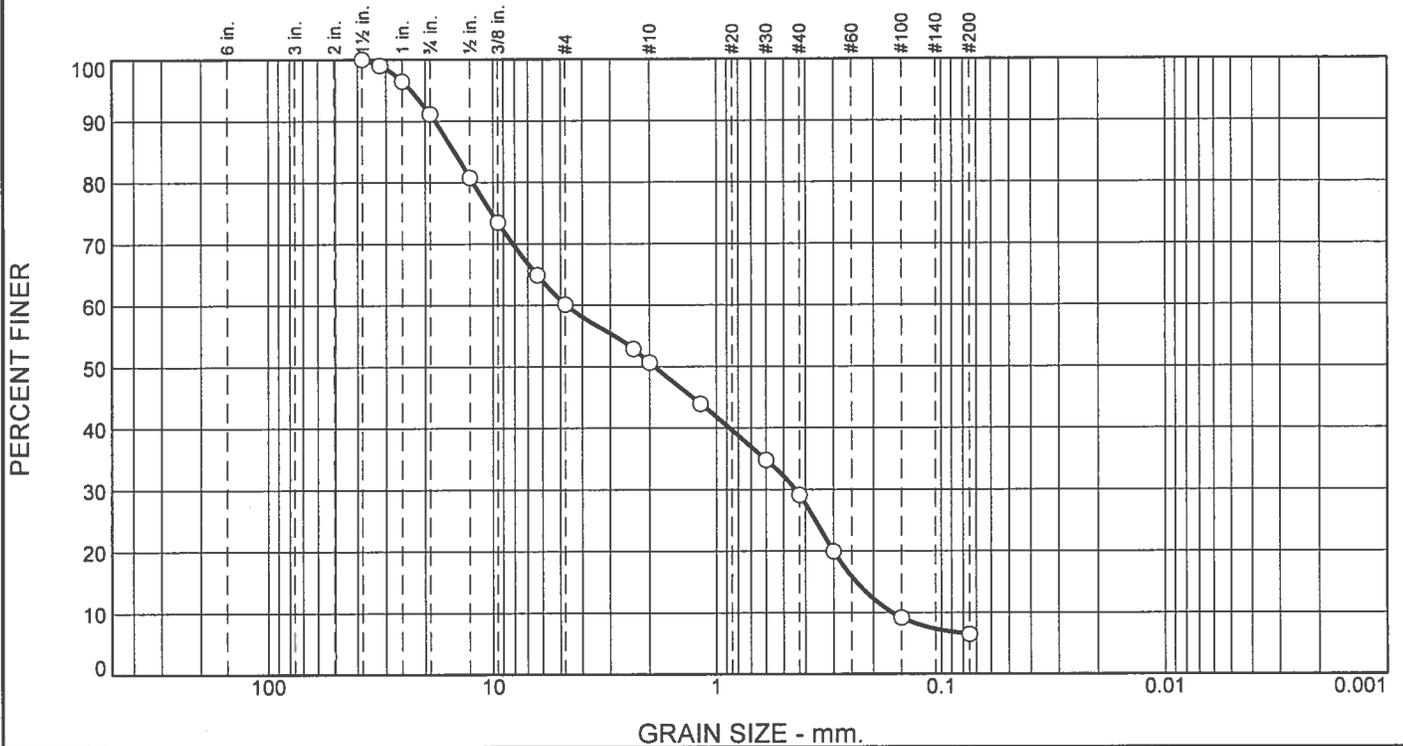
Date Received: 6-27-14 Date Tested: 7-3-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: WBH 5 @ 9.5' - 11.0'
Sample Number: 14-0179

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	31	9	22	23	6	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	99		
1	96		
3/4"	91		
1/2"	81		
3/8"	73		
1/4"	65		
#4	60		
#8	53		
#10	51		
#16	44		
#30	35		
#40	29		
#50	20		
#100	9		
#200	6.5		

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 1.5%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 18.1345 D₈₅= 14.8664 D₆₀= 4.7034
 D₅₀= 1.9053 D₃₀= 0.4427 D₁₅= 0.2384
 D₁₀= 0.1652 C_u= 28.48 C_c= 0.25

Remarks

Date Received: 6-27-14 Date Tested: 7-3-14
 Tested By: J. Alcanterra
 Checked By: A. Capper
 Title: lab Supervisor

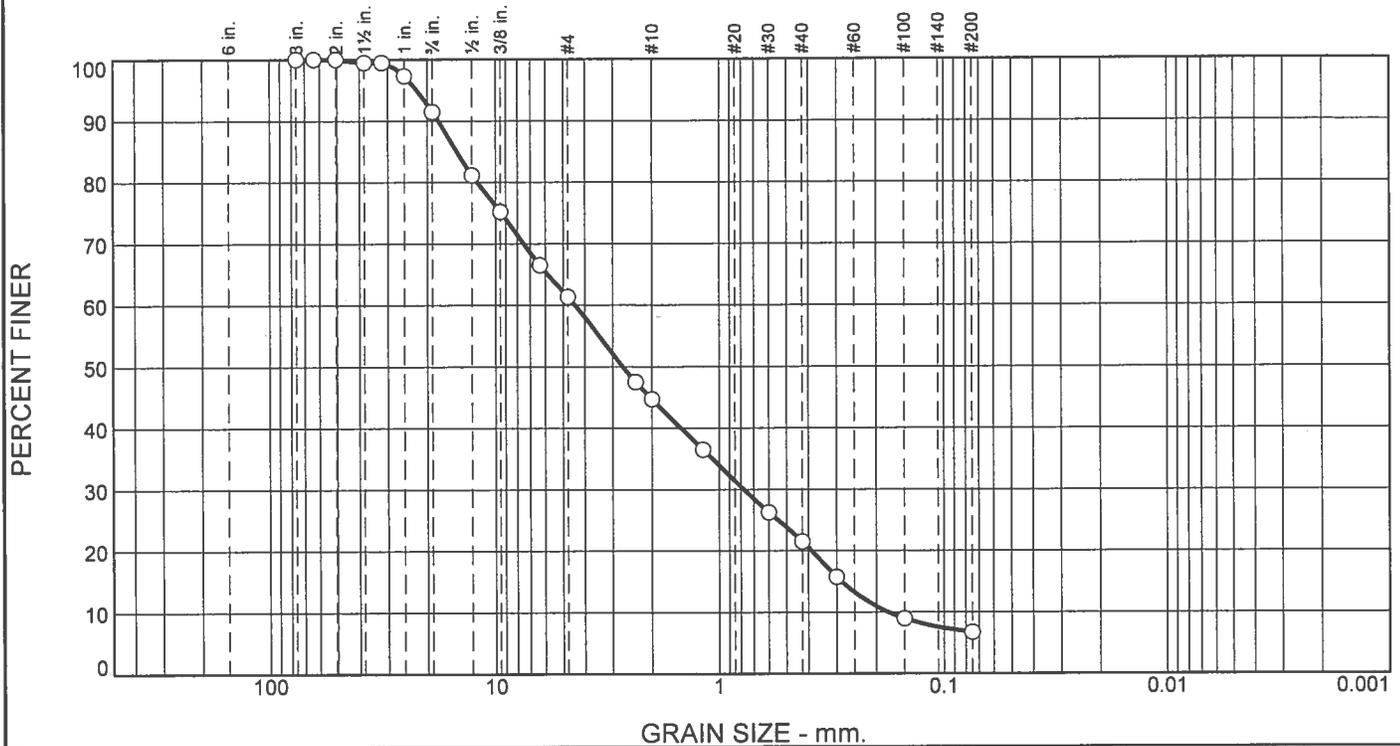
* (no specification provided)

Source of Sample: WBH 5 @ 14.0' - 15.0'
 Sample Number: 14-0180

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	8	31	16	23	15	7	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	100		
1.5"	99		
1.25"	99		
1"	97		
3/4"	92		
1/2"	81		
3/8"	75		
1/4"	67		
#4	61		
#8	47		
#10	45		
#16	37		
#30	26		
#40	22		
#50	16		
#100	9		
#200	6.7		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 1.4%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 17.9340 D₈₅= 14.8236 D₆₀= 4.4113
D₅₀= 2.6965 D₃₀= 0.7760 D₁₅= 0.2855
D₁₀= 0.1773 C_u= 24.88 C_c= 0.77

Remarks

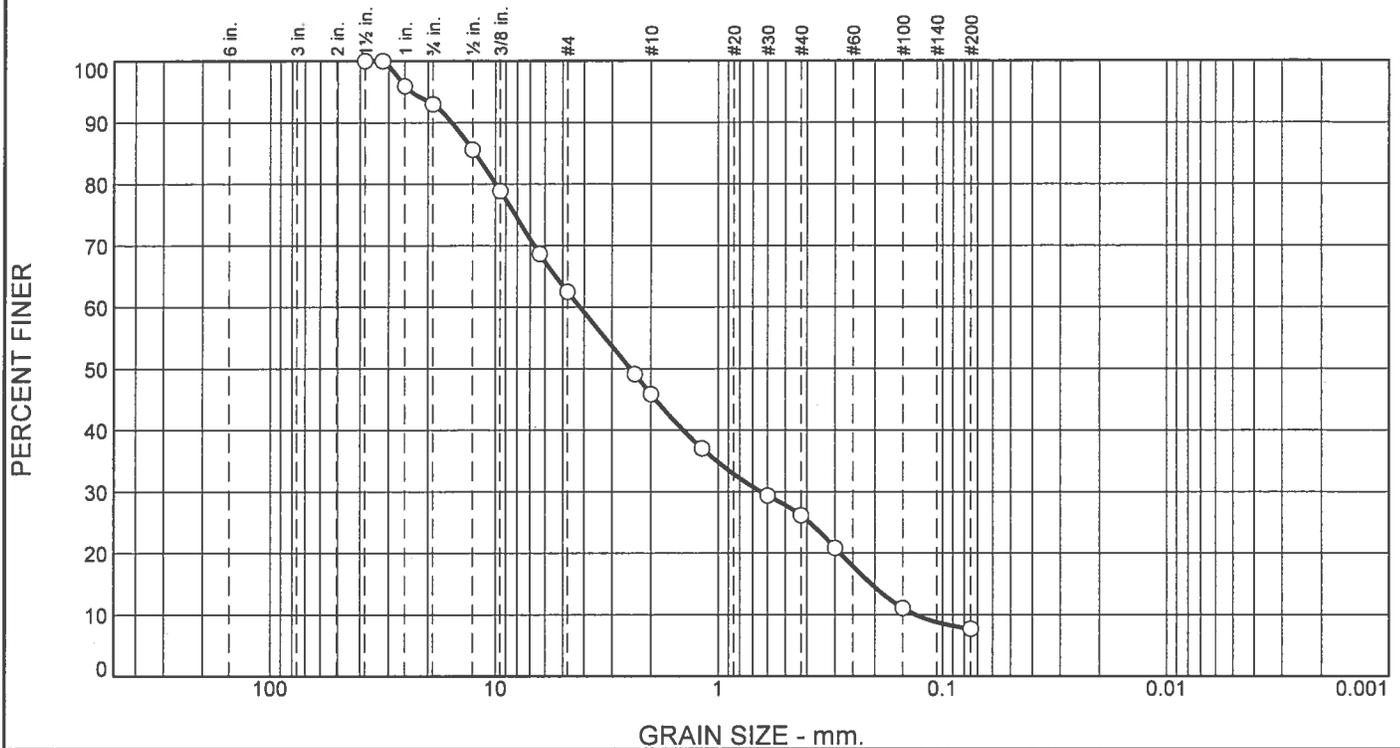
Date Received: 6-27-14 Date Tested: 7-3-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: WBH 7 @ 9.0' - 10.0'
Sample Number: 14-0182

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	7	30	17	20	18	8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	96		
3/4"	93		
1/2"	86		
3/8"	79		
1/4"	69		
#4	63		
#8	49		
#10	46		
#16	37		
#30	29		
#40	26		
#50	21		
#100	11		
#200	7.7		

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 2.6%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 15.6434 D₈₅= 12.3679 D₆₀= 4.1763
D₅₀= 2.4732 D₃₀= 0.6441 D₁₅= 0.2077
D₁₀= 0.1320 C_u= 31.63 C_c= 0.75

Remarks

Date Received: 6-27-14 Date Tested: 7-3-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

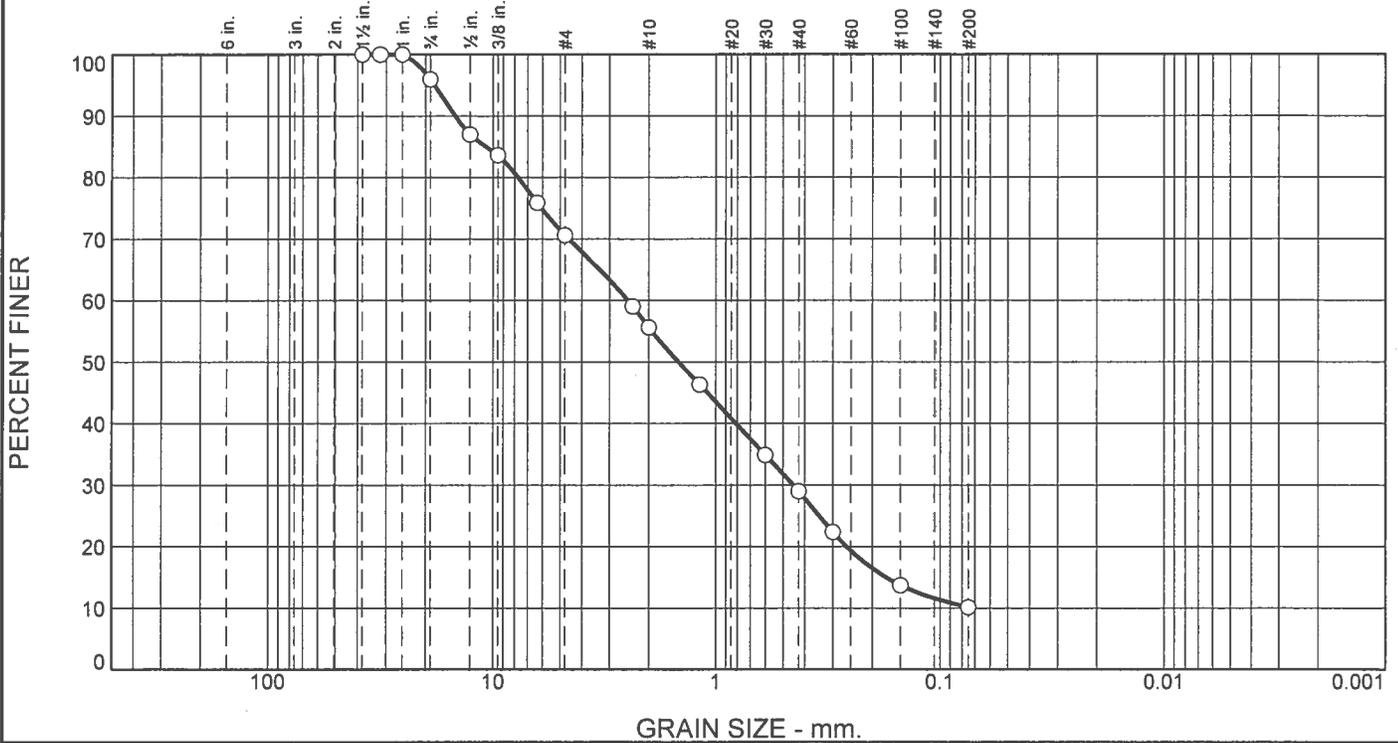
* (no specification provided)

Source of Sample: WBH 7 @ 14.5' - 16.0'
Sample Number: 14-0183

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	4	25	15	27	19	10	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	100		
3/4"	96		
1/2"	87		
3/8"	84		
1/4"	76		
#4	71		
#8	59		
#10	56		
#16	46		
#30	35		
#40	29		
#50	22		
#100	14		
#200	10		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 0.5%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 14.7688 D₈₅= 10.7617 D₆₀= 2.4813
D₅₀= 1.4702 D₃₀= 0.4485 D₁₅= 0.1739
D₁₀= C_u= C_c=

