Geotechnical Engineering Report

Roadway Pavement Design
Indian Route 8084
Many Farms Toward Tsaile
Many Farms, Arizona
January 4, 2010
Terracon Project No. 69095030
BIA Contract Number CMN00060009
BIA Task Order Number TON00090104

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Prepared for:
BIA-Navajo Regional Office
Division of Transportation
Gallup, New Mexico

Prepared by:
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EXECUTIVE SUMMARY

This geotechnical executive summary should be used in conjunction with the entire report for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled General Comments should be read for an understanding of the report limitations.

A geotechnical exploration has been performed for the Bureau of Indian Affairs (BIA) Project No. N8084(1)1, 2&4, beginning at U.S. 191, near Many Farms, and generally following the existing dirt road towards Tsaile, Arizona. Terracon's geotechnical scope of work for the pavement design recommendation part of this project included the advancement of 124 test borings to approximate depths of one to two meters below existing site grades. Additionally, in accordance with the request of the client, three borings were drilled in the area of potentially questionable soil conditions between Station 4+600.00 and Station 4+800.00. Four bridges are also included for this project and the geotechnical information for the bridges will be addressed in separate reports.

Based on the information obtained from our subsurface exploration, the site is suitable for development of the proposed project. The following geotechnical considerations were identified:

Site Soils: The site surface and subsurface materials along the staked roadway alignment generally consisted of medium to high plastic clays, clayey silts, sands with varying amounts of clay and silt underlain by shale and sandstone bedrock in various stages of weathering. Groundwater was not encountered at the time of drilling in the relatively shallow borings drilled and sampled for the pavement structural section design recommendation part of the project. Due to the length of the project, the boring logs in Appendix A should be reviewed for surface and subsurface materials encountered at a specific location. On-site, low plastic sand soils are suitable for use as engineered fill beneath pavements. The medium to high plastic clay soils are not suitable for use as engineered fill beneath pavements and these soils will need to be prepared as recommended in this report or removed to depths recommended herein prior to placement of asphaltic concrete pavement sections..

Pavement Section: Paved Roadway - 3 inches Asphaltic Concrete over 8 inches Aggregate Base Course over prepared subgrade soils as discussed in this report.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, aggregate base course and asphaltic concrete placement, and other geotechnical conditions exposed during construction

Terracon

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Registered Professional Engineer (Civil) CERTIFICATE NO. 24016 KIM M. PRESTON Date Signed 1/5/2010 ARIZONA, U.S.A.

Expires 12/31/2013

Terracon

January 4, 2010

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Attention: Ms. Ella M. Dempsey
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Re: Geotechnical Engineering Report
Roadway Pavement Design
Indian Route 8084 – Many Farms toward Tsaile
Many Farms, Arizona
Terracon Project No. 69095030
BIA Contract Number CMN00060009
BIA Task Order Number TON00090104

Dear Ms. Dempsey:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the roadway pavement structural section design portion for the above referenced project. These services were performed in general accordance with our proposal number P69090201, Revision No. 1 dated September 18, 2009. This geotechnical engineering report presents the results of the subsurface exploration and provides geotechnical recommendations concerning roadway alignment earthwork and the pavement structural section design for the proposed project. Four bridges are also included for this project and the geotechnical information for the bridges will be addressed in separate reports.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Heather M. Dawson
Staff Professional

Mary E. Wells, P.E.
Principal

Kim M. Preston, P.E.
Office Manager

Registered Professional Engineer (Civil) CERTIFICATE NO. 24016 KIM M. PRESTON Date Signed 1/5/10 ARIZONA, U.S.A.

Expires 12/31/2012

Copies to: Addressee (3 Hand Delivered)

GEOTECHNICAL ENGINEERING REPORT

ROADWAY PAVEMENT DESIGN
INDIAN ROUTE 8084
MANY FARMS TOWARD TSAILE
MANY FARMS, ARIZONA

Terracon Project No. 69095030

January 4, 2010

1.0 INTRODUCTION

This report presents the results of a portion of our geotechnical engineering services performed for the Bureau of Indian Affairs (BIA) Project No. N8084(1)1, 2&4, beginning at U.S. 191, near Many Farms, and generally following the existing dirt road towards Tsaile, Arizona. This geotechnical engineering report presents the results of the subsurface exploration for the pavement design recommendation portion of the project and provides geotechnical recommendations concerning roadway alignment earthwork and the pavement structural section design for the proposed roadway. Also included in this report are the logs of the borings drilled at a location where information on the subsurface soils was requested by the client. Four bridges are also included for this project and the geotechnical information for the bridges will be addressed in separate reports.

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

- subsurface soil conditions
- groundwater conditions
- earthwork
- pavement design and construction

Our geotechnical engineering scope of work for the roadway pavement structural design part of this project included the advancement of 124 test borings to depths ranging from approximately one to three meters below existing site grades with the exceptions of borings RB-53, RB-54, RB-55, RB-58, RB-59, RB-60, RB-61,RB-63, RB-65, RB-73,RB-74RB-77, RB-81, RB-83, RB-84, RB-85, RB-87, RB-102, and RB-122 where refusal was encountered on bedrock at a depth less than one meter. Also, in accordance with the request of the client, three borings were drilled in the area of potentially questionable soil conditions between Station 4+600.00 and Station 4+800.00. These three borings were advanced to depths ranging from about 22 meters to 30½ meters below existing grade at the boring locations.

Logs of the borings along with a Site Location Map and Boring Location Plans are included in Appendix A of this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included in Appendix B of this report. Descriptions of the field exploration and laboratory testing are included in their respective appendices.

2.0 PROJECT INFORMATION

2.1 Project Description

ITEM	DESCRIPTION
Site layout	Refer to the Site Location Map and Boring Location Plans (Appendix A)
Proposed Roadway Alignment and Grading	It is Terracon's understanding that the project will include the construction of Indian Route 8084 from Station 0+000.00 at the centerline of U.S. 191 to Station 24+420.00. This results in a total length of approximately 24.42 kilometers (15.17 miles) which will be paved with asphaltic concrete. Included in the project is the construction of four bridges, two three-span bridges and two two-span bridges. The roadway centerline stationing was staked in the field during our field subsurface exploration for this portion of the project. Plan and profile drawings had not been prepared prior to our field exploration. Therefore, maximum cut and fill was not available for the road profile. It has been assumed for the purposes of this report that maximum cut and fill will not exceed one meter along the alignment.
Drainage Culverts	There are several areas where culverts may be needed as a part of this project. Actual locations were not available at the writing of this report.
Traffic loading	Based on traffic information provided by the owner, Equivalent Signal Axle Loads (ESAL's) were developed based on 200 vehicles per day with 1% trucks. ■ 8084 Roadway ESAL's: 51,885
Bridges	Four Bridges are planned for this project and the geotechnical recommendations for these bridges will be addressed in separate reports. The four bridges are: ■ Chinle Wash – Three Span ■ Sheep Dip Wash – Three Span ■ Jimson Weed Wash – Two Span ■ Tezinie Wash – Two Span

2.2 Site Location and Description

ITEM	DESCRIPTION	
Location	Indian Route 84 from State Highway 191 near Many Farms toward Tsaile, Navajo Nation, Arizona.	
Latitude and Longitude	Point of Beginning Station 0 + 000.00 UTM NAD 83 Z-12 N = 4018785.683m E = 624895.587m	Point of Ending Station 24 + 420.000 UTM NAD 83 Z-12 N = 4019565.136m E – 643911.629m
Existing site features (site interior)	Native desert with a cleared gravel and dirt roadway along a large part of the proposed alignment and native desert in the proposed areas of the new alignment.	
Surrounding developments	None	
Current ground cover	Moderate growth of grass, weeds, cacti and creosote. Trees and bushes along the washes and drainages.	
Existing topography	Gently rolling desert terrain with numerous small and large washes and drainages.	

3.0 SUBSURFACE CONDITIONS

3.1 Site Geology

The project site is located in near the northern flanks of the Black Mesa Basin in the Colorado Plateau Physiographic Province. The Black Mesa Basin, formed during the Laramide orogeny of Tertiary Time, is a broad downwarped area marked by a thick accumulation of sediment, and characterized by gently folded to nearly flat-lying rocks. Tertiary volcanic activity created numerous small intrusions in this area. The project site area lies on the Triassic Chinle Formation consisting of colorful mudstone and less abundant lenses of sandstone and conglomerate deposited by a large river system.

3.2 Typical Subsurface Profile

As presented on the Logs of Borings in Appendix A, the site surface and subsurface materials generally consisted of medium to high plastic clays, clayey silts, sands with varying amounts of clay and silt, underlain by shale and sandstone bedrock in various stages of weathering. In general, the clay soils were encountered near the beginning of the project with the sands and sandstone encountered closer to the end of the project, however, areas of clayey soils were encountered throughout the project length.

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs included in Appendix A of this report.

The results of field exploration and laboratory testing completed for this evaluation indicate the surficial site soils typically range from medium to high plastic clays, clayey silts, sands with varying amounts of clay and silt, and shale and sandstone bedrock in various stages of weathering.

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B. A summary of the testing performed is presented in the following table:

Laboratory Test	Number of Tests Performed
Moisture Content	122
Sieve Analyses and Atterberg Limits	122
Modified Proctor	22
Modified Proctor with Remolded Swell Potential	12
Resistance Value of Compacted Soil (R-Value)	16
Corrosion Testing	15

3.3 Groundwater

Groundwater was not encountered at the time of field exploration in the test borings drilled and sampled for the pavement design recommendation portion of this project. Groundwater was encountered, at a depth of about seven feet below existing ground surface elevation, in the test borings drilled and sampled in the area of potentially questionable soil conditions between Station 4+600.00 and Station 4+800.00 (Borings M-1 thru M-3) 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 and weather conditions.

Zones of perched and/or trapped groundwater may also occur at times in the subsurface soils overlying bedrock, on top of the bedrock surface or within permeable fractures in the bedrock materials. 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.

Fluctuations in groundwater levels can best be determined by implementation of a groundwater monitoring plan. Such a plan would include installation of groundwater monitoring wells, and periodic measurement of groundwater levels over a sufficient period of time.

The possibility of groundwater fluctuations should be considered when developing design and construction plans for the project.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the borings. Based on our borings and associated laboratory testing, the majority of the soils between Stations 0+000 (Beginning of Project) and 10+800 are generally comprised of low strength surficial clayey soils. From Station 11+000 through Station 24+420 (End of Project) the soils encountered are generally silty and clayey sand soils with some areas of clay and silt soils. Samples of the clay soils were tested for remolded swell potential; and some of these samples exhibited slight to significant swell potential when remolded to about 95 percent of the maximum laboratory dry density at about 2 percent below optimum moisture content and inundated with water to simulate saturation. Therefore, construction of the proposed roadway in the areas of clay soils in the present condition may most likely result in an unacceptable degree of distress to the road.

Expansive soils are present on this site. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement should be anticipated. Eliminating the risk of movement may not be feasible, but it may be possible to further reduce the risk of movement if significantly more expensive measures are used during construction.

Based on the laboratory test results and experience with similar soil conditions, the roadway structural section in the areas of clay soil subgrade should be constructed on a minimum of 305-millimeters (mm) of lime stabilized native subgrade materials. After the initial site earthwork has been completed and the roadway is at finished subgrade elevation, sufficient material should be processed with the lime stabilization procedure so that the compacted, lime-stabilized material is at least 305 mm thick. The work shall comply with Section 213 – Subgrade Stabilization of the Standard Specifications for Construction of Roads and Bridges on Federal Projects (FP-03 Metric Units) with Revisions and Supplemental Specifications as provided by the BIA. Other soil modification procedures as approved by the BIA roads engineers may also be considered.

Our recommendations are based on the assumption that the subsurface conditions across the site are similar to those disclosed by the borings excavated for this project. **If variations are noted during construction or if changes are made in location, size or configuration of the proposed roadway, we should be notified so that we can supplement our recommendations, as applicable.** This report does not encompass the effects, if any, of underlying geology, or regional groundwater movement/fluctuation, and expresses no opinion regarding their effects on surface movement.

All grades must provide effective drainage away from the roadway areas during and after construction. Water permitted to pond next to the roadway can result in greater soil movements than those discussed in this report.

Exposed ground should be sloped at a minimum 5 percent away from the roadway for at least 15 feet beyond the pavement edge. We recommend verifying final grades to document that effective drainage has been achieved. Grades along the road should also be periodically inspected and adjusted as necessary, as part of the maintenance program.

Because even low plasticity clay soils shrink and swell to some extent with normal variations in moisture content, some movements normally occur and should be expected and anticipated in any case. Recommendations in this report are intended to reduce the potential for extreme movements caused by the presence of expansive soils on this site, that experience moisture content variations within a normal range. Because many site conditions (growth of plants adjacent to roadway, and changes in site drainage, etc.) can not be controlled, larger movements should still be expected if expansive soils are exposed to moisture or drying.

Geotechnical engineering recommendations for pavement subgrade preparation and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing (which are presented in Appendices A and B), engineering analyses, and our current understanding of the proposed project.

4.2 Earthwork

The following presents recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including pavements are contingent upon following the recommendations outlined in this section.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, and other geotechnical conditions exposed during the construction of the project.

4.2.1 Site Preparation

Strip and remove existing vegetation, debris, and other deleterious materials from proposed pavement areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

Stripped materials consisting of vegetation and organic materials should be wasted from the site, or used to revegetate landscaped areas or exposed slopes after completion of grading operations.

The site should be initially graded to create a relatively level surface to receive fill, and to provide for a relatively uniform thickness of fill beneath proposed pavement structural sections.

If fill is placed in areas of the site where existing slopes are steeper than 5:1 (horizontal:vertical), the area should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be wide enough to accommodate compaction and earth moving equipment, and to allow placement of horizontal lifts of fill.

Although evidence of fills or underground facilities was not observed during the site reconnaissance, such features could be encountered during construction. If unexpected fills or underground facilities are encountered, such features should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

4.2.2 Excavation

It is anticipated that excavation of the soils for the proposed construction can be accomplished with conventional earthmoving equipment.

Excavations penetrating the shale and sandstone bedrock may require the use of specialized heavy-duty equipment, together with drilling and blasting to facilitate rock break-up and removal.

