GEOTECHNICAL ENGINEERING REPORT

EAST AZTEC ARTERIAL ROUTE
AZTEC, NEW MEXICO

Terracon Project No. 69085011
August 28, 2008

Prepared for:

WILSON & COMPANY, INC., ENGINEERS & ARCHITECTS
2600 American Road, Suite 100
Rio Rancho, New Mexico 87124

Attention: Mr. Steve J. Salazar, P.E.

Prepared by:

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Terracon

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August 28, 2008

Wilson and Company, Inc.
2600 American Road, Suite 100
Rio Rancho, New Mexico 87124

Attention: Mr. Steve J. Salazar, P.E.

Regarding: Geotechnical Engineering Report
East Aztec Arterial Route
Aztec, New Mexico
Terracon Project No. 69085011

Ladies and Gentlemen:

Terracon Consultants, Inc. (Terracon) has completed a geotechnical engineering exploration and evaluation for the proposed construction of the East Aztec Arterial Route in Aztec, New Mexico. This study was performed in general accordance with our proposal number G08-505, dated January 16, 2008. The results of our engineering evaluation, including the site plan, laboratory test results, logs of test pits, geotechnical recommendations to be used in the design and construction of the pavement sections, and other geotechnically-related phases of this project are attached.

Nineteen test pits were excavated and sampled along the proposed roadway alignment on June 23, 2008. The test pits were excavated to approximate depths ranging from 2½ to 17 feet below existing ground surface where the excavations were terminated. Refusal on sandstone and shale occurred at the shallower depths. The subsurface materials encountered generally consisted of silty sand, clayey sand, clayey silty sand, lean clay with varying amounts of sand, shale and sandstone. No ground water was encountered during the site exploration. For detailed soil conditions at a specific location, please refer to the Logs of Test Pits presented in Appendix A.

Based on the geotechnical engineering analyses, subsurface exploration and laboratory test results, it is our opinion that the site is suitable for the proposed construction. The design and construction recommendations, based upon geotechnical conditions, are included in this report. It is understood that the project is to be designed and constructed in accordance with NMDOT guidelines.

We appreciate being of service to you in the geotechnical engineering phase of this project, and are prepared to assist you during the construction phases as well. If you have any questions concerning this report or any of our testing, inspection, design and consulting services, please do not hesitate to contact us.

Sincerely,
TERRACON CONSULTANTS, INC.

Heather M. Dawson
Staff Geologist

Kim M. Preston, P.E.
Four Corners Area Manager

Mary E. Wells, P.E.
Principal

Distribution: Addressee (3)

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GEOTECHNICAL ENGINEERING REPORT

EAST AZTEC ARTERIAL ROUTE
AZTEC, NEW MEXICO

Terracon Project No. 69085011
August 28, 2008

INTRODUCTION

This report contains the results of Terracon's geotechnical engineering exploration and evaluation for the proposed construction of the East Aztec Arterial Route in Aztec, New Mexico.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions;
- Groundwater conditions;
- Pavement structural section design and construction;
- General earthwork; and
- Geotechnically-related drainage.

The recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, experience with similar soil conditions and structures, and our understanding of the proposed project.

PROPOSED CONSTRUCTION

The project will consist of the construction of approximately two and a half miles of new roadway and approximately one mile of reconstructed roadway proposed as the East Aztec Arterial Route for the City of Aztec, New Mexico. This new roadway will connect US Highway 550 southwest of the city to New Mexico State Highway 173 east of the city. Approximately one mile of New Mexico State Highway 173 will be reconstructed from the new roadway west to US Highway 550. The design for the reconstruction of the portion of New Mexico State Highway 173 will be performed by New Mexico Department of Transportation (NMDOT) and is not included in this study. It is our understanding that that no below grade or earth retention structures are included in the development of this project. The project is to be designed and constructed in accordance with New Mexico Department of Transportation (NMDOT) guidelines.

SITE EXPLORATION

The scope of the services performed for this project included site reconnaissance by a staff geologist, a subsurface exploration program, laboratory testing and engineering analyses.

Field Exploration: Nineteen test pits were excavated and sampled on June 23, 2008. The test pits were advanced by an utilizing a subcontracted, track-mounted excavator (track-hoe) to approximate depths ranging from 2½ to 17 feet below existing ground surface. Refusal on sandstone and shale occurred at the shallower depths. No groundwater was encountered at the time of exploration. The approximate locations of the exploratory borings are shown on the Boring Location Plan in Appendix A.

The test pits were located in the field by measuring from existing site features by using a measuring wheel or pacing at right angles, and locations are therefore estimated. The accuracy of boring locations should only be assumed to the level implied by the methods used to determine locations.

A lithologic log of each test pit was recorded by the field engineer during the excavation operations. Bulk samples of subsurface materials were obtained from each test pit.

Laboratory Testing: Samples retrieved during the field exploration were taken to the laboratory for observation by the project geotechnical engineer and were classified in general accordance with the Unified Soil Classification System described in Appendix C. At that time an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Laboratory tests were conducted on selected soil samples and are presented in Appendix B and on the Logs of Test Pits in Appendix A. The test results were used for the geotechnical engineering analyses, pavement structural section design, and earthwork and drainage recommendations. Laboratory tests were performed in general accordance with the applicable local or other accepted standards.

Selected soil samples were tested for the following engineering properties:

- Moisture content
- Plasticity index
- Corrosivity
- Grain size distribution
- R-value

Upon completion of the laboratory testing, the field descriptions were confirmed or modified as necessary and Logs of Test Pits were prepared and are presented in Appendix A.

SITE CONDITIONS

The site is characterized as being rural, undeveloped land vegetated by trees, shrubs, and grasses native to the area. The area is crossed by several dirt roads used by oil field traffic to access the well sites scattered throughout the area. The topography of the west and north portions of the project is gently sloping with rolling hills and variable sized washes. The middle portion of the project is higher in elevation with more rugged terrain, steeper hillsides and deeper washes.

SUBSURFACE CONDITIONS

Geology: The project area is located within the San Juan Basin of the Colorado Plateau physiographic providence. The San Juan Basin, formed during the Laramide Orogeny of Tertiary time, is a structurally complex feature characterized by a broad, gently downwarping interior which is flanked by numerous uplifts and platforms. It is rimmed by older Cretaceous rock that gradually proceeds to younger Tertiary rock towards the center of the basin. The project site area lies on the Tertiary Nacimiento Formation, locally consisting of sandstone, shale and conglomerates.

Soil Conditions: As presented on the Logs of Test Pits, the subsurface materials encountered generally consisted of silty sand, clayey sand, clayey silty sand, lean clay with varying amounts of sand, shale and sandstone. The shale was commonly sandy and the sandstone commonly clayey. Bedrock was often encountered at a shallow depth with the exception of Test Pits TP-17 and TP-19 where no sandstone or shale was encountered to the total explored depth of 17 feet below ground surface.

Field and Laboratory Test Results: The results of field exploration and laboratory testing completed for this evaluation indicate the surficial site soils range from silty and clayey sands to sandy lean clays. Five representative samples submitted for laboratory testing indicate that project soils have R-values ranging from 10 to 21. NMDOT method correlations of sieve analyses and plasticity index test results indicated correlated R-values ranging from less than 5 to 45.

Groundwater Conditions: Groundwater was not encountered in the test pits at the time of field exploration. These observations represent groundwater conditions at the time of the field exploration, and may not be indicative of other times, or at other locations. Groundwater levels can be expected to fluctuate with varying seasonal weather conditions and other factors.

Zones of perched and/or trapped groundwater may also occur at times in the subsurface soils overlying the moderate to high plasticity clayey sand soils. The location and amount of

perched water is dependent upon several factors, including hydrologic conditions, type of site development, irrigation demands on or adjacent to the site, fluctuations in water features, seasonal and weather conditions.

ENGINEERING ANALYSES AND RECOMMENDATIONS

Geotechnical Considerations: The site appears suitable for construction of the proposed construction based upon geotechnical conditions encountered in the exploratory test pits. Design and construction recommendations for the Plant-Mix Bituminous Pavement (PMBP) and Portland Cement Concrete Pavement (PCCP) structural sections and other geotechnically-related earthwork connected phases of the project are outlined below.

There are a significant number of very heavy trucks associated with the nearby gas industry field work in the area that are anticipated to use this roadway on a daily basis. Based on experience in the area with similar projects the use of rigid Portland Cement Concrete Pavement (PCCP) is recommended for the new roadway. The heavy traffic loading, the current relative costs associated with the procurement of oil for asphalt products and conversations with NMDOT pavement personnel resulted in this recommendation. PMBP pavement sections are also provided for use by the project engineer and the owner in selecting the pavement material and structural section for the project. **It is important that the owner understands that due to the volume of heavy truck traffic, using the Flexible Pavement (PMBP) option will likely result in rutting in the future, which will require milling and inlay to repair the rutting.**

Pavement Design: The pavement structural section design for the project is based on the New Mexico Department of Transportation (NMDOT) Pavement Type Selection and Design Guideline, Revision III, dated July 21, 2008. Traffic 18-kip equivalent single axle load (ESAL) criteria for nearby roadways was provided by NMDOT personnel for use in the pavement thickness design process. The ESAL criteria used was developed from the provided NMDOT information.

Laboratory test results and correlated R-values were input into the NMDOT program in addition to NMDOT designated parameters for the project type and the local area. Input parameters and regional factors are presented in the following table.

PARAMETER AND/OR AREA FACTOR	PMBP VALUE	PCCP VALUE
Design R-Value	13/33	13/33
Regional Factor	1.8	
Initial Serviceability	4.2	4.2
Terminal Serviceability	2.0	2.0
Design ESAL Years	20	20

PARAMETER AND/OR AREA FACTOR	PMBP VALUE	PCCP VALUE
Design Structural Number	4.55	
Design ESAL	SN1 5,054,141	10,000,000
	SN2 5,363,090	
	SN3 5,701,746	
	SN4 5,327,255	
	SN5 5,461,550	
	SN6 4,778,103	
PMBP Type	SP-III	
PG Base Grade	64-22	
PCCP 28-Day Compressive Strength		Class F 3,000 psi @14 days*
Load Transfer Coefficient		2.9**

***Slip-formed Pavements**

****Tied P.C.C. Shoulders per NMDOT Specifications**

Flexible (PMBP) Pavement Design: Based on the NMDOT procedure, the recommended pavement structural section alternatives for asphaltic concrete over aggregate base course placed on compacted subgrade soils is as follows:

PROPOSED EAST ARTERIAL ROUTE AZTEC, NEW MEXICO				
Pavement Structural Section	**Plant-Mix Bituminous Pavement (PMBP) (inches)**	**Compacted Aggregate Base Course (ABC) (inches)**	**Subgrade R-Value**	**Scarified, Moisture Conditioned and Compacted Subgrade Soils (inches)**
Flexible (PMBP)	9½	6.0	14 (Native Clayey Soils)	6.0
Flexible (PMBP)	7½	6.0	33 (Imported Sand Soils)	6.0

The subgrade soils below the aggregate base course, should be scarified to a minimum depth of 6 inches, moisture conditioned within optimum to 5 percent below optimum for subgrade soils with Plasticity Index less than 15 and optimum to 4 percent above optimum for plasticity Index greater than or equal to 15 and compacted to a minimum of 100 percent of the maximum laboratory dry density as evaluated by AASHTO T 99 (Standard Proctor).

Aggregate base course should consist of a blend of sand and gravel that meets strict specifications for quality and gradation. Use of materials meeting New Mexico State Highway and Transportation Department Class IB or IIB specifications is recommended.

Aggregate base course material should be tested to determine compliance with these specifications prior to importation to the site.

Plant-Mix Bituminous Pavement and Bituminous Treated Base design and construction should conform to the requirements of the New Mexico State Highway and Transportation Standard Specifications for Highway and Bridge Construction. Aggregate used in asphalt concrete should meet specifications for SP-III PMBP using a 64-22 PG base grade asphalt binder. If the project design speed is 40 miles per hour (mph) or greater, either an open graded friction course or other approved alternative material is required. The mix design should be submitted prior to construction to verify its adequacy.

Rigid (PCCP) Pavement Design: Based on the NMDOT procedure, the recommended pavement structural section for Portland Cement Concrete Pavement (PCCP) over aggregate base course placed on compacted subgrade soils is as follows:

PROPOSED EAST ARTERIAL ROUTE AZTEC, NEW MEXICO				
Pavement Structural Section	**Portland Cement Concrete Pavement (PMBP) (inches)**	**Compacted Aggregate Base Course (ABC) (inches)**	**Subgrade R-Value**	**Scarified, Moisture Conditioned and Compacted Subgrade Soils (inches)**
Rigid (PCCP)	10½	6.0	14 (Native Clayey Soils)	6.0
Rigid (PCCP)	10½	6.0	33 (Imported Sand Soils)	6.0

Where rigid pavements are used, the New Mexico State Highway and Transportation Department Standard Specifications for Highway and Bridge Construction should be followed.

The performance of all pavements can be enhanced by minimizing excess moisture which can reach the subgrade soils. The following recommendations should be considered at minimum:

- Site grading at a minimum 2 percent grade away from the pavements;
- Compaction of any utility trenches for landscaped areas to the same criteria as the pavement subgrade;
- Sealing all landscaped areas in, or adjacent to pavements to minimize or prevent moisture migration to subgrade soils;
- Placing compacted backfill against the exterior side of curb and gutter; and,

- Placing curb, gutter and/or sidewalk directly on subgrade soils without the use of base course materials.

Preventative maintenance should be planned and provided for through an on-going pavement management program in order to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment.

Preventative maintenance consists of both localized maintenance (e.g. crack sealing and patching) and global maintenance (e.g. surface sealing). Preventative maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements.

Earthwork:

General Considerations: The following presents recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project. Earthwork should be in accordance with Section 200 of the New Mexico State Highway and Transportation Department Standard Specifications for Highway and Bridge Construction.

Earthwork on the project should be observed and tested by Terracon. These services should include observation and testing of engineered fill, subgrade preparation and other geotechnical conditions exposed during the construction of the project.

Clearing and Grubbing: Clearing and Grubbing should be in accordance with Section 201 of the New Mexico State Highway and Transportation Department Standard Specifications for Highway and Bridge Construction.

Excavation, Borrow and Embankment: Excavation, Borrow and Embankment should be in accordance with Section 203 of the New Mexico State Highway and Transportation Department Standard Specifications for Highway and Bridge Construction.

Subgrade Preparation: Subgrade Preparation should be in accordance with Section 207 of the New Mexico State Highway and Transportation Department Standard Specifications for Highway and Bridge Construction.

Excavation and Trench Construction: Excavations into the on-site soils will encounter a variety of conditions. However, caving soils may be encountered on the site. The individual contractor(s) should be responsible for designing and

constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

As a safety measure, it is recommended that all vehicles and soil piles be kept to a minimum lateral distance from the crest of the slope equal to no less than the slope height. The exposed slope face should be protected against the elements.

The contractor should retain a geotechnical engineer to monitor the soils exposed in all excavations and provide engineering services for slopes. This will provide an opportunity to monitor the soil types encountered and to modify the excavation slopes as necessary. It also offers an opportunity to verify the stability of the excavation slopes during construction.

Additional Design and Construction Considerations:

Surface Drainage: Positive drainage should be provided during construction and maintained throughout the life of the proposed project. Infiltration of water into the subgrade soils and utility excavations must be prevented during construction and maintained throughout the life of the proposed project. Backfill in utility trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.

Corrosion Protection: Experience with the soils in the project area indicates that ASTM Type II Portland cement is suitable for concrete on and below grade. Foundation concrete should be designed in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4.