Remarks

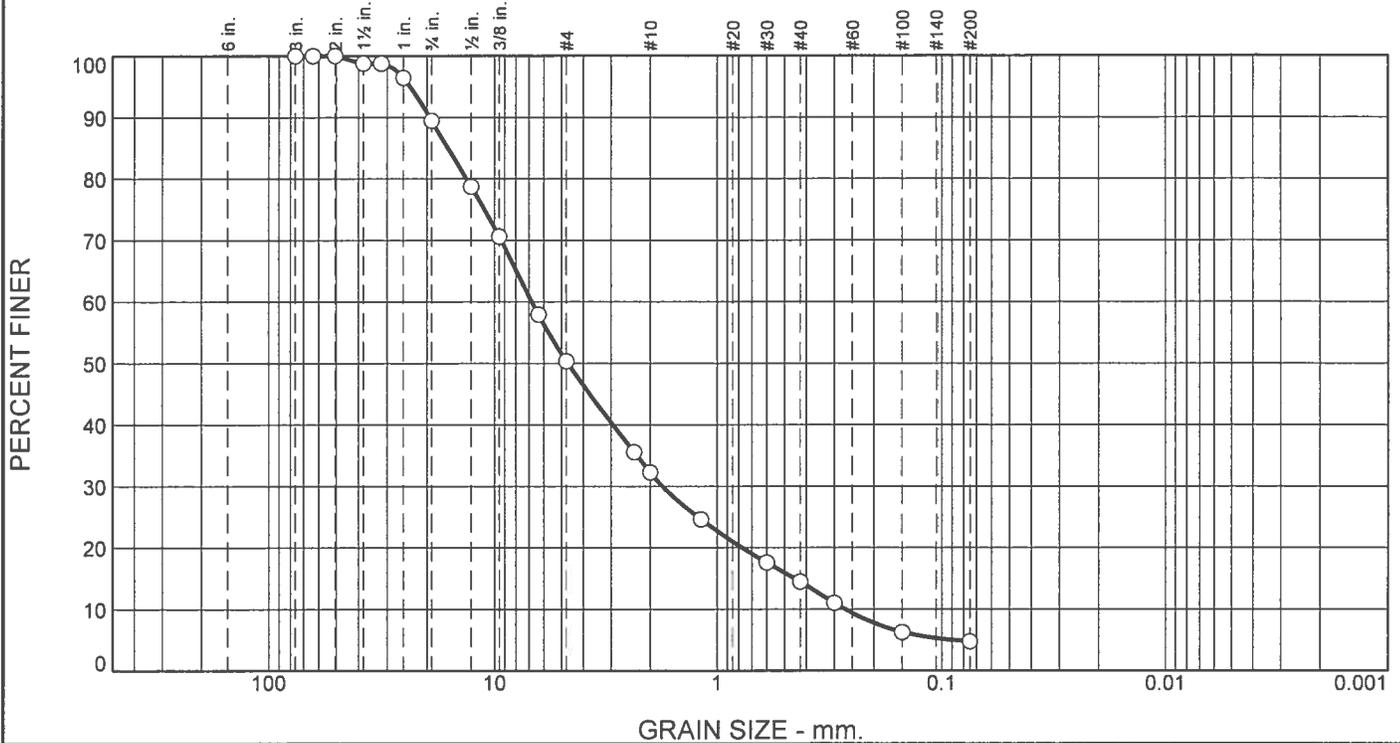
Date Received: 6-27-14 Date Tested: 7-8-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: BBH 1 @ 4.5' - 6.0'
Sample Number: 14-0184

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	11	39	18	18	9	5	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	100		
1.5"	99		
1.25"	99		
1"	96		
3/4"	89		
1/2"	79		
3/8"	71		
1/4"	58		
#4	50		
#8	36		
#10	32		
#16	25		
#30	18		
#40	14		
#50	11		
#100	6		
#200	4.7		

* (no specification provided)

Material Description

Well Graded Gravel with Sand
Moisture Content: 0.6%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= GW AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 19.4313 D₈₅= 16.1039 D₆₀= 6.8048
D₅₀= 4.6794 D₃₀= 1.7580 D₁₅= 0.4490
D₁₀= 0.2689 C_u= 25.30 C_c= 1.69

Remarks

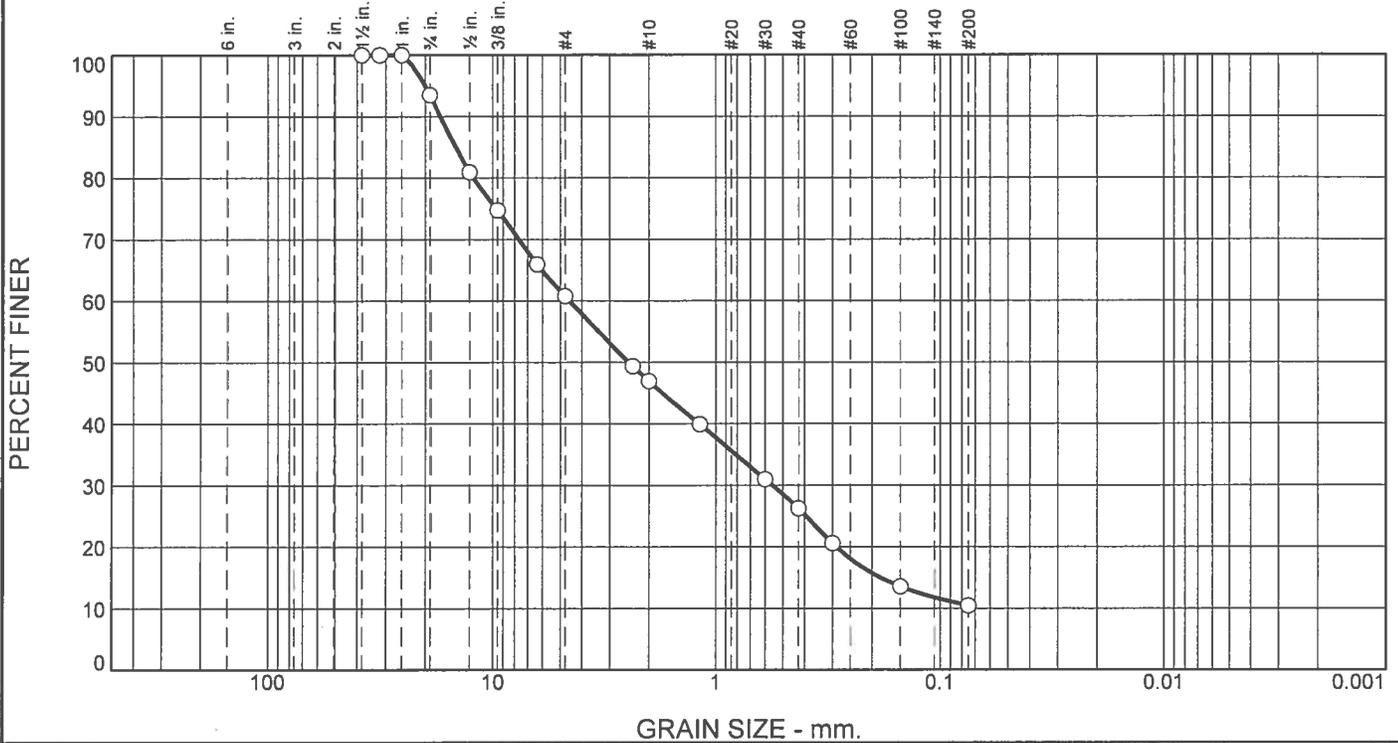
Date Received: 6-27-14 Date Tested: 7-8-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: BBH 1 @ 18.5' - 19.5'
Sample Number: 14-0185

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	7	32	14	21	16	10	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	100		
3/4"	93		
1/2"	81		
3/8"	75		
1/4"	66		
#4	61		
#8	49		
#10	47		
#16	40		
#30	31		
#40	26		
#50	21		
#100	14		
#200	10		

* (no specification provided)

Material Description

Poorly Graded sand with Silt and Gravel
Moisture Content: 0.4%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 17.0916 D₈₅= 14.6326 D₆₀= 4.5387
D₅₀= 2.4588 D₃₀= 0.5563 D₁₅= 0.1837
D₁₀= C_u= C_c=

Remarks

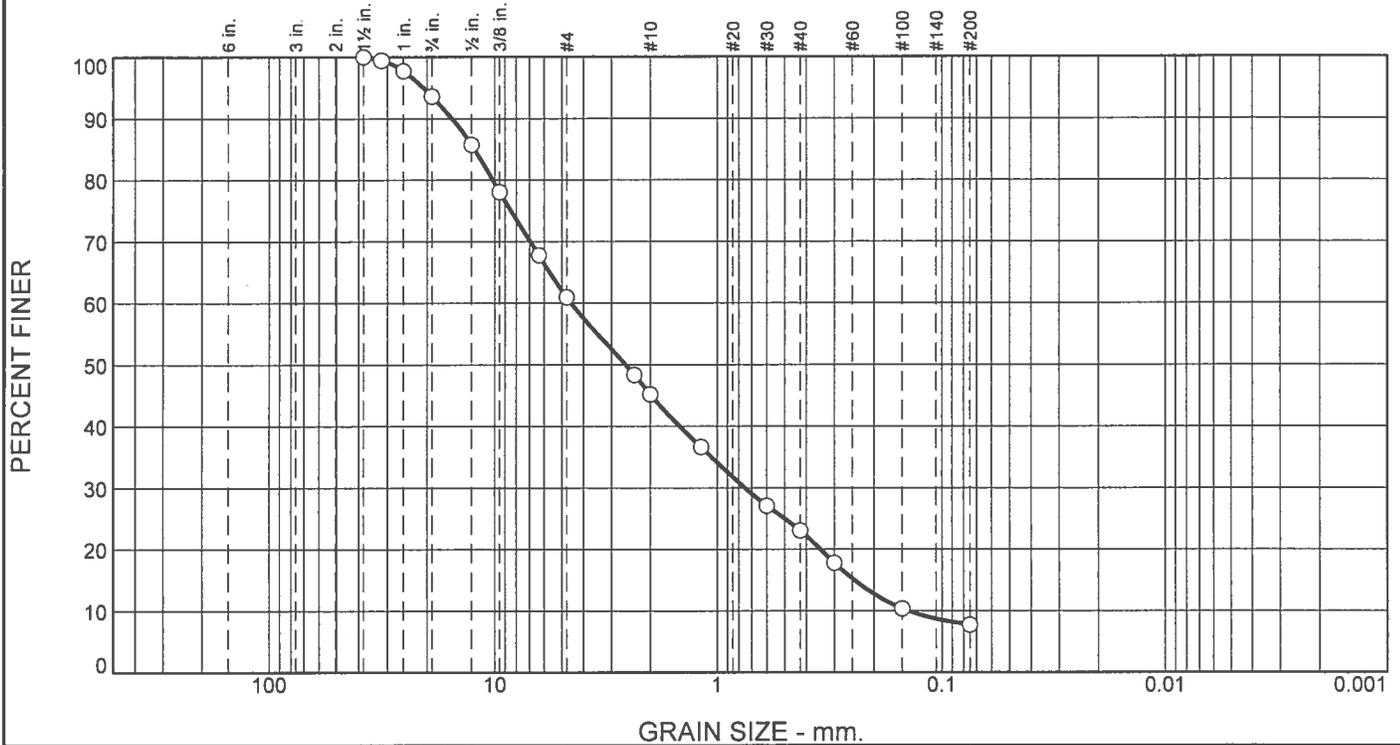
Date Received: 6-27-14 Date Tested: 7-8-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: BBH 2 @ 9.5' - 11.0'
Sample Number: 14-0186

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	6	33	16	22	15	8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	99		
1	98		
3/4"	94		
1/2"	86		
3/8"	78		
1/4"	68		
#4	61		
#8	48		
#10	45		
#16	37		
#30	27		
#40	23		
#50	18		
#100	10		
#200	7.7		

* (no specification provided)

Material Description

Poorly Graded sand with Silt and Gravel
Moisture Content: 0.7%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 15.4803 D₈₅= 12.3123 D₆₀= 4.5436
D₅₀= 2.5848 D₃₀= 0.7515 D₁₅= 0.2444
D₁₀= 0.1417 C_u= 32.07 C_c= 0.88

Remarks

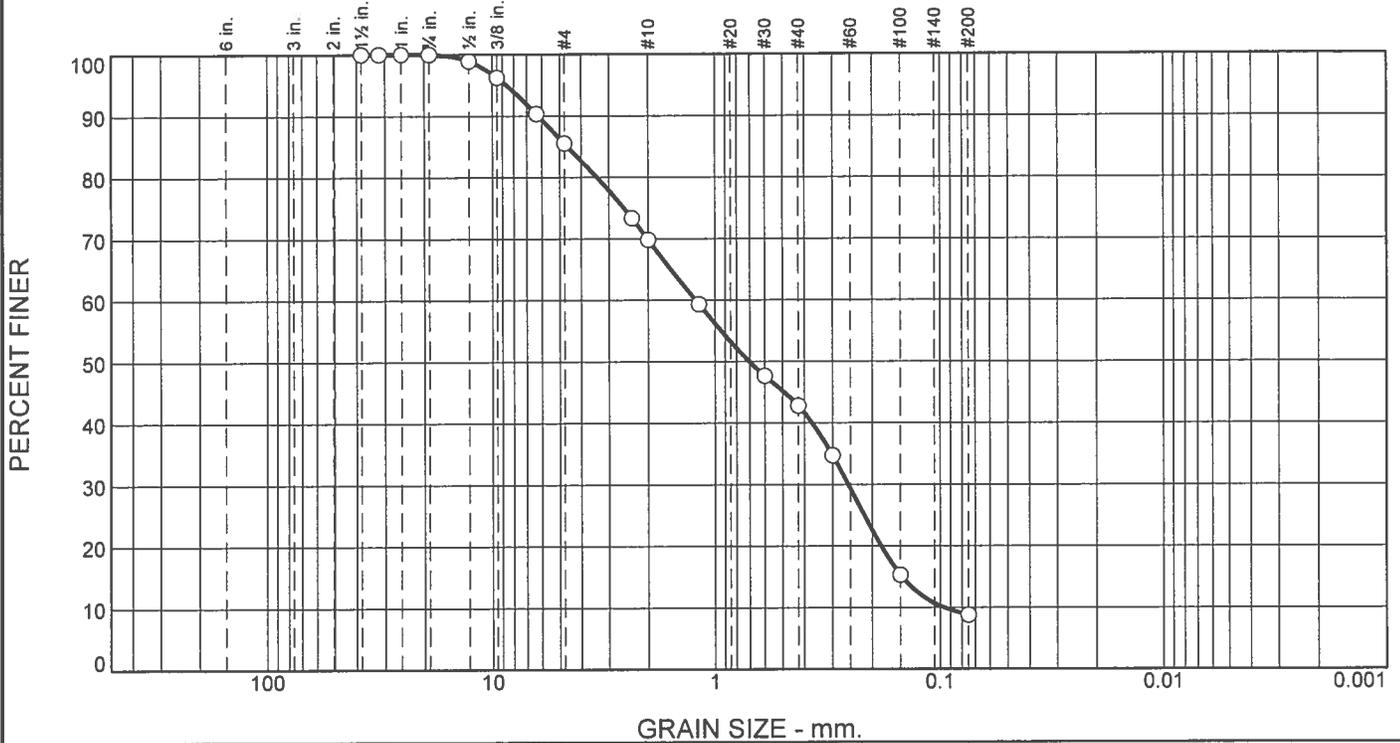
Date Received: 6-27-14 Date Tested: 7-8-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: BBH 2 @ 14.0' - 15.0'
Sample Number: 14-0187

Date Sampled: 6-27-14

<p>ATL, INC.</p> <p>Phoenix, AZ</p>	<p>Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03</p>
<p>Figure</p>	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	14	16	27	34	9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	100		
3/4"	100		
1/2"	99		
3/8"	96		
1/4"	90		
#4	86		
#8	73		
#10	70		
#16	59		
#30	48		
#40	43		
#50	35		
#100	15		
#200	8.8		

Material Description

Poorly Graded sand with Silt
Moisture Content: 1.0%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 6.2164 D₈₅= 4.6013 D₆₀= 1.2210
D₅₀= 0.7035 D₃₀= 0.2555 D₁₅= 0.1477
D₁₀= 0.0965 C_u= 12.66 C_c= 0.55

Remarks

Date Received: 6-27-14 Date Tested: 7-8-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