Depending upon depth of excavation and seasonal conditions, groundwater may be encountered in excavations on the site. Pumping from sumps may be utilized to control water within excavations. Well points may be required for significant groundwater flow, or where excavations penetrate groundwater to a significant depth.

On-site clay and silt soils may pump or become unstable or unworkable at high water contents. Workability may be improved by scarifying and drying. Overexcavation of wet zones and replacement with granular materials may be necessary. Lightweight excavation equipment may be required to reduce subgrade pumping.

Use of lime, fly ash, kiln dust, cement or geotextiles may also be considered as a stabilization technique. Laboratory evaluation is recommended to determine the effect of chemical stabilization on subgrade soils prior to construction.

4.2.3 Subgrade Preparation

Engineered fill should extend below proposed pavements as required by the approved project plan and profile drawings. The engineered fill should extend laterally an additional distance of 18 inches for each foot of engineered fill below the roadway structural section.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of ten inches, conditioned to near optimum moisture content, and compacted.

Areas of loose soils may be encountered at roadway fill bearing depth after excavation is completed for the roadway. When such conditions exist beneath planned roadway areas, the subgrade soils should be surficially compacted prior to placement of the roadway fill. If sufficient compaction can not be achieved in-place, the loose soils should be removed and replaced as engineered fill. For placement of engineered fill below roadway areas, the excavation should be widened laterally, at least eighteen inches for each foot of fill placed below roadway subgrade.

Subgrade soils beneath pavements should be scarified, moisture conditioned and compacted to a minimum depth of twelve inches. The moisture content and compaction of subgrade soils should be maintained until pavement construction.

4.2.3 Fill Materials and Placement

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than six inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following:

- general site grading
- pavement areas

On-site clay soils are not recommended for use as compacted fill beneath pavement areas without chemical or approved alternative treatment to reduce or eliminate expansive potential.

Imported soils for use as fill material within proposed pavement areas should conform to low volume change materials as indicated in the following specifications:

Gradation	Percent Finer by Weight (ASTM C 136)
152 mm	100
76 mm	70-100
No. 4 Sieve	50-100
No. 200 Sieve	59 (max)

- Liquid Limit ..... 30 (max)
- Plasticity Index ..... 15 (max)
- Maximum expansive potential (%)*..... 0.5

*Measured on a sample compacted to approximately 95 percent of the ASTM D1557 maximum dry density at about 2 percent below optimum water content. The sample is confined under a 100 psf surcharge and submerged/inundated.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed ten inches loose thickness.

4.2.4 Compaction Requirements

Recommended compaction and moisture content criteria for engineered fill materials are as follows:

Material Type and Location	Per the Modified Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction	
		Minimum	Maximum
On-site granular or approved imported fill soils:			
Beneath asphalt pavements:	95	-3%	+3%
Aggregate base (beneath pavements)	100	-3%	+3%
Miscellaneous backfill	95	-3%	+3%

4.2.5 Shrinkage

For balancing grading plans, estimated shrink or swell of soils <and bedrock> when used as compacted fill following recommendations in this report are as follows:

Estimated Shrink/Swell	
Soil Type	Based on ASTM D1557
Silt and Clay	-5 to -15
Sand	-5 to -15
Gravel	0 to -5
Shale and Sandstone	+5 to +10

4.2.6 Slopes

For permanent slopes in compacted fill areas, recommended maximum configurations for on-site materials are as follows:

Maximum Slope Configuration	
Soil Type	**Horizontal:Vertical (H:V)**
Silt and Clay	3H:1V
Sand	3H:1V
Gravel	3H:1V
Shale and Sandstone	1H:1V

If steeper slopes are required for site development, stability analyses should be completed to design the grading plan.

The face of all slopes should be compacted to the minimum specification for fill embankments. Alternately, fill slopes can be over-built and trimmed to compacted material.

4.2.7 Corrosion Potential

Results of soluble sulfate testing indicate that ASTM Type I/II Portland cement is suitable for concrete on and below grade. Foundation concrete should be designed for low sulfate exposure in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4.

Laboratory test results indicate that on-site soils have resistivities ranging from 424 to 2792 ohm-centimeters, indicating these soils are corrosive to moderately corrosive toward ferrous metals, and pH values ranging from 7.2 to 8.7 indicating a concrete cover of less than one (1) inch is not advisable. These values should be used to determine potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Chloride ions are particularly corrosive to ferrous metals and in higher concentrations can overcome the corrosion inhibiting effect of concrete on reinforcing steel. The chloride concentration test results ranged from about 26 to 179 indicating moderately to very corrosive; therefore, a minimum concrete cover over reinforcing steel should be 3 inches.

While resistivity, pH, chloride content and soluble sulfate content indicate the potential of corrosion, these properties alone are not solely responsible for the corrosive effects of soil. One major consideration in combination with other parameters is the in-situ moisture content of the soils. As the moisture content of soils increases, the corrosion potential increases in like manner provided that other properties of the soils indicate corrosive potential.

4.2.8 Culvert Selection

Typically, galvanized corrugated metal culvert is used for to provide drainage below roadways in wash areas. The corrosion testing presented in this report indicates that the soils in this area are potentially corrosive and as such, the use of metallic culvert pipe could lead to future corrosion problems.

Based on the test results, Terracon recommends that the use of High Density Polyethylene (HDPE) pipe should be considered for use at this site. This material is relatively inert when not exposed to direct sun. This material should prevent culvert distress due to the corrosive effects of the site soils.

Refer to Summary of Laboratory Results contained in Appendix B for the complete results of the various corrosivity testing conducted on the site soils in conjunction with this geotechnical exploration.

4.3 Pavements

4.3.1 Design Recommendations

Pavement sections based upon a more detailed pavement design could be provided if specific traffic loading, frequencies, and desired pavement design life are provided. As a minimum, we suggest the following typical pavement sections be considered.

Roadway Subgrade Areas	Recommended Pavement Section Thickness (mm)				
	Asphalt Concrete Surface	Aggregate Base Course	Scarified, Moisture Conditioned and Compacted Native Subgrade Soils	Lime or Other Approved Stabilized Clayey Subgrade Soils	Total
Low Strength Clayey Soils	76 mm	203 mm		305 mm	584 mm
Higher Subgrade Strength	76 mm	203 mm	305 mm		584 mm

Design of the pavement structural for the project has been based on the procedures outlined in the 1993 Guideline for Design of Pavement Structures by the American Association of State Highway and Transportation Officials (AASHTO). Traffic criteria used for pavement thickness design include single 18-kip equivalent axle loads (ESAL's) of 51,885 for general estimated roadway traffic.

Based upon AASHTO criteria, Arizona is located within Climatic Region V of the United States. This region is characterized as being dry, with freeze-thaw cycling. For design purposes, these conditions typically result in saturated or near-saturated subgrade soil moisture conditions for approximately 4 percent of the annual moisture variation cycle.

Local drainage characteristics of proposed pavement areas are considered to vary from fair to good depending upon location on the site. For purposes of this design analysis, fair drainage characteristics are considered to control the design. These characteristics, coupled with the approximate duration of saturated subgrade conditions, results in a design drainage coefficient of 1.0 when applying the AASHTO criteria for design.

For flexible pavement design, a terminal serviceability index of 2.0 was utilized along with an inherent reliability of 65 percent. Using the correlated design R-value, appropriate ESAL/day, environmental criteria and other factors, the structural numbers (SN) of the pavement sections were determined on the basis of the 1993 AASHTO design equation.

These pavement sections are considered minimal sections based upon the expected traffic and the existing subgrade conditions. However, they are expected to function with periodic maintenance and overlays if good drainage is provided and maintained.

All Earthwork, Aggregate Base Course and Asphalt Concrete shall comply with Divisions 200 – 700 of the Standard Specifications for Construction of Roads and Bridges on Federal Projects (FP-03 Metric Units) with Revisions and Supplemental Specifications as provided by the BIA.

4.3.2 Construction Considerations

Expansive and compressible soils are present at this site. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. Even if these recommendations are followed, some pavement distress should be anticipated.

Pavement design methods are intended to provide structural sections with adequate thickness over a particular subgrade such that wheel loads are reduced to a level the subgrade can support. The support characteristics of the subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade such as the soils encountered on this project. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade. It is, therefore, important to minimize moisture changes in the subgrade to reduce shrink/swell movements.

Long term pavement performance will be dependent upon several factors, including maintaining subgrade moisture levels and providing for preventive maintenance. The following recommendations should be considered the minimum:

- Site grading at a minimum 2 percent grade away from the pavements;
- The subgrade and the pavement surface have a minimum ¼ inch per foot slope to promote proper surface drainage;
- Consider appropriate edge drainage and pavement under drain systems;
- Install joint sealant and seal cracks immediately;
- Seal all landscaped areas in, or adjacent to pavements to minimize or prevent moisture migration to subgrade soils;
- Placing compacted, low permeability 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.

Preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance.

Site grading is generally accomplished early in the construction phase. However as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall. As a result, the pavement subgrade may not be suitable for pavement construction and corrective action will be required. The subgrade should be carefully evaluated at the time of pavement construction for signs of disturbance or excessive rutting. If disturbance has occurred, pavement subgrade areas should be reworked, moisture conditioned, and properly compacted to meet the recommendations in this report immediately prior to paving.

We recommend the pavement areas be rough graded and then thoroughly proofrolled with a loaded tandem axle dump truck prior to final grading and paving. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills. All pavement areas should be moisture conditioned and properly compacted to meet the recommendations in this report immediately prior to paving.

The minimum pavement section outlined above was determined based on the laboratory test results and anticipated post-construction traffic loading conditions for this type of development. This pavement section does not account for heavy construction traffic during

the early stages of the development. A partially constructed structural section may be subjected to heavy construction traffic that can result in pavement deterioration and premature failure. Our experience indicates that this pavement construction practice can result in pavements that will not perform as intended. Considering this information, several alternatives are available to mitigate the impact of heavy construction traffic on the pavement construction. These include using thicker sections to account for the construction traffic, using some method of soil stabilization to improve the support characteristics of the pavement subgrade, or by routing heavy construction traffic around paved streets. We are available to discuss these alternatives with you.

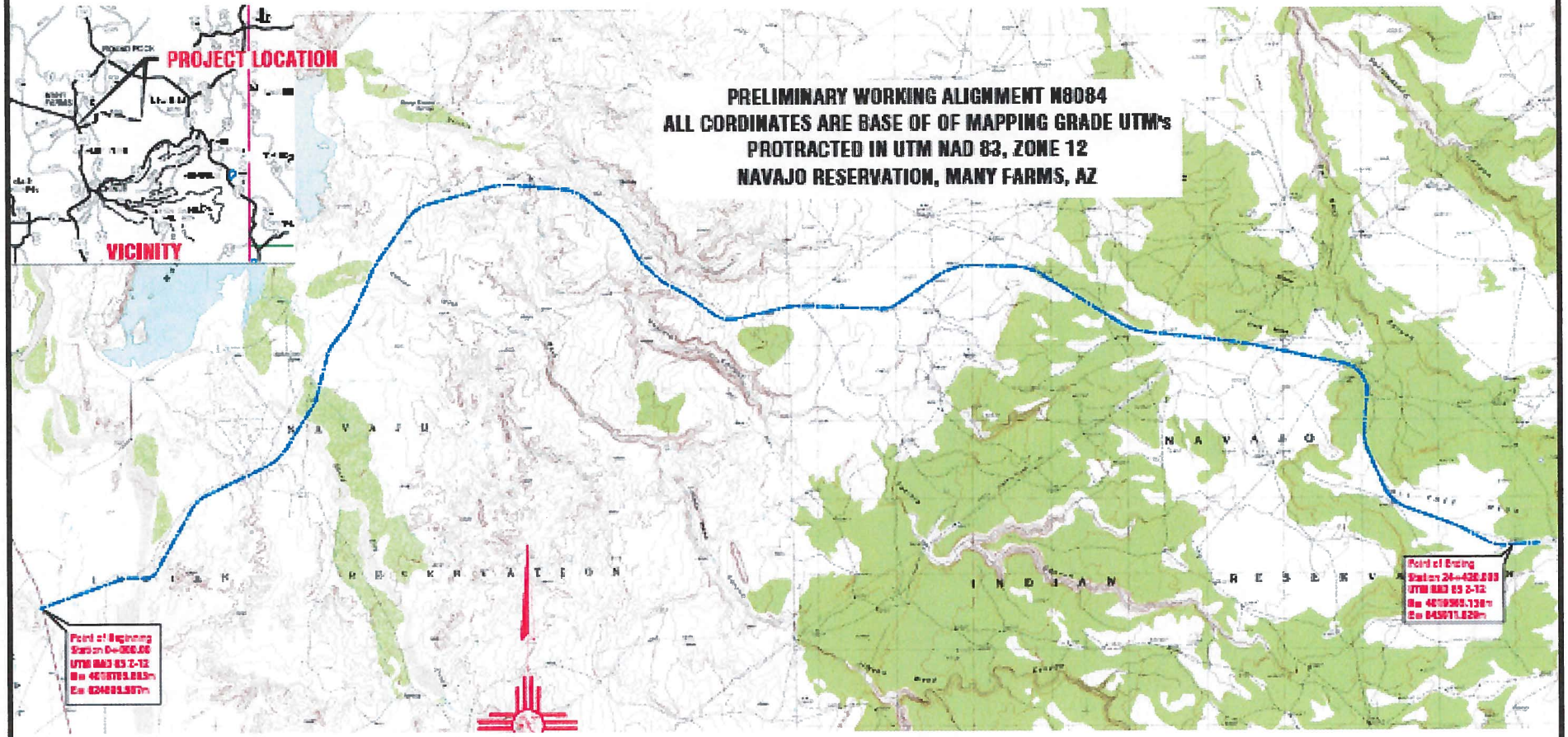
5.0 GENERAL COMMENTS

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 observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or 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 or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, 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 dewatering 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.