GENERAL COMMENTS

Construction of the new roadway following recommendations provided in this report will help to minimize future movement of the pavement sections. However, due to the inconsistent and unpredictable nature of the in-situ soils at the site, some movement and cracking in the new Portland cement concrete curb and gutter as well as the PMBP and PCCP structure could occur in the future. **The owner needs to understand that the Flexible Pavement choice will likely result in rutting in the future and will require milling and inlay to repair the rutting.**

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to

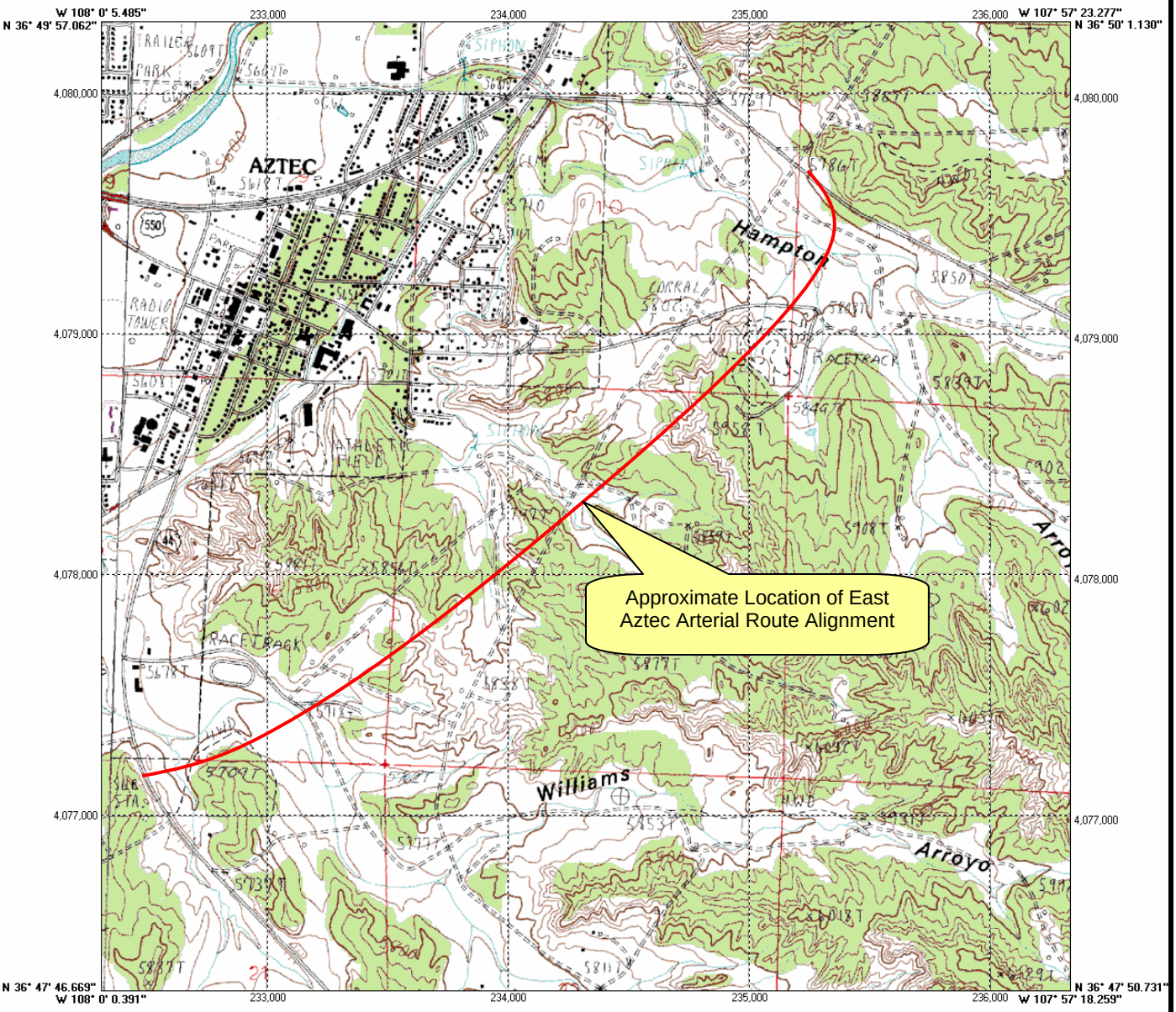
provide testing and observation during excavation, grading, and construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the test pits performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between test pits, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and de-watering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

MAP



1927 North American Datum; 1,000-meter UTM grid zone 13
Generated by BigTopo (www.igage.com)
Map compiled from USGS Quads: Flora Vista; NM Aztec; NM

0 ¼ ½ 1 Mile
0 1000 2000 3000 5000 Feet
0 0.5 1 Kilometer

Site Plan

Project Mngr:	KMP
Drawn By:	HMD
Checked By:	KMP
Approved By:	KMP

Project No.	68085011
Scale	~ 1:24,000
File No.	Site Map.doc
Date:	08/15/08

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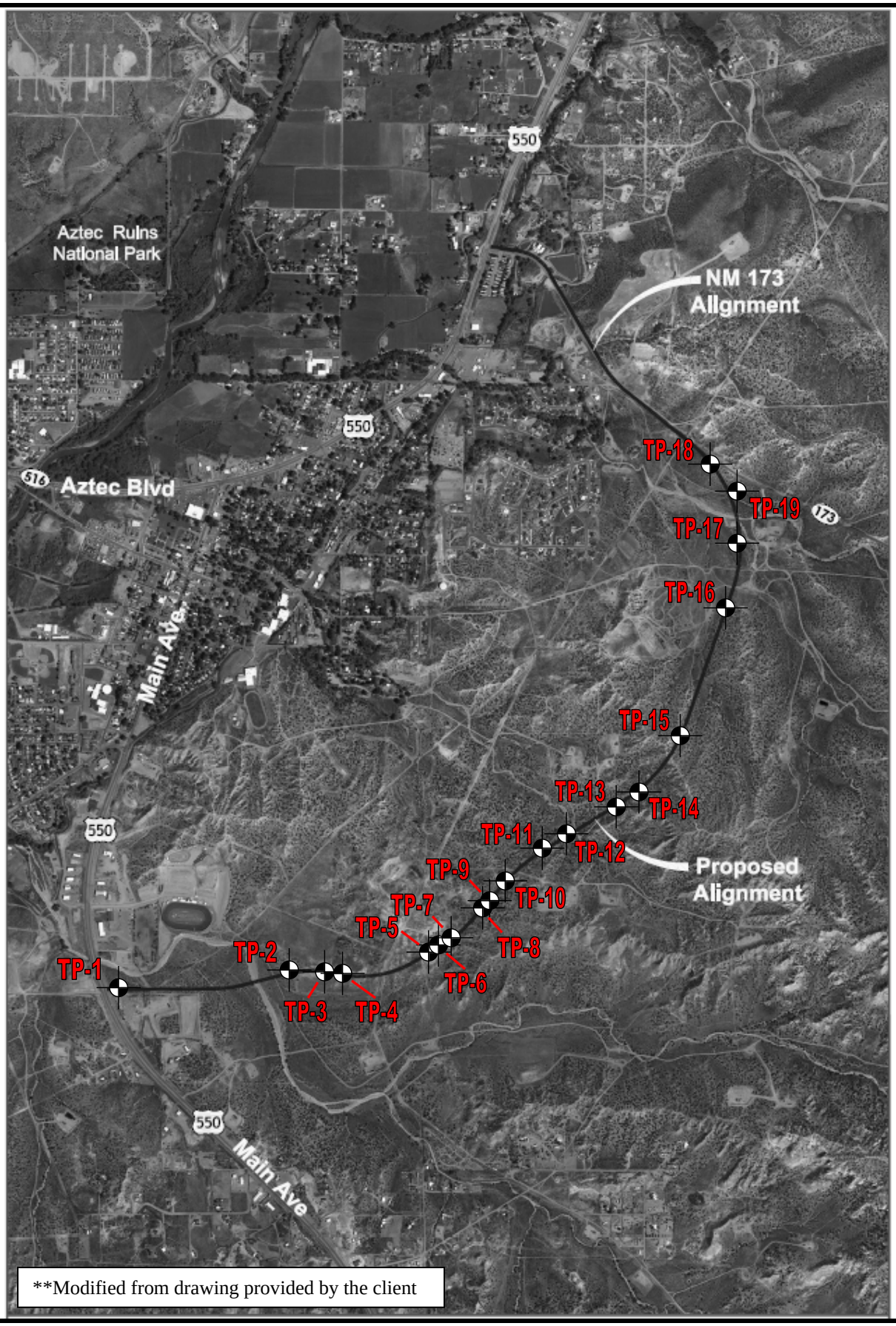
Site Location Map

East Aztec Arterial Route
Aztec, New Mexico

FIG No.

1



**Modified from drawing provided by the client

Project Mngr:	KMP
Drawn By:	HMD
Checked By:	KMP
Approved By:	KMP

Project No.	68085011
Scale	~ 1:24,000
File No.	Borings.doc
Date:	08/15/08

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Test Pit Location Plan

East Aztec Arterial Route
Aztec, New Mexico

FIG No.

2

LOG OF BORING NO. TP-1

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 13+50

Approx. Surface Elev.: 5707 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	LEAN CLAY WITH SAND; tan, dry.									
	1.5 — 5705.5									
	SANDY SHALE; tan to light gray, dry to moist, complete to slight weathering, very soft to moderately hard.									
		5	CL		GRAB			13.0		
		10								
	11.5 — 5695.5									
	12 — 5695 **SANDSTONE**; tan, moist, very slight weathering, moderately hard.									
	Exploration terminated at 12 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

LOG OF BORING NO. TP-2

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 39+75

Approx. Surface Elev.: 5765 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SILTY SAND; tan, dry.									
	2 — 5763									
	SANDSTONE; tan, dry to moist, complete to slight weathering, very soft to hard.		SM		GRAB			8.0		
		5								
	7 — 5758									
	Exploration terminated at 7 feet below existing groundsurface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-3

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 44+00

Approx. Surface Elev.: 5788 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SANDSTONE; tan and orange, dry to moist, complete to slight weathering, very soft to hard.									
			SC SM		GRAB			6.0		
	3	5785								
	Exploration terminated at 3 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-4

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 46+50

Approx. Surface Elev.: 5805 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SANDSTONE; grayish tan, clayey, dry to moist, very severe to moderate weathering, soft to hard.									
			SC		GRAB			9.0		
	4	5801								
	Exploration terminated at 4 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-5

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 50+25

Approx. Surface Elev.: 5849 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	LEAN CLAY WITH SAND; tan, dry.									
	1.5	5847.5	CL		GRAB			7.0		
	SHALE; gray, sandy, moist, complete to moderate weathering, very soft to medium hardness.									
	3.5	5845.5								
	4 **SANDSTONE**; gray, clayey, slight weathering, hard to very hard.	5845								
	Exploration terminated at 4 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-6

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 62+75

GRAPHIC LOG	DESCRIPTION		DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	Approx. Surface Elev.: 5845 ft										
	LEAN CLAY WITH SAND; light gray, dry.										
	1	5844									
	SHALE; dark to light gray, dry to moist, complete to very slight weathering, very soft to moderately hard.		5								
			10	CL		GRAB			7.0		
	12	5833									
	Exploration terminated at 12 feet below existing ground surface due to equipment refusal on possible sandstone. No groundwater encountered.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-7

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 65+00

Approx. Surface Elev.: 5850 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SANDY LEAN CLAY; tan, dry.									
	2 — 5848									
	SHALE; tan to gray, sandy, dry to moist, complete to slight weathering, very soft to hard.									
		5	CL		GRAB			5.0		
	7.5 — 5842.5									
	Exploration terminated at 7.5 feet below ground surface due to equipment refusal on shale. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-8

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 67+00

Approx. Surface Elev.: 5853 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SHALE; light to dark gray, sandy, dry to moist, complete to slight weathering, massive to thin bedded.									
	4 — 5849									
	SANDSTONE; yellow, dry, medium grained, slight weathering, moderately hard.	5	CL		GRAB			5.0		
	5.5 — 5847.5									
	SHALE; light gray to gray, moist to dry, very slight weathering, moderately hard to hard.									
	7.5 — 5845.5									
	Exploration terminated at 7.5 feet below existing ground surface due to equipment refusal on shale. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-9

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 69+25

Approx. Surface Elev.: 5865 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SHALE; tan to gray, sandy, dry to moist, complete to slight weathering, very soft to medium hardness.									
	7	5858								
	7.5 **SANDSTONE**; yellow, dry, medium grained, slight weathering, moderately hard.	5857.5								
	SHALE; gray to dark gray, dry to moist, very slight weathering, medium to hard.	5	CL		GRAB			6.0		
	11	10 5854								
	Exploration terminated at 11 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

LOG OF BORING NO. TP-10

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 77+25

Approx. Surface Elev.: 5861 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SHALE; tan to light gray, sandy, dry to moist, complete to very slight weathering, very soft to hard.	5								
		10	CL		GRAB			4.0		
	12	5849								
	Exploration terminated at 12 feet below existing ground surface due to equipment refusal on shale. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-11

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 83+75

Approx. Surface Elev.: 5873 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	CLAYEY SILTY SAND; white tan, dry.	1								
		5872								
	SANDSTONE; tan, dry, complete to slight weathering, very soft to hard.		SM		GRAB			4.0		
		5								
		6								
		5867								
	Exploration terminated at 6 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-12

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 86+00

Approx. Surface Elev.: 5863 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	CLAYEY SILTY SAND; white tan, dry.	1								
		5862								
	SANDSTONE; tan, dry, complete to slight weathering, very soft to hard.		SM		GRAB			4.0		
		5								
		6								
		5857								
	Exploration terminated at 6 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

LOG OF BORING NO. TP-13

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 96+00

Approx. Surface Elev.: 5886 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SANDSTONE; grayish white, clayey, dry, complete to slight weathering, soft to hard.									
			SC		GRAB			4.0		
	3	5883								
	Exploration terminated at 3 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-14

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 99+50

Approx. Surface Elev.: 5906 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	SILTY SAND; tan, dry.	1 / 5905	SM		GRAB			6.0		
	SANDSTONE; light gray, dry, complete to slight weathering, very soft to hard.	2.5 / 5903.5								
	Exploration terminated at 2.5 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

LOG OF BORING NO. TP-15

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 112+00

Approx. Surface Elev.: 5922 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	LEAN CLAY WITH SAND; tan to light gray, dry.	2								
		5920								
	SANDSTONE; tan to gray, clayey, dry to moist, complete to slight weathering, very soft to hard.	5								
			SC		GRAB			9.0		
		9								
		5913								
	Exploration terminated at 9 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-16

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 126+00

Approx. Surface Elev.: 5859 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	CLAYEY SILTY SAND; tan, dry to moist.									
		5								
		10	SC SM		GRAB			4.0		
	13	5846								
	SANDSTONE; white tan, moist, medium grained, complete to slight weathering, very soft to hard.									
	15	5844								
	Exploration terminated at 15 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	15								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-17

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 141+00

DESCRIPTION

Approx. Surface Elev.: 5799 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
CLAYEY SAND; tan, dry to moist.	5								
	10								
		SC		GRAB			4.0		
	15								
17 5782									
Exploration terminated at 17 feet below existing ground surface. No groundwater encountered.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	6-23-08		
BORING COMPLETED	6-23-08		
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-18

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: 154+00

Approx. Surface Elev.: 5805 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.		USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi
	CLAYEY SAND; tan, dry to moist.										
	7		5798								
	SHALE; light to dark gray, sandy, dry to moist, severe to slight weathering, very soft to moderately hard.	5									
	10		5795								
	SANDSTONE; white tan, moist, slight weathering, moderately hard to hard.	10		CL		GRAB			11.0		
	14		5791								
	Exploration terminated at 14 feet below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

LOG OF BORING NO. TP-19

CLIENT
Wilson & Company, Inc.

SITE
Aztec, New Mexico

PROJECT
East Aztec Arterial Route

Boring Location: East Branch to Hwy 170

DESCRIPTION

Approx. Surface Elev.: 5810 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psi	DESCRIPTION
										CLAYEY SAND; tan, dry to moist.
	5									
	10									
	15	SC		GRAB			7.0			
	17									Exploration terminated at 17 feet below existing ground surface. No groundwater encountered.
	5793									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Elevations are interpolated from drawing provided by client and are approximate.

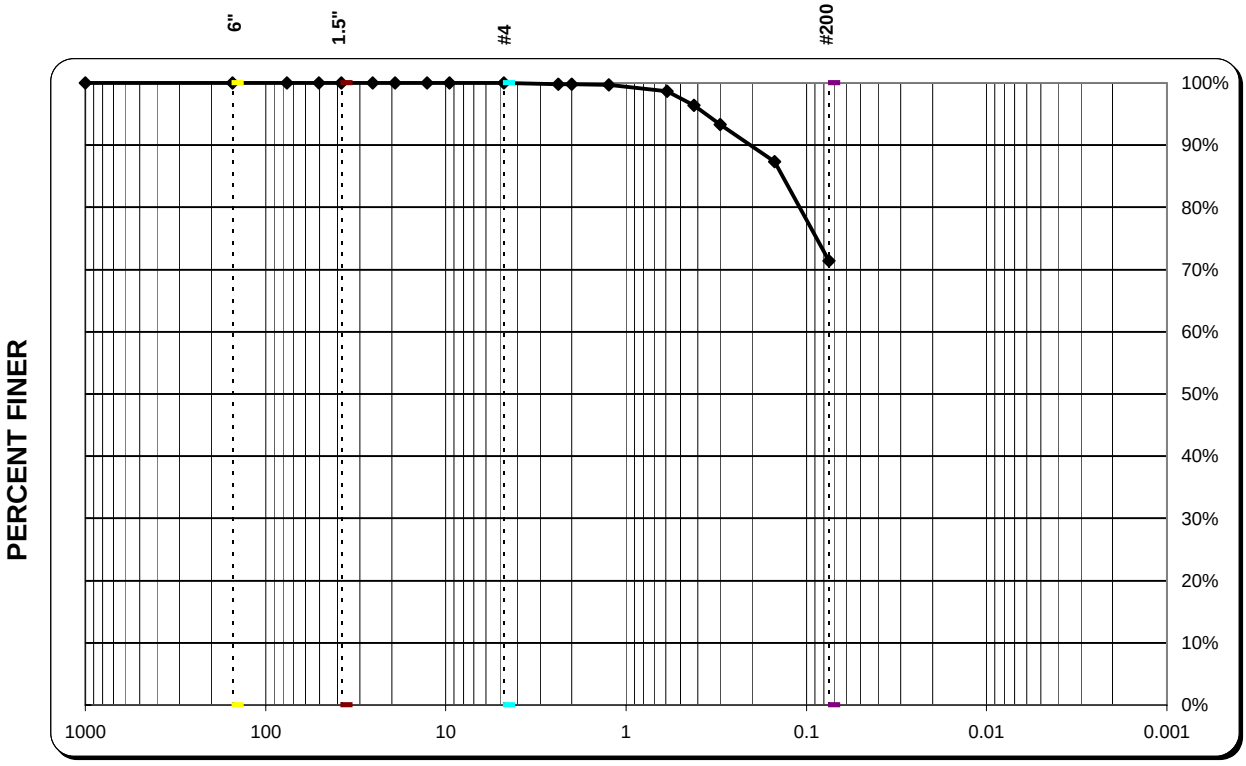
WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			6-23-08
BORING COMPLETED			6-23-08
RIG	CME-75	FOREMAN	HMD
APPROVED	KMP	JOB #	69085011

BOREHOLE_99 LOG OF BORING.GPJ TERRACON.GDT 8/18/08

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	100	96	87	71.4
Specification								

% GRAVEL =	0.0	**D_{85} =** 0.1	**D_{15} =**
% SAND =	28.6	**D_{60} =**	**D_{10} =**
% SILT & CLAY =	71.4	**D_{50} =**	**C_U =**
		D_{30} =	**C_C =**