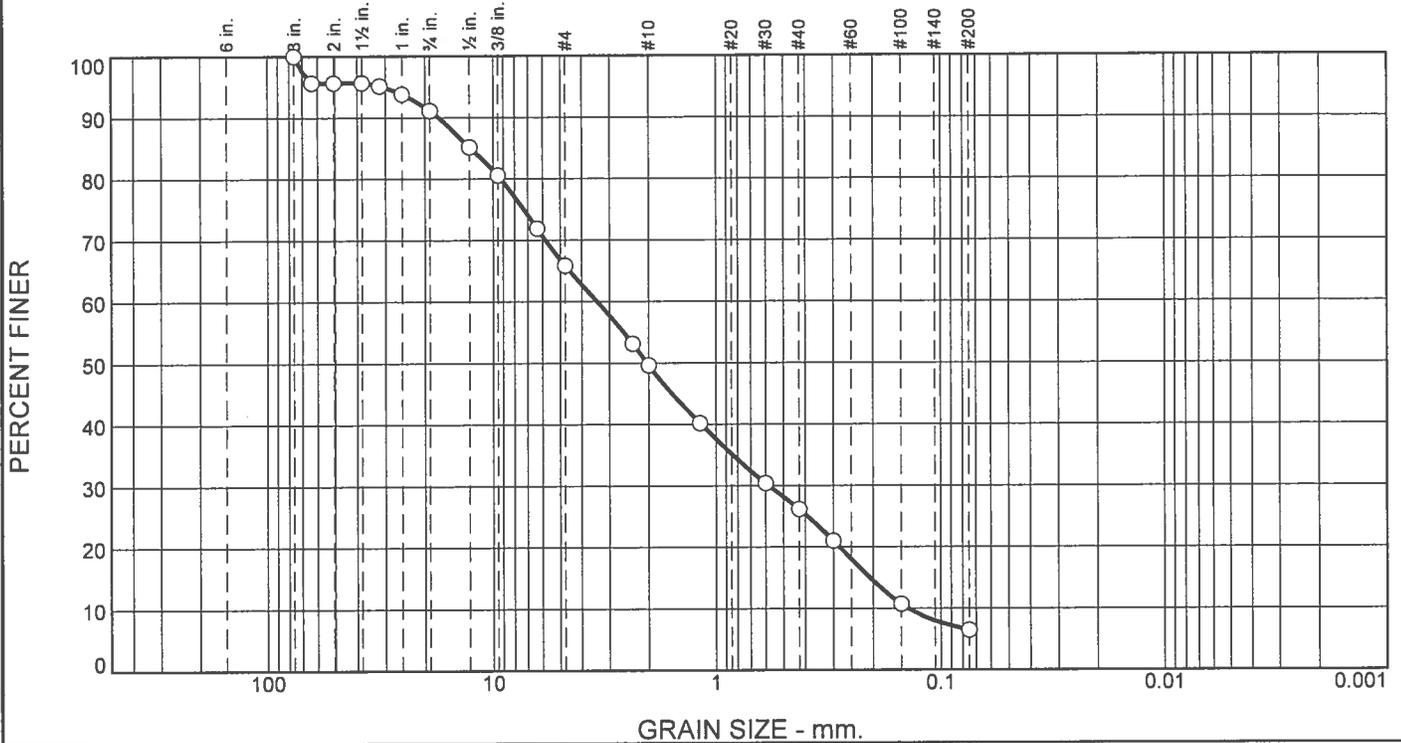
* (no specification provided)

Source of Sample: BBH 3 @ 4.5' - 6.0'
Sample Number: 14-0188

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	25	16	24	20	6	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	96		
2"	96		
1.5"	96		
1.25"	95		
1"	94		
3/4"	91		
1/2"	85		
3/8"	81		
1/4"	72		
#4	66		
#8	53		
#10	50		
#16	40		
#30	30		
#40	26		
#50	21		
#100	11		
#200	6.5		

Material Description

Poorly Graded sand with Silt and Gravel
Moisture Content: 1.4%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 17.4594 D₈₅= 12.5581 D₆₀= 3.4138
D₅₀= 2.0372 D₃₀= 0.5817 D₁₅= 0.2068
D₁₀= 0.1399 C_u= 24.39 C_c= 0.71

Remarks

Date Received: 6-27-14 Date Tested: 7-9-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

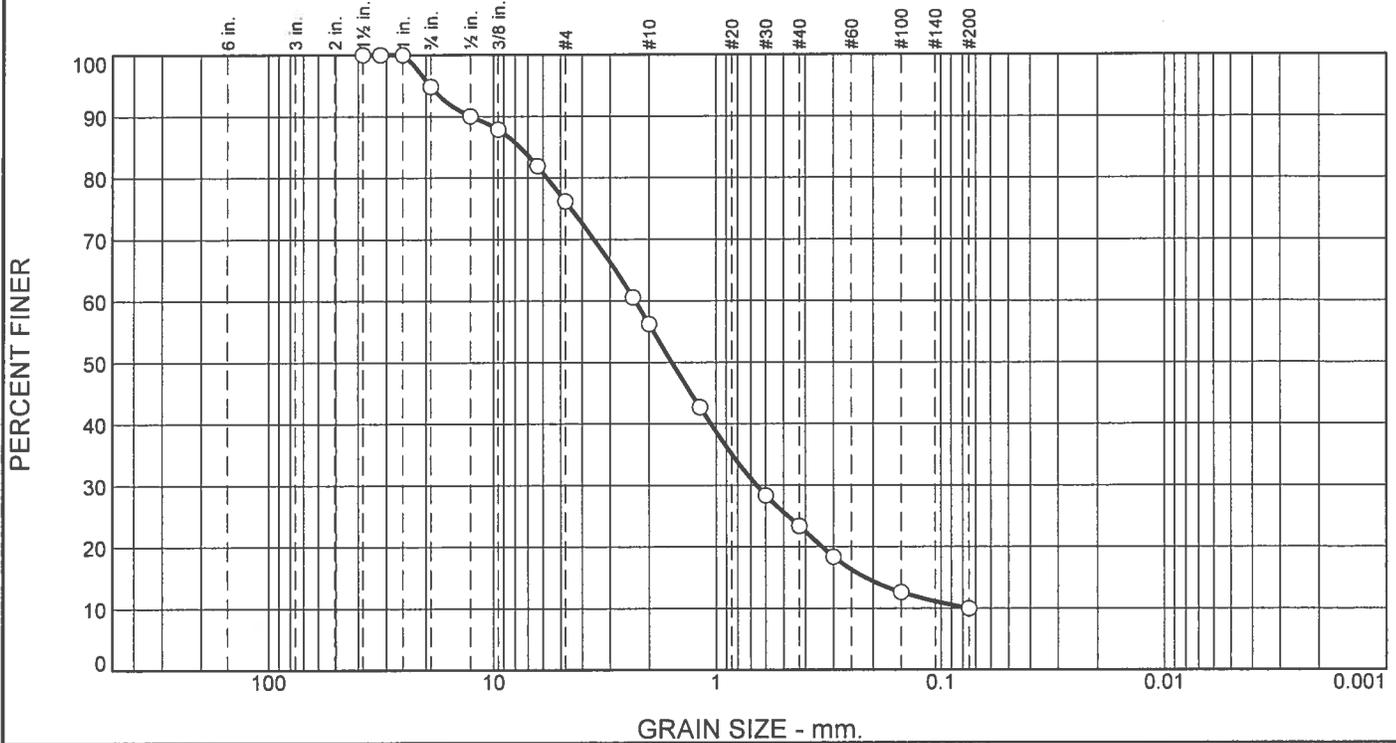
* (no specification provided)

Source of Sample: BBH 3 @ 19.0' - 20.0'
Sample Number: 14-0189

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	5	19	20	33	13	10	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	100		
3/4"	95		
1/2"	90		
3/8"	88		
1/4"	82		
#4	76		
#8	61		
#10	56		
#16	43		
#30	28		
#40	23		
#50	18		
#100	13		
#200	10.0		

Material Description

Well Graded sand with Silt and Gravel
Moisture Content: 1.4%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SW-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 12.6451 D₈₅= 7.6089 D₆₀= 2.3064
D₅₀= 1.5773 D₃₀= 0.6608 D₁₅= 0.2167
D₁₀= 0.0757 C_u= 30.45 C_c= 2.50

Remarks

Date Received: 6-27-14 Date Tested: 7-9-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

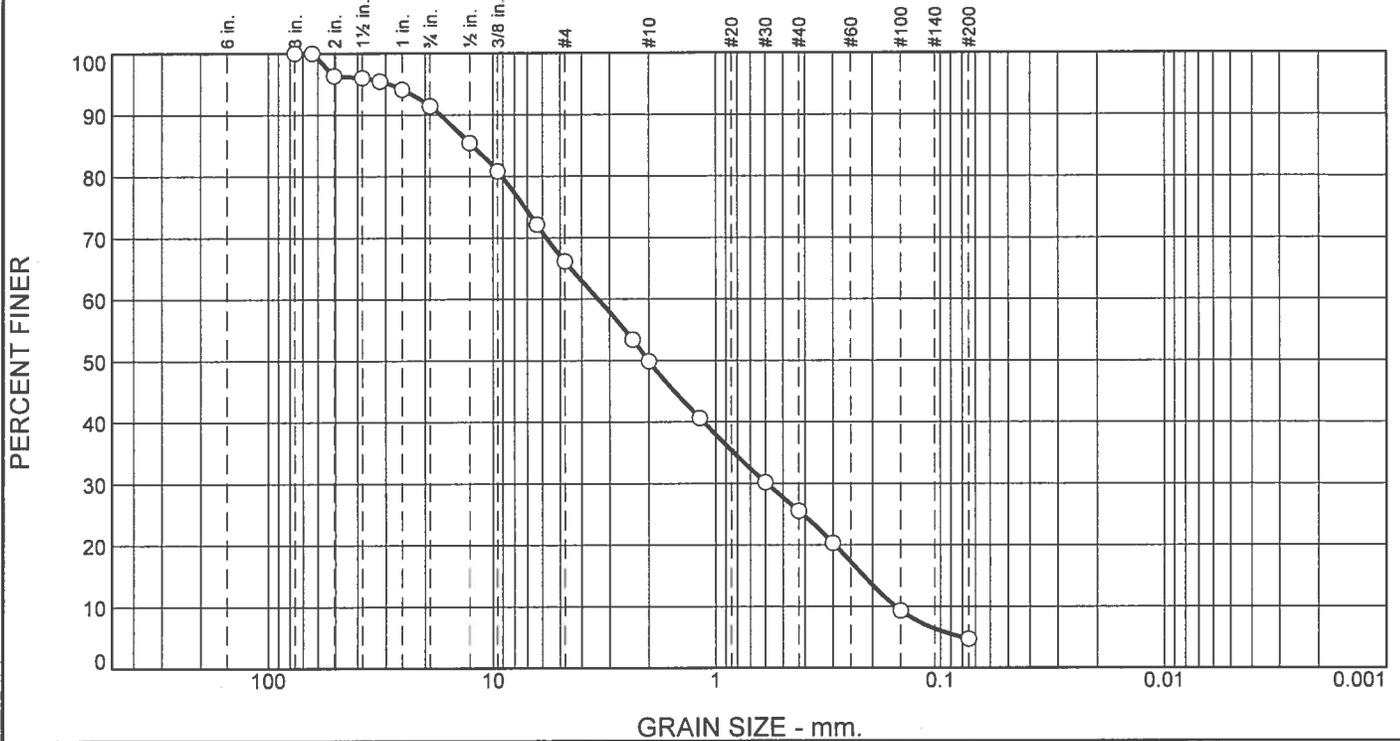
* (no specification provided)

Source of Sample: BBH 4 @ 9.5' - 11.0'
Sample Number: 14-0191

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	25	16	24	21	5	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	96		
1.5"	96		
1.25"	95		
1"	94		
3/4"	91		
1/2"	85		
3/8"	81		
1/4"	72		
#4	66		
#8	53		
#10	50		
#16	41		
#30	30		
#40	26		
#50	20		
#100	9		
#200	4.7		

Material Description

Poorly Graded sand with Silt and Gravel
Moisture Content: 1.3%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 17.1067 D₈₅= 12.3288 D₆₀= 3.3695
D₅₀= 2.0088 D₃₀= 0.5914 D₁₅= 0.2192
D₁₀= 0.1583 C_u= 21.29 C_c= 0.66

Remarks

Date Received: 6-27-14 Date Tested: 7-9-14

Tested By: J. Alcanterra

Checked By: A. Capper

Title: lab Supervisor

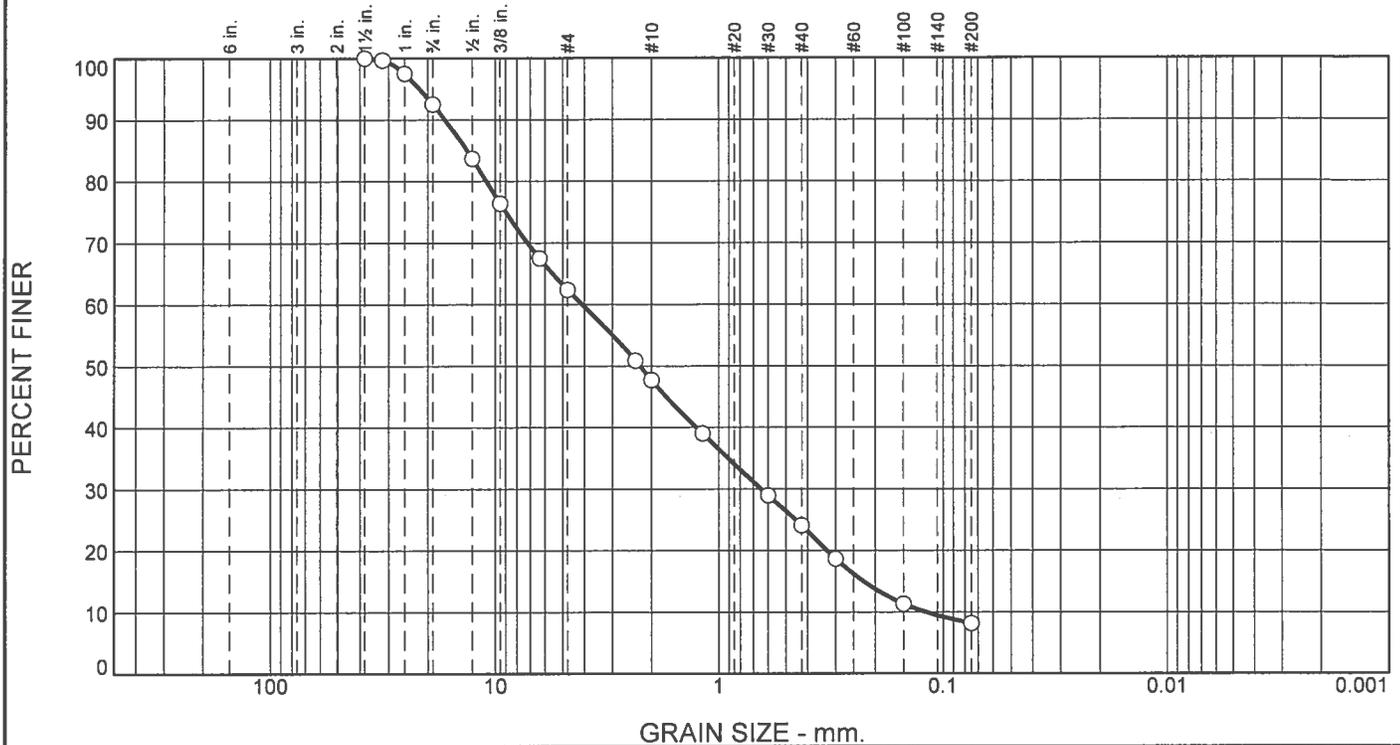
* (no specification provided)

Source of Sample: BBH 4 @ 19.0' - 20.0'
Sample Number: 14-0192

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	7	31	14	24	16	8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	98		
3/4"	93		
1/2"	84		
3/8"	76		
1/4"	68		
#4	62		
#8	51		
#10	48		
#16	39		
#30	29		
#40	24		
#50	19		
#100	11		
#200	8.2		

* (no specification provided)

Material Description

Poorly Graded sand with Silt and Gravel
Moisture Content: 0.9%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 16.7863 D₈₅= 13.3999 D₆₀= 4.0870
D₅₀= 2.2531 D₃₀= 0.6460 D₁₅= 0.2257
D₁₀= 0.1194 C_u= 34.24 C_c= 0.86