***Modified from drawing provided by client.**

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

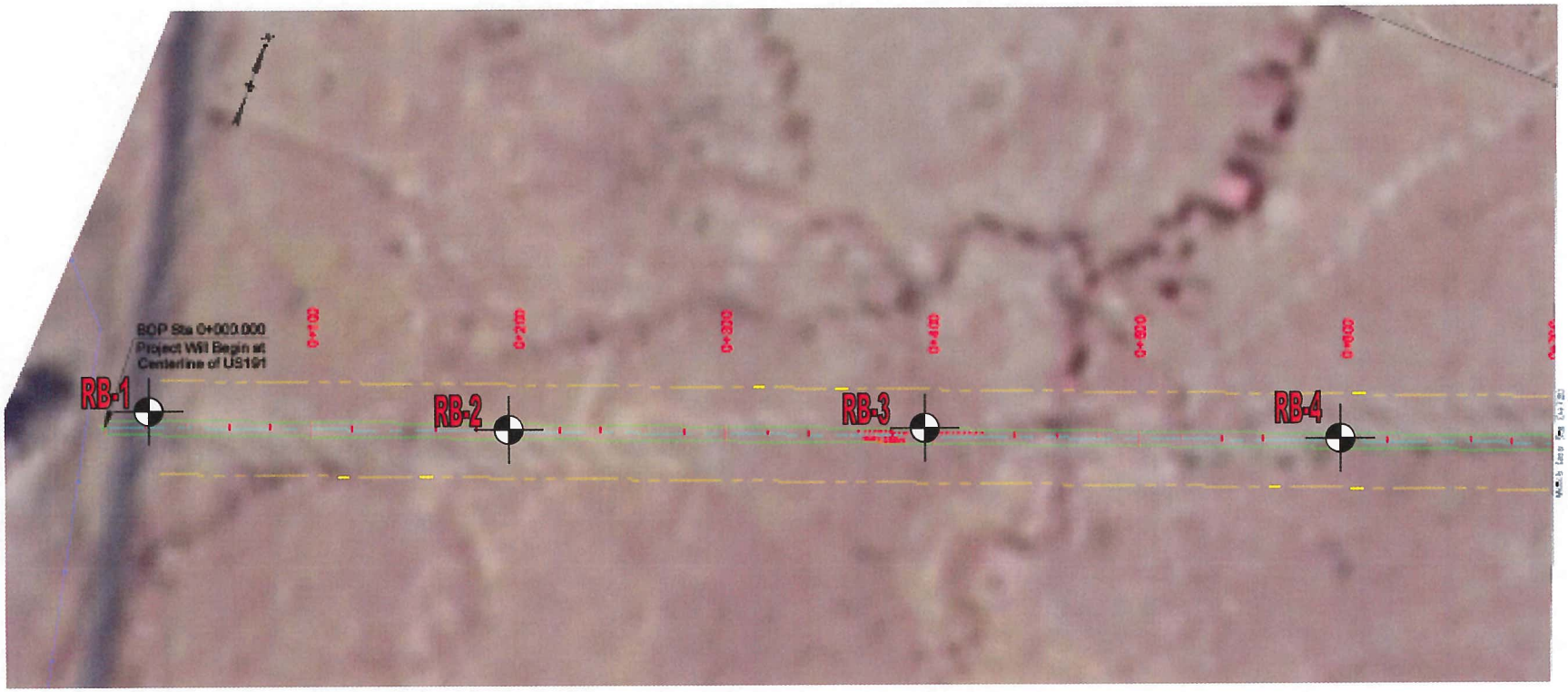
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Flora Vista, New Mexico
505.334.2900 Fax: 505.334.9703

Site Location Map

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-1



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-2



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

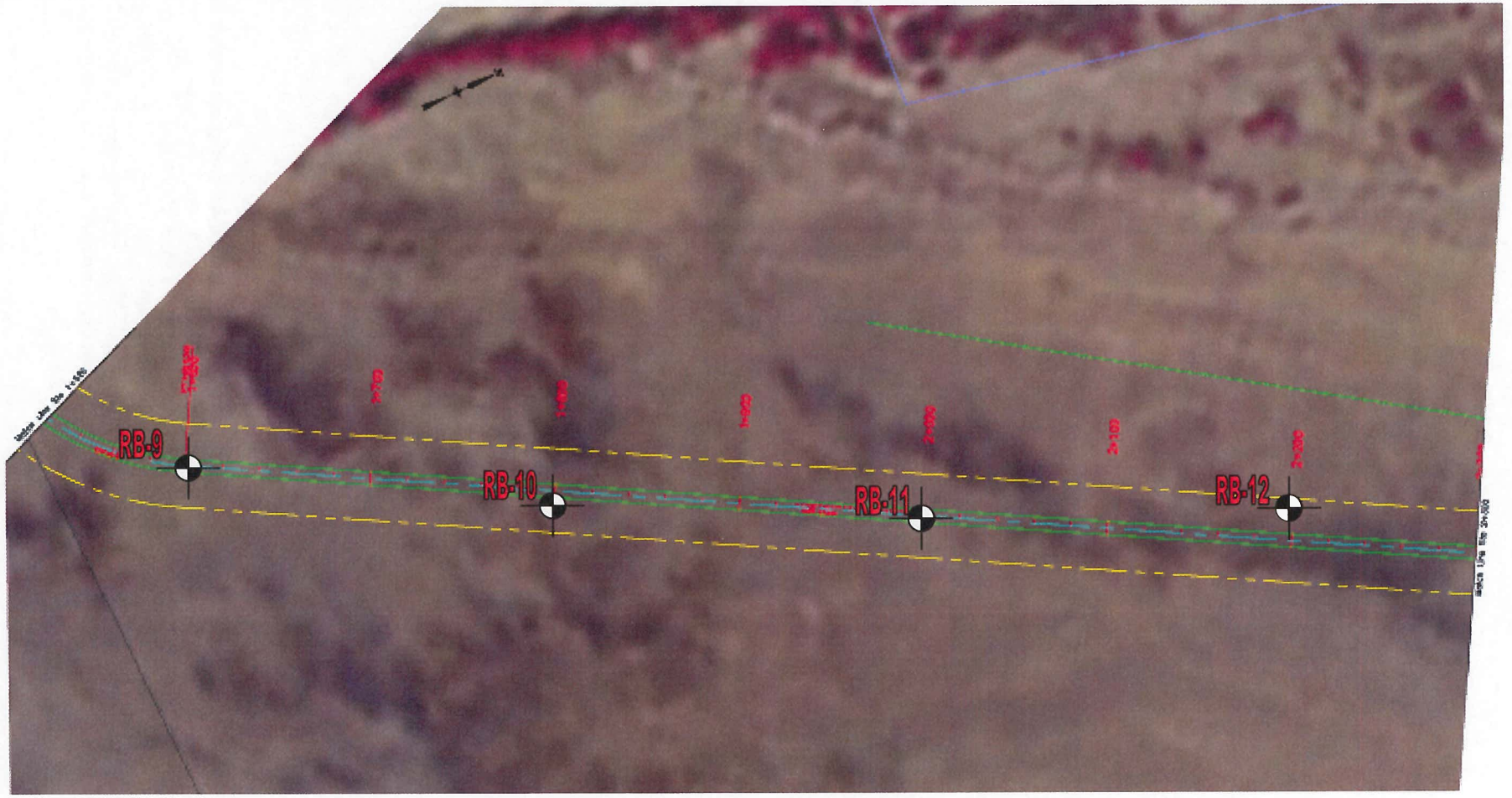
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-3



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

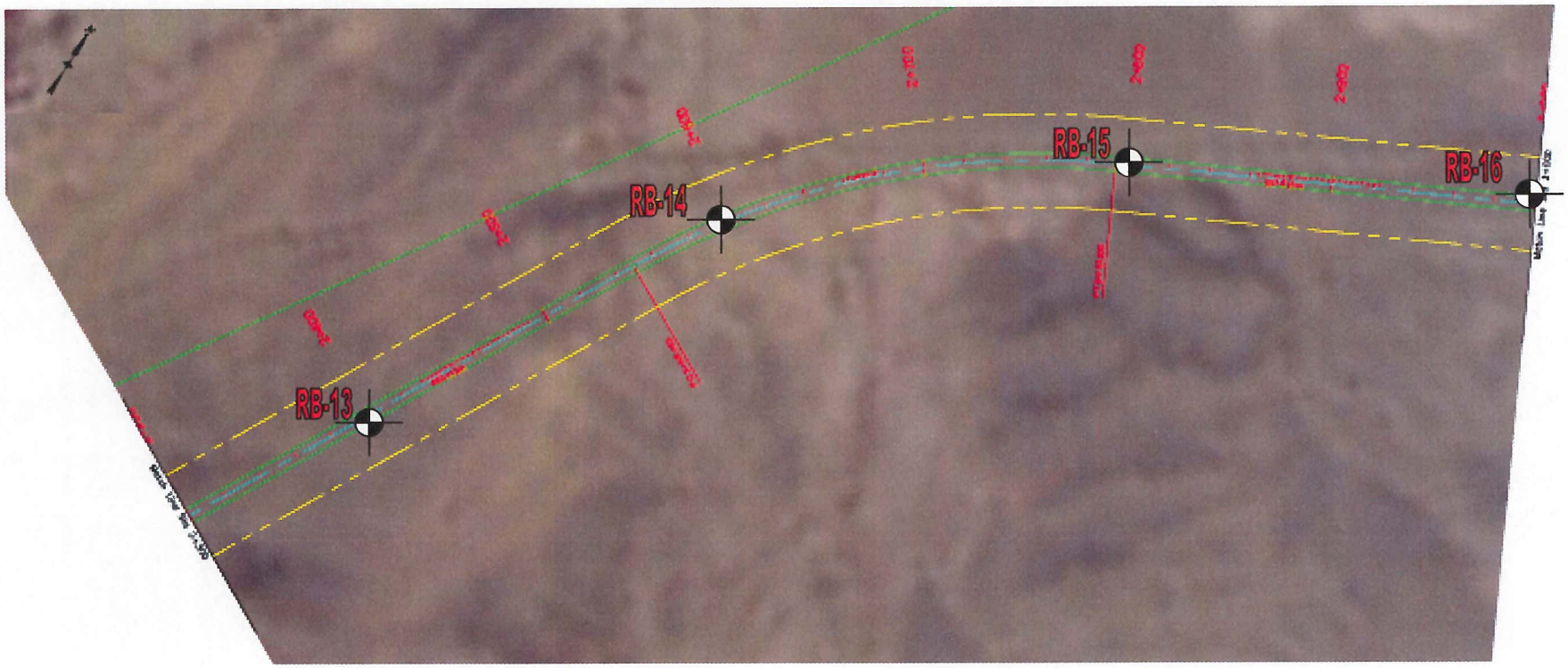
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-4



Legend

RB-1 - Approximate Boring Location

***Modified from drawing provided by client.**

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

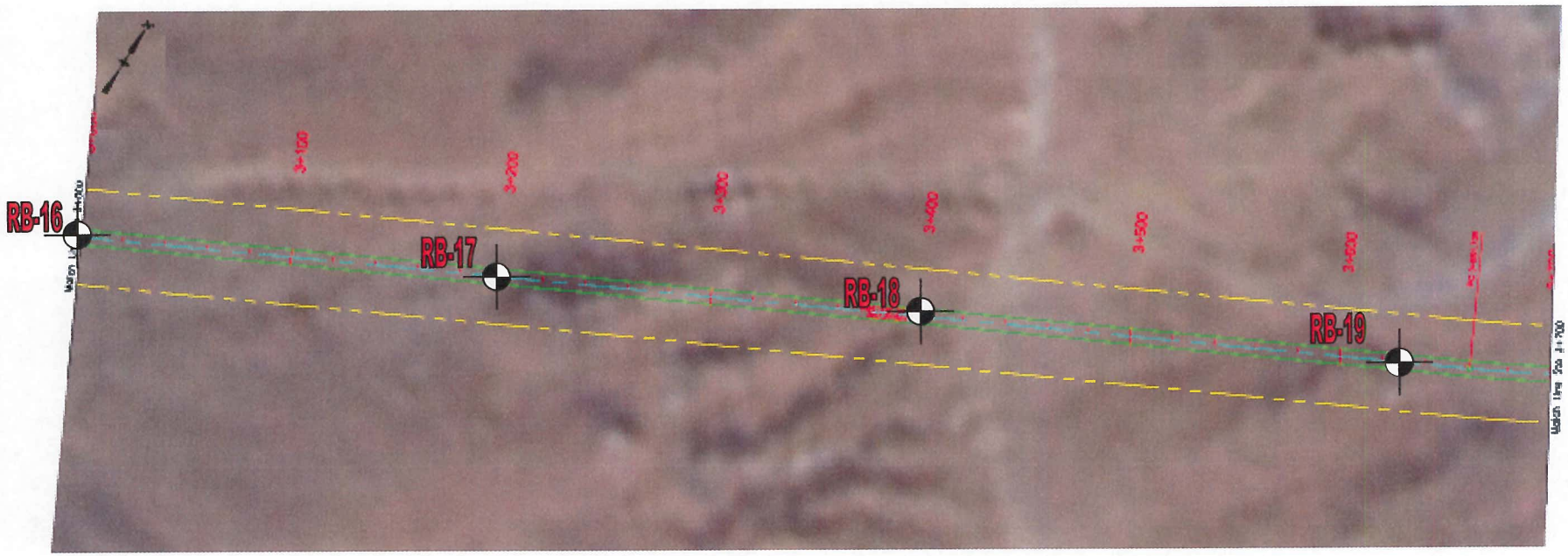
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-5