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-1 @ 5-8'

Liquid Limit: 34

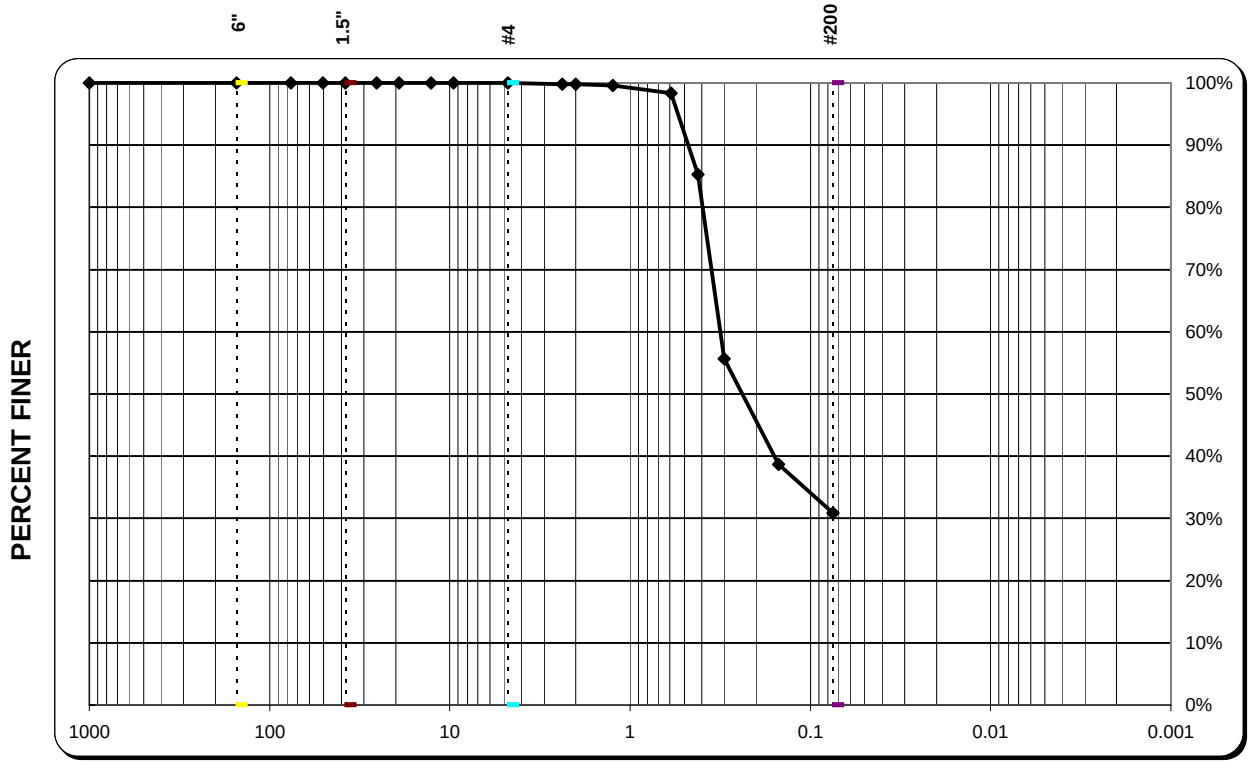
Plasticity Index: 18

USCS Classification: CL

Material Description: Lean Clay with Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	100	85	39	30.9
Specification								

% GRAVEL =	0.0	**D_{85} =**	0.4	**D_{15} =**	
% SAND =	69.1	**D_{60} =**	0.3	**D_{10} =**	
% SILT & CLAY =	30.9	**D_{50} =**	0.2	**C_U =**	
		D_{30} =		**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-2 @ 4-6'

Liquid Limit: 38

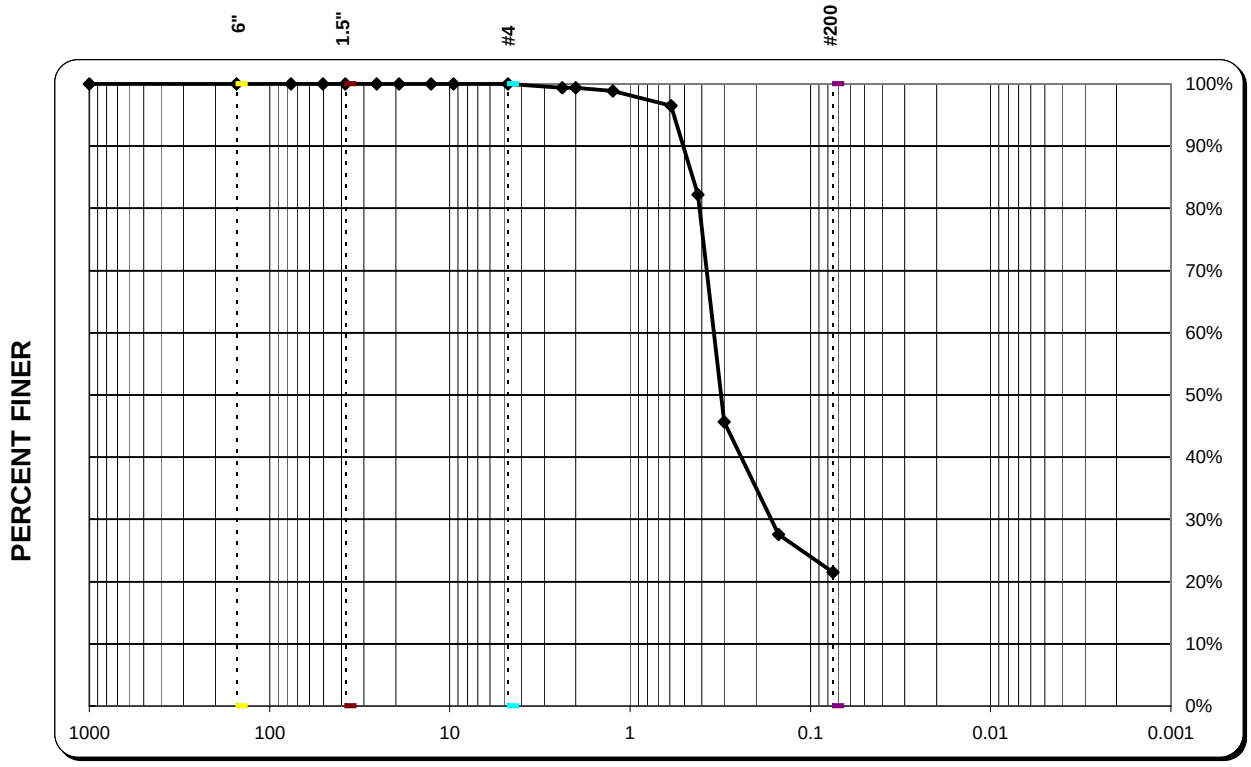
Plasticity Index: 10

USCS Classification: SM

Material Description: Silty Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	99	82	28	21.5
Specification								

% GRAVEL =	0.0	**D_{85} =**	0.4	**D_{15} =**	
% SAND =	78.4	**D_{60} =**	0.3	**D_{10} =**	
% SILT & CLAY =	21.5	**D_{50} =**	0.3	**C_U =**	
		D_{30} =	0.2	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-3 @ 1-3'

Liquid Limit: 29

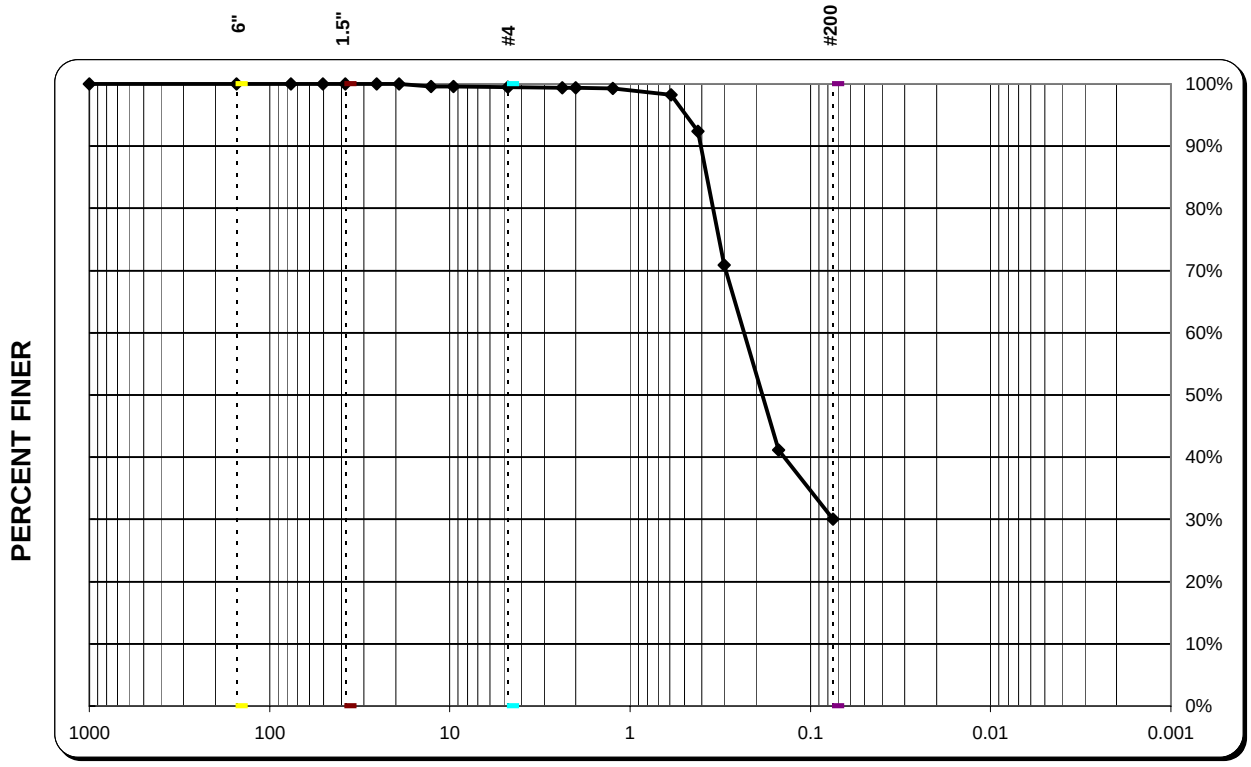
Plasticity Index: 7

USCS Classification: SC-SM

Material Description: Clayey Silty Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	99	92	41	30.1
Specification								

% GRAVEL =	0.5	**D_{85} =**	0.4	**D_{15} =**	
% SAND =	69.5	**D_{60} =**	0.2	**D_{10} =**	
% SILT & CLAY =	30.1	**D_{50} =**	0.2	**C_U =**	
		D_{30} =		**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-4 @ 2-4'

Liquid Limit: 50

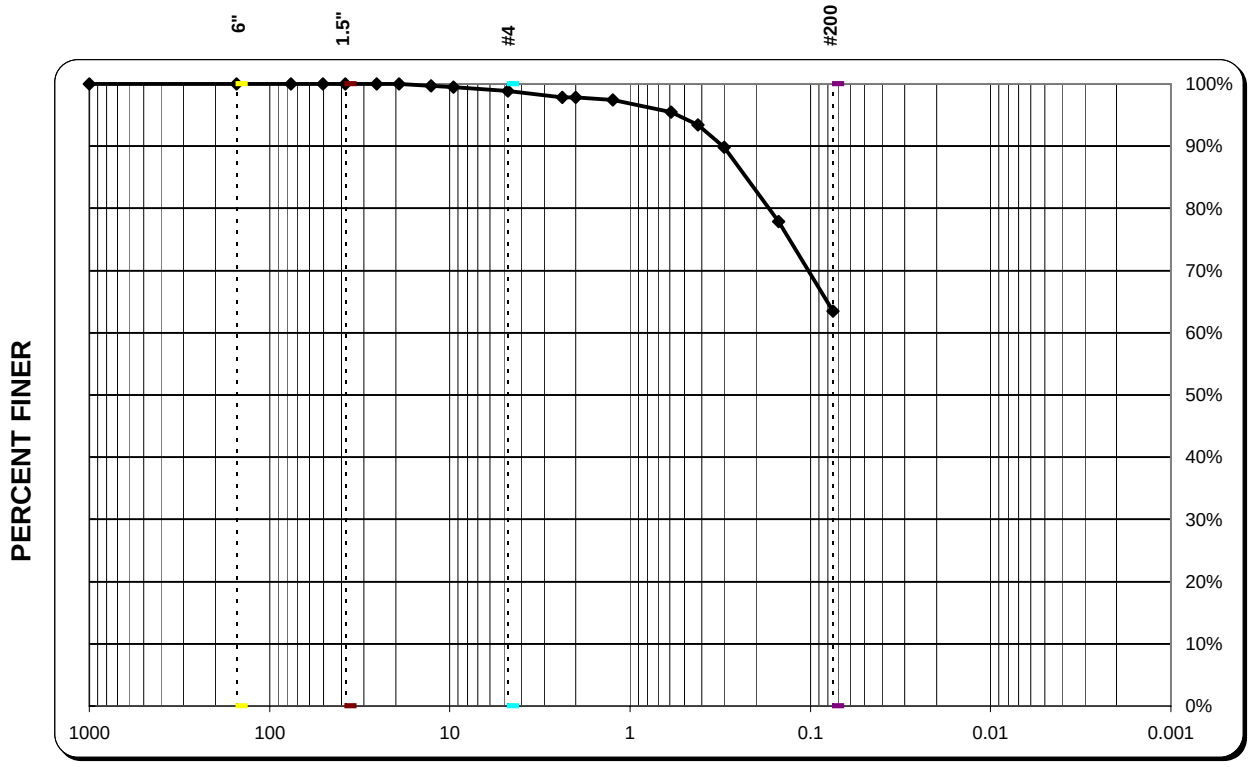
Plasticity Index: 32

USCS Classification: SC

Material Description: Clayey Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	99	98	93	78	63.5
Specification								

% GRAVEL =	1.2	**D_{85} =** 0.2	**D_{15} =**
% SAND =	35.4	**D_{60} =**	**D_{10} =**
% SILT & CLAY =	63.5	**D_{50} =**	**C_U =**
		D_{30} =	**C_C =**

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-5 @ 1-3'

Liquid Limit: 39

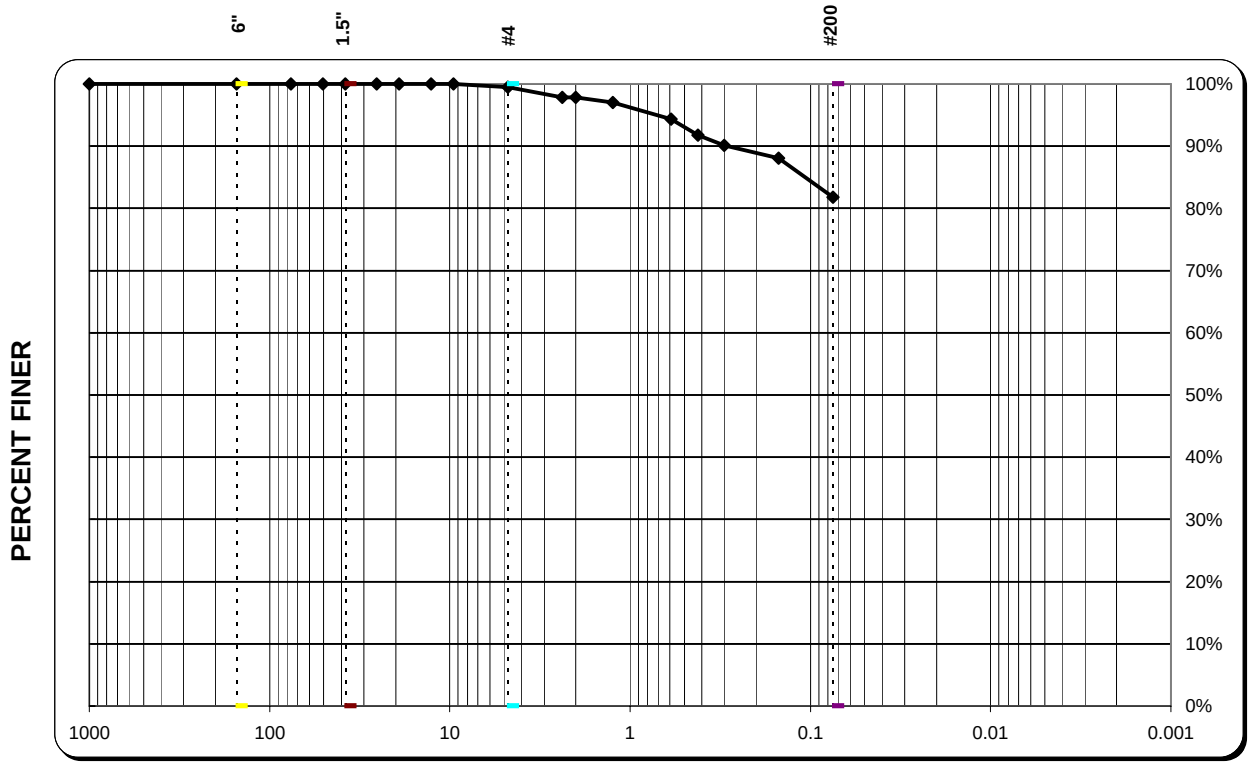
Plasticity Index: 23

USCS Classification: CL

Material Description: Sandy Lean Clay

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	99	98	92	88	81.8
Specification								

% GRAVEL =	0.6		**D_{85} =** 0.1	**D_{15} =**	
% SAND =	17.7		**D_{60} =**	**D_{10} =**	
% SILT & CLAY =	81.8		**D_{50} =**	**C_U =**	
			D_{30} =	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-6 @ 10-12'