Remarks

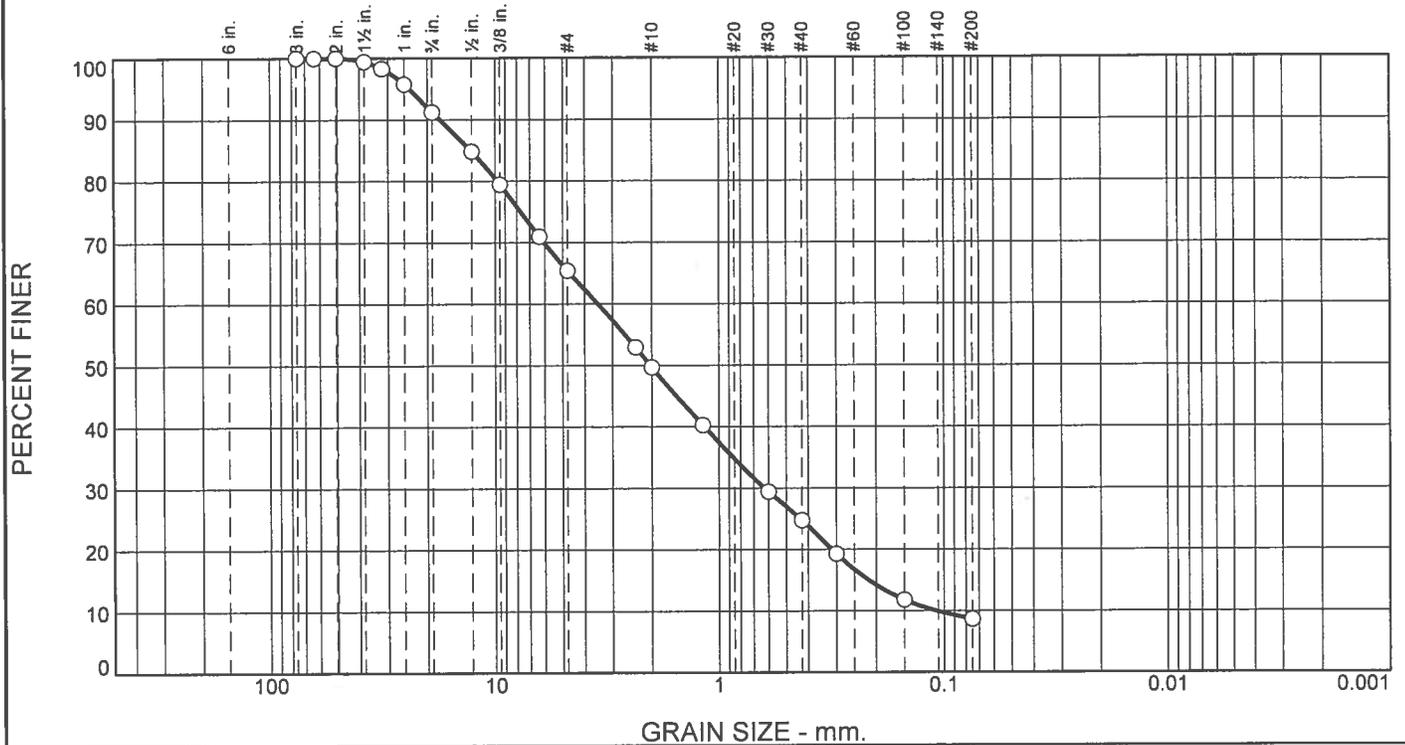
Date Received: 6-27-14 Date Tested: 7-9-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: BBH 5 @ 14.0' - 15.0'
Sample Number: 14-0194

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	26	15	25	16	9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	100		
1.5"	99		
1.25"	98		
1"	96		
3/4"	91		
1/2"	85		
3/8"	79		
1/4"	71		
#4	65		
#8	53		
#10	50		
#16	40		
#30	29		
#40	25		
#50	19		
#100	12		
#200	8.6		

Material Description

Well Graded sand with Silt and Gravel
Moisture Content: 1.0%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SW-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 17.6091 D₈₅= 12.8297 D₆₀= 3.4873
D₅₀= 2.0338 D₃₀= 0.6260 D₁₅= 0.2160
D₁₀= 0.1086 C_u= 32.12 C_c= 1.03

Remarks

Date Received: 6-27-14 Date Tested: 7-9-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

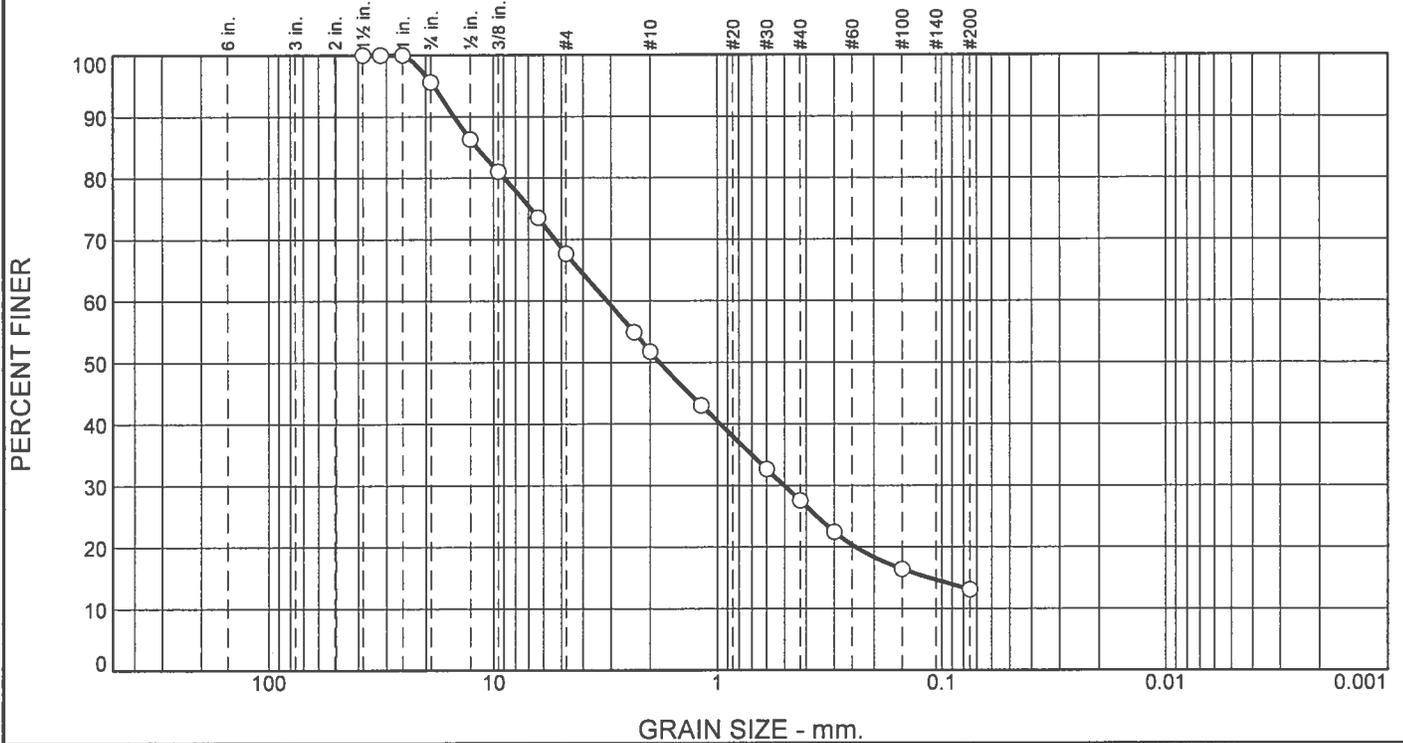
* (no specification provided)

Source of Sample: BBH 6 @ 14.0' - 15.0'
Sample Number: 14-0195

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03 Figure
--	--

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	4	28	16	24	15	13	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	100		
1	100		
3/4"	96		
1/2"	86		
3/8"	81		
1/4"	74		
#4	68		
#8	55		
#10	52		
#16	43		
#30	33		
#40	28		
#50	22		
#100	16		
#200	13		

Material Description

Silty Sand with Gravel
Moisture Content: 1.2%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 14.9543 D₈₅= 11.8861 D₆₀= 3.1234
D₅₀= 1.8161 D₃₀= 0.5012 D₁₅= 0.1146
D₁₀= C_u= C_c=

Remarks

Date Received: 6-27-14 Date Tested: 7-9-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

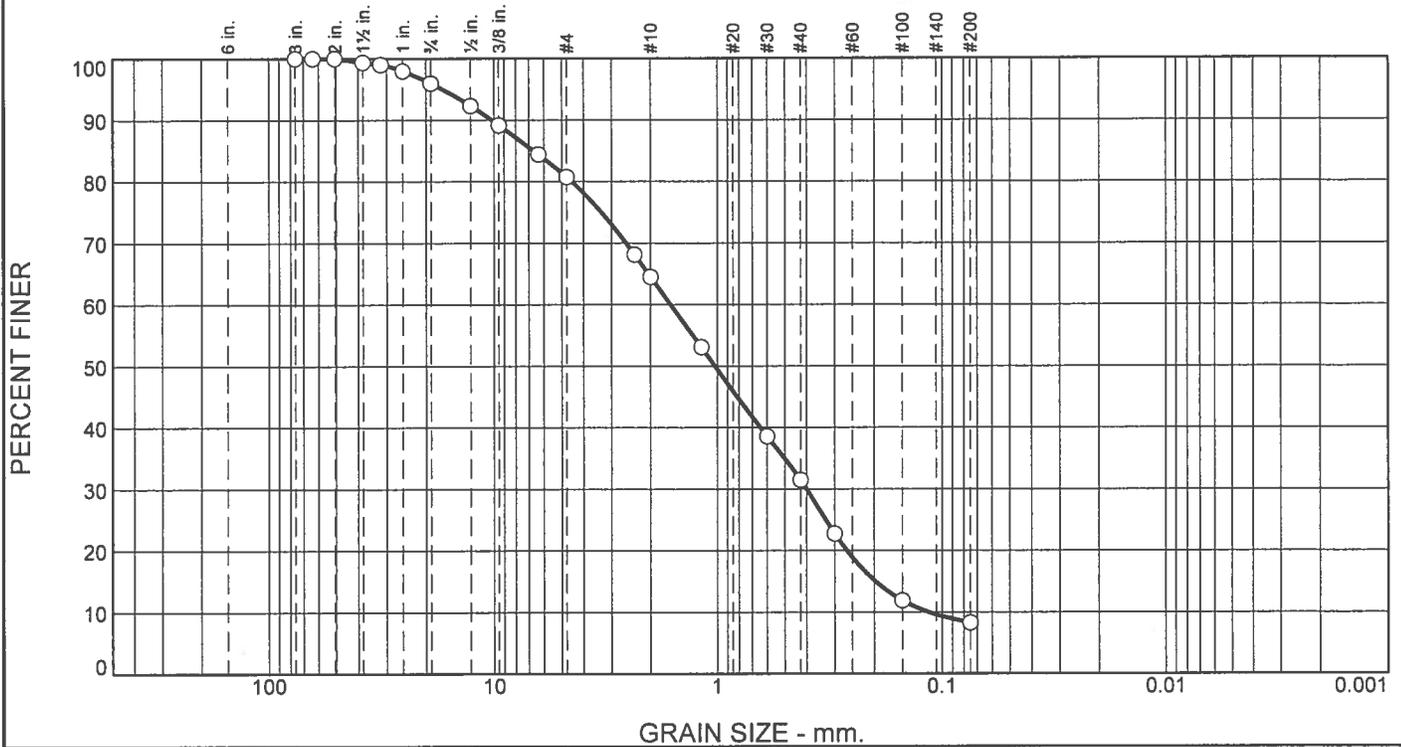
* (no specification provided)

Source of Sample: BBH 6 @ 19.5' - 21.0'
Sample Number: 14-0196

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	4	15	16	34	23	8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	100		
1.5"	99		
1.25"	99		
1"	98		
3/4"	96		
1/2"	92		
3/8"	89		
1/4"	84		
#4	81		
#8	68		
#10	65		
#16	53		
#30	39		
#40	31		
#50	23		
#100	12		
#200	8.3		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 1.6%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 10.2492 D₈₅= 6.6704 D₆₀= 1.6252
D₅₀= 1.0262 D₃₀= 0.3999 D₁₅= 0.1973
D₁₀= 0.1149 C_u= 14.15 C_c= 0.86

Remarks

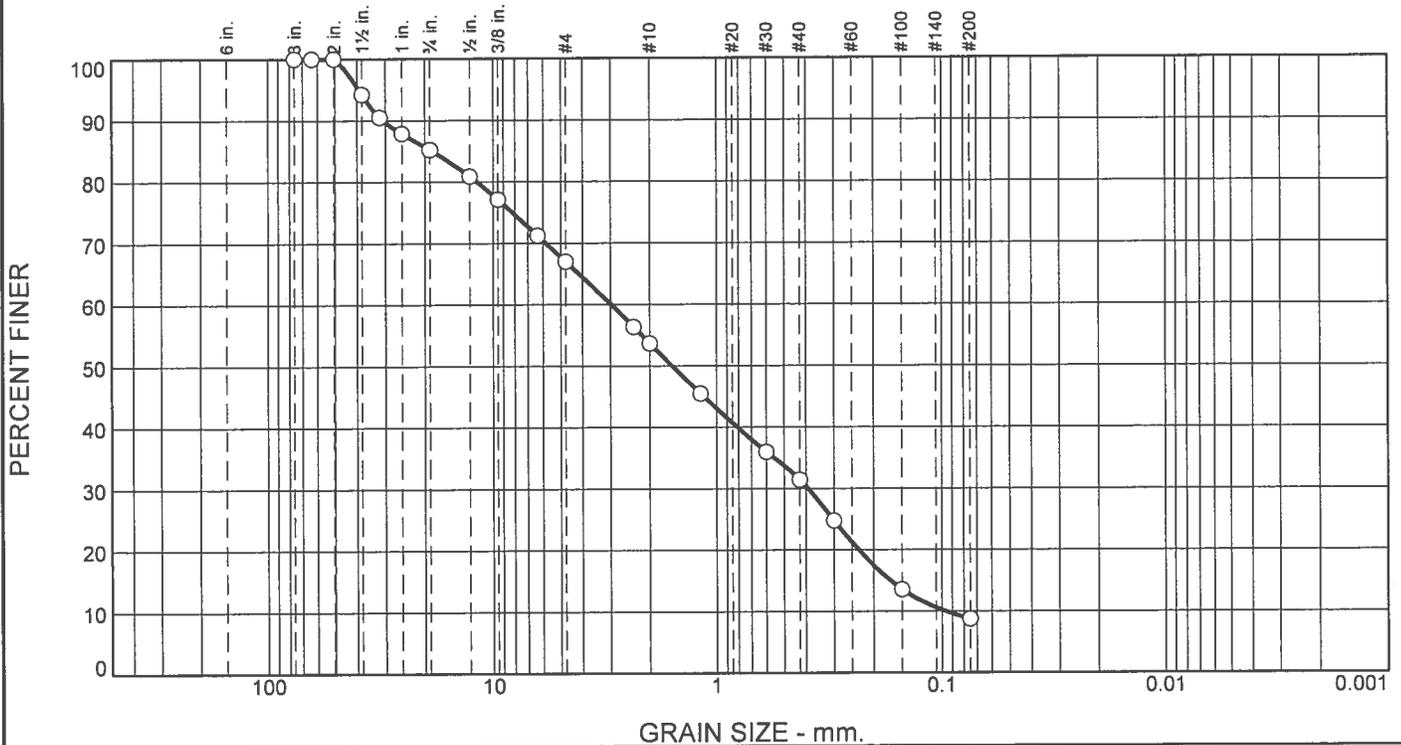
Date Received: 6-27-14 Date Tested: 7-10-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: TP 1 @ 0.0' - 3.0'
Sample Number: 14-0197

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	15	18	13	23	22	9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	100		
1.5"	94		
1.25"	90		
1"	88		
3/4"	85		
1/2"	81		
3/8"	77		
1/4"	71		
#4	67		
#8	56		
#10	54		
#16	46		
#30	36		
#40	31		
#50	25		
#100	14		
#200	8.7		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 1.0%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 30.7597 D₈₅= 18.6144 D₆₀= 2.9729
D₅₀= 1.5883 D₃₀= 0.3910 D₁₅= 0.1690
D₁₀= 0.0961 C_u= 30.94 C_c= 0.54