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

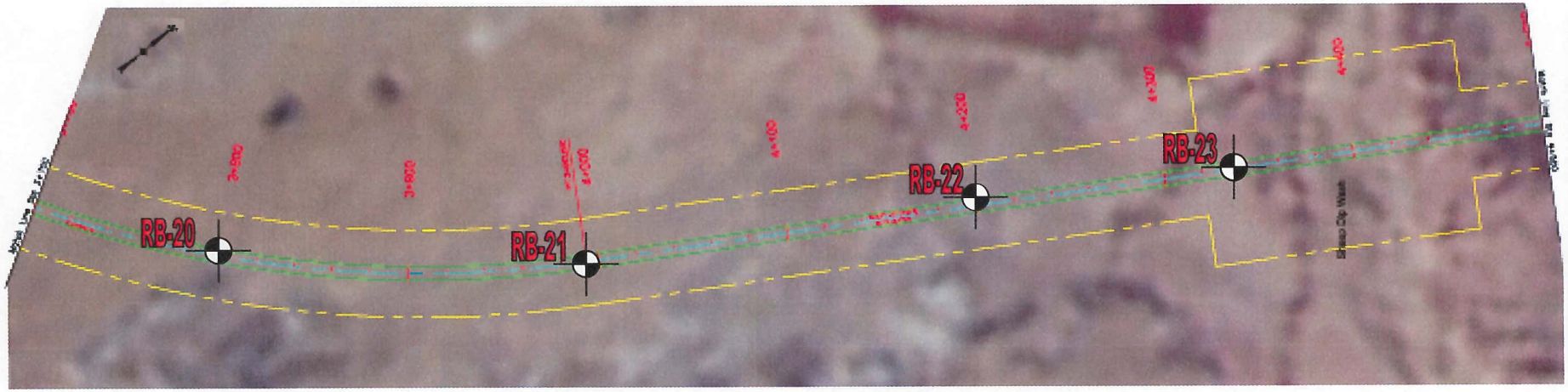
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-6



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

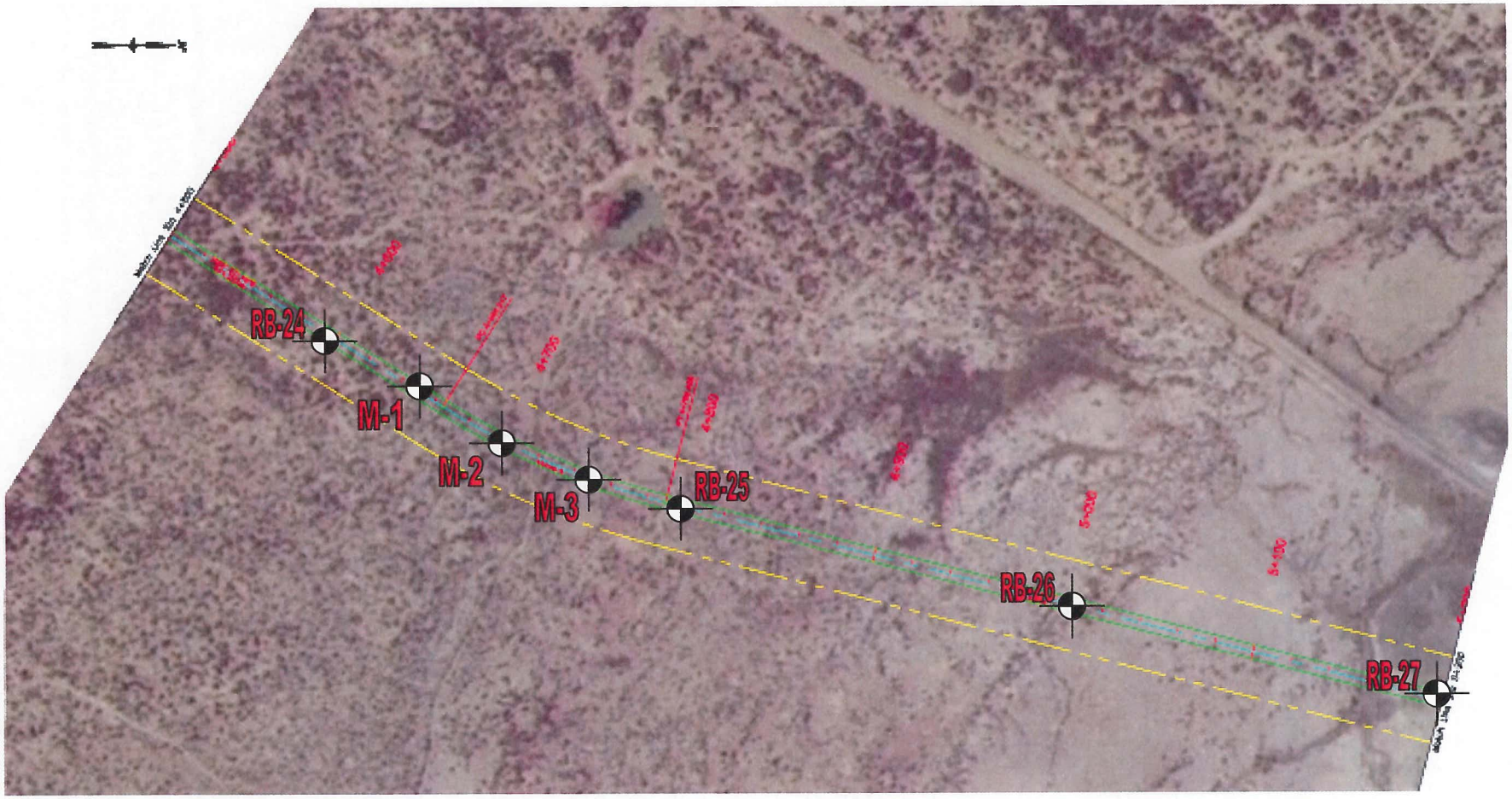
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-7



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

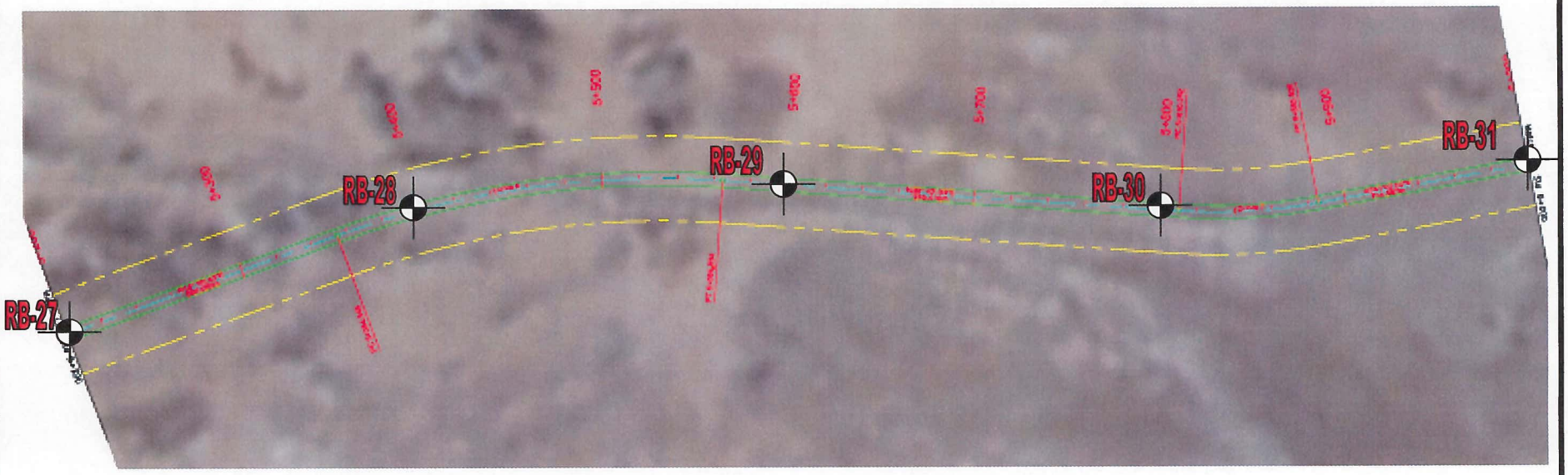
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-8



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
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Date:	12/07/2009

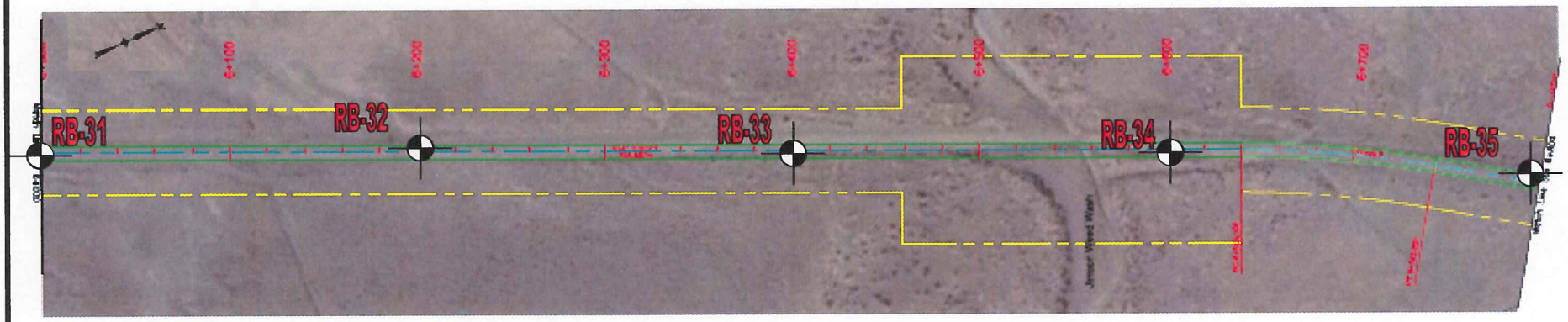
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-9



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

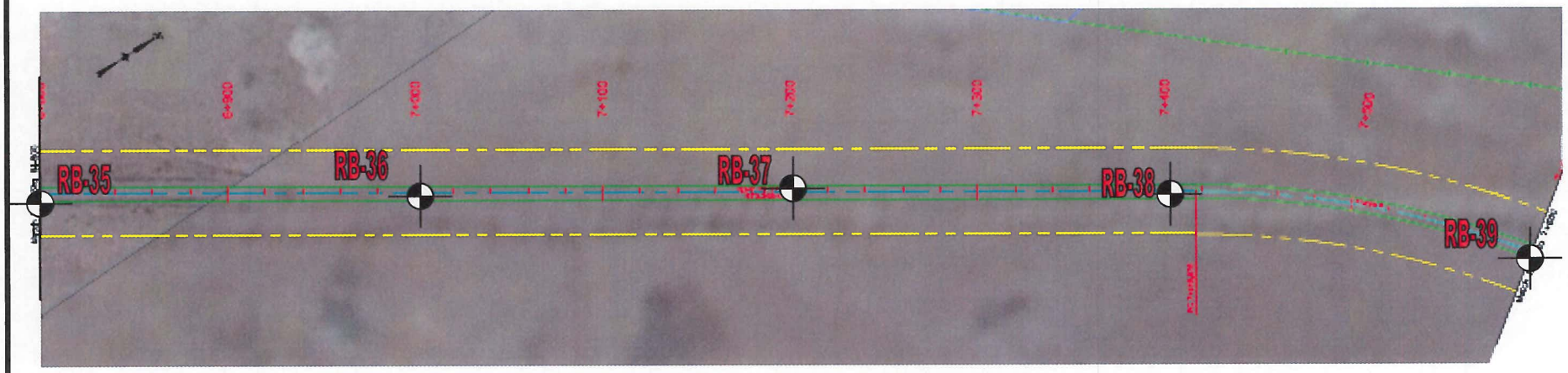
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-10



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
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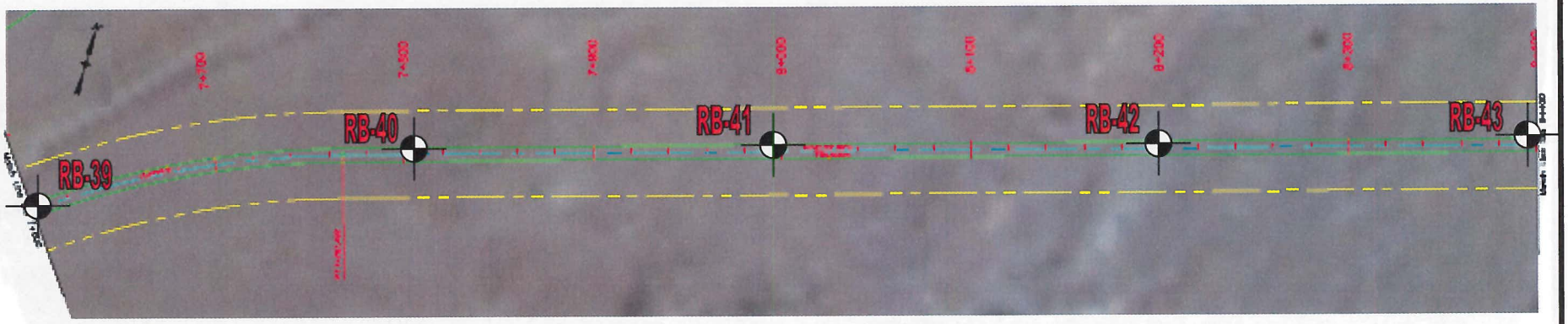
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-11



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-12



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
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File No:	Boring.doc
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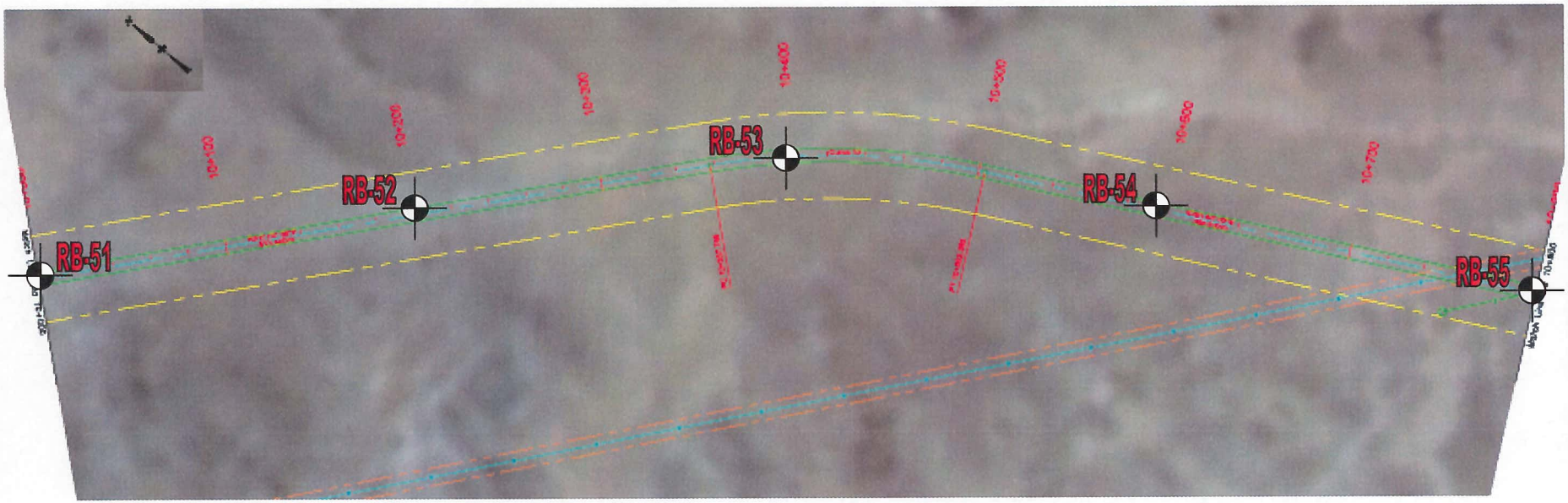
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-14