Liquid Limit: 41

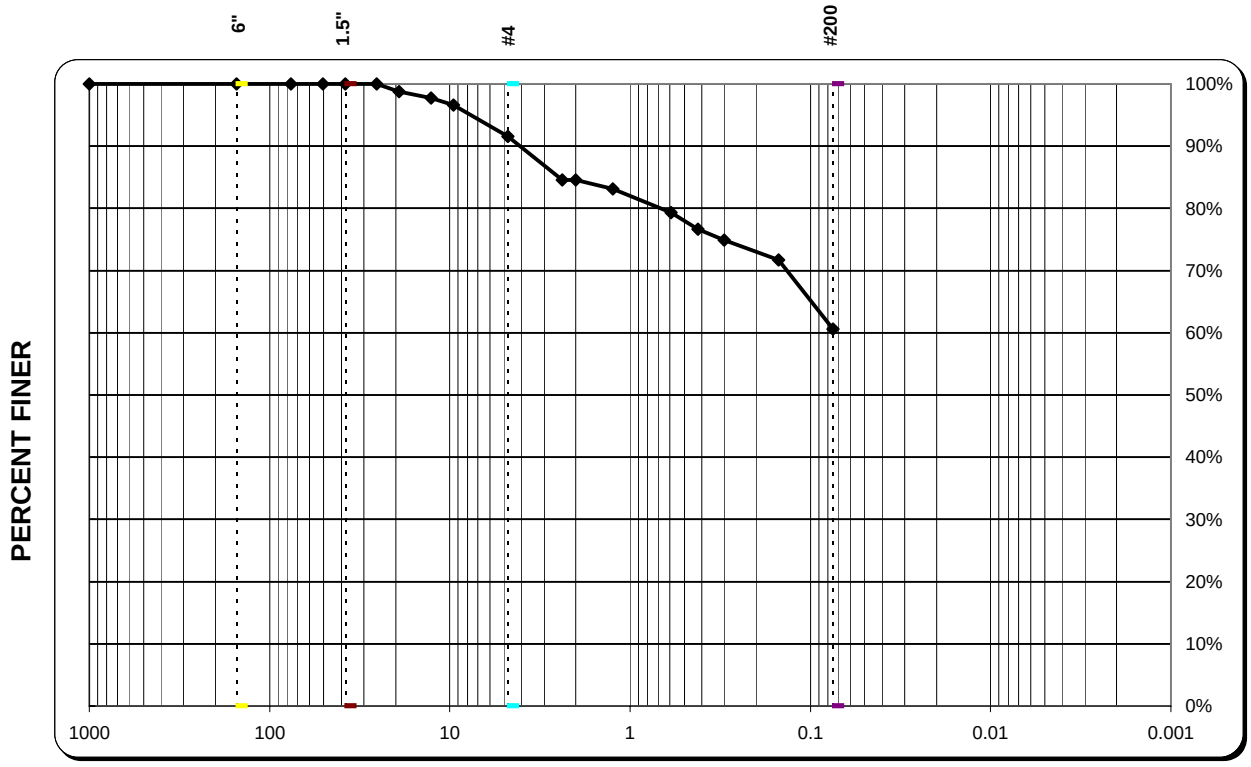
Plasticity Index: 24

USCS Classification: CL

Material Description: Lean Clay with Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	99	97	92	85	77	72	60.6
Specification								

% GRAVEL =	8.5	**D_{85} =** 2.1	**D_{15} =**
% SAND =	30.9	**D_{60} =**	**D_{10} =**
% SILT & CLAY =	60.6	**D_{50} =**	**C_U =**
		D_{30} =	**C_C =**

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-7 @ 5-7'

Liquid Limit: 39

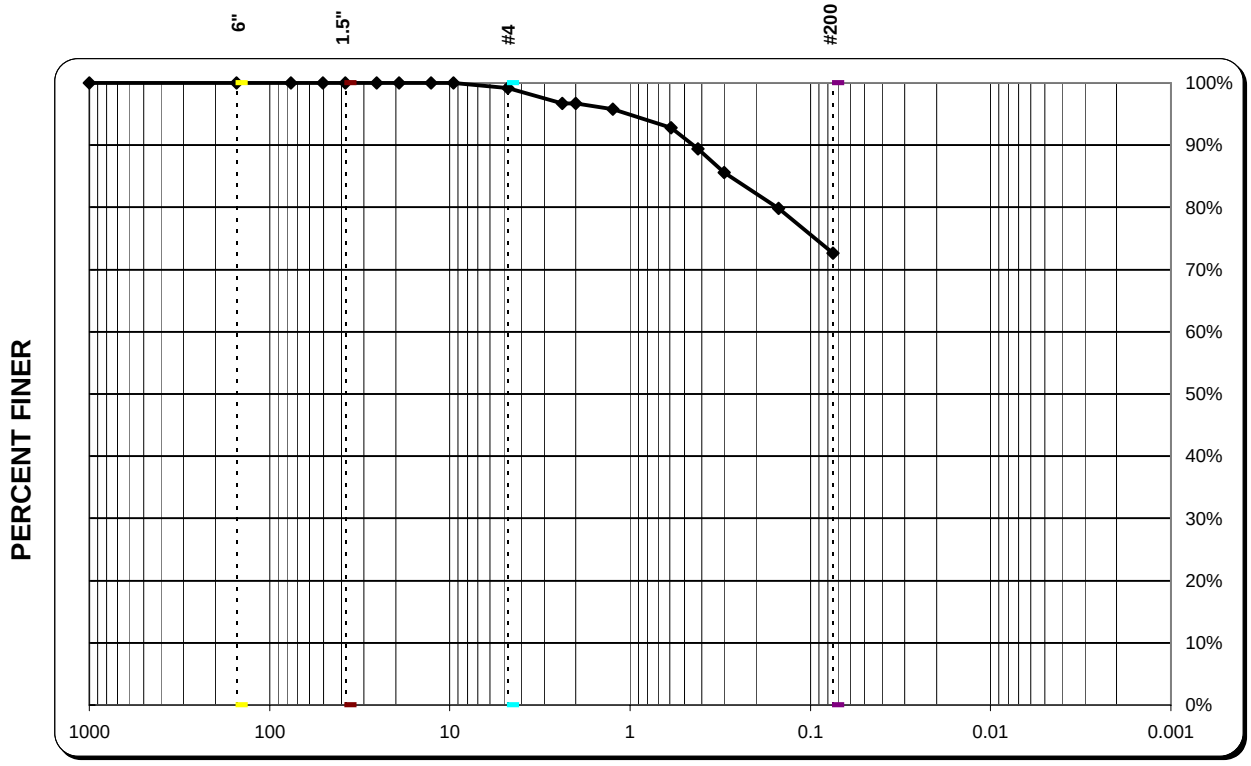
Plasticity Index: 24

USCS Classification: CL

Material Description: Sandy Lean Clay

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	99	97	89	80	72.6
Specification								

% GRAVEL =	0.8		**D_{85} =** 0.3	**D_{15} =**	
% SAND =	26.5		**D_{60} =**	**D_{10} =**	
% SILT & CLAY =	72.6		**D_{50} =**	**C_U =**	
			D_{30} =	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-8 @ 5-7'

Liquid Limit: 42

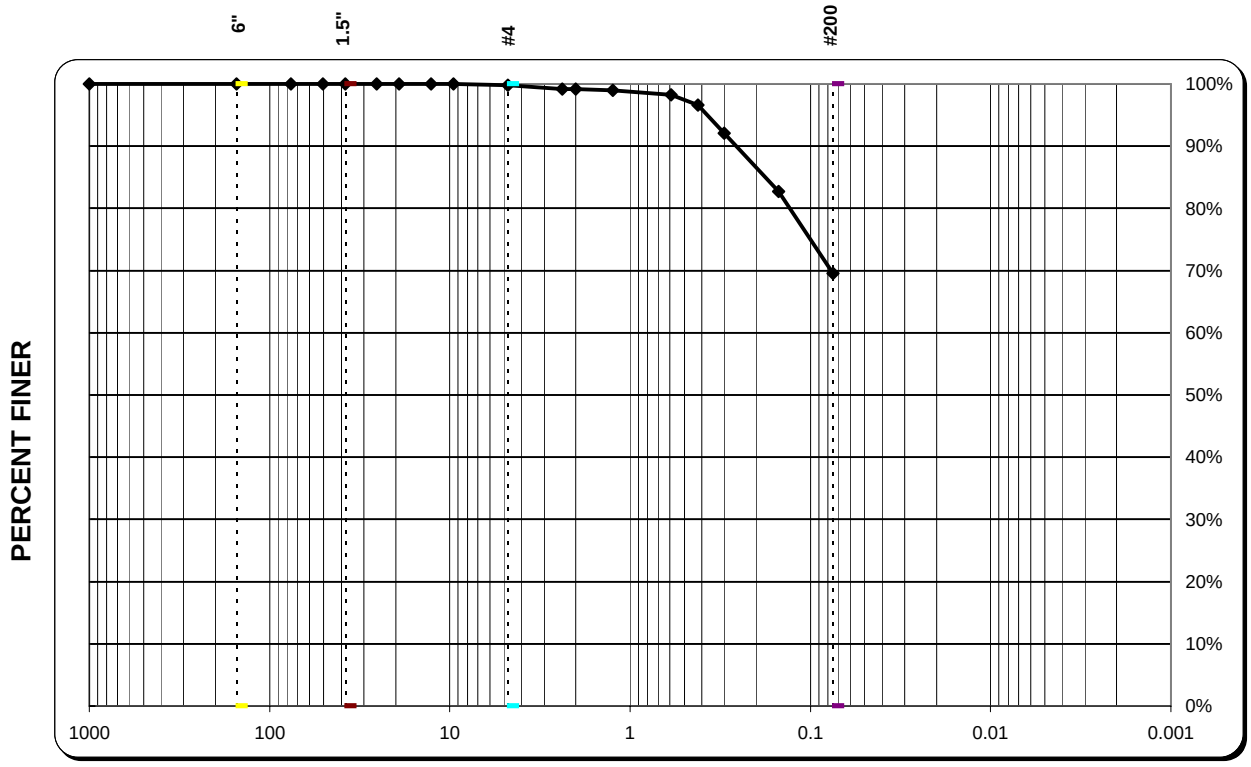
Plasticity Index: 28

USCS Classification: CL

Material Description: Lean Clay with Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	99	97	83	69.5
Specification								

% GRAVEL =	0.2	**D_{85} =** 0.2	**D_{15} =**
% SAND =	30.3	**D_{60} =**	**D_{10} =**
% SILT & CLAY =	69.5	**D_{50} =**	**C_U =**
		D_{30} =	**C_C =**

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-9 @ 9-11'

Liquid Limit: 33

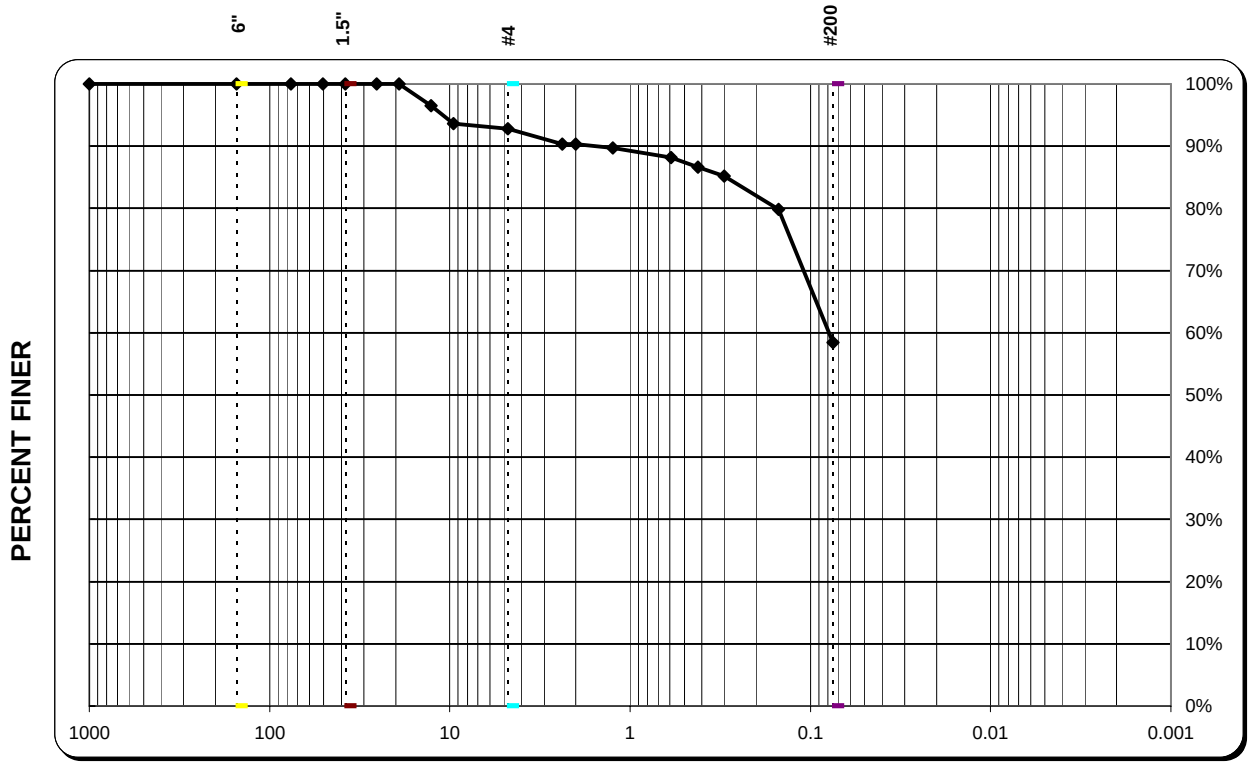
Plasticity Index: 21

USCS Classification: CL

Material Description: Sandy Lean Clay

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	94	93	90	87	80	58.4
Specification								

% GRAVEL =	7.2		**D_{85} =** 0.3	**D_{15} =**	
% SAND =	34.4		**D_{60} =** 0.1	**D_{10} =**	
% SILT & CLAY =	58.4		**D_{50} =**	**C_U =**	
			D_{30} =	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-10 @ 10-12'

Liquid Limit: 30

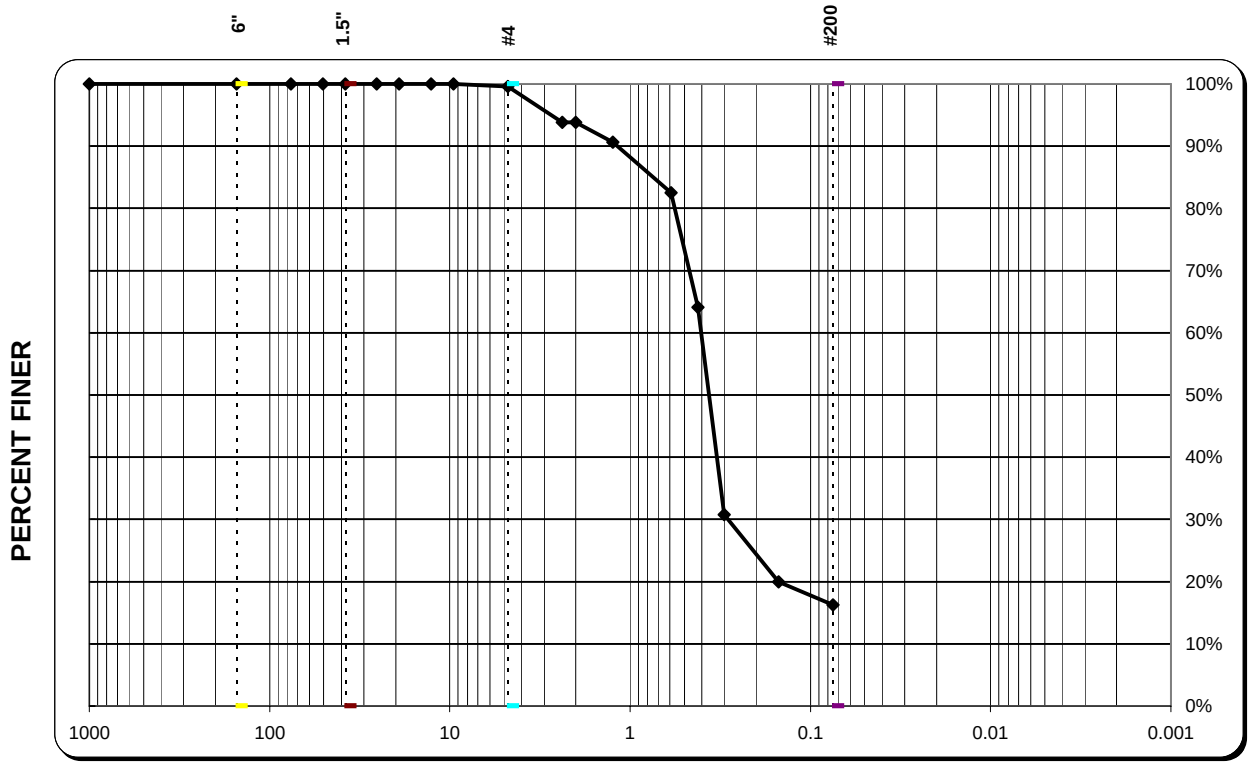
Plasticity Index: 17

USCS Classification: CL

Material Description: Sandy Lean Clay

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	94	64	20	16.3
Specification								

% GRAVEL =	0.4	**D_{85} =**	0.8	**D_{15} =**	
% SAND =	83.3	**D_{60} =**	0.4	**D_{10} =**	
% SILT & CLAY =	16.3	**D_{50} =**	0.4	**C_U =**	
		D_{30} =	0.3	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-11 @ 4-6'