Remarks

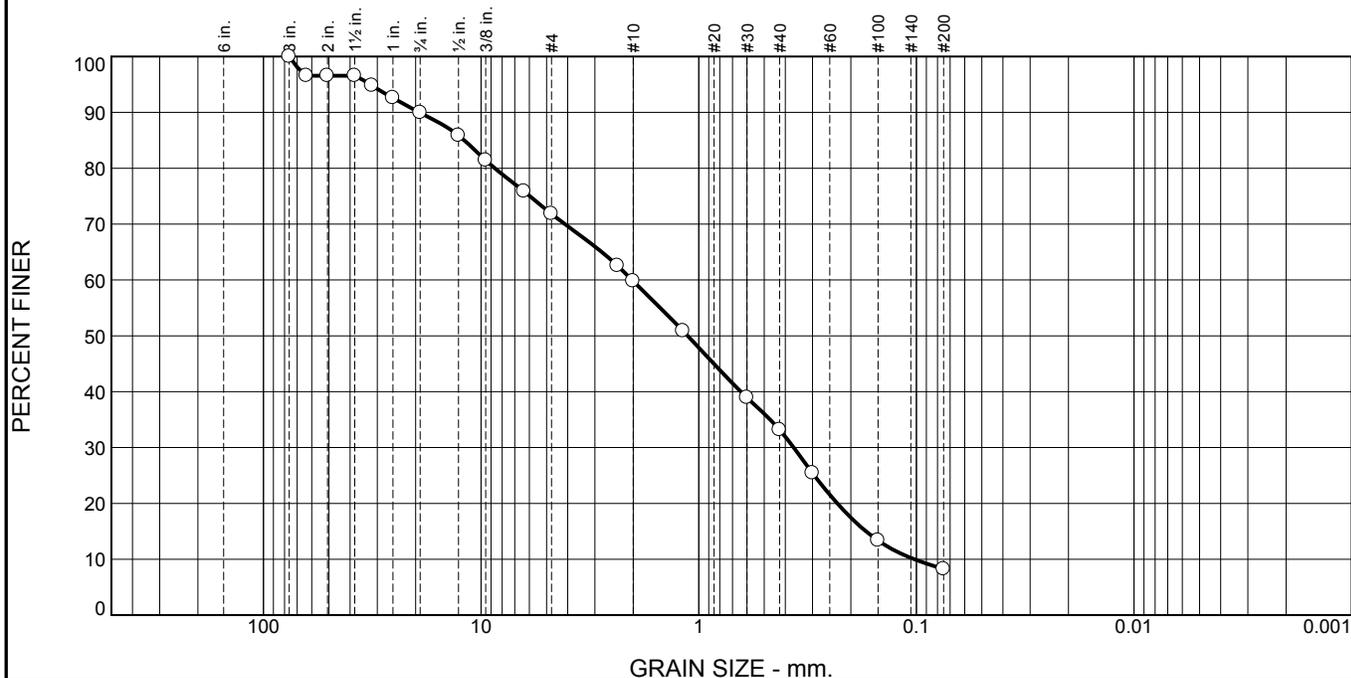
Date Received: 6-27-14 Date Tested: 7-10-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: TP 2 @ 0.0' - 3.0'
Sample Number: 14-0199

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03 Figure
--	--

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	10	18	12	27	25	8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	97		
2"	97		
1.5"	97		
1.25"	95		
1"	93		
3/4"	90		
1/2"	86		
3/8"	81		
1/4"	76		
#4	72		
#8	63		
#10	60		
#16	51		
#30	39		
#40	33		
#50	25		
#100	13		
#200	8.2		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 0.8%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 19.2303 D₈₅= 11.9503 D₆₀= 2.0265
D₅₀= 1.1239 D₃₀= 0.3663 D₁₅= 0.1704
D₁₀= 0.1022 C_u= 19.83 C_c= 0.65

Remarks

Date Received: 6-27-14 Date Tested: 7-10-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

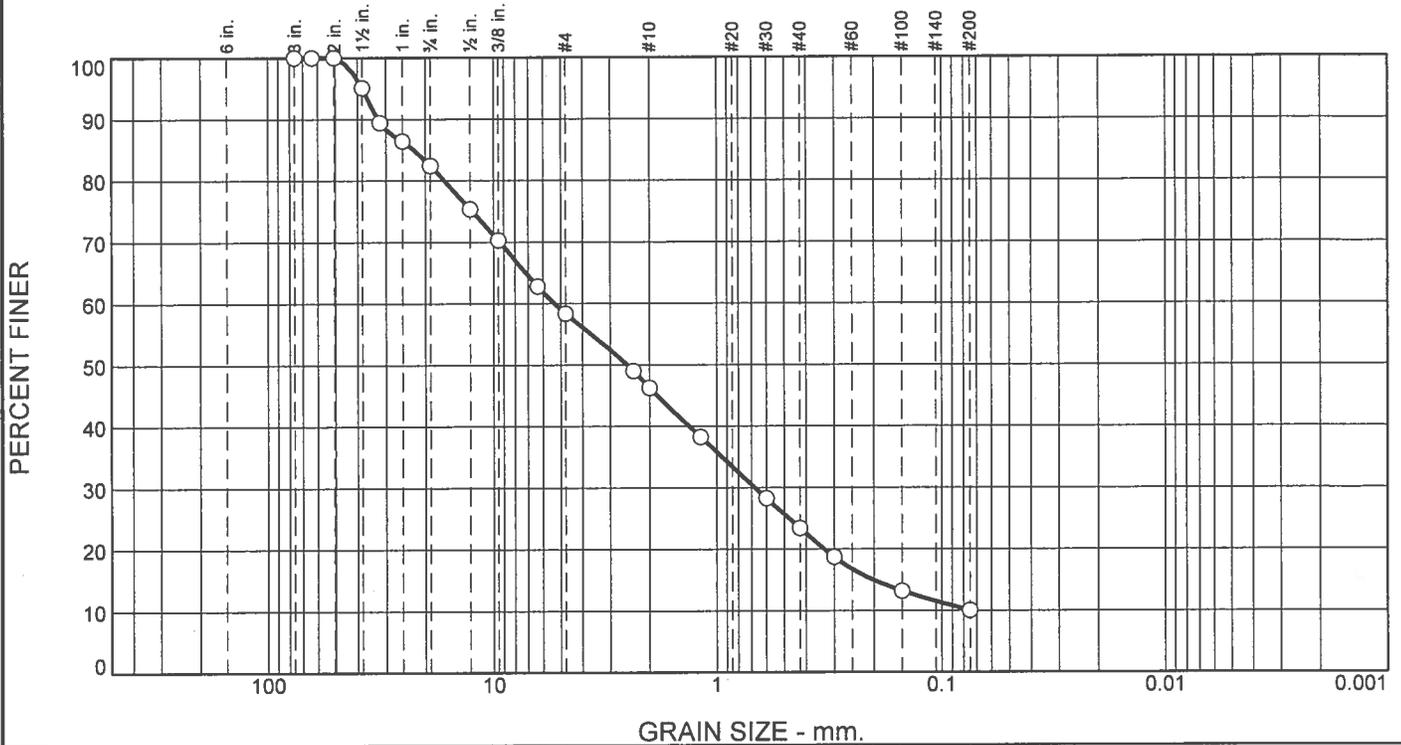
Source of Sample: TP 3 @ 0.0' - 3.0'
Sample Number: 14-0201

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
--	--

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	18	24	12	23	13	10	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	100		
1.5"	95		
1.25"	89		
1"	86		
3/4"	82		
1/2"	75		
3/8"	70		
1/4"	63		
#4	58		
#8	49		
#10	46		
#16	38		
#30	28		
#40	23		
#50	19		
#100	13		
#200	10		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 2.9%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 32.4828 D₈₅= 22.5267 D₆₀= 5.3225
D₅₀= 2.5134 D₃₀= 0.6770 D₁₅= 0.2013
D₁₀= C_u= C_c=

Remarks

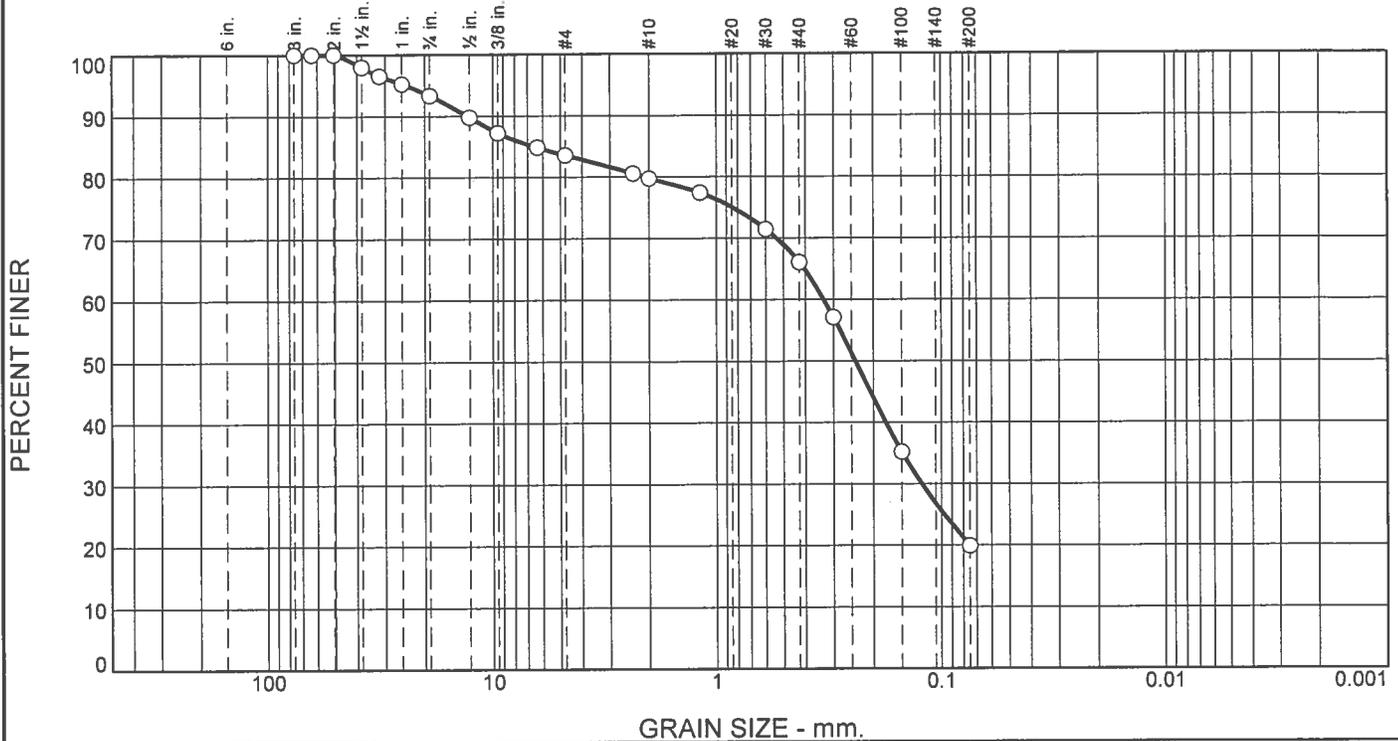
Date Received: 6-27-14 Date Tested: 7-10-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: TP 4 @ 0.0' - 3.0'
Sample Number: 14-0201

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	7	9	4	14	46	20	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2.5"	100		
2"	100		
1.5"	98		
1.25"	97		
1"	95		
3/4"	93		
1/2"	90		
3/8"	87		
1/4"	85		
#4	84		
#8	81		
#10	80		
#16	77		
#30	71		
#40	66		
#50	57		
#100	35		
#200	20		

Material Description

Silty Sand with Gravel
Moisture Content: 1.5%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 12.9740 D₈₅= 6.5503 D₆₀= 0.3315
D₅₀= 0.2399 D₃₀= 0.1224 D₁₅=
D₁₀= C_u= C_c=

Remarks

Date Received: 6-27-14 Date Tested: 7-10-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

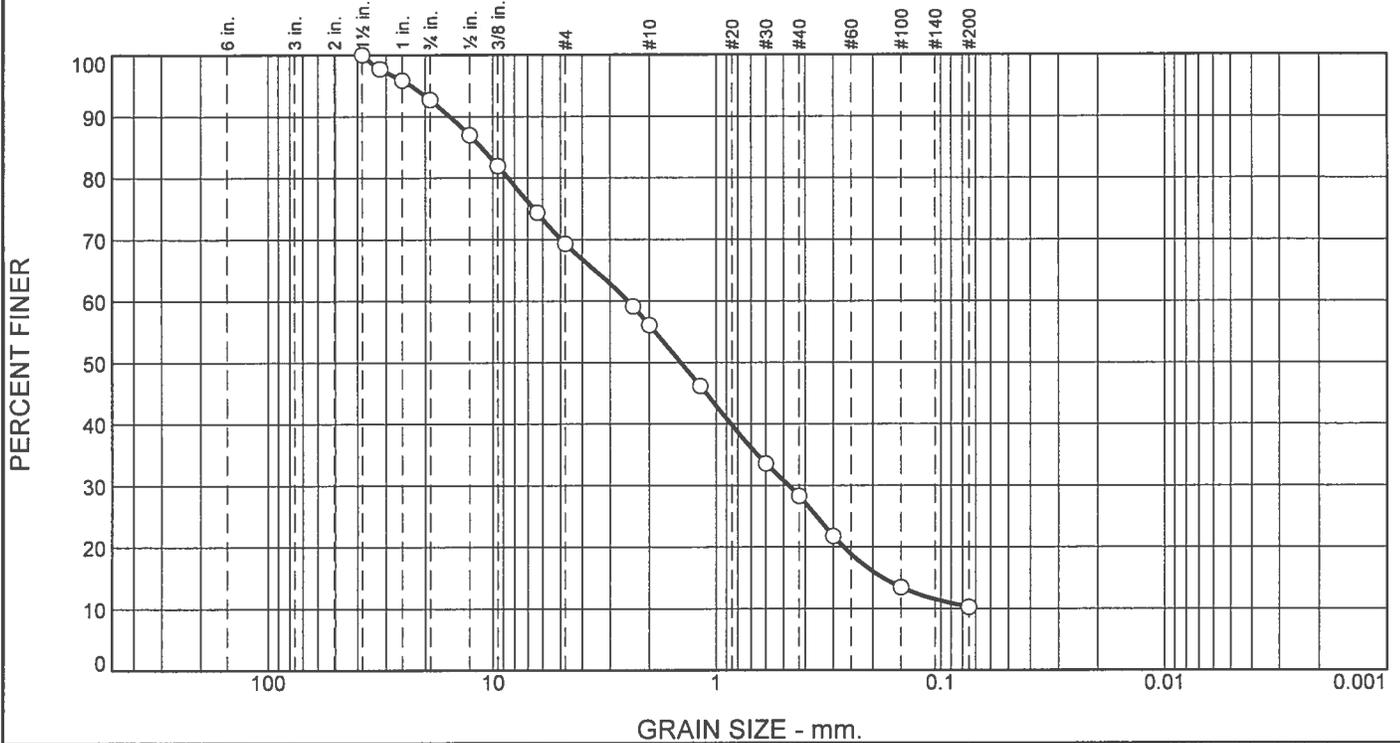
* (no specification provided)

Source of Sample: TP 5 @ 0.0' - 3.0'
Sample Number: 14-0204

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	7	24	13	28	18	10	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1.25	98		
1	96		
3/4"	93		
1/2"	87		
3/8"	82		
1/4"	74		
#4	69		
#8	59		
#10	56		
#16	46		
#30	34		
#40	28		
#50	22		
#100	13		
#200	10		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt and Gravel
Moisture Content: 1.5%

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 15.5451 D₈₅= 11.2821 D₆₀= 2.4836
D₅₀= 1.4441 D₃₀= 0.4730 D₁₅= 0.1808
D₁₀= C_u= C_c=