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

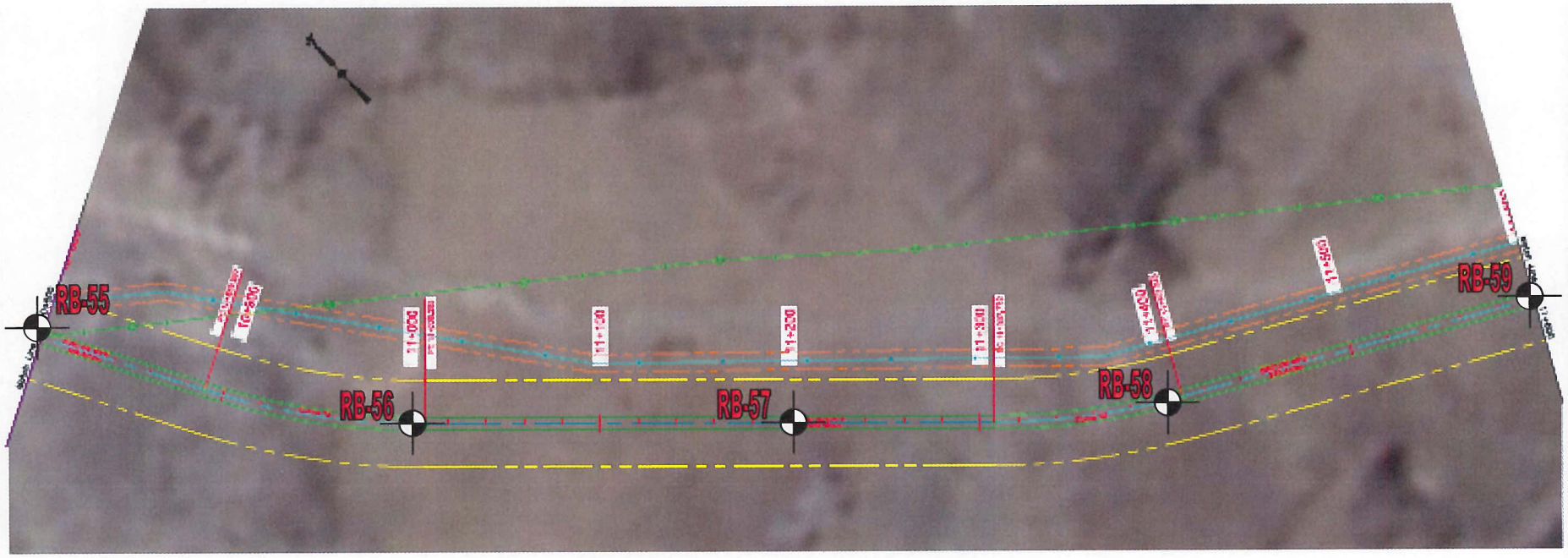
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-15



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

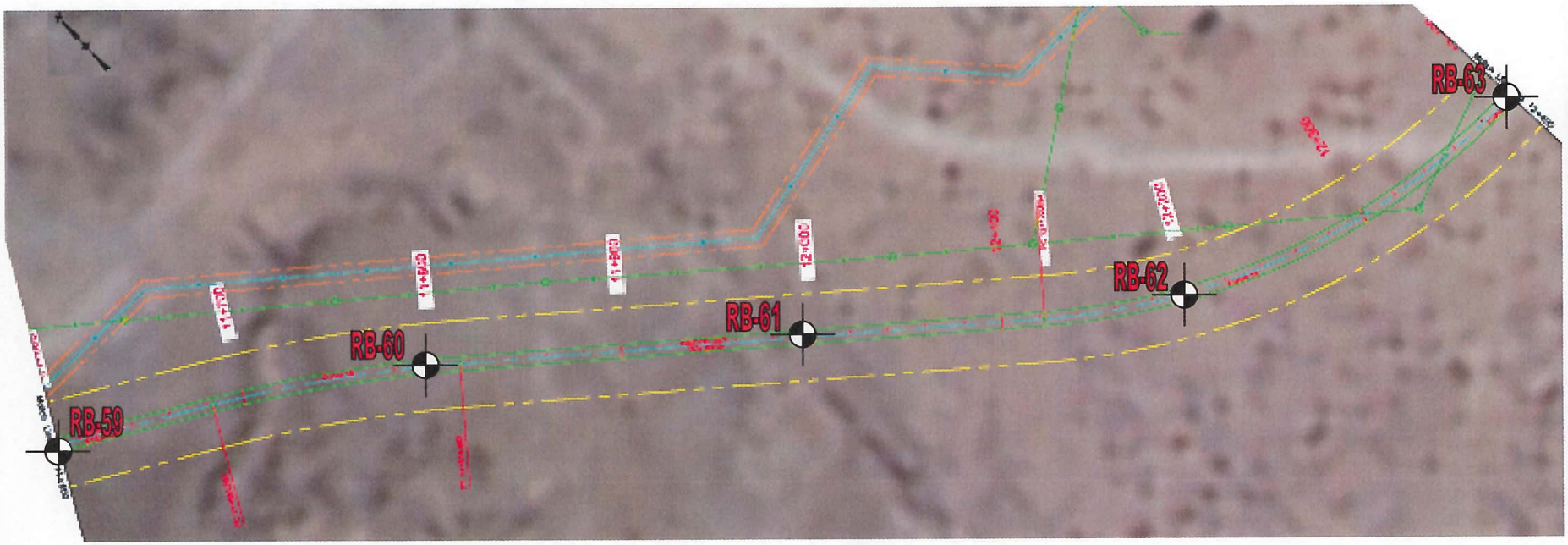
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-16



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-17



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-18



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
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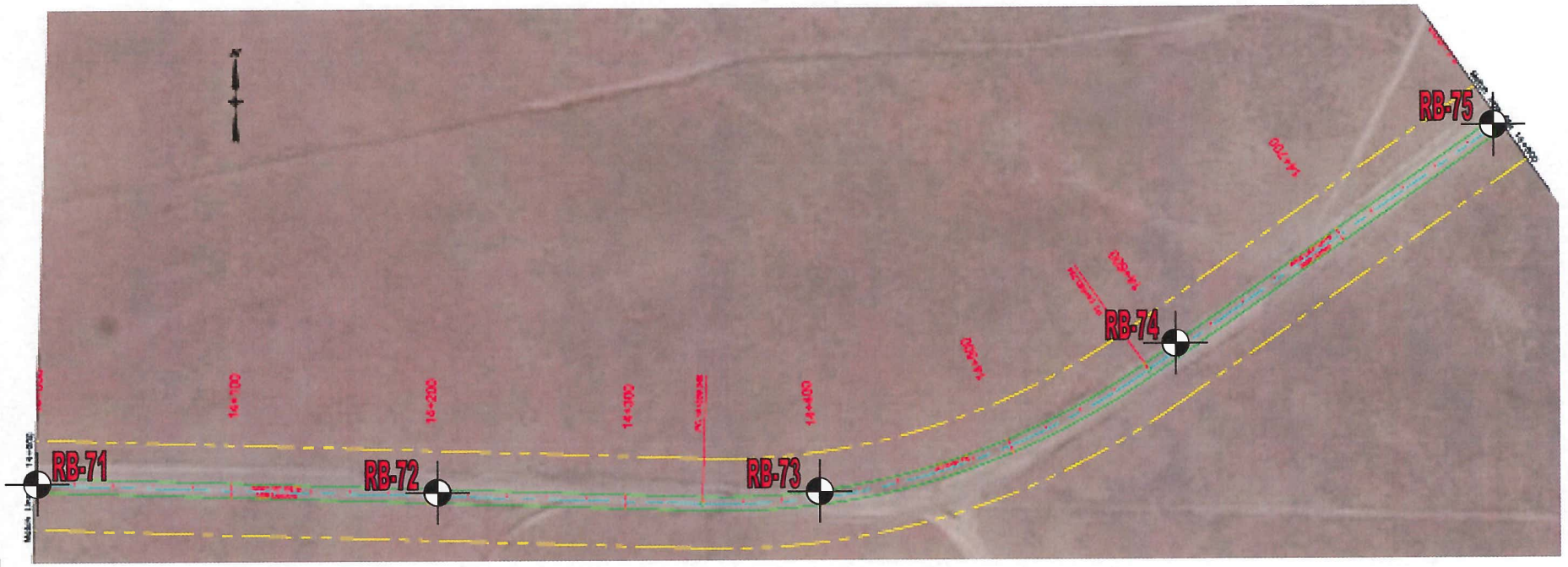
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-19



Legend

RB-1 - Approximate Boring Location

***Modified from drawing provided by client.**

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Drawn By:	HMW
Checked By:	KMP
Approved By:	KMP

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

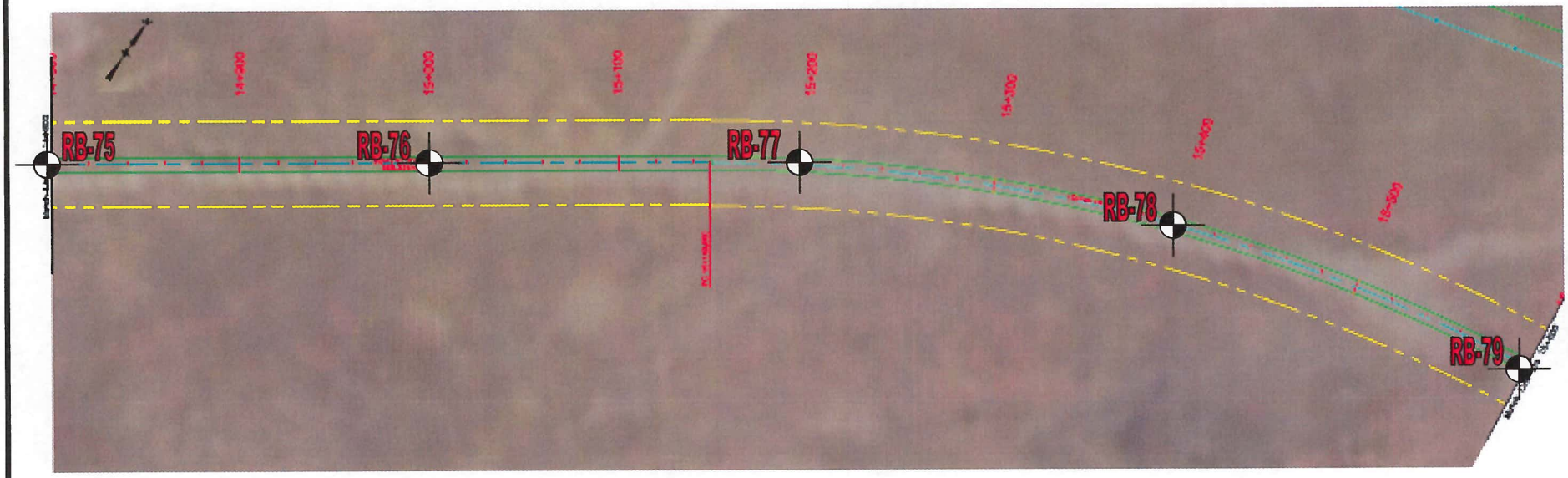
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-20



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

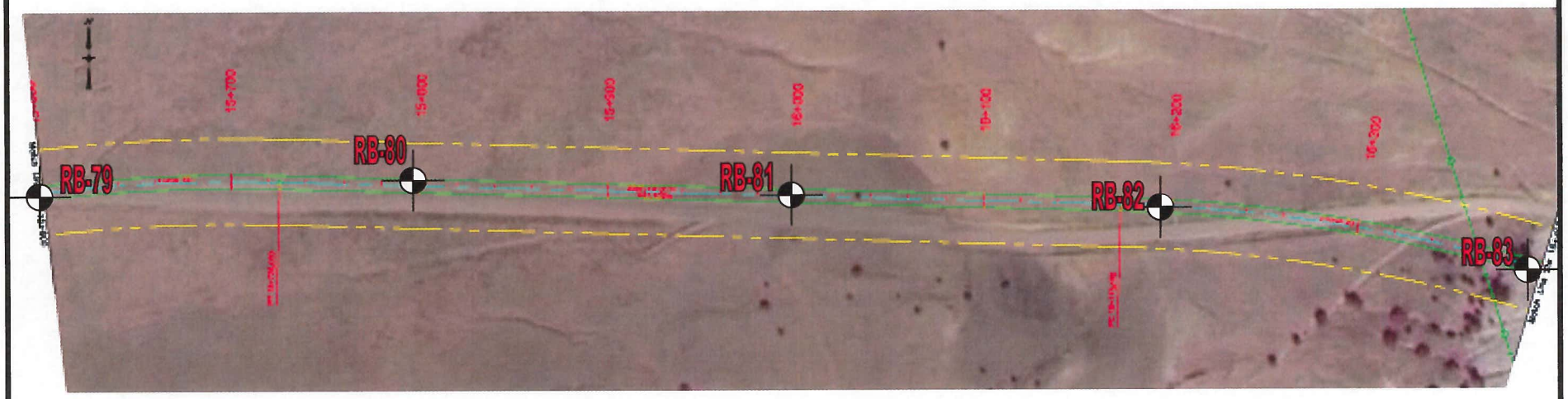
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-21