Liquid Limit: 33

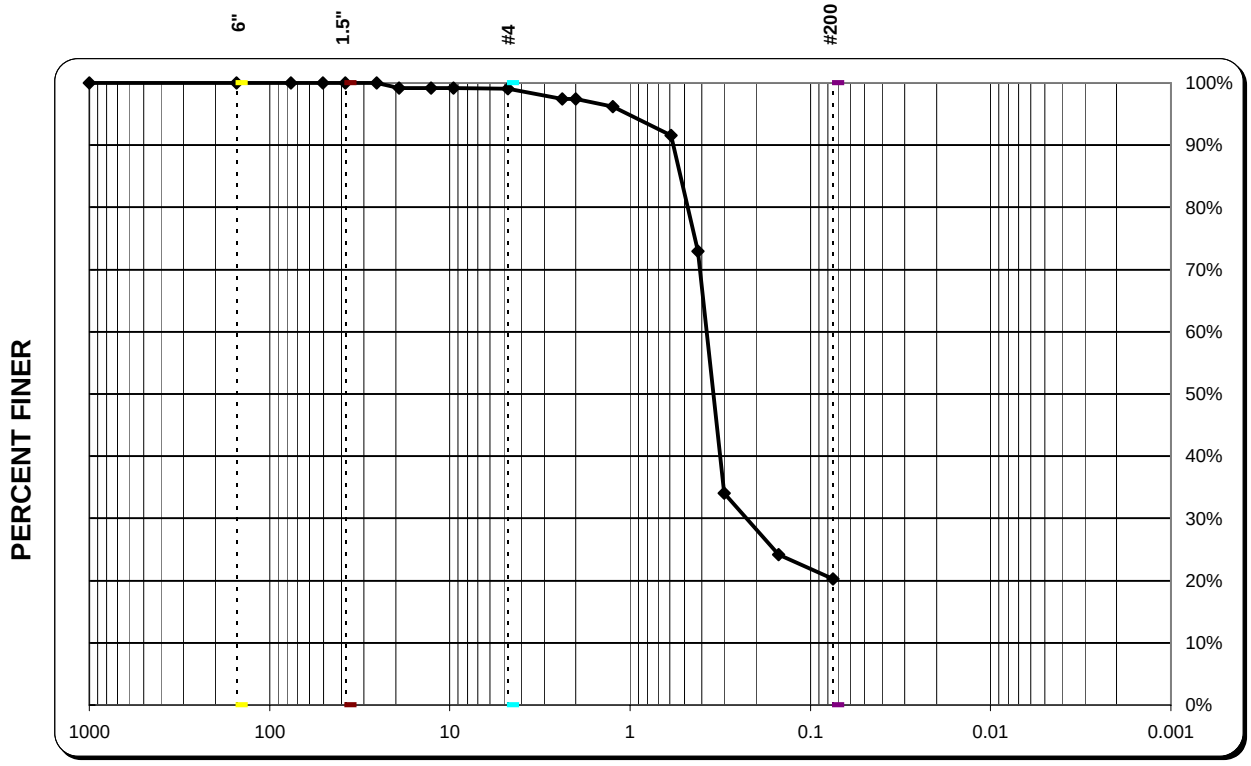
Plasticity Index: 8

USCS Classification: SM

Material Description: Silty Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	99	99	99	97	73	24	20.3
Specification								

% GRAVEL =	0.9	**D_{85} =**	0.5	**D_{15} =**	
% SAND =	78.8	**D_{60} =**	0.4	**D_{10} =**	
% SILT & CLAY =	20.3	**D_{50} =**	0.3	**C_U =**	
		D_{30} =	0.2	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-12 @ 4-6'

Liquid Limit: 38

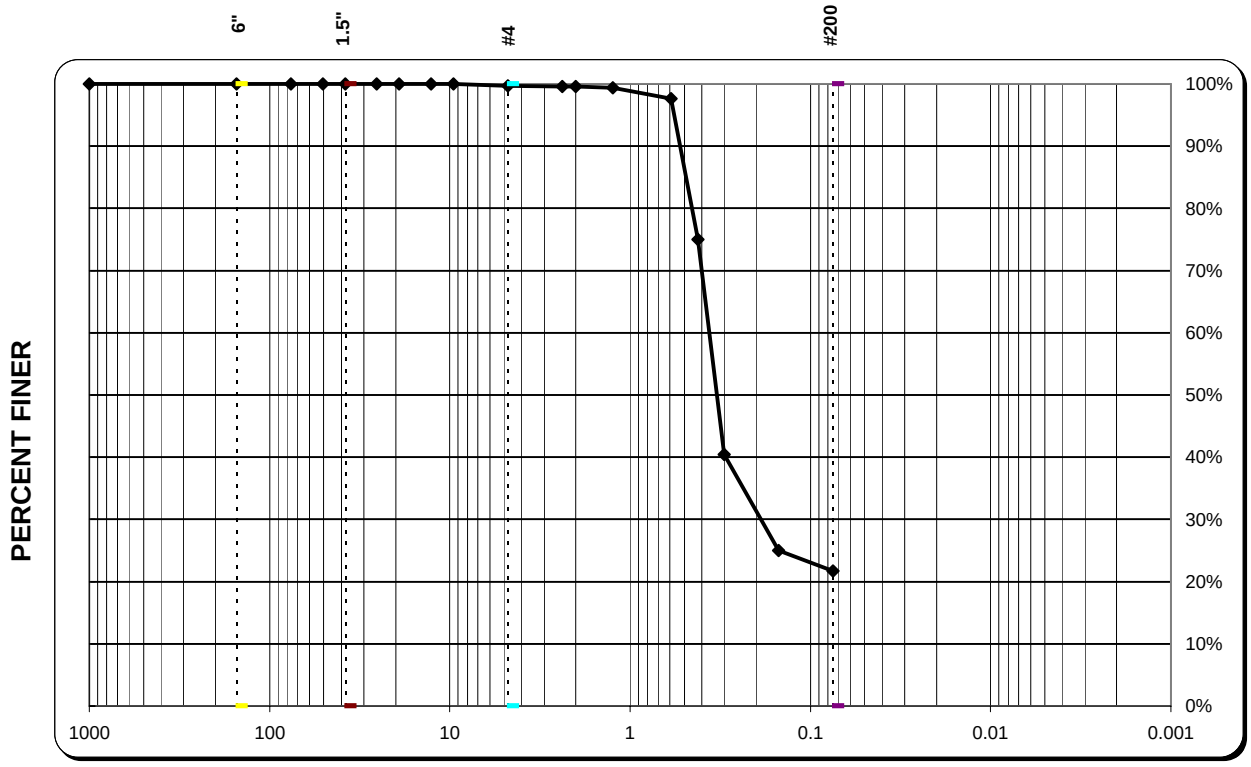
Plasticity Index: 11

USCS Classification: SM

Material Description: Silty Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	100	75	25	21.7
Specification								

% GRAVEL =	0.3	**D_{85} =**	0.5	**D_{15} =**	
% SAND =	78.0	**D_{60} =**	0.4	**D_{10} =**	
% SILT & CLAY =	21.7	**D_{50} =**	0.3	**C_U =**	
		D_{30} =	0.2	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-13 @ 1-3'

Liquid Limit: 37

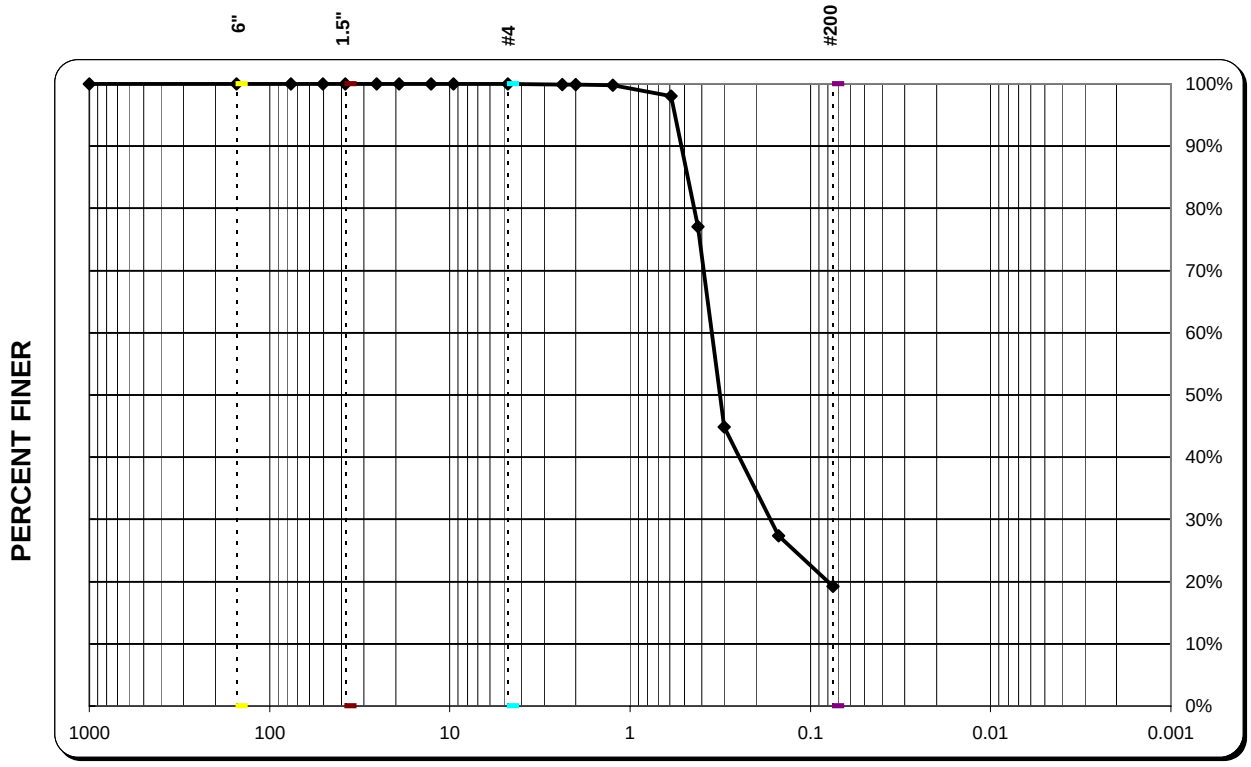
Plasticity Index: 23

USCS Classification: SC

Material Description: Clayey Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	100	77	27	19.2
Specification								

% GRAVEL =	0.0		**D_{85} =** 0.5	**D_{15} =**	
% SAND =	80.8		**D_{60} =** 0.4	**D_{10} =**	
% SILT & CLAY =	19.2		**D_{50} =** 0.3	**C_U =**	
			D_{30} = 0.2	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-14 @ 0-2'

Liquid Limit: 24

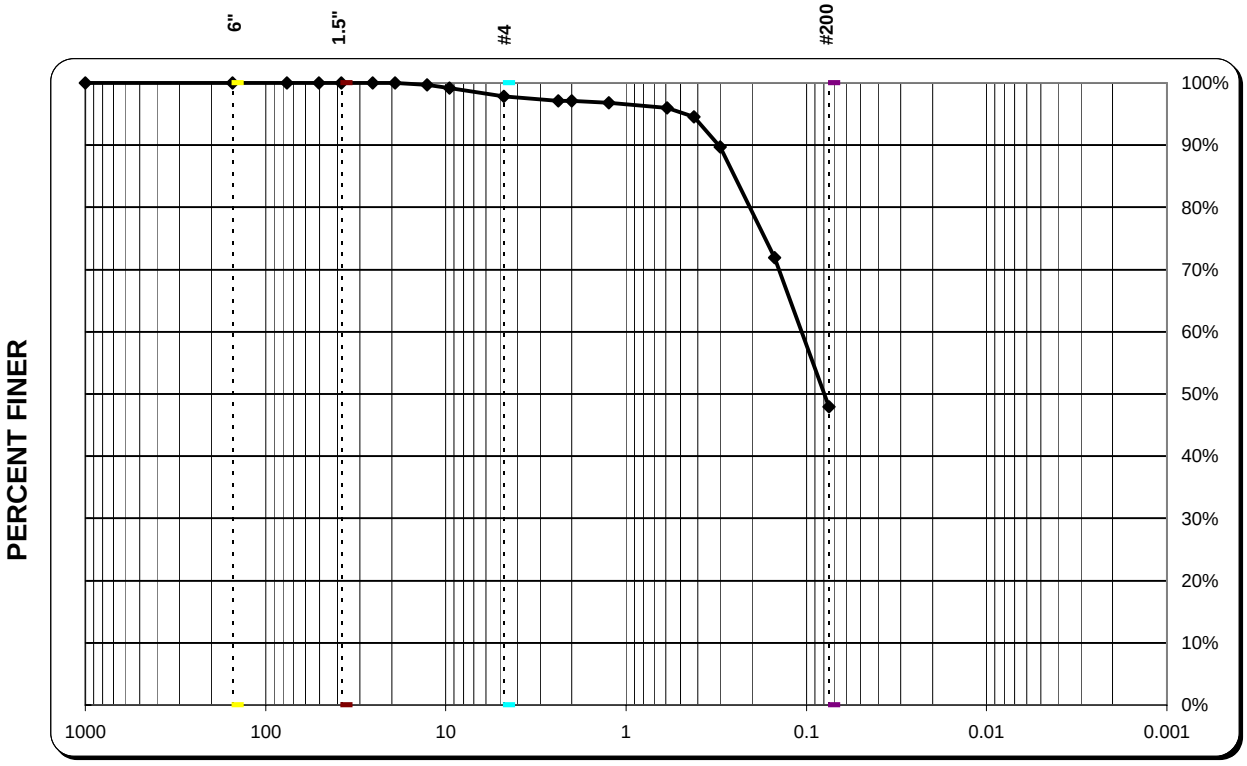
Plasticity Index: 3

USCS Classification: SM

Material Description: Silty Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	99	98	97	95	72	47.9
Specification								

% GRAVEL =	2.2		**D_{85} =** 0.2	**D_{15} =**	
% SAND =	49.9		**D_{60} =** 0.1	**D_{10} =**	
% SILT & CLAY =	47.9		**D_{50} =** 0.1	**C_U =**	
			D_{30} =	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-15 @ 7-9'

Liquid Limit: 31

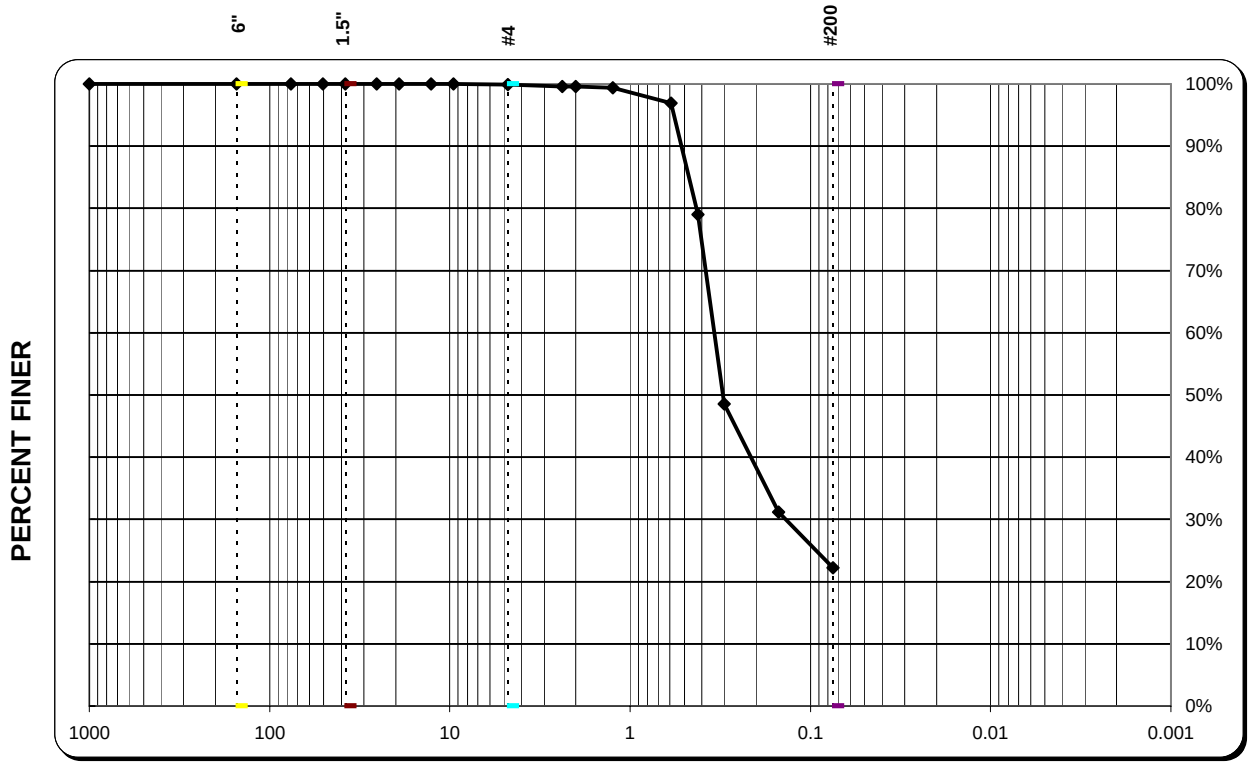
Plasticity Index: 13

USCS Classification: SC

Material Description: Clayey Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	100	79	31	22.2
Specification								

% GRAVEL =	0.1		**D_{85} =** 0.5	**D_{15} =**	
% SAND =	77.6		**D_{60} =** 0.3	**D_{10} =**	
% SILT & CLAY =	22.2		**D_{50} =** 0.3	**C_U =**	
			D_{30} = 0.1	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-16 @ 10-12'