Remarks

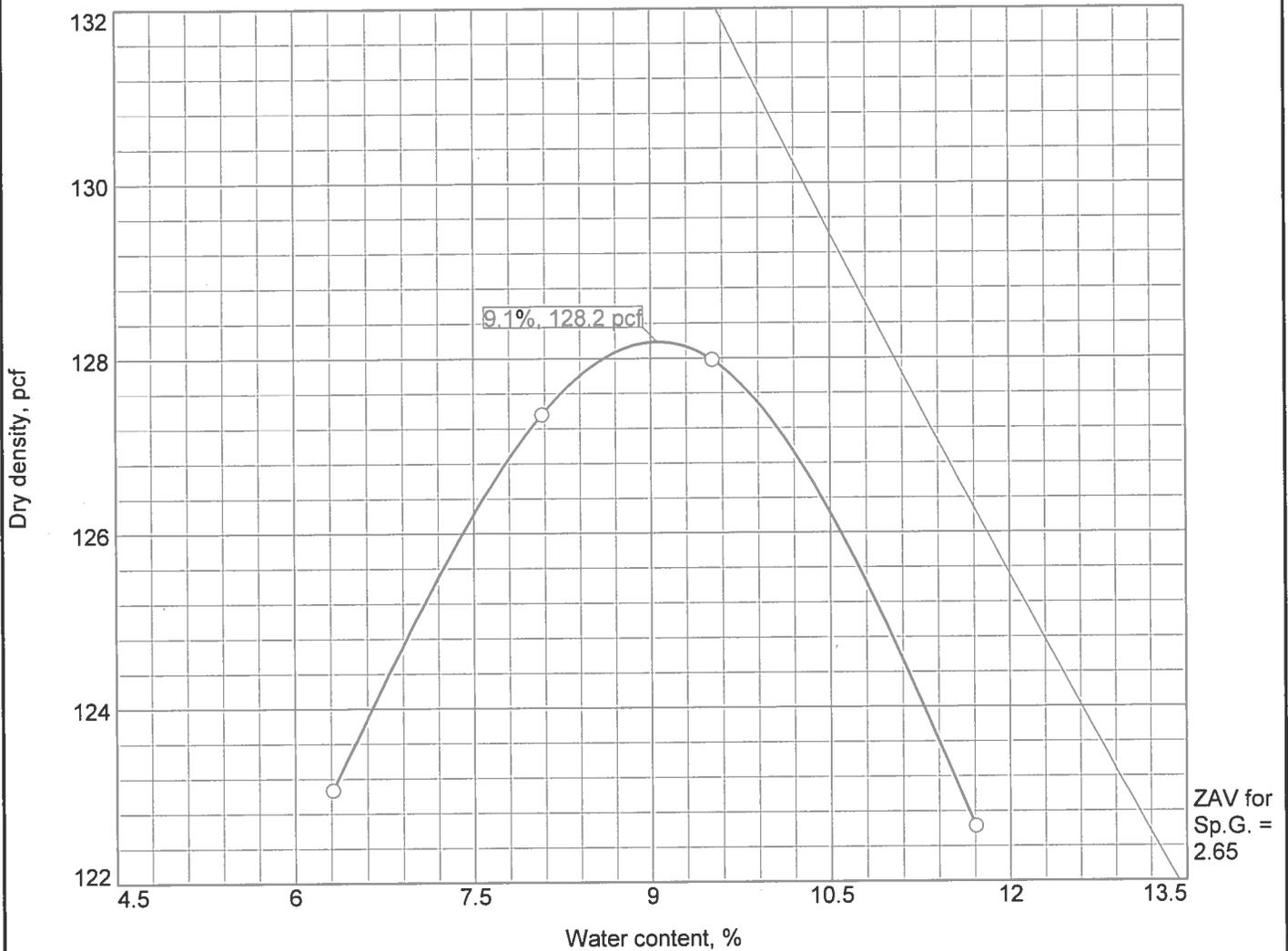
Date Received: 6-27-14 Date Tested: 7-10-14
Tested By: J. Alcanterra
Checked By: A. Capper
Title: lab Supervisor

Source of Sample: P 1 @ 0.0' - 5.0'
Sample Number: 14-0206

Date Sampled: 6-27-14

ATL, INC. Phoenix, AZ	Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D Project No: 213020-03
Figure	

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SP-SM	A-1-a		2.65	NV	NP	42	10

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 128.2 pcf Optimum moisture = 9.1 %	Poorly Graded Sand with Silt and Gravel Moisture Content: 2.9%
Project No. 213020-03 Client: AECOM Project: ADOT ECS On-Call Ehrenberg, H616101D ○ Source of Sample: TP 4 @ 0.0' - 5.0' Sample Number: 14-0203 ATL, INC. Phoenix, AZ	Remarks: <div style="text-align: right;">Figure</div>

Tested By: A. Capper

Checked By: A. Capper

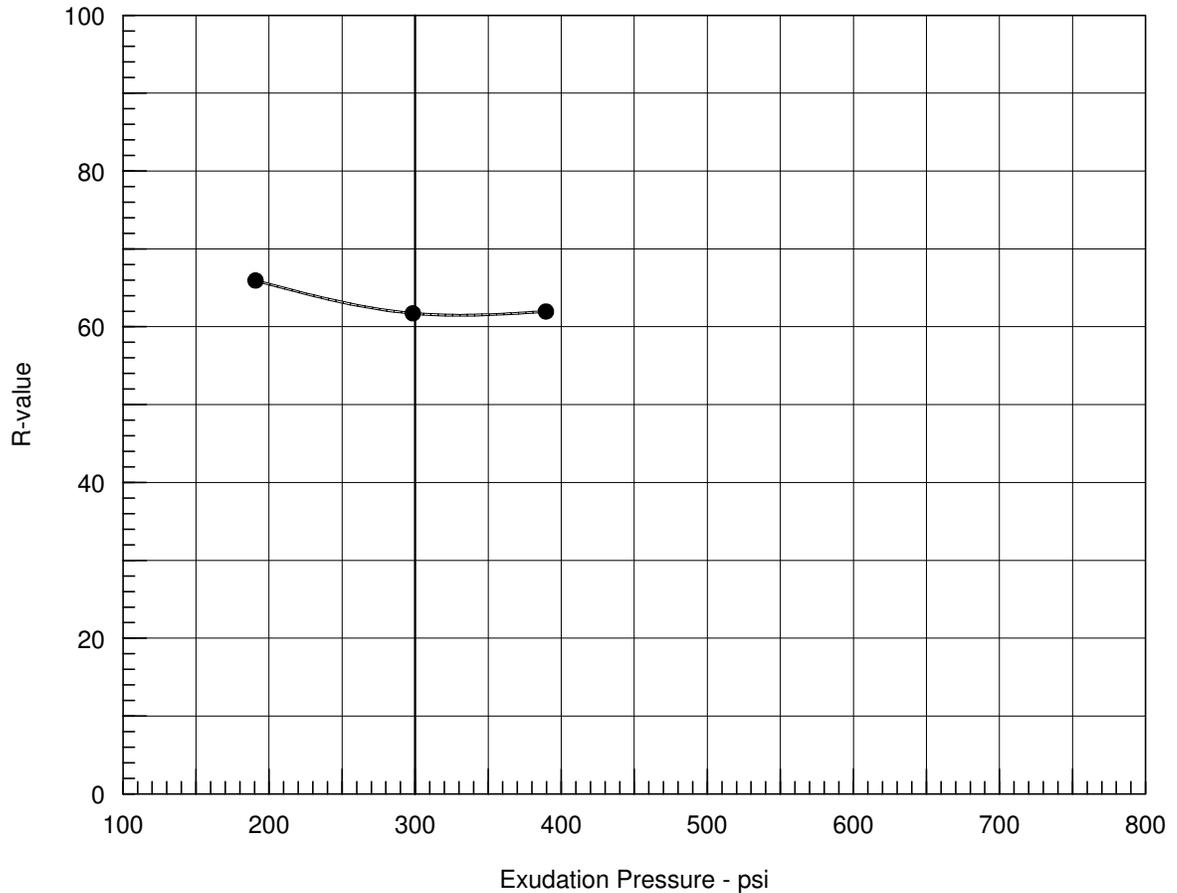


ADOT ECS On-Call Ehrenberg, H616101D
AECOM
ATL JOB NO. 213020-03

DENSITY OF SOIL IN PLACE BY THE DRIVE-CYLINDER METHOD (ASTM D2937)

LAB No.	Sample ID	Moist. Content	DRY DENSITY (pcf)
14-0178	RING SAMPLE WBH-3 @ 10.0-11.0	3.5%	121.7
14-0193	RING SAMPLE BBH-4 @ 20.0-21.0	2.9%	121.7

R-VALUE TEST REPORT

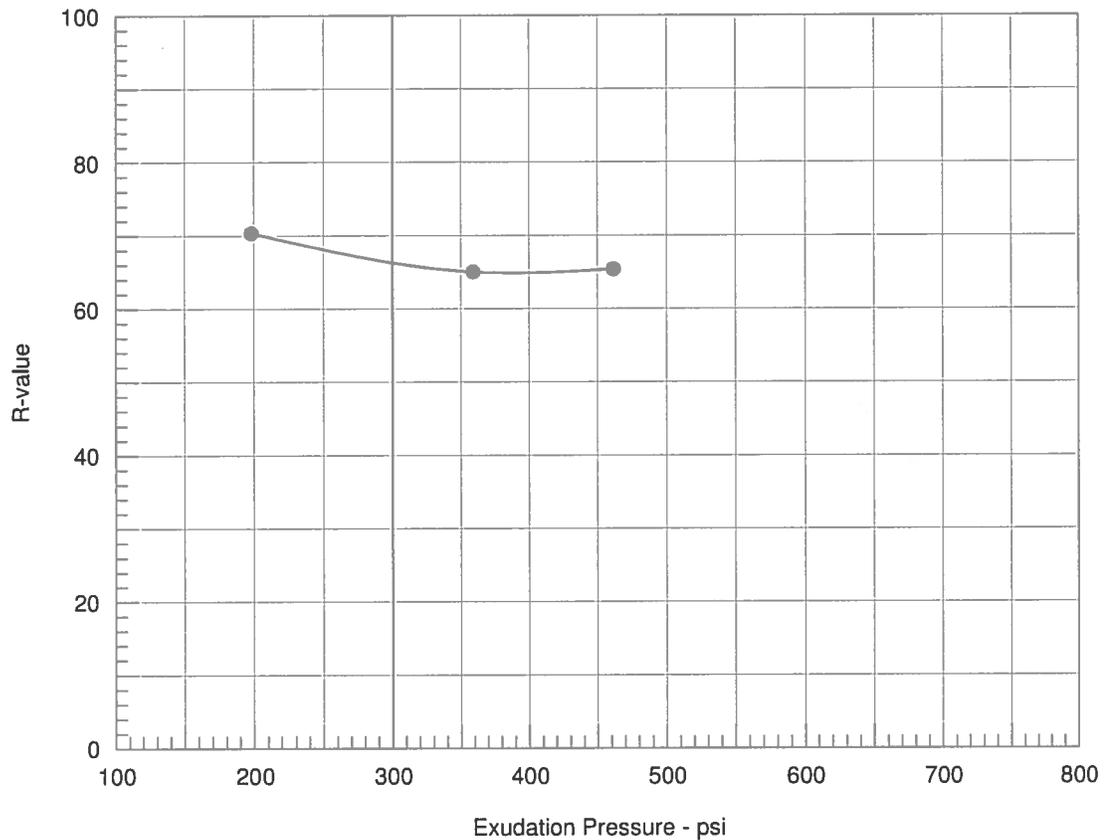


Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	134.3	7.6	0.00	32	2.40	191	68.1	65.9
2	350	133.6	8.0	0.00	39	2.45	298	61.7	61.7
3	350	135.8	7.2	0.00	35	2.41	390	64.1	62.0

Test Results	Material Description
<p>R-value at 300 psi exudation pressure = 61.7</p>	<p>Poorly Graded Sand with Silt and Gravel Moisture Content: 1.6%</p>
<p>Project No.: 213020-03 Project: ADOT ECS On-Call Ehrenberg, H616101D Source of Sample: TP 1 @ 0.0' - 3.0' Sample Number: 14-0197 Date: 7/16/2014</p>	<p>Tested by: A. Capper Checked by: A. Capper Remarks:</p>
<p>R-VALUE TEST REPORT ATL, Inc.</p>	<p>Figure _____</p>

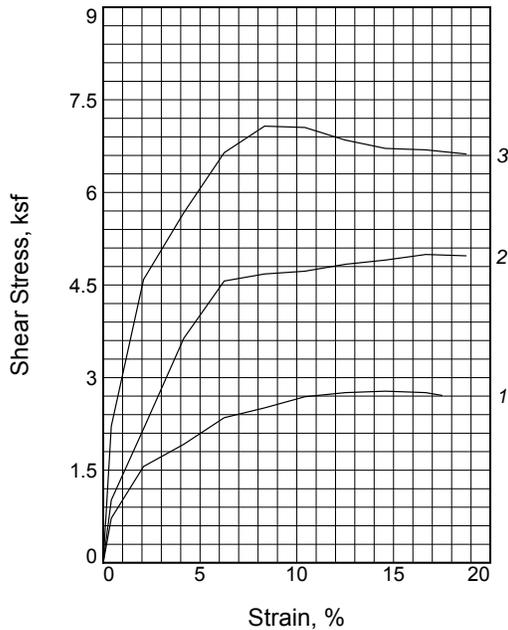
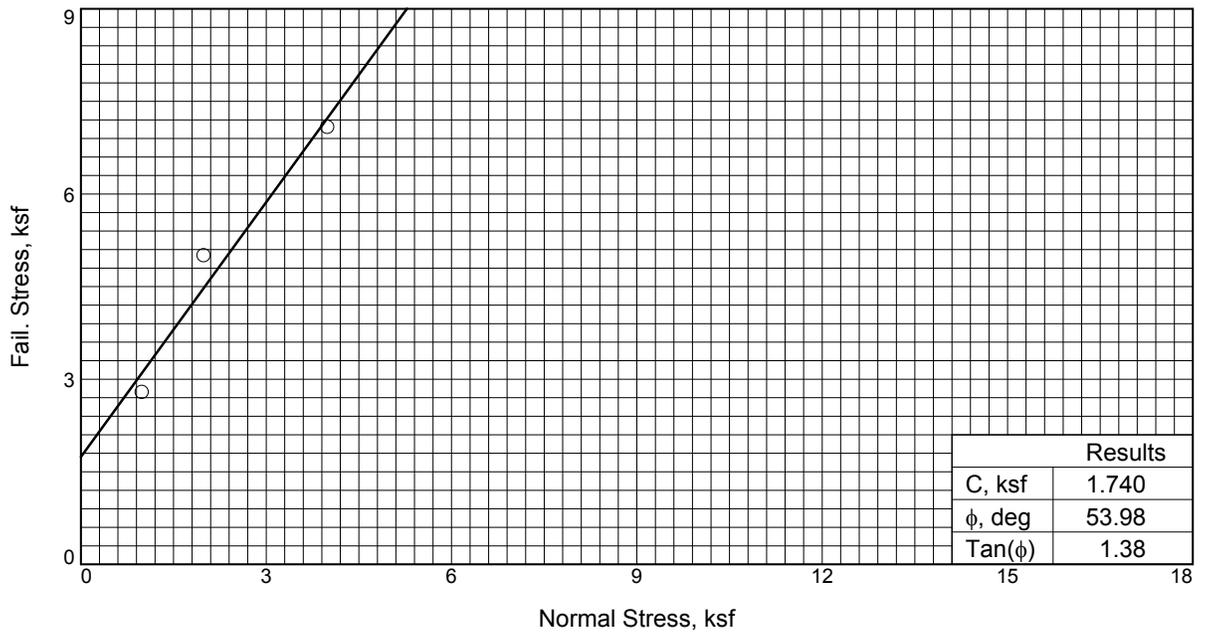
R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	133.1	6.6	0.00	34	2.45	198	70.3	70.3
2	350	136.0	6.2	0.00	37	2.45	359	65.0	65.0
3	350	133.3	5.6	0.00	40	2.46	462	65.4	65.4

Test Results	Material Description
R-value at 300 psi exudation pressure = 66.3	Poorly Graded Sand with Silt and Gravel Moisture Content: 0.8%
Project No.: 213020-03 Project: ADOT ECS On-Call Ehrenberg, H616101D Source of Sample: TP 3 @ 0.0' - 3.0' Sample Number: 14-0201 Date: 7/16/2014	Tested by: A. Capper Checked by: A. Capper Remarks:
R-VALUE TEST REPORT ATL, Inc.	Figure _____



Sample No.	1	2	3	
Initial	Water Content, %	6.5	5.8	6.8
	Dry Density, pcf	125.6	125.9	125.7
	Saturation, %	54.6	49.1	56.8
	Void Ratio	0.3172	0.3141	0.3158
	Diameter, in.	2.400	2.400	2.400
	Height, in.	1.000	1.000	1.000
At Test	Water Content, %	6.5	5.7	6.8
	Dry Density, pcf	125.6	125.9	125.7
	Saturation, %	54.2	48.5	57.4
	Void Ratio	0.3172	0.3141	0.3158
	Diameter, in.	2.400	2.400	2.400
	Height, in.	1.000	1.000	1.000
Normal Stress, ksf	1.000	2.000	4.000	
Fail. Stress, ksf	2.780	4.995	7.074	
Strain, %	14.6	16.7	8.3	
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.	0.020	0.020	0.020	

Sample Type: In-Situ
Description: Poorly Graded Silt with gravel

Assumed Specific Gravity= 2.65

Remarks:

Figure _____

Client: AECOM

Project: ADOT ECS On-Call Ehrenberg, H616101D

Source of Sample: WBH 5 @ 15.0' - 16.0'