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

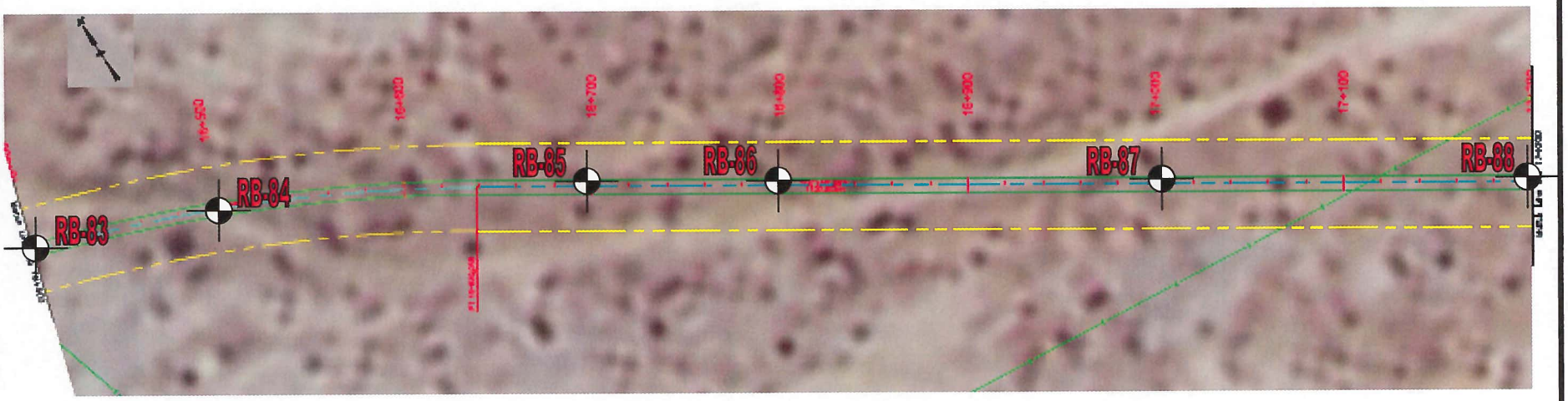
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-22



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

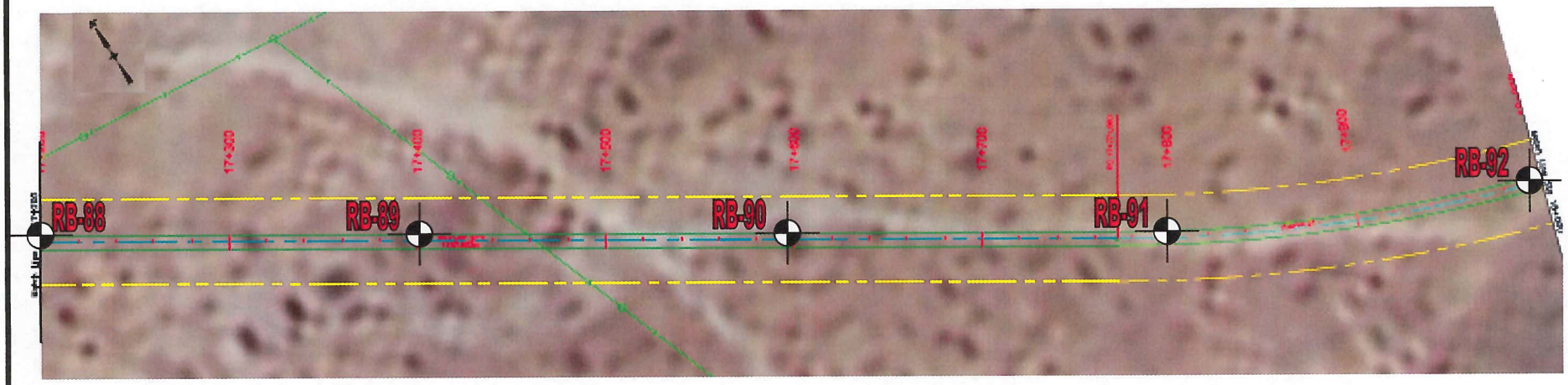
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-23



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-24



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-25



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

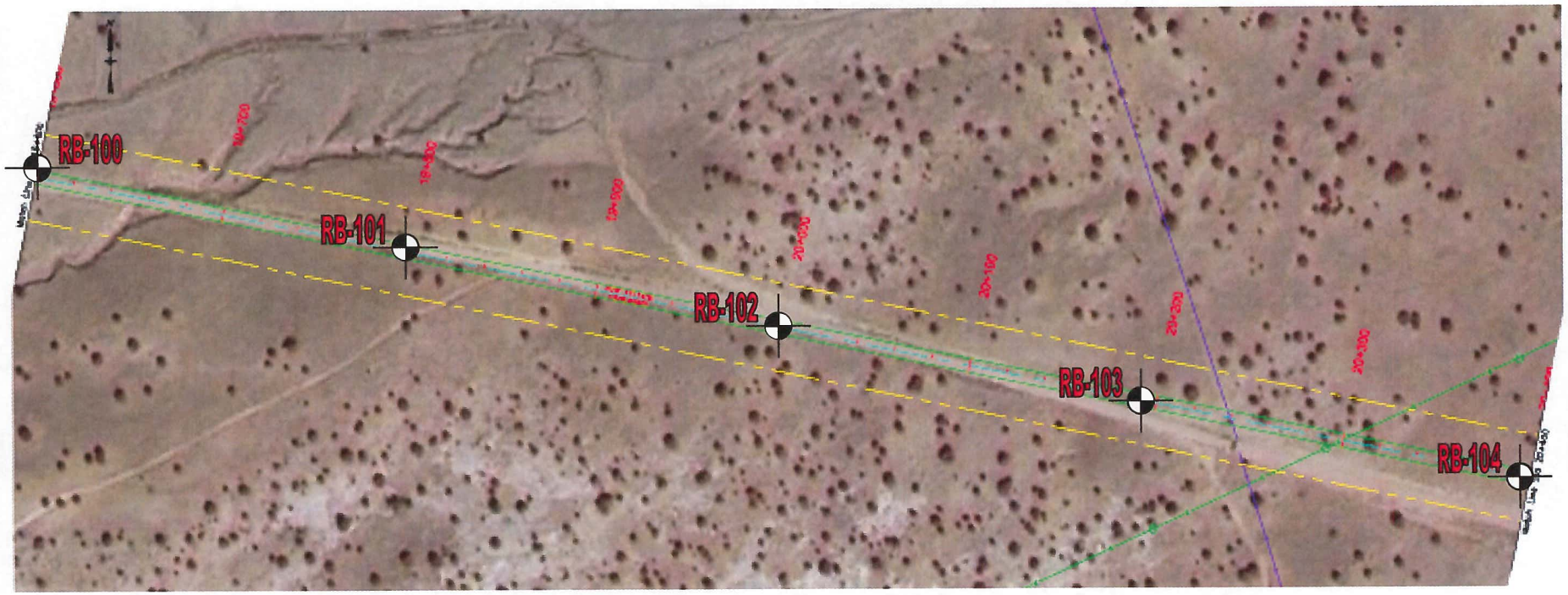
Terracon
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-26



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

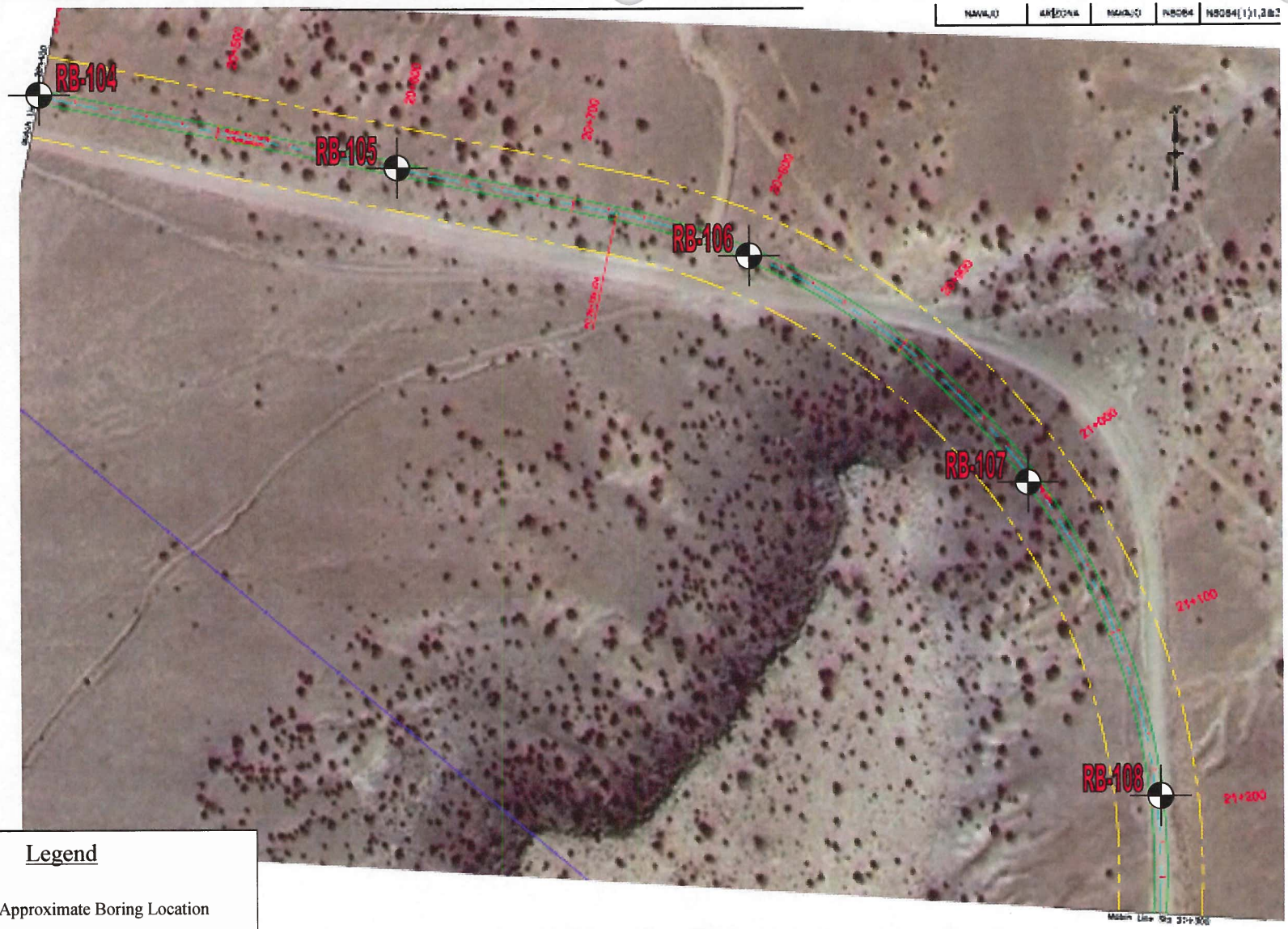
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-27



Legend

RB-1 - Approximate Boring Location

*Modified from drawing provided by client.

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

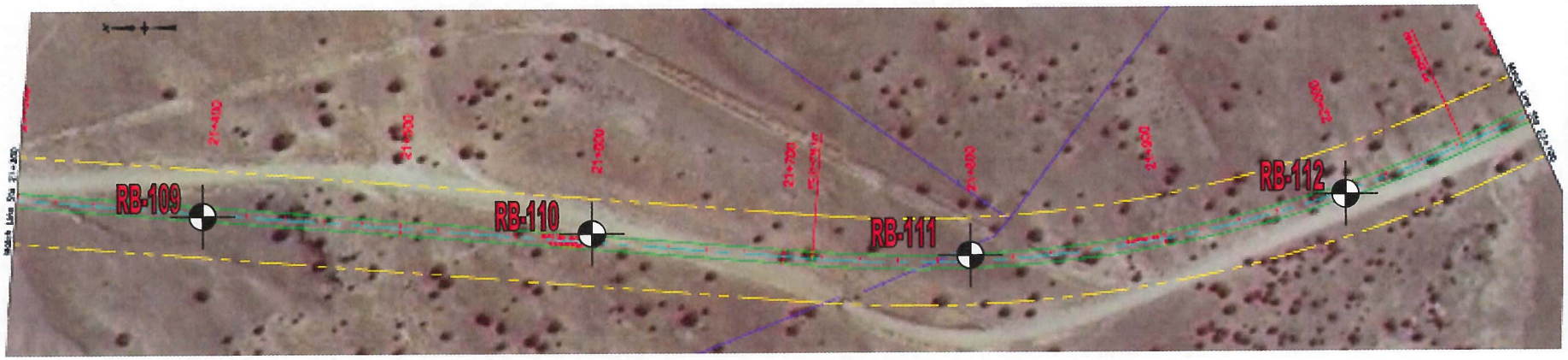
Terracon
Consulting Engineers & Scientists
#4A CR 3499
Flora Vista, New Mexico
505.334.2900 Fax: 505.334.9703

Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-28



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

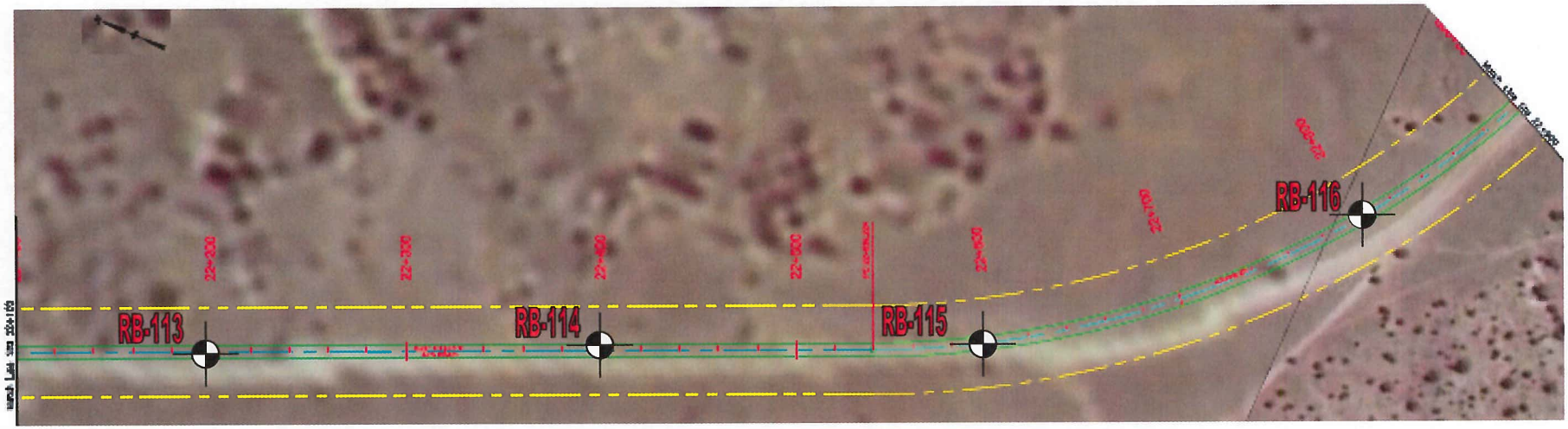
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Flora Vista, New Mexico
505.334.2900 Fax: 505.334.9703

Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-29



Legend

RB-1 - Approximate Boring Location

***Modified from drawing provided by client.**

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

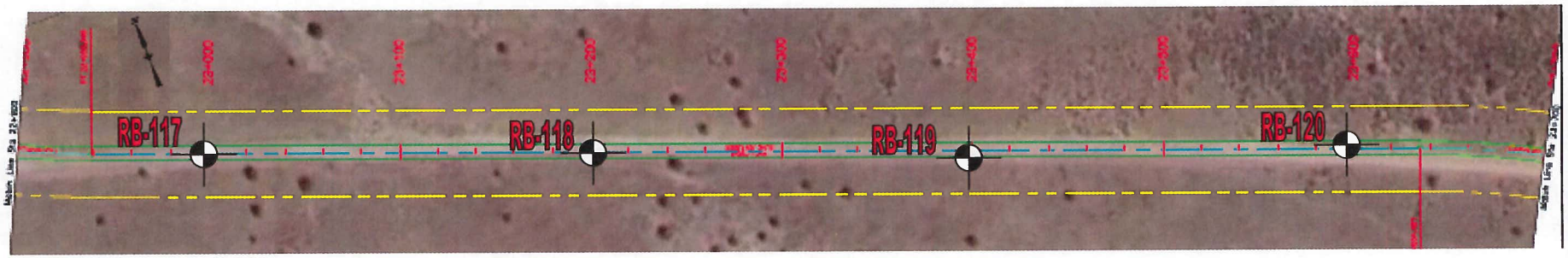
Terracon
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#4A CR 3499
Flora Vista, New Mexico
505.334.2900 Fax: 505.334.9703

Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-30



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

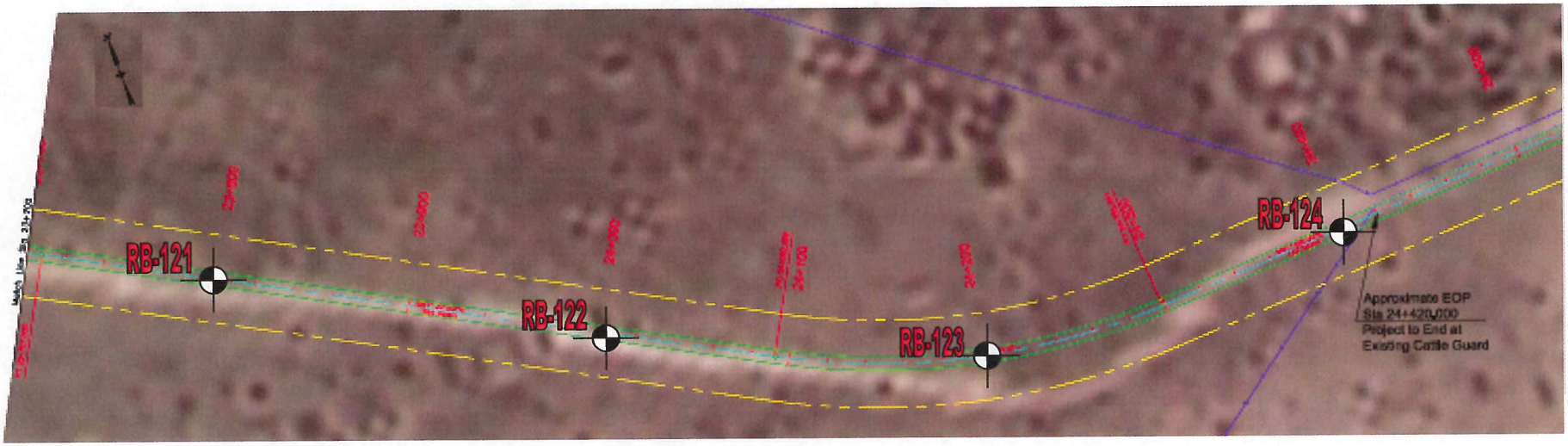
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#4A CR 3499
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Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-31



***Modified from drawing provided by client.**

Legend

RB-1 - Approximate Boring Location

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

Project No:	69095030
Scale:	NTS
File No:	Boring.doc
Date:	12/07/2009

Terracon
Consulting Engineers & Scientists
#4A CR 3499
Flora Vista, New Mexico
505.334.2900 Fax: 505.334.9703

Boring Location Plan

N8084 Many Farms Toward Tsaile
Many Farms, Arizona

FIG No.

A-32

Field Exploration Description

A geotechnical exploration has been performed for the Bureau of Indian Affairs (BIA) Project No. N8084(1)1, 2&4, beginning at U.S. 191, near Many Farms, and generally following the existing dirt road towards Tsaile, Arizona. Terracon's geotechnical scope of work for the pavement design recommendation part of this project included the advancement of 124 test borings to approximate depths of one to two meters below existing site grades. Additionally, in accordance with the request of the client, three borings were drilled in the area of potentially questionable soil conditions between Station 4+600.00 and Station 4+800.00. Four bridges are also included for this project and the geotechnical information for the bridges will be addressed in separate reports. The approximate locations shown on the attached

The test borings were advanced with a truck-mounted CME-75 drill rig utilizing 8-inch diameter hollow-stem augers.

The borings were located in the field by using the proposed site plan, aerial photography of the site, and roadway center line staking provided by the project surveyor. The accuracy of boring locations should only be assumed to the level implied by the method used.

Continuous lithologic logs of each boring were recorded by the field geologist during the drilling operations. At selected intervals, samples of the subsurface materials were taken by driving split-spoon or ring-barrel samplers. Bulk samples of subsurface materials were also obtained.

Penetration resistance measurements were obtained by driving the split-spoon and ring-barrel samplers into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency or relative density of materials encountered.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.>

Groundwater conditions were evaluated in each boring at the time of site exploration.

LOG OF BORING NO. RB-1

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 0+041 1.5 Meters Left
GPS: UTM NAD 83 Z-12 N= 4018805m E= 0624931m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	LEAN CLAY WITH SAND; red tan, dry to moist.	1	CL		GRAB			4.5			-200: 82% LL: 33 PI: 20
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-2

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 0+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4018853m E= 0625078m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			3.2			-200: 69% LL: 27 PI: 16
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-3

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 0+400 2 Meters Left
GPS: UTM NAD 83 Z-12 N= 4018923m E= 0625269m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	FAT CLAY; red tan, dry to moist, trace sand.	1	CH		GRAB			7.0			-200: 94% LL: 52 PI: 35
		2									
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-4

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 0+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4018988m E= 0625457m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	LEAN CLAY; red tan, dry to moist, trace sand.	1	CL		GRAB			5.1			-200: 85% LL: 38 PI: 23
		2									
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-5

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 0+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019061m E=0625643m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	FAT CLAY; red tan, dry to moist, trace sand.	1	CH		GRAB			6.8			-200: 89% LL: 50 PI: 35
		2									
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE '99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-6

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 1+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019122m E= 0625834m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	FAT CLAY; red tan, dry to moist, trace sand.	1	CH		GRAB			7.3			-200: 95% LL: 50 PI: 35
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-7

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 1+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019180m E= 0626027m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan, dry.		SM		GRAB			0.7			-200: 25% LL: NV PI: NP
	0.6										
	POORLY GRADED SAND WITH SILT; red tan, dry to moist.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-8

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 1+440.713 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019180m E= 0626265m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			3.0			-200: 65% LL: 37 PI: 23
	2.4 **POORLY GRADED SAND WITH CLAY**; red tan, dry to moist.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-9

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 1+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019257m E= 0626397m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.		CL		GRAB			5.7			-200: 51% LL: 39 PI: 21
	0.6										
	CLAYSTONE; red tan, dry to moist, trace silt, completely to moderately weathered, very soft to medium hardness.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-10

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 1+800 5 Meters Right
GPS: UTM NAD 83 Z-12 N= 4019445m E= 0626508m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.		SC		GRAB			7.1			-200: 42% LL: 35 PI: 17
	0.5 **CLAYSTONE**; red tan, dry to moist, trace silt, complete to moderate weathering, very soft to medium hardness.	1									
		2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-11

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 2+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019606m E= 0626591m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.	1	SC		GRAB			7.6			-200: 41% LL: 37 PI: 20
	1.5 **CLAYSTONE**; red tan, dry to moist, trace silt, compete to moderate weathering, very soft to medium hardness.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-12

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 2+200 16 Meters Left
GPS: UTM NAD 83 Z-12 N= 4019783m E= 0626672m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY ELASTIC SILT; red tan, dry to moist.		MH		GRAB			9.1			-200: 51% LL: 52 PI: 23
	0.3										
	CLAYSTONE; red tan, dry to moist, trace silt, complete to moderate weathering, very soft to medium hardness.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-13

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 2+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019956m E= 0626785m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.		CL		GRAB			5.0			-200: 61% LL: 42 PI: 27
	0.9										
	CLAYSTONE; red tan, dry to moist, trace silt, complete to moderate weathering, very soft to medium hardness.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE '99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-14

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 2+600 On Centerline
GPS: UTM NAD 84 Z-12 N= 4020127m E= 0626885m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist, trace gravel.	1	SC		GRAB			2.0			-200: 35% LL: 30 PI: 17
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE '99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-15

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 2+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020254m E= 0627039m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TESTS: TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			4.8			-200: 58% LL: 30 PI: 17
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-16

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 3+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020340m E=0627221m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **CLAYEY SAND**; red tan, dry to moist, trace gravel.		SC		GRAB			6.2			-200: 47% LL: 39 PI: 19
	CLAYSTONE; pink, dry to moist, complete to moderate weathering, very soft to medium hardness.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-17

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 3+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020426m E= 0627402m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.	1	SC		GRAB			7.5			-200: 41% LL: 39 PI: 19
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-18

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 3+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020513m E= 0627581m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **CLAYEY SAND WITH GRAVEL**; red tan, dry to moist.										
	POORLY GRADED SAND WITH CLAY; tan to brown, dry to moist.	1	SP SC		GRAB			0.5			-200: 9% LL: NV PI: NP
		2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-19

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 3+630 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020619m E= 0627790m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **CLAYEY SAND WITH GRAVEL**; red tan, dry to moist. **CLAYEY SAND**; tan, dry to moist.	1	SC		GRAB			7.1			-200: 45% LL: 45 PI: 28
	2.4 **SANDSTONE**; tan, dry, complete to moderate weathering, very soft to moderately hard.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-20

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 3+803 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020706m E= 0627933m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	FAT CLAY WITH SAND; gray, dry to moist.		CH		GRAB			7.7			-200: 71% LL: 53 PI: 30
	0.3										
	CLAYSTONE; gray, dry to moist, trace sand, complete to moderate weathering, very soft to medium hardness.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-21

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 4+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020854m E= 0628064m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **CLAYEY SAND WITH GRAVEL**; red tan, dry to moist.		SC		GRAB			3.8			-200: 41% LL: 28 PI: 19
	CLAYEY SAND; tan, dry to moist.	1									
	1.2 **CLAYSTONE**; gray, dry, complete to moderately severe weathering, very soft to soft.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-22

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 4+195 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021048m E= 0628186m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TESTS: TEST RESULTS
	LEAN CLAY WITH SAND; gray, dry to moist.		CL		GRAB			6.0			-200: 67% LL: 38 PI: 25
	1.2	1									
	CLAYSTONE; gray, dry to moist, complete to moderate weathering, very soft to medium hardness.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-23

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 4+340 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021153m E= 0628250m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	LEAN CLAY WITH SAND; tan, dry to moist.	1	CL		GRAB			3.8			-200: 75% LL: 33 PI: 21
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	11-3-09		
BORING COMPLETED	11-3-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-24

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 4+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021361m E= 0628385m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; tan, dry to moist.	1	SM		GRAB			0.3			-200: 15% LL: NV PI: NP
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-25

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 4+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021537m E= 0628472m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan to tan, dry to moist.		SC SM		GRAB			0.9			-200: 35% LL: 19 PI: 5
		1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-26

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 5+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021731m E= 0628524m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.		CL		GRAB			2.5			-200: 62% LL: 24 PI: 12
		1									
		2									
		3									
	3 Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-27

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 5+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021923m E= 0628574m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m^3	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan to tan, dry to moist.		SC		GRAB			2.1			-200: 36% LL: 28 PI: 16
	0.9										
	CLAYEY SAND WITH GRAVEL; tan and gray, dry to moist, trace cobbles.	1									
	1.5										
	CLAYSTONE; green gray, dry to moist, very severe to severe weathering, very soft to medium hardness.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-28

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 5+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022115m E= 0628627m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	LEAN CLAY WITH SAND; tan, dry to moist.		CL		GRAB			4.8			-200: 73% LL: 42 PI: 26
	0.2 **CLAYSTONE**; green tan, dry to moist, complete to moderately severe weathering, very soft to medium hardness.	1									
		2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-29