Liquid Limit: 25

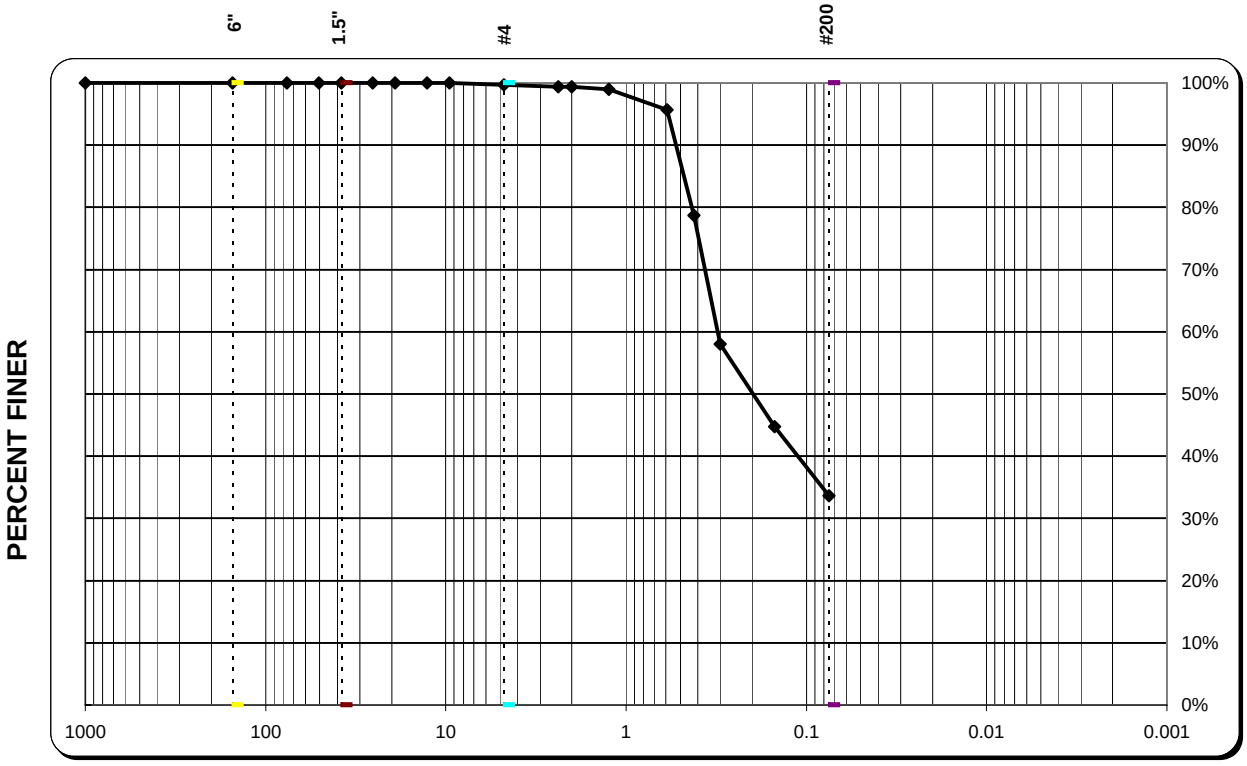
Plasticity Index: 6

USCS Classification: SC-SM

Material Description: Clayey Silty Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	99	79	45	33.6
Specification								

% GRAVEL =	0.3	**D_{85} =**	0.5	**D_{15} =**	
% SAND =	66.1	**D_{60} =**	0.3	**D_{10} =**	
% SILT & CLAY =	33.6	**D_{50} =**	0.2	**C_U =**	
		D_{30} =		**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-17 @ 12-15'

Liquid Limit: 24

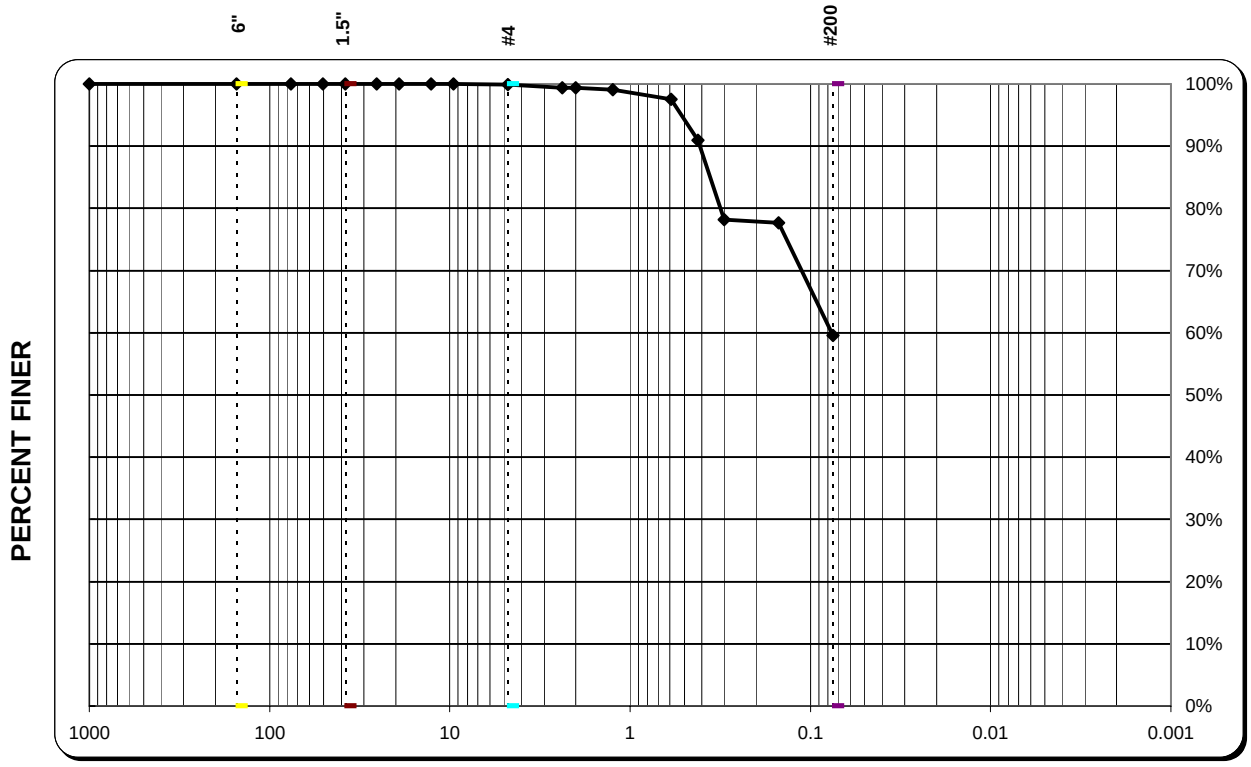
Plasticity Index: 8

USCS Classification: SC

Material Description: Clayey Sand

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



GRAIN SIZE - mm

TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	100	99	91	78	59.6
Specification								

% GRAVEL =	0.1		**D_{85} =** 0.4	**D_{15} =**	
% SAND =	40.4		**D_{60} =** 0.1	**D_{10} =**	
% SILT & CLAY =	59.6		**D_{50} =**	**C_U =**	
			D_{30} =	**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-18 @ 12-14'

Liquid Limit: 28

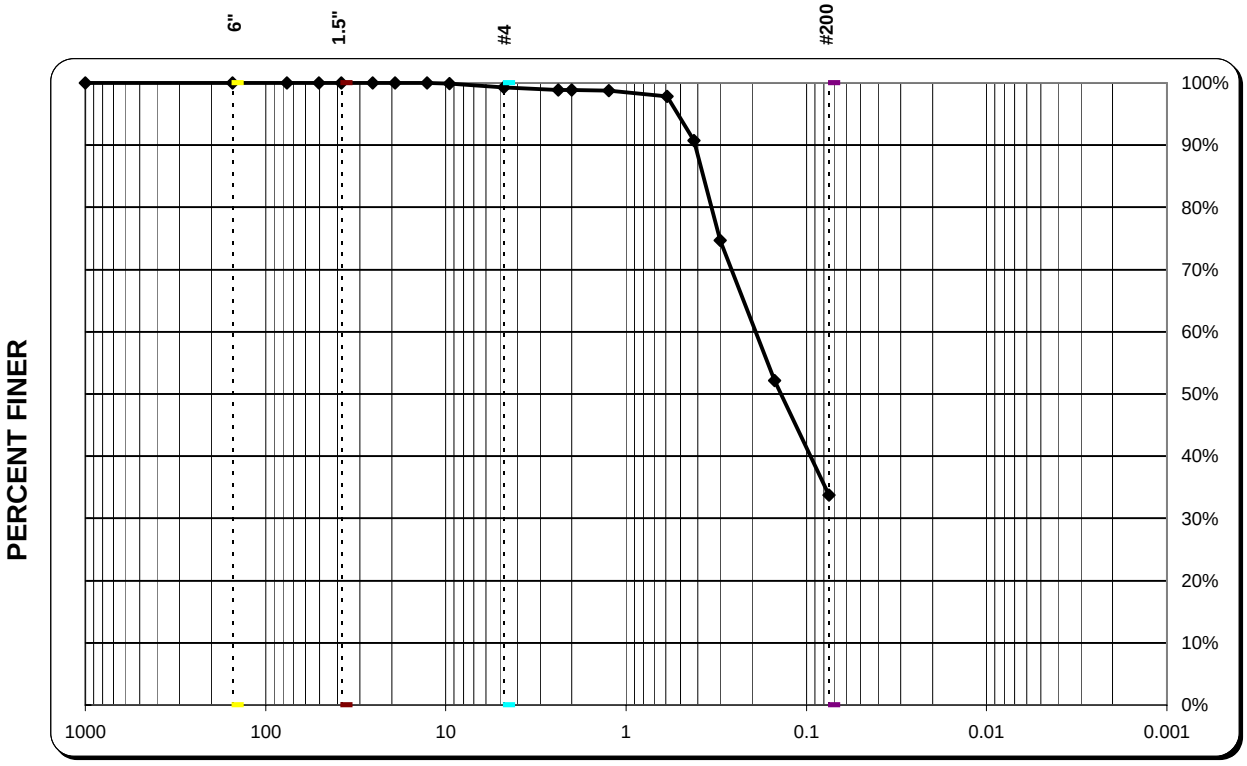
Plasticity Index: 14

USCS Classification: CL

Material Description: Sandy Lean Clay

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	100	100	99	99	91	52	33.7
Specification								

% GRAVEL =	0.7	**D_{85} =**	0.4	**D_{15} =**	
% SAND =	65.6	**D_{60} =**	0.2	**D_{10} =**	
% SILT & CLAY =	33.7	**D_{50} =**	0.1	**C_U =**	
		D_{30} =		**C_C =**	

Sample Date: 6/23/2008

Project No.: 69085011

Project Name: East Aztec Arterial Route

Report Date: 8/28/2008

Sample Location: TP-19 @ 14-16'

Liquid Limit: 25

Plasticity Index: 9

USCS Classification: SC

Material Description: Clayey Sand

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P.O. Box 503
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(970) 484-0359 FAX (970) 484-0454

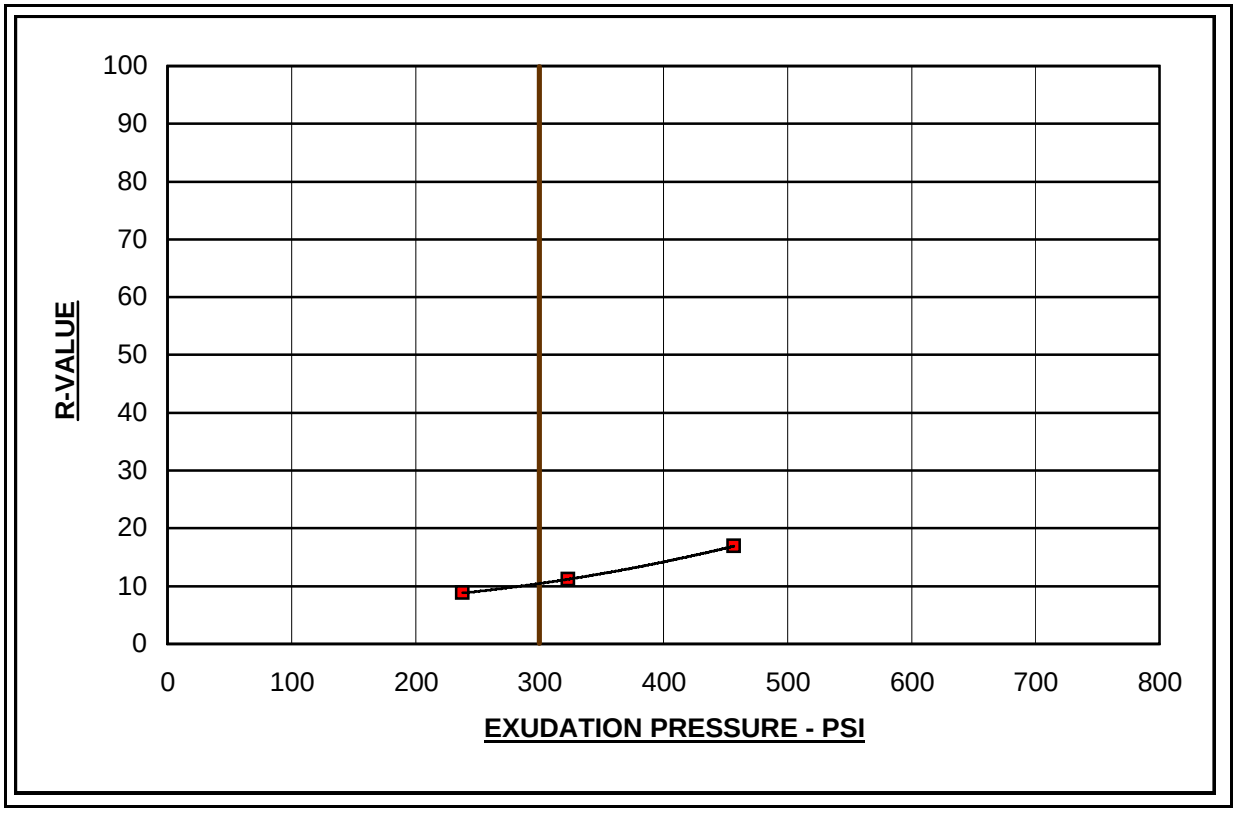
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	Wilson & Company, Inc.	**DATE OF TEST:**	11-Jul-08
PROJECT:	East Aztec Arterial Route		
LOCATION:	TP-4 @ 2'-4'		
TERRACON NO.	69085011	**CLASSIFICATION:**	Clayey Sand

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	110	130	240
DENSITY (PCF)	109.9	113.1	117.0
MOISTURE CONTENT (%)	17.8	16.7	14.8
EXPANSION PRESSURE (PSI)	0.50	0.06	1.86
HORIZONTAL PRESSURE @ 160 PSI	136	131	121
SAMPLE HEIGHT (INCHES)	2.57	2.54	2.49
EXUDATION PRESSURE (PSI)	237.9	323.0	456.6
CORRECTED R-VALUE	8.8	11.2	16.9
UNCORRECTED R-VALUE	8.6	11.2	16.9

R-VALUE @ 300 PSI EXUDATION PRESSURE = **11**



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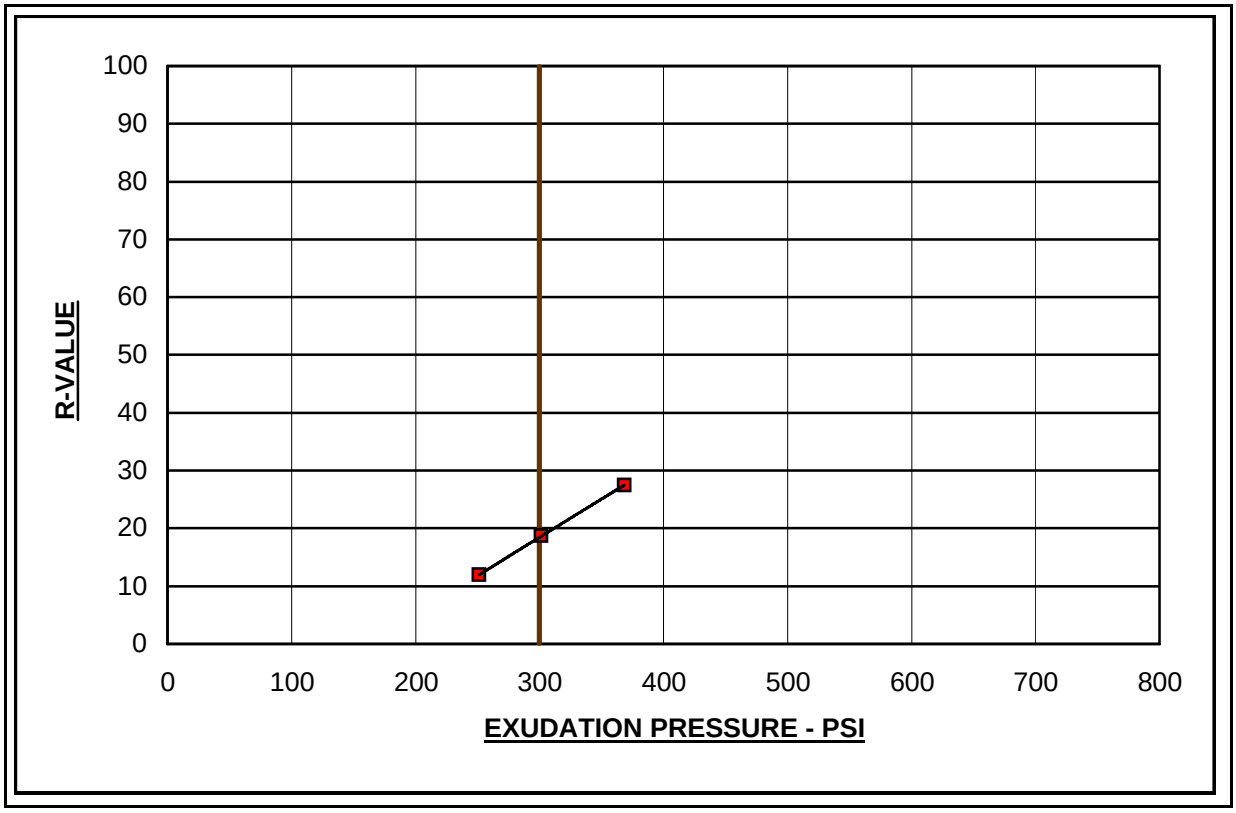
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	Wilson & Company, Inc.	**DATE OF TEST:**	11-Jul-08
PROJECT:	East Aztec Arterial Route		
LOCATION:	TP-8 @ 5.5'-7"		
TERRACON NO.	69085011	**CLASSIFICATION:**	Lean Clay with Sand