Sample Number: 14-0181

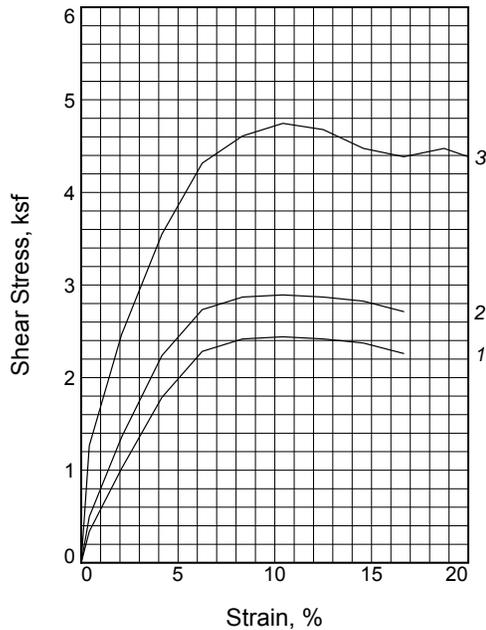
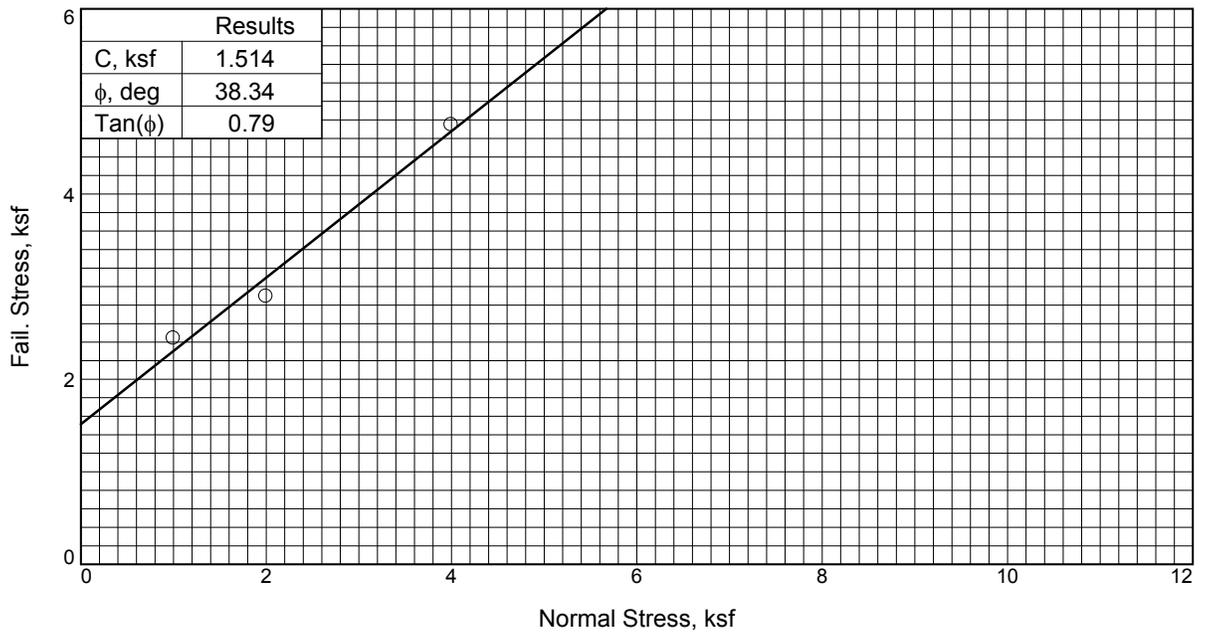
Proj. No.: 213020-03

Date Sampled: 6-27-14

DIRECT SHEAR TEST REPORT
 ATL, INC.
 Phoenix, AZ

Tested By: A. Capper

Checked By: A. Capper



Sample No.	1	2	3	
Initial	Water Content, %	2.2	2.5	2.7
	Dry Density, pcf	114.2	114.7	113.5
	Saturation, %	13.2	15.1	15.7
	Void Ratio	0.4481	0.4428	0.4579
	Diameter, in.	2.400	2.400	2.400
	Height, in.	1.000	1.000	1.000
At Test	Water Content, %	2.7	2.3	2.4
	Dry Density, pcf	114.2	114.7	113.5
	Saturation, %	15.9	13.8	13.9
	Void Ratio	0.4481	0.4428	0.4579
	Diameter, in.	2.400	2.400	2.400
	Height, in.	1.000	1.000	1.000
Normal Stress, ksf	1.000	2.000	4.000	
Fail. Stress, ksf	2.441	2.893	4.746	
Strain, %	10.4	10.4	10.4	
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.	0.020	0.020	0.020	

Sample Type: In-Situ
Description: Poorly Graded Sand with Silt and Gravel
Assumed Specific Gravity= 2.65
Remarks:

Figure _____

Client: AECOM
Project: ADOT ECS On-Call Ehrenberg, H616101D
Source of Sample: BBH 3 @ 20.0' - 21.0'
Sample Number: 14-0190
Proj. No.: 213020-03 **Date Sampled:**

DIRECT SHEAR TEST REPORT
 ATL, INC.
 Phoenix, AZ

Tested By: A. Capper _____ **Checked By:** A. Capper _____



pH and RESISTIVITY

AECOM

ADOT, ADOT ECS On-Call Ehrenberg, H616101D

ATL JOB NO. 213020-03

SAMPLE ID	SAMPLE DEPTH (ft)	LAB. NO.	pH*	RESISTIVITY* (ohm/cm)
TP1	0.0-5.0	14-0198	8.1	670
TP2	0.0-5.0	14-0200	8.2	1010
TP5	0.0-5.0	14-0205	8.4	1010

Note:

*AZ 236b

APPENDIX B
ADOT Geotechnical Report 04-29
Dated August 31, 2004

**REVISED FINAL
GEOTECHNICAL REPORT
No. 04-29
EHRENBERG PORT OF ENTRY
PROJECT NO.: 10 LA 003
TRACS NO. H616101D**

Prepared by

**Geotechnical Design Section
Materials Group
Arizona Department of Transportation**

August 31, 2004



Arizona Department of Transportation
Materials Group – Geotechnical Design Section
1221 N. 21st Ave. 068R Phoenix, Arizona 85007-3213
Phone 602.712.7231 Fax 602.712.8138

Janet Napolitano
Governor

Victor M.
Mendez
Director

Debra Brisk
Deputy Director

PROJECT

**GEOTECHNICAL INVESTIGATION
EHRENBERG PORT OF ENTRY
10 LA 003**

REPORT NO.: 04-29

DATE: August 31, 2004
PROJECT NO.: 10 LA 003
TRACS NO.: H616101D

SUMMARY

This report presents final geotechnical recommendations for design of the upgrades to the existing port facility. The project is located on the eastbound side of I-10 between Mileposts 3.02 and 4.08, in La Paz County of the Yuma District, approximately 1.5 miles east of Ehrenberg Arizona.

The project consists of adding truck parking, a second truck scale, area lighting, making improvements to the existing buildings, reconfiguring the existing Arizona Department of Agriculture (ADA) Inspection Station, building Commercial Vehicle Safety Inspection (CVSI) bays; and providing a separate parking space to serve as a hazardous material containment pit.

The field investigation included 6 test pits and 6 test borings. The results of the field and laboratory investigation as well as design recommendations for the proposed construction and pavements are presented in this report.

Distribution:

ADOT MVD Director's Office / Dave Mellgren (MD 614E) – 1 copy
ADOT Roadway Design / Steve Mishler (MD 615E) – 1 copy
ADOT Yuma District Development/ Scott Omer (MD Y200) – 1 copy
ADOT Materials Pavement Design / Keith Kiter (MD 068R) – 1 copy
Huitt - Zollars / Denis Howe – 3 copies
Gabor Lorant Architects, Inc. / T.J. Schmutde – 1 copy
Report File
Project File

TABLE OF CONTENTS

1. INTRODUCTION.....	1
1.1. <i>Scope</i>	1
1.2. <i>Field Investigation</i>	1
1.3. <i>Laboratory Investigation</i>	1
2. SITE DESCRIPTION.....	2
3. SUBSURFACE CONDITIONS.....	2
3.1. <i>Soil and Rock Conditions</i>	2
3.2. <i>Groundwater Conditions</i>	2
4. RECOMMENDATIONS.....	2
4.1. <i>Foundation Design Information</i>	2
4.2. <i>Pavement Design Information</i>	3
4.3. <i>Slopes and Earthwork Factors</i>	3
4.4. <i>Pipe Design Information</i>	4
4.5. <i>Water Requirements</i>	4
4.6. <i>Borrow Information</i>	4
4.7. <i>Aggregate Availability, Weight and Hauls</i>	5

TABLES

Table 1. Summary Of pH, Resistivity, Sulfates, and Chlorides Test Results.....	4
---	---

APPENDICES

APPENDIX A - Field Investigation	
Investigation Location Plans	
Subgrade Logs	
Boring Logs	
APPENDIX B - Laboratory Test Results	

1. INTRODUCTION

1.1. Scope

This report presents revised final geotechnical recommendations for design of the upgrades to the existing port facility. The project is located on the eastbound side of I-10 between Mileposts 3.02 and 4.08, in La Paz County of the Yuma District, approximately 1.5 miles east of Ehrenberg Arizona.

The project consists of adding truck parking, a second truck scale, area lighting, making improvements to the existing buildings, reconfiguring the existing Arizona Department of Agriculture (ADA) Inspection Station, building Commercial Vehicle Safety Inspection (CVSI) bays; and providing a separate parking space to serve as a hazardous material containment pit.

1.2. Field Investigation

The field investigation included:

- 6 test pits
- 6 test borings

The test borings were advanced using ADOT Geotechnical Operations Section's Foremost Mobile B-59 truck-mounted drill rig using hollow stem auger. Test borings were advanced to depths up to 40 ft. Detailed boring logs are presented in Appendix A.

Test pits were advanced with ADOT Geotechnical Operations Section's Case 450 backhoe. Test pits were advanced to depths up to 5 ft and were logged by ADOT personnel. The test pit (subgrade) logs are presented in Appendix A.

A Site Plan showing test boring and test pit locations is presented in Appendix A. The soil and rock encountered were logged by ADOT field technicians and sampled at selected intervals. Sampling included bulk samples of auger cuttings and standard split-spoon samples. In the test pits, bulk samples were obtained and field moisture and density were measured at selected locations using a nuclear moisture-density gauge.

1.3. Laboratory Investigation

The samples obtained from the test pits during the field investigation were transported to the ADOT Materials laboratory for testing. Samples were tested for the following:

- Gradation
- Atterberg Limits
- R-value
- Moisture Content
- pH & Resistivity
- Soluble Sulfates & Chlorides
- Moisture - Density Relationship Of Compacted Soil

The results of laboratory testing are presented in Appendix B.

2. **SITE DESCRIPTION**

The port of entry is located south of the existing alignment of I-10 between Mileposts 3.02 and 4.08. The terrain includes gently undulating hills and scattered wash channels. Surficial soils are composed primarily of silty to clayey sand with varying amounts of gravel and cobbles

Vegetation along the alignment is light to moderate and mostly composed of desert broom, acacia trees, thorn bushes, small cacti and grasses.

3. **SUBSURFACE CONDITIONS**

3.1. Soil and Rock Conditions

In general the site soils are composed of silty to clayey sand, with varying amounts of gravel and cobbles. The soils are predominantly medium dense to very dense and exhibit low to medium plasticity. The granitic bedrock, in general, is slightly weathered to completely weathered.

3.2. Groundwater Conditions

No free groundwater was observed in any of the test borings or test pits at the time of our investigation. The observed moisture conditions may vary considerably with time, according to the prevailing climate, rainfall or other factors.

4. **RECOMMENDATIONS**

4.1. Foundation Design Information

A bearing capacity of 2500 psf (pounds per square foot) may be used for design. The minimum depth of footings should be 1.5 feet below lowest adjacent finished

subgrade for exterior footings and 1.0 feet below finished subgrade for interior footings. The minimum recommended widths of square and continuous footings are 2.0 feet and 1.0 feet, respectively.

Vertical movements of footings designed as recommended above are estimated not to exceed 3/4-inch. Differential settlement between similarly loaded, adjacent footings founded in similar material is expected to be less than 1/2-inch. Significant moisture increases could result in additional movements. In order to minimize the sensitivity of the structure to differential settlements, footings should be reinforced to allow for a degree of load redistribution should a localized zone of supporting soils become saturated.

The active soil pressure of properly compacted backfill against unrestrained and restrained walls should be considered as being equal to forces exerted by a fluid of 37 and 55 pounds per cubic foot, respectively. The passive soil resistance of properly compacted backfill against edges of footings, stem walls, and similar vertical foundation elements should be considered as being equal to forces exerted by a fluid of 400 pounds per cubic foot unit weight. A coefficient of friction of 0.40 is recommended for computing lateral resistance between the bases of footings and soil in analyzing lateral loads. If a key is utilized beneath a retaining wall footing, the coefficient of friction may be increased to 0.60. Prior to placing steel or concrete, footing excavations should be cleaned of all debris, loose or soft soil, and water.

4.2. Pavement Design Information

Engineering fill should meet the material and placement requirements of Section 203 of the ADOT Standard Specifications. All native ground outside of existing roadway prisms that will receive the engineering fill or will bear the pavement directly should be over-excavated to a depth of 1.0 ft., uniformly moisture conditioned, and compacted to 95% Proctor Density prior to the placement of the fill or the pavement.

The correlated and tested R-values of the samples obtained for this project are presented in Appendix B on the Project Test Results Report.

4.3. Slopes and Earthwork Factors

An excavation factor of 5% shrink may be used throughout the project limits. A ground compaction factor of 0.1 feet should be compensated for on embankment sections outside the existing roadway prism.

Due to the highly errodible nature of the site soils, cut slopes should be

constructed with slopes no steeper than 2:1 (H:V). Fill sections constructed with materials from areas of on-site excavation should be constructed with slopes no steeper than 3:1 (H:V).

4.4 Pipe Design Information

The following tabulation presents a summary of pH, resistivity, sulfates, and chlorides test results at soil sample locations near proposed new pipes and/or culverts:

TABLE 1. SUMMARY OF pH, RESISTIVITY, SULFATES, AND CHLORIDES TEST RESULTS

<u>Station</u>	<u>Offset</u>		<u>Boring or Test Pit No.</u>	<u>Depth Interval (ft)</u>			<u>pH</u>	<u>Resistivity (ohm-cm)</u>	<u>Soluble Sulfates (ppm)</u>	<u>Soluble Chlorides (ppm)</u>
165+00	60	RT	1	0.0	-	5.0	8.2	8052	0	93
173+00	60	RT	2	0.0	-	5.0	8.1	4476	--	--
180+90	285	RT	3	0.0	-	5.0	8.1	1127	573	57
184+70	330	RT	5	0.0	-	5.0	--	--	597	197
188+00	225	RT	6	0.0	-	5.0	--	--	1817	1123
188+40	285	RT	7	0.0	-	5.0	--	--	48	0
188+80	225	RT	8	0.0	-	5.0	--	--	563	101
190+70	330	RT	9	0.0	-	5.0	--	--	1090	72
191+30	330	RT	9A	0.0	-	5.0	8.7	3160	389	11
194+60	160	RT	11	0.0	-	5.0	8.3	2140	825	10

Due to the high sulfate content of the site soils, Type V cement is recommended.

4.5. Water Requirements

Approximately 75 gallons of water per cubic yard may be estimated for compaction of base and subgrade materials. This is considerably higher than the amount calculated based on the difference between in-situ and optimum compaction moisture content and includes a conservative overrun for losses due to seepage, evaporation, inadequate mixing, spillage, etc. Precipitation during and/or before construction may also reduce the required amount of water significantly.

4.6. Borrow Information

No source for borrow will be designated. No borrow is anticipated for this project. If the need arises for borrow in design considerations, borrow shall be as specified in Section 203 of the Standard Specifications.

4.7. Aggregate Availability, Weight and Hauls

No source of aggregate material will be designated. For estimating purposes, information on asphalt concrete, portland cement concrete, hauls, weights and asphalt content can be obtained from ADOT Materials Testing Services on request.