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	120	180	280
DENSITY (PCF)	107.4	113.2	118.0
MOISTURE CONTENT (%)	20.1	18.0	14.5
EXPANSION PRESSURE (PSI)	1.49	3.16	5.02
HORIZONTAL PRESSURE @ 160 PSI	132	121	110
SAMPLE HEIGHT (INCHES)	2.53	2.47	2.45
EXUDATION PRESSURE (PSI)	251.4	301.5	368.3
CORRECTED R-VALUE	12.0	18.7	27.5
UNCORRECTED R-VALUE	12.0	18.7	27.5

R-VALUE @ 300 PSI EXUDATION PRESSURE = **18**



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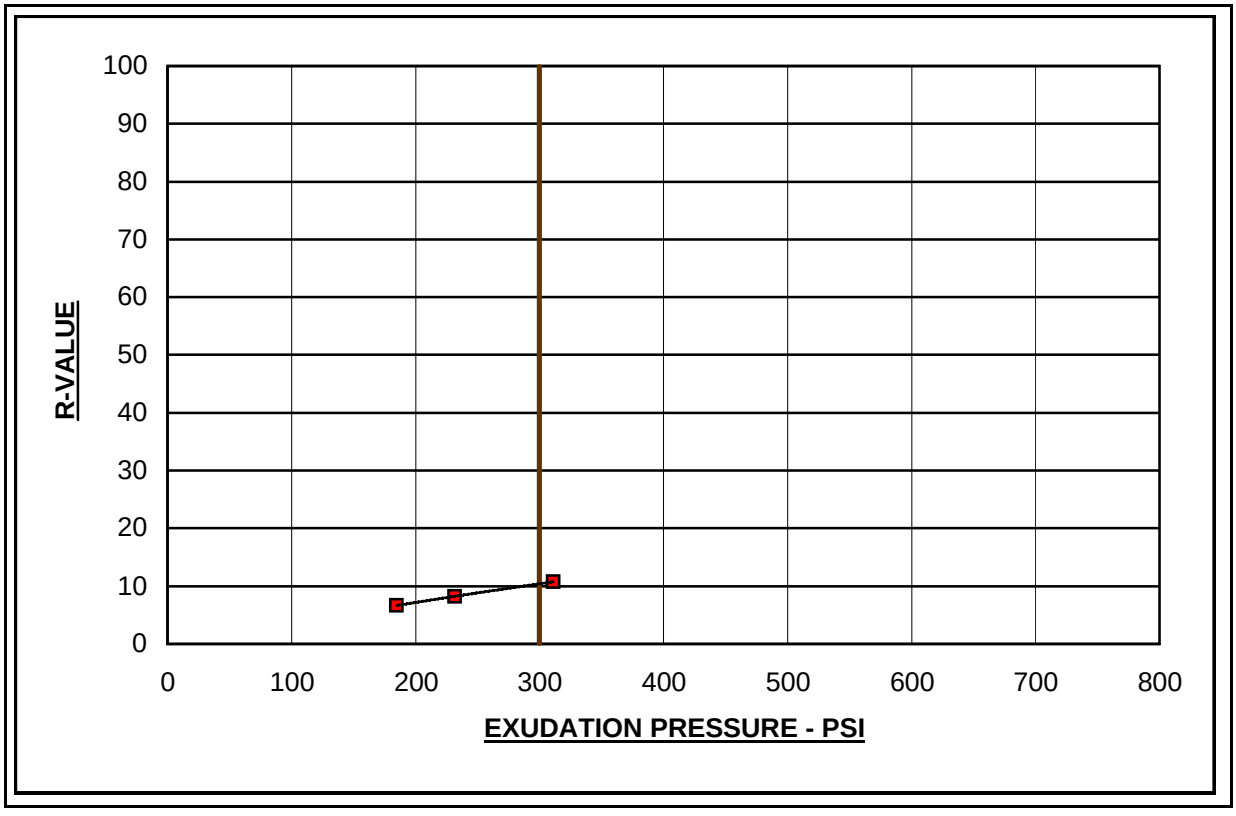
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	Wilson & Company, Inc.	**DATE OF TEST:**	11-Jul-08
PROJECT:	East Aztec Arterial Route		
LOCATION:	TP-10 @ 10'-12'		
TERRACON NO.	69085011	**CLASSIFICATION:**	Sandy Lean Clay

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	100	170	270
DENSITY (PCF)	108.3	112.1	115.3
MOISTURE CONTENT (%)	19.9	17.9	16.7
EXPANSION PRESSURE (PSI)	0.53	0.68	2.29
HORIZONTAL PRESSURE @ 160 PSI	142	139	134
SAMPLE HEIGHT (INCHES)	2.55	2.52	2.48
EXUDATION PRESSURE (PSI)	184.6	231.5	311.1
CORRECTED R-VALUE	6.6	8.2	10.7
UNCORRECTED R-VALUE	6.6	8.2	10.7

R-VALUE @ 300 PSI EXUDATION PRESSURE = **10**



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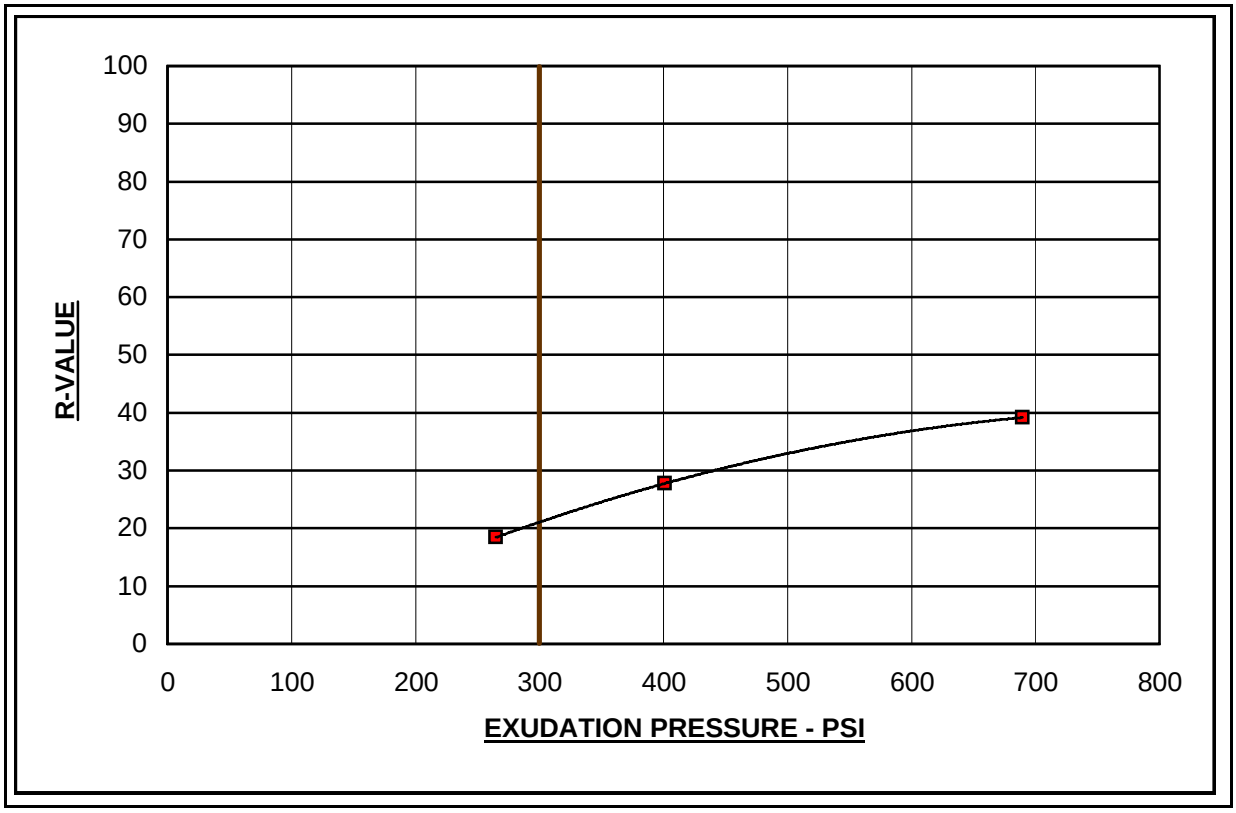
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	Wilson & Company, Inc.	**DATE OF TEST:**	10-Jul-08
PROJECT:	East Aztec Arterial Route		
LOCATION:	TP-13 @ 1'-3'		
TERRACON NO.	69085011	**CLASSIFICATION:**	Clayey Sand

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	290	350	350
DENSITY (PCF)	115.0	115.9	118.2
MOISTURE CONTENT (%)	15.3	14.4	13.7
EXPANSION PRESSURE (PSI)	-0.06	0.34	0.84
HORIZONTAL PRESSURE @ 160 PSI	119	101	83
SAMPLE HEIGHT (INCHES)	2.51	2.49	2.47
EXUDATION PRESSURE (PSI)	264.9	401.0	689.7
CORRECTED R-VALUE	18.4	27.8	39.2
UNCORRECTED R-VALUE	18.4	27.8	39.2

R-VALUE @ 300 PSI EXUDATION PRESSURE = **21**



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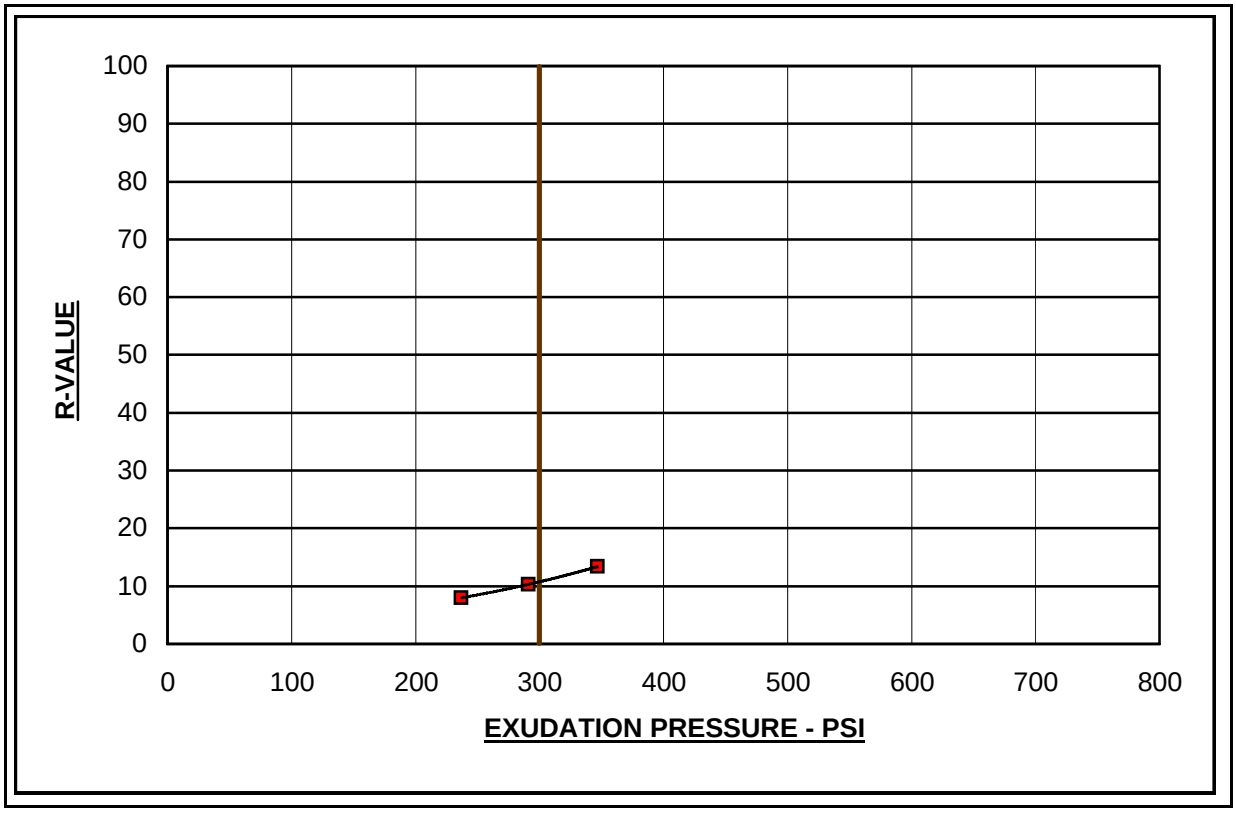
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	Wilson & Company, Inc.	**DATE OF TEST:**	10-Jul-08
PROJECT:	East Aztec Arterial Route		
LOCATION:	TP-18 @ 12'-14'		
TERRACON NO.	69085011	**CLASSIFICATION:**	Sandy Lean Clay

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	90	13	210
DENSITY (PCF)	108.0	110.2	114.2
MOISTURE CONTENT (%)	20.4	19.1	17.3
EXPANSION PRESSURE (PSI)	-0.06	-0.03	0.34
HORIZONTAL PRESSURE @ 160 PSI	141	137	132
SAMPLE HEIGHT (INCHES)	2.56	2.60	2.58
EXUDATION PRESSURE (PSI)	237.1	291.2	346.9
CORRECTED R-VALUE	8.0	10.3	13.4
UNCORRECTED R-VALUE	7.8	9.9	13.0

R-VALUE @ 300 PSI EXUDATION PRESSURE = **11**



WELD LABORATORIES, INC.
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REC'D AUG 15 2008

July 22, 2008

Terracon
#4A CR 3499
Flora Vista, NM 87415

Project No.: 69085011

Results

Sample ID:	TP-18 @ 12-14'	TP-13 @ 1-3'	TP-4 @ 2-4'	TP-10 @ 10-12'	TP-8 @ 5.5-7'
Laboratory No.:	S8192-72	S8192-73	S8192-74	S8192-75	S8192-76
pH	7.23	7.26	7.63	7.46	7.36
Min. Lab Resistivity (ohm-cm)	250	647	400	275	137
Sulfate (mg/kg)	1970	279	350	1130	2550
Chloride (mg/kg)	426	177	106	355	248

Project Manager

7/22/08
Date

Sampling procedures can affect the value of analytical results – customers are advised to use appropriate sampling protocol to insure samples are truly representative of the bulk sample.

New Mexico Department of Transportation
Engineering Support Division - Pavement Design Buerau
Probablistic Flexible Pavement Design (English) - Release 2.0

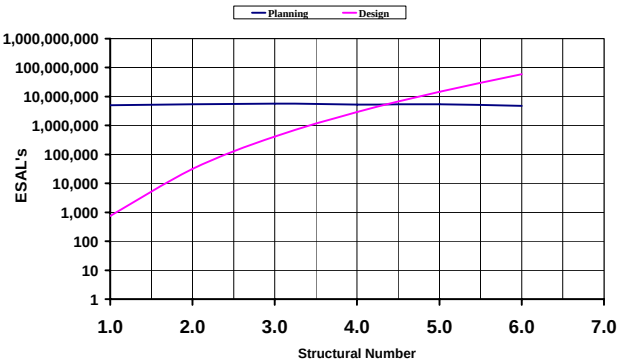
Project Information

Date: 28-Aug-08

Project Number: 69085011
Control Number: N/A

Location: East Aztec Arterial Route

District Number: 5
County: SAN JUAN
Designer: MRM
PDE:
Type of Construction: NEW CONSTRUCTION



Flexible Pavement Structural Number Computation Worksheet

Design Factor Summary

Design R-Value: 13.8
Regional Factor (R): 1.8
Initial Serviceability (Pi): 4.2
Terminal Serviceability (P_t): 2.0
Design ESAL (years): 20.0

DESIGN STRUCTUAL NUMBER : 4.35
DESIGN ESAL : 5,274,796

Design ESAL Summary

Assumed Structural Number	Calculated Flexible ESALs	
	Planning	Design
1.0	5,054,141	746
2.0	5,363,090	31,746
3.0	5,701,746	417,065
4.0	5,327,255	2,916,931
5.0	5,461,550	14,568,486
6.0	4,778,103	58,614,537
	Planning Uncertainty Percentage =	25%

English Units Version

Pavement Type	Design Depth (Inches)	Design Structural Coefficient	Thickness Uncertainty	Layer Structural Number
New Rubberized Open Graded Friction Course	0.00	0.00	--------	--------
New Open Graded Friction Course	0.625	0.00	--------	--------
Stone Matrix Asphalt	0.00	0.40	10%	0.00
New Plant Mix Bituminous Pavement	9.50	0.44	10%	4.18
New Aggregate Base Course	6.00	0.11	10%	0.66
New Cement Treated Base Course	0.00	0.27	0%	0.00
New Asphalt Treated Base Course	0.00	0.27	0%	0.00
Geo-Grid (Effective Base Course)	0.00	0.11	0%	0.00
New Cement Treated Subgrade	0.00	0.20	0%	0.00
New Lime Treated Subgrade	0.00	0.10	0%	0.00
	0.00	0.00	0%	0.00
Hot Recycle	0.00	0.30	0%	0.00
In-Situ Cold Recyle of Existing PMBP	0.00	0.30	10%	0.00
Cold Milling of Existing PMBP	0.00	-0.27	0%	0.00
Existing Plant Mix Bituminous Pavement	0.00	0.27		0.00
Existing Aggregate Base Course	0.00	0.08		0.00
Existing Cement Treated Base Course	0.00	0.05		0.00
Existing Asphalt Treated Base Course	0.00	0.05		0.00
Existing Cement Treated Subgrade	0.00	0.08		0.00
Existing Lime Treated Subgrade	0.00	0.08		0.00