Submitted by:

James D. Wilson, P.E.
Geotechnical Engineer

Reviewed by:

John E. Lawson, Jr., P.E.
Manager, Geotechnical
Design Section

APPENDIX A
FIELD INVESTIGATION



STA 20+50 RAMP 'A' MATCH LINE - SEE SHEET

AREA	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
5			14		

PRELIMINARY STAGE II 30% DESIGN		ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADWAY DESIGN SERVICES
DESIGNER JULIO SOLARIS PROJECT ENGINEER ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADWAY DESIGN SERVICES	CHECKER DATE / DAY / MONTH / YEAR DATE / DAY / MONTH / YEAR	DRAWN BY DATE / DAY / MONTH / YEAR
TRACS NO. 1-10		EMBREBERG - PORT OF ENTRY
PROJECT TITLE DRAINAGE PLAN		SHEET NO. 14 OF 14

Arizona Department of Transportation
Materials Group
Subgrade Log Report

Project Location: EHRENBURG PORT OF ENTRY
 TracsNumber: H6161S1D
 Sampled By: Struckmeyer

Hole #	Distance	R/L	Dir	Station	From	To	Material Description	Date
1	60.00	R	EB	165+00	0.00	1.00	Silty Sand with Gravel (SP-SM), some cobbles, weakly lime cemented, light brown, dry, poorly graded, non-plastic.	02/10/2004
	60.00	R	EB	165+00	0.00	5.00	Sand with Gravel (SP), some cobbles, weakly lime cemented, light brown, dry, poorly graded, non-plastic.	02/10/2004
2	60.00	R	EB	173+00	0.00	1.00	Silty Sand with Gravel (SM), some cobbles, weakly lime cemented, light brown, dry, poorly graded, non-plastic.	02/10/2004
	60.00	R	EB	173+00	0.00	5.00	Sand with Gravel (SP), some cobbles, weakly lime cemented, light brown, dry, poorly graded, non-plastic.	02/10/2004
4	105.00	R	EB	181+00	0.00	5.00	Sand with Gravel (SP), some cobbles, weakly lime cemented, light brown, dry, poorly graded, non-plastic.	02/10/2004
5A	320.00	R	EB	183+05	0.00	5.00	Sandy Gravel (GP), some cobbles, weakly lime cemented, light brown, dry, poorly graded, non-plastic.	02/10/2004
9A	330.00	R	EB	191+30	0.00	5.00	Sandy Gravel (GP), some cobbles, weakly lime cemented, light brown, dry, poorly graded, non-plastic.	02/11/2004
10	100.00	R	EB	192+00	0.00	5.00	Clayey Gravel (GP-GC), some cobbles, weakly lime cemented, light brown, dry, poorly graded, low to medium plasticity.	02/11/2004
11	160.00	R	EB	194+60	0.00	5.00	Sandy Gravel (GP), some cobbles, weakly lime cemented, light brown, dry, poorly graded, non-plastic.	02/11/2004

GEOTECHNICAL BORING LOG

Project Number: **H616101C**
 Project Name: **Ehrenberg Port of Entry**
 Date: **2/4/04**
 Station/Offset: **180+90, 285' RT**

Boring No.: **3**
 Ground Elev. (ft): **467.4**
 Total Depth (ft): **31.5**
 Logged By: **C. Struckmeyer**

Elevation (ft)	Depth (ft)	Graphic Log	Blows/ft or REC/RQD	Sample Type	Drill Method	Dry Density (pcf)	Water Content (%)	MATERIAL DESCRIPTION
465 460 455 450 445 440 30	5 10 15 20 25 30		32 21 30 50/3" 46 64		6.25 inch Hollow Stem Auger			<p>SILTY SAND WITH GRAVEL (SM), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine to medium grained, low plasticity to non-plastic.</p> <p>Stopped Auger @ 30.0 feet Stopped Sampler @ 31.5 feet</p>

GBLPEE H616101C.GPJ 8/3/04

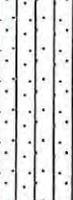
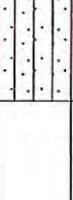


- | | | | |
|------|--------------|----------------------|-------------------------|
| SPT | Tube | Auger/Drill cuttings | Water Table Encountered |
| Ring | Penetrometer | Rock core | Water Table Stabilized |

GEOTECHNICAL BORING LOG

Project Number: **H616101C**
 Project Name: **Ehrenberg Port of Entry**
 Date: **1/28/04**
 Station/Offset: **184+70, 330' RT**

Boring No.: **5**
 Ground Elev. (ft): **473.8**
 Total Depth (ft): **25.4**
 Logged By: **C. Struckmeyer**

Elevation (ft)	Depth (ft)	Graphic Log	Blows/ft or REC/RQD	Sample Type	Drill Method	Dry Density (pcf)	Water Content (%)	MATERIAL DESCRIPTION
470	5		16		6.25 inch Hollow Stem Auger			SANDY GRAVEL (GP), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine to medium grained, low plasticity to non-plastic.
465	10		21					SILTY SAND WITH GRAVEL (SM), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine to medium grained, low plasticity to non-plastic.
460	15		25					Note: well graded below 13 feet
455	20		25					
450	25		50/5"					Stopped Auger @ 25.0 feet

GBLPEE H616101C.GPJ 8/3/04



- | | | | |
|--|--|--|---|
|  SPT |  Tube |  Auger/Drill cuttings |  Water Table Encountered |
|  Ring |  Penetrometer |  Rock core |  Water Table Stabilized |

GEOTECHNICAL BORING LOG

Project Number: H616101C
 Project Name: Ehrenberg Port of Entry
 Date: 1/29/04
 Station/Offset: 188+00, 225' RT

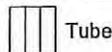
Boring No.: 6
 Ground Elev. (ft): 474.1
 Total Depth (ft): 40.5
 Logged By: C. Struckmeyer

Elevation (ft)	Depth (ft)	Graphic Log	Blows/ft or REC/RQD	Sample Type	Drill Method	Dry Density (pcf)	Water Content (%)	MATERIAL DESCRIPTION
470	5		19	○	6.25 inch Hollow Stem Auger			SILTY SAND WITH GRAVEL (SM-SC), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine to medium grained, low plasticity to non-plastic.
465	10		44	⊗				SILTY SAND WITH GRAVEL (SM), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine to medium grained, low plasticity to non-plastic.
460	15		30	⊗				
455	20		83	⊗				
450	25		58	⊗				
445	30		50.2"	⊗				
440	35		21	⊗				
435	40							CLAYEY SAND WITH GRAVEL (SP-SC), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine to medium grained, low plasticity to non-plastic. Stopped Auger @ 40.0 feet Stopped Sampler @ 40.5 feet

GBLPEE H616101C.GPJ 8/3/04



SPT



Tube



Auger/Drill cuttings



Water Table Encountered



Ring



Penetrometer



Rock core



Water Table Stabilized

GEOTECHNICAL BORING LOG

Project Number: **H616101C**
 Project Name: **Ehrenberg Port of Entry**
 Date: **2/4/04**
 Station/Offset: **188+40, 285' RT**

Boring No.: **7**
 Ground Elev. (ft): **469.4**
 Total Depth (ft): **35.2**
 Logged By: **C. Struckmeyer**

Elevation (ft)	Depth (ft)	Graphic Log	Blows/ft or REC/RQD	Sample Type	Drill Method	Dry Density (pcf)	Water Content (%)	MATERIAL DESCRIPTION
465	5		32	○	6.25 inch Hollow Stem Auger			SILTY TO CLAYEY SAND WITH GRAVEL (SM-SC), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine to medium grained, low plasticity to non-plastic.
460	10		36	⊗				SILTY SAND WITH GRAVEL (SW-SM), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, well graded, low plasticity to non-plastic.
455	15		53	⊗				CLAYEY SAND WITH GRAVEL (SC), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, well graded, low plasticity to non-plastic.
450	20		38	⊗				
445	25		30	⊗				
440	30		50/3"	⊗				
435	35		50/6"	⊗				SANDY GRAVEL (GW), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine grained, non-plastic.
								Stopped Auger @ 35 feet Sample refused @ 35.5 feet

GSLPEE H616101C.GPJ 8/4/04



- ⊗ SPT
- ||| Tube
- Auger/Drill cuttings
- ∇ Water Table Encountered
- ⊘ Ring
- || Penetrometer
- ▽ Rock core
- ∇ Water Table Stabilized

GEOTECHNICAL BORING LOG

Project Number: **H616101C**
 Project Name: **Ehrenberg Port of Entry**
 Date: **2/3/04**
 Station/Offset: **188+80, 225' RT**

Boring No.: **8**
 Ground Elev. (ft): **473.4**
 Total Depth (ft): **40.3**
 Logged By: **C. Struckmeyer**

Elevation (ft)	Depth (ft)	Graphic Log	Blows/ft or REC/RQD	Sample Type	Drill Method	Dry Density (pcf)	Water Content (%)	MATERIAL DESCRIPTION
470	5		22	○	6.25 inch Hollow Stem Auger			GRAVELLY SAND (SW), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, well graded, low plasticity to non-plastic.
465	10		11	⊗				SILTY TO CLAYEY SAND WITH GRAVEL (SM-SC), some cobbles, weakly lime cemented, light brown, medium dense to very dense, dry, predominantly fine to medium grained, low plasticity to non-plastic.
460	15		19	⊗				
455	20		22	⊗				
450	25		50/5"	⊗				
445	30		63	⊗				
440	35		36	⊗				
435	40		50/3"	⊗				Stopped Auger @ 40.0 feet Sample refused @ 40.3 feet

GSLPEE H616101C.GPJ 8/3/04



- | | | | |
|--------|--------------|------------------------|---------------------------|
| ⊗ SPT | Tube | ○ Auger/Drill cuttings | ∇ Water Table Encountered |
| ⊘ Ring | Penetrometer | ∇ Rock core | ∇ Water Table Stabilized |

APPENDIX B
LABORATORY TESTING RESULTS

Arizona Department of Transportation
Materials Group
Project Test Results Report

For Project: H6161 S1D (All)

Project Name EHRENBURG PORT OF ENTRY

Tracs No. H6161S1D Project Number

Test Hole/Phase	Depth From To	LL	PI	3/4" 1/4"	Percent Passing #4 #8 #10 #20	R-Value	Moist. Content	Opt. Moist. Density	Max Dry Density	PH	Res	PP02	Hydrometer PP002	PP001	Direct Shear Deg	Coh	Consol	Lab Class	Lab No
Date Received 01/29/2004																			
5 /	5.0	17	2	96	90	86	77	56	13.0	77.27								SM	2004-03050
6 /	5.0	16	1	98	86	81	54	21	5.5	89.13								SW-SM	2004-03051
8 /	5.0	16	2	99	84	77	51	15	3.5	88.10								SW	2004-03052
5 /	5.0	NP		100	100	90	79	47	8.9									SP-SM	2004-03053
6 /	5.0	18	4	100	100	84	69	33	13.8	70.66								SC-SM	2004-03058
6 /	10.0	16	1	100	100	60	47	17	5.1	89.62								SP-SM	2004-03059
6 /	15.0	17	2	100	100	70	61	34	11.9	78.45								SP-SM	2004-03060
6 /	20.0	16	2	100	100	62	49	22	7.1	83.83								SP-SM	2004-03061
5 /	10.0	17	2	100	100	79	69	40	11.6	78.78								SP-SM	2004-03054
5 /	15.0	16	2	100	100	82	71	35	9.2	81.43								SW-SM	2004-03055
5 /	20.0	16	2	100	100	73	58	22	8.2	82.57								SW-SM	2004-03056
5 /	25.0	16	3	100	100	68	57	26	11.9	75.44								SW-SM	2004-03057
6 /	25.0	16	2	100	100	68	57	29	12.5	77.80								SM	2004-03062
6 /	35.0	15	1	100	100	81	72	48	6.5	87.90								SP-SM	2004-03063
6 /	40.0	24	9	100	100	65	52	29	8.7	62.34								SP-SC	2004-03064
8 /	5.0	16	23	100	100	64	54	28	9.9	35.45								SP-SC	2004-03065
Date Received 02/06/2004																			
9 /	5.0	15	1	100	86	80	63	29	6.3	88.15								SP-SM	2004-03102
3 /	5.0	15	1	100	100	64	56	30	11.5	82.04								SP-SM	2004-03103
3 /	10.0	17	2	100	100	72	61	33	12.9	77.37								SM	2004-03104
3 /	15.0	16	2	100	100	67	54	23	6.1	85.00								SP-SM	2004-03105
7 /	25.0	27	12	100	100	55	41	21	7.7	56.21								SW-SC	2004-03113
7 /	30.0	22	7	100	100	61	49	28	11.0	65.31								SP-SC	2004-03114
7 /	35.0	17	1	100	100	49	40	17	3.7	91.37								GW	2004-03115
8 /	30.0	17	3	100	100	73	67	40	8.0	79.62								SW-SM	2004-03120
8 /	35.0	27	6	100	100	70	57	24	5.8	72.98								SP-SC-SM	2004-03121
8 /	40.0	22	8	100	100	67	58	38	11.8	62.12								SP-SC	2004-03122
9 /	5.0	18	3	100	100	78	66	36	12.3	75.02								SM	2004-03123
3 /	5.0	14	1	100	92	88	79	55	9.7	84.10								SP-SM	2004-03100

8.1 1127

Arizona Department of Transportation
Materials Group
Project Test Results Report

For Project: H6161 S1D (All)

Project Name EHNBERG PORT OF ENTRY

Tracs No. H6161S1D Project Number

Test Hole/Phase	Depth From	Depth To	LL	PI	Percent Passing			R-Value Corr	Moist. Content	Opt. Moist.	Max Dry Density	PH	Res	PP02	Hydrometer PP002	PP001	Direct Shear		Lab Class	Lab No
					3/4"	1/4"	#4										Deg	Coh		
7 /	5.0	20.0	5		98	79	72	59	26	10.6	71.02								SW-SC-SM	2004-03101
3 /	20.0	20.8	15	1	100	100	67	55	26	9.9	83.87								SW-SM	2004-03106
3 /	25.0	26.5	14	1	100	100	78	68	34	13.0	80.35								SM	2004-03107
3 /	30.0	31.5	18	3	100	100	76	62	29	13.2	74.10								SM	2004-03108
7 /	5.0	6.5	15	NP	100	100	75	62	30	11.1	76.91								SW-SM	2004-03109
7 /	10.0	11.5	17	3	100	100	71	58	27	10.5	76.91								SW-SM	2004-03110
7 /	15.0	16.5	26	11	100	100	78	66	34	16.2	51.98								SW-SM	2004-03110
7 /	20.0	21.5	25	9	100	100	63	49	23	9.2	61.92								SC	2004-03111
8 /	10.0	11.5	NP		100	100	81	73	36	8.1									SW-SC	2004-03112
8 /	15.0	16.5	16	2	100	100	68	58	33	9.8	80.76								SP-SM	2004-03116
8 /	20.0	21.5	15	1	100	100	73	59	28	9.3	84.57								SP-SM	2004-03117
8 /	25.0	25.5	18	3	100	100	63	47	18	6.0	81.85								SW-SM	2004-03118
9 /	10.0	11.5	18	3	100	100	77	66	22	8.4	79.18								SP-SM	2004-03119
9 /	15.0	16.5	16	2	100	100	73	61	30	12.5	77.80								SW-SM	2004-03124
9 /	20.0	21.5	15	1	100	100	64	53	27	10.3	83.41								SM	2004-03125
9 /	25.0	26.5	18	3	100	100	74	60	28	11.3	76.07								SP-SM	2004-03126
																			SW-SM	2004-03127
Date Received 02/12/2004																				
4 /	0.0	5.0	16	1	77	56	51	43	15	0.1	96.03	88.7							SP	2004-03095
5 / A	0.0	5.0	15	1	74	52	48	39	18	4.3	90.61	83.1							GP	2004-03096
9 / A	0.0	5.0	15	2	65	49	45	33	9	1.4	90.70	81.2	8.7	3160					GP	2004-03097
10 /	0.0	5.0	25	10	61	45	42	34	18	6.5	61.80	62.8							GP-GC	2004-03098
1 /	0.0	1.0	NP		83	66	63	56	33	8.5			10.7	128.5					SP-SM	2004-03091
1 /	0.0	5.0	NP		92	81	79	75	47	4.4									SP	2004-03092
2 /	0.0	1.0	16	1	86	69	63	50	27	18.5	74.47								SM	2004-03093
2 /	0.0	5.0	16	2	85	66	61	50	23	1.7	90.32	88.3	8.1	4476					SP	2004-03094
11 /	0.0	5.0	30	14	62	43	39	32	16	4.1	54.63	76.3	8.3	2140					GP	2004-03099

APPENDIX C
Method Specification for Compaction of Native Soils

SECTION 203 - EARTHWORK:

203-10.03

(B) Compaction: the section is revised to include the following method specification for mass grading operations:

Density requirements will not apply to portions of embankments constructed of materials that cannot be tested by approved in-place methods such as AZ 230 or AZ 235.

Materials shall be placed, spread and leveled in 12 inches thick layers over the full width of the embankment.

Adjust the moisture content of the material to a range of minus 1 percent to plus 4 percent of optimum moisture, as determined on the minus #4 fraction. Optimum moisture shall be determined by Arizona Test Method 225, Method A. Compact each layer of material full width with one of the following:

- (1) Six roller passes of a vibratory roller having a minimum dynamic force 40,000 pounds impact per vibration and a minimum frequency of 1,000 vibrations per minute
- (2) Twelve roller passes of a vibratory roller having a minimum dynamic force of 30,000 pounds impact per vibration and a minimum frequency of 1,000 vibrations per minute

Operate vibratory rollers at speeds less than 3 feet per second.

In addition to the above rolling, each layer shall be further compacted by routing the hauling equipment uniformly over the entire width of the embankment.