Proposed Structural Number: 4.84
Design Structural Number: 4.35

Design Reliability: 65%
Reliability For Constructability: 75%

Proposed Structural Number MEETS Minimum Design Requirements

New Mexico Department of Transportation
Engineering Support Division - Pavement Design Buerau
Probablistic Flexible Pavement Design (English) - Release 2.0

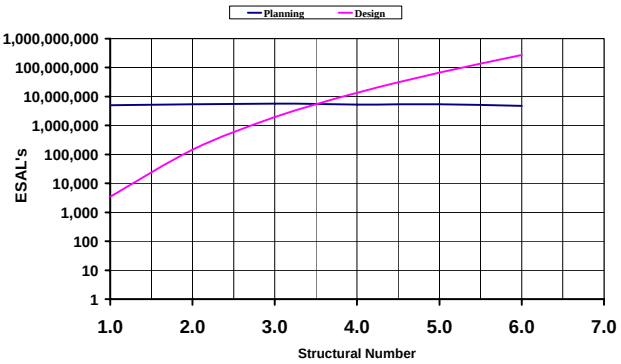
Project Information

Date: 28-Aug-08

Project Number: 69085011
Control Number: N/A

Location: East Aztec Arterial Route

District Number: 5
County: SAN JUAN
Designer: MRM
PDE:
Type of Construction: NEW CONSTRUCTION



Flexible Pavement Structural Number Computation Worksheet

Design Factor Summary

Design R-Value: 33.5
Regional Factor (R): 1.8
Initial Serviceability (Pi): 4.2
Terminal Serviceability (P_t): 2.0
Design ESAL (years): 20.0

DESIGN STRUCTUAL NUMBER : 3.51
DESIGN ESAL : 5,512,924

Design ESAL Summary

Assumed Structural Number	Calculated Flexible ESALs	
	Planning	Design
1.0	5,054,141	3,458
2.0	5,363,090	147,244
3.0	5,701,746	1,934,456
4.0	5,327,255	13,529,486
5.0	5,461,550	67,572,429
6.0	4,778,103	271,869,469
Planning Uncertainty Percentage =		25%

English Units Version

Pavement Type	Design Depth (Inches)	Design Structural Coefficient	Thickness Uncertainty	Layer Structural Number
New Rubberized Open Graded Friction Course	0.00	0.00	--------	--------
New Open Graded Friction Course	0.625	0.00	--------	--------
Stone Matrix Asphalt	0.00	0.40	10%	0.00
New Plant Mix Bituminous Pavement	7.50	0.44	10%	3.30
New Aggregate Base Course	6.00	0.11	10%	0.66
New Cement Treated Base Course	0.00	0.27	0%	0.00
New Asphalt Treated Base Course	0.00	0.27	0%	0.00
Geo-Grid (Effective Base Course)	0.00	0.11	0%	0.00
New Cement Treated Subgrade	0.00	0.20	0%	0.00
New Lime Treated Subgrade	0.00	0.10	0%	0.00
	0.00	0.00	0%	0.00
Hot Recycle	0.00	0.30	0%	0.00
In-Situ Cold Recyle of Existing PMBP	0.00	0.30	10%	0.00
Cold Milling of Existing PMBP	0.00	-0.27	0%	0.00
Existing Plant Mix Bituminous Pavement	0.00	0.27		0.00
Existing Aggregate Base Course	0.00	0.08		0.00
Existing Cement Treated Base Course	0.00	0.05		0.00
Existing Asphalt Treated Base Course	0.00	0.05		0.00
Existing Cement Treated Subgrade	0.00	0.08		0.00
Existing Lime Treated Subgrade	0.00	0.08		0.00

Proposed Structural Number: 3.96
Design Structural Number: 3.51

Design Reliability: 65%
Reliability For Constructability: 75%

Proposed Structural Number MEETS Minimum Design Requirements

New Mexico Department of Transportation
Context Sensitive Solutions Bureau - Pavement Design Solutions

Probablistic Rigid Pavement Slab Thickness Computation Worksheet
for Jointed Plain Concrete Pavement

Release (1.81)

8/28/2008 13:39

Control Number:	**N/A**	**Pavement Designer:**	**KMP/MRM**
Project Number:	**69085011**	**Project Development Engineer:**	
District Number:	**5**	**Type of Construction:**	**New Construction**
County Name:	**San Juan**	**Design Period (Years):**	**20**

Design Factor Summary

	Value	Units
Initial Serviceability Index (P_i):	4.2	
Termininal Serviceability Index (P_t):	2.5	
28-Day Compressive Strength (f'_c):	3000	psi
Base Thickness (D_B):	4.00	inches
Base Thickness Variation:	10.0	%
Base Modulus (M_{SB}):	15,000	psi
Loss of Base Support:	1.0	
Subgrade R-Value (RV_S):	14	
Bedrock Depth:	15.0	feet
Reliability Level (R):	75	%
Load Transfer Coefficient (J):	3.2	
Overall Drainage Coefficient (C_d):	1.0	

Design ESAL Summary

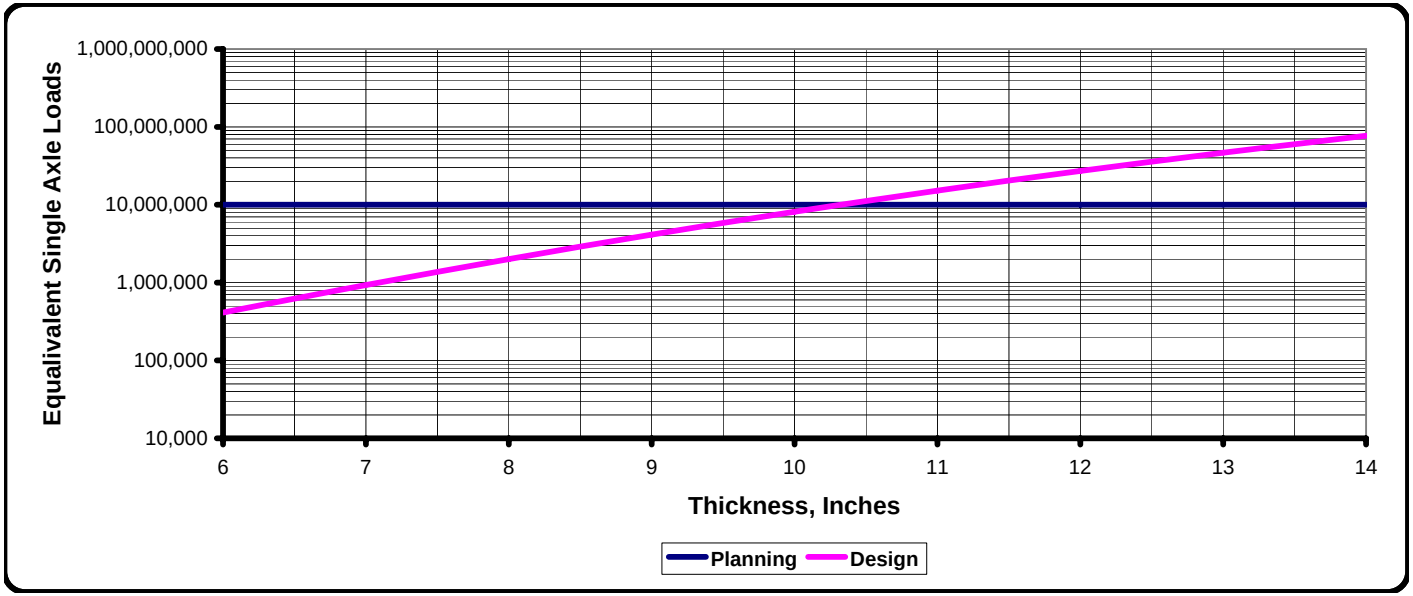
Slab Thickness (Inches)	Calculated Rigid ESALs	
	Planning	Design
6	10,000,000	411,648
7	10,000,000	929,346
8	10,000,000	2,002,255
9	10,000,000	4,138,087
10	10,000,000	8,135,148
11	10,000,000	15,207,793
12	10,000,000	27,145,203
13	10,000,000	46,504,479
14	10,000,000	76,843,745

Planning Uncertainty Percentage = **25%**

DESIGN PCCP THICKNESS => **10.32** **inches**

DESIGN ESAL => **9,991,323**

Corrected K-Value (psi/in) = **63**



New Mexico Department of Transportation
Context Sensitive Solutions Bureau - Pavement Design Solutions

Probablistic Rigid Pavement Slab Thickness Computation Worksheet
for Jointed Plain Concrete Pavement

Release (1.81)

8/28/2008 13:40

Control Number:	**N/A**	**Pavement Designer:**	**KMP/MRM**
Project Number:	**69085011**	**Project Development Engineer:**	
District Number:	**5**	**Type of Construction:**	**New Construction**
County Name:	**San Juan**	**Design Period (Years):**	**20**

Design Factor Summary

	Value	Units
Initial Serviceability Index (P_i):	4.2	
Termininal Serviceability Index (P_t):	2.5	
28-Day Compressive Strength (f'_c):	3000	psi
Base Thickness (D_B):	4.00	inches
Base Thickness Variation:	10.0	%
Base Modulus (M_{SB}):	15,000	psi
Loss of Base Support:	1.0	
Subgrade R-Value (RV_S):	33	
Bedrock Depth:	15.0	feet
Reliability Level (R):	75	%
Load Transfer Coefficient (J):	3.2	
Overall Drainage Coefficient (C_d):	1.0	

Design ESAL Summary

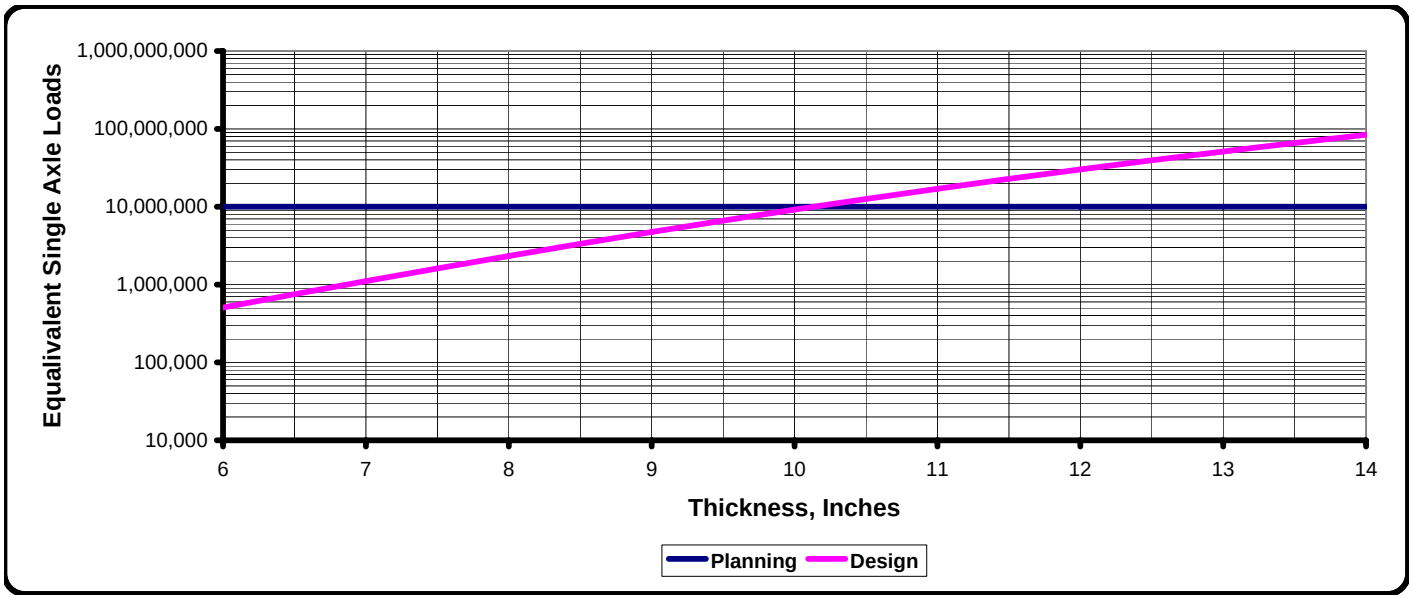
Slab Thickness (Inches)	Calculated Rigid ESALs	
	Planning	Design
6	10,000,000	507,527
7	10,000,000	1,108,702
8	10,000,000	2,333,804
9	10,000,000	4,740,377
10	10,000,000	9,194,483
11	10,000,000	17,003,588
12	10,000,000	30,082,997
13	10,000,000	51,156,969
14	10,000,000	84,000,729

Planning Uncertainty Percentage = **25%**

DESIGN PCCP THICKNESS => **10.13** **inches**

DESIGN ESAL => **9,985,974**

Corrected K-Value (psi/in) = **101**



GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1-3/8" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 2" O.D., unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 3" O.D. ring samplers (RS) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per foot," and is not considered equivalent to the "Standard Penetration"or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling	WE:	While Excavating
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	<2	Very Soft
500 – 1,000	2-3	Soft
1,001 – 2,000	4-6	Medium Stiff
2,001 – 4,000	7-12	Stiff
4,001 – 8,000	13-26	Very Stiff
8,000+	26+	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Ring Sampler (RS) Blows/Ft.	Relative Density
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 49	59-98	Dense
50+	99+	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifiers	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	30+

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GENERAL NOTES
Description of Rock Properties

WEATHERING

Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
Very slight	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 in. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
Moderately severe	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil". Rock "fabric" not discernible or discernible only in small, scattered locations. Quartz may be present as dikes or stringers.

HARDNESS (for engineering description of rock – not to be confused with Moh's scale for minerals)

Very hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately hard	Can be scratched with knife or pick. Gouges or grooves to ¼ in. deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 in. deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1-in. maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

Joint, Bedding and Foliation Spacing in Rock[a]

Spacing	Joints	Bedding/Foliation
Less than 2 in.	Very close	Very thin
2 in. – 1 ft.	Close	Thin
1 ft. – 3 ft.	Moderately close	Medium
3 ft. – 10 ft.	Wide	Thick
More than 10 ft.	Very wide	Very thick

Rock Quality Designator (RQD)[b]		Joint Openness Descriptors	
RQD, as a percentage	Diagnostic description	Openness	Descriptor
Exceeding 90	Excellent	No Visible Separation	Tight
90 – 75	Good	Less than 1/32 in.	Slightly Open
75 – 50	Fair	1/32 to 1/8 in.	Moderately Open
50 – 25	Poor	1/8 to 3/8 in.	Open
Less than 25	Very poor	3/8 in. to 0.1 ft.	Moderately Wide
		Greater than 0.1 ft.	Wide

a. Spacing refers to the distance normal to the planes, of the described feature, which are parallel to each other or nearly so.
b. RQD (given as a percentage) = length of core in pieces 4 in. and longer/length of run.

References: American Society of Civil Engineers. Manuals and Reports on Engineering Practice - No. 56. Subsurface Investigation for Design and Construction of Foundations of Buildings. New York: American Society of Civil Engineers, 1976.
U.S. Department of the Interior, Bureau of Reclamation, Engineering Geology Field Manual.

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UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification	
					Group Symbol	Group Name[B]
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]		GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]		GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH		GM	Silty gravel[F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]		SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]		SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH		SM	Silty sand[G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]		CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]		ML	Silt[K,L,M]
		organic	Liquid limit - oven dried	< 0.75	OL	Organic clay[K,L,M,N]
			Liquid limit - not dried			Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line		CH	Fat clay[K,L,M]
			PI lots below "A" line		MH	Elastic Silt[K,L,M]
		organic	Liquid limit - oven dried	< 0.75	OH	Organic clay[K,L,M,P]
			Liquid limit - not dried			Organic silt[K,L,M,Q]
Highly organic soils	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

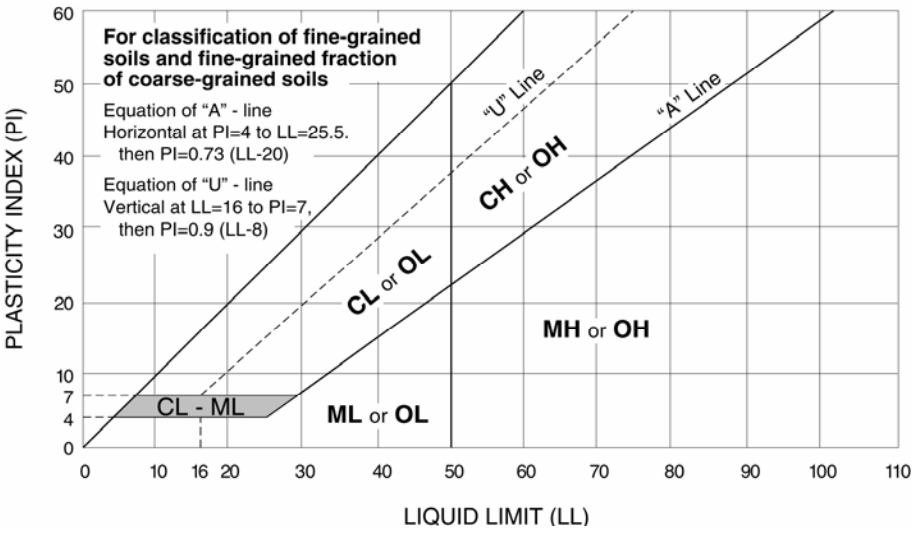
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



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