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 5+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022291m E= 0628729m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **CLAYEY SAND**; gray tan, dry to moist.		SC		GRAB			3.6			-200: 47% LL: 30 PI: 19
	CLAYSTONE; green tan, dry to moist, complete to moderately severe weathering, very soft to medium hardness.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-30

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 5+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022444m E= 0628855m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.		CL		GRAB			3.1			-200: 55% LL: 33 PI: 22
	0.9										
	CLAYSTONE; green tan, dry to moist, complete to moderate weathering, very soft to moderately hard.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-31

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 6+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022617m E= 0628946m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan to tan, dry to moist.		SC		GRAB			5.5			-200: 42% LL: 42 PI: 28
	0.9										
	CLAYEY SANDSTONE; green tan, dry to moist, very severe to slight weathering, soft to hard.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-32

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 6+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022801m E= 0629029m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan to tan, dry to moist.	1	SC		GRAB			1.8			-200: 42% LL: 30 PI: 19
	1.8 **CLAYEY SANDSTONE**; green tan, dry to moist, severe to slight weathering, medium to hard.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-33

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 6+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022982m E= 0629110m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TESTS: TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			1.6			-200: 58% LL: 27 PI: 17
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-34

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 6+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023164m E= 0629192m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			1.8			-200: 55% LL: 23 PI: 12
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-35

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 6+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023338m E= 0629290m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.	1	SC		GRAB			1.8			-200: 43% LL: 25 PI: 13
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-36

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 7+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023503m E= 0629402m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; brown, dry to moist.	1	SC SM		GRAB			0.9			-200: 22% LL: 20 PI: 4
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE_99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-37

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 7+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023668m E= 0629514m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.		SC		GRAB			2.4			-200: 38% LL: 30 PI: 18
	1.2	1									
	SANDY LEAN CLAY; tan, dry to moist.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 69 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-38

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 7+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023834m E= 0629628m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; brown, dry to moist.	1	SC		GRAB			2.3			-200: 30% LL: 27 PI: 15
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-39

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 7+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023979m E= 0629763m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan, dry to moist.	1	SM		GRAB			1.4			-200: 18% LL: 19 PI: 2
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-40

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 7+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024059m E= 0629945m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan to tan, dry to moist.	1	SC		GRAB			2.0			-200: 33% LL: 23 PI: 8
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-41

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 8+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024111m E= 0630139m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; green tan, dry to moist.	1	CL		GRAB			8.1			-200: 61% LL: 42 PI: 27
	1.8 **SANDY CLAYSTONE**; green tan, dry to moist, very severe to moderately severe weathering, very soft to soft.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE: 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-42

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 8+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024165m E= 0630327m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; green tan, dry to moist.	1	SC		GRAB			4.7			-200: 29% LL: 47 PI: 32
	2.3	2									
	Exploration terminated at a depth of approximately 2.3 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-43

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 8+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024225m E= 0630524m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist, trace gravel.	1	SC		GRAB			1.9			-200: 23% LL: 23 PI: 10
	1.2										
	SANDY CLAYSTONE; green tan, dry to moist, complete to moderately severe weathering, very soft to medium hardness.	2									
	2.1										
	Exploration terminated at a depth of approximately 2.1 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-44

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 8+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024274m E= 0630717m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; green tan, dry to moist.	1	SC		GRAB			2.9			-200: 44% LL: 25 PI: 14
	2.7										
	Exploration terminated at a depth of approximately 2.7 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-45

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 8+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024301m E= 0630915m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; green tan, dry to moist.	1	SC		GRAB			6.6			-200: 44% LL: 37 PI: 23
	1.2										
	SANDY CLAYSTONE; green tan, dry to moist, complete to moderately severe weathering, very soft to medium hardness.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-46

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 9+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024293m E= 0631115m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND WITH GRAVEL AND COBBLES; red tan and gray, dry to moist. 0.3		SC SM		GRAB			1.2			-200: 22% LL: 19 PI: 6
	CLAYEY SILTY SAND; red tan, dry to moist.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-47

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 9+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024277m E= 0631313m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	LEAN CLAY WITH SAND; green tan, dry to moist.		CL		GRAB			5.6			-200: 76% LL: 37 PI: 22
	1.2	1									
	Exploration terminated at a depth of approximately 1.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-48

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 9+400 2 Meters Right
GPS: UTM NAD 83 Z-12 N= 4024256m E= 0631511m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	LEAN CLAY WITH SAND; green tan, dry to moist, trace gravel.		CL		GRAB			5.6			-200: 71% LL: 38 PI: 22
	0.6										
	CLAYSTONE; green tan, dry to moist, trace sand, complete to slight weathering, very soft to moderately hard.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-49

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 9+595 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024248m E= 0631706m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan to tan, dry to moist, trace gravel.	1	SM		GRAB			0.7			-200: 20% LL: NV PI: NP
		2									
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-50

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 9+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024163m E= 0631896m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; tan, dry to moist.	1	CL		GRAB			5.8			-200: 67% LL: 33 PI: 20
	1.5 **CLAYSTONE**; tan, dry to moist, complete to moderate weathering, very soft to hard.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-51

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 10+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4024040m E= 0632052m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	POORLY GRADED SAND WITH SILT; red tan, dry to moist.	1	SP SM		GRAB			0.8			-200: 12% LL: NV PI: NP
	2.3	2									
	CLAYSTONE; green tan, dry to moist, complete to moderate weathering, very soft to medium hardness.										
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-52

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 10+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023915m E= 0632208m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	LEAN CLAY; yellow tan, dry to moist, trace sand.	1	CL		GRAB			6.1			-200: 85% LL: 44 PI: 28
	2.1	2									
	CLAYSTONE; tan, dry to moist, trace sand, complete to moderate weathering, very soft to moderately hard.										
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-53

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 10+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023787m E= 0632363m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **SILTY SAND**; red tan, dry to moist, trace gravel and cobbles.		SM		GRAB			0.8			-200: 30% LL: NV PI: NP
	0.3 **SANDSTONE**; dark red to black, dry, moderately severe weathering, hard to very hard.										
	Exploration terminated at a depth of approximately 0.3 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-54

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 10+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023619m E= 0632470m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **CLAYEY SAND**; red tan, dry to moist, trace gravel.		SC		GRAB			1.5			-200: 34% LL: 19 PI: 9
	Exploration terminated at a depth of approximately 0.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-55

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 10+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023446m E= 0632568m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TESTS: TEST RESULTS
	0.2 **SANDY LEAN CLAY**; red tan, dry to moist, trace gravel.		CL		GRAB			2.9			-200: 52% LL: 25 PI: 13
	Exploration terminated at a depth of approximately 0.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-14-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-56

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 11+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023278m E= 0632677m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; light tan, dry to moist, trace gravel.		SM		GRAB			0.5			-200: 23% LL: 16 PI: 1
	1.2	1									
	CLAYEY SAND; light brown, dry to moist.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-57

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 11+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023141m E= 0632822m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND WITH GRAVEL AND COBBLES; red and tan, dry to moist.		SC		GRAB			0.8			-200: 27% LL: 21 PI: 10
	0.9										
	Exploration terminated at a depth of approximately 0.9 meter below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-58

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 11+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023009m E= 0632975m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	GRAVELLY CLAYEY SAND; red tan and light brown, dry to moist.		SC		GRAB			0.0			-200: 26% LL: 26 PI: 15
	0.6 Exploration terminated at a depth of approximately 0.6 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-59

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 11+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022916m E= 0633150m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TESTS: TEST RESULTS
	0.2 **CLAYEY SILTY SAND**; red tan, dry to moist, trace gravel and cobbles.		SC SM		GRAB			0.8			-200: 28% LL: 19 PI: 5
	Exploration terminated at a depth of approximately 0.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1									
		2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-60

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 11+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022815m E= 0633321m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **SILTY SAND WITH GRAVEL**; red tan, dry to moist.		SM		GRAB			0.6			-200: 24% LL: 18 PI: 3
	SANDSTONE; white tan, dry to moist, moderately weathered, hard to very hard.										
	0.6 Exploration terminated at a depth of approximately 0.6 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-61

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 12+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022695m E= 0633480m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **GRAVELLY SILTY SAND**; red tan with white tan, dry to moist.		SM		GRAB			0.4			-200: 19% LL: NV PI: NP
	SANDSTONE; white, dry to moist, moderately weathered, hard to very hard.										
	0.6 Exploration terminated at a depth of approximately 0.6 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-62

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 12+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022576m E= 0633643m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **SILTY SAND** red tan, dry to moist, trace gravel.		SM		GRAB			0.7			-200: 26% LL: 19 PI: 2
	SANDSTONE; tan, dry to moist, moderately severe to slight weathering, moderately hard to very hard.	1									
	2.3	2									
	Exploration terminated at a depth of approximately 2.3 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-63

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 12+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022537m E= 0633837m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND WITH GRAVEL; red tan, dry to moist.		SM		GRAB			0.2			-200: 19% LL: NV PI: NP
	0.9										
	Exploration terminated at a depth of approximately 0.9 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-64

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 12+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022577m E= 0634033m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.		CL		GRAB			1.7			-200: 54% LL: 27 PI: 14
	0.2 **CLAYEY SAND**; tan, dry to moist.										
	1.1 Exploration terminated at a depth of approximately 1.1 meter below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-65

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 12+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022621m E= 0634226m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **SILTY SAND**; red tan and tan, dry to moist, trace gravel and cobbles.		SM		GRAB			0.9			-200: 28% LL: NV PI: NP
	Exploration terminated at a depth of approximately 0.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-66

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 13+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022665m E= 0634420m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan to white tan, dry to moist, trace gravel and cobbles.		SC SM		GRAB			0.8			-200: 34% LL: 21 PI: 7
	0.6										
	Exploration terminated at a depth of approximately 0.6 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1									
		2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-67

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 13+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022710m E= 0634617m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; withe tan, dry to moist.	1	CL		GRAB			4.5			-200: 61% LL: 32 PI: 20
	2.1	2									
	SANDSTONE; white tan to yellow tan, dry to moist, complete to slight weathering, soft to very hard.										
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-68

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 13+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022705m E= 0634817m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan to pink, dry to moist, trace gravel.		SC		GRAB			1.5			-200: 39% LL: 25 PI: 14
	0.9										
	SANDSTONE; pink, dry to tan, severe to slight weathering, soft to hard.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-69

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 13+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022702m E= 0635017m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red brown, dry to moist.	1	CL		GRAB			3.3			-200: 53% LL: 30 PI: 19
	1.5 **SANDSTONE**; white tan, dry to moist, slight weathering, hard.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-70

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 13+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022695m E= 0635217m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.	1	SC		GRAB			2.3			-200: 43% LL: 23 PI: 11
	1.4 Exploration terminated at a depth of approximately 1.4 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-71

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 14+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022687m E= 0635417m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND WITH GRAVEL; tan, dry to moist.		SC		GRAB			1.2			-200: 32% LL: 21 PI: 10
	0.6										
	SANDSTONE; tan to brown, dry to moist, complete to slight weathering, very soft to hard.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-72

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 14+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022683m E= 0635618m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND WITH GRAVEL; white tan, dry to moist.		SC		GRAB			2.0			-200: 22% LL: 24 PI: 11
	0.3										
	SANDSTONE; white tan, dry to moist, complete to slight weathering, very soft to very hard.	1									
	1.2										
	Exploration terminated at a depth of approximately 1.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-73

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 14+400 On Centerline
GPS: UTM NAD 83 Z-12 N=4022680m E=0635815m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0 Exploration terminated at surface due equipment refusal on sandstone. No groundwater encountered.	1									
		2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE '99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-74

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 14+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022751m E= 0635990m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND WITH GRAVEL; red tan to white tan, dry to moist.		SC		GRAB			1.4			-200: 29% LL: 21 PI: 8
	0.5										
	SANDSTONE; white tan, dry to moist, slight weathering, hard to very hard.										
	0.6										
	Exploration terminated at a depth of approximately 0.6 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-75

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 14+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022869m E= 0636166m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND WITH GRAVEL; red tan to white tan, dry to moist, trace gravel.	1	SC		GRAB			1.8			-200: 39% LL: 23 PI: 11
	1.5										
	SANDSTONE; white tan, dry, moderately severe to slight weathering, moderately hard to very hard.										
	2	2									
	Exploration terminated at a depth of approximately 2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-76

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 15+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022984m E= 0636327m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red brown to purple tan, dry to moist, trace gravel.	1	SC		GRAB			2.4			-200: 47% LL: 26 PI: 15
	1.2 **SANDSTONE**; white tan, dry, moderate to slight weathering, hard to very hard. 1.4										
	Exploration terminated at a depth of approximately 1.4 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-77

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 15+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023096m E= 0636490m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND WITH GRAVEL; yellow tan to tan, dry to moist.		SC		GRAB			0.7			-200: 27% LL: 20 PI: 9
	0.6 Exploration terminated at a depth of approximately 0.6 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-78

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 15+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023182m E= 0636671m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY GRAVEL WITH SAND; red tan, dry to moist.		GM		GRAB			0.8			-200: 14% LL: 19 PI: 3
	0.3										
	SANDSTONE; white tan, dry, moderate to slight weathering, hard to very hard.	1									
	1.2										
	Exploration terminated at a depth of approximately 1.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-79

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 15+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023228m E=0636866m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist, trace gravel.		CL		GRAB			2.7			-200: 58% LL: 30 PI: 18
	0.9										
	SANDSTONE; white tan, dry, moderate to slight weathering, hard to very hard.	1									
	1.2										
	Exploration terminated at a depth of approximately 1.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-80

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 15+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023233m E= 0637065m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.		SC		GRAB			1.6			-200: 48% LL: 23 PI: 10
	2.1	1									
	2.3 **SANDSTONE**; withe tan, dry, moderate to slight weathering, hard to very hard.										
	Exploration terminated at a depth of approximately 2.3 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-81

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 16+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023225m E= 0637264m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	GRAVELLY CLAYEY SILTY SAND; red tan, dry to moist.		SC SM		GRAB			0.7			-200: 23% LL: 19 PI: 6
	0.6 **SANDSTONE**; white tan, dry, moderate to slight weathering, hard to very hard. 0.8	1									
	Exploration terminated at a depth of approximately 0.8 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-82

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 16+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023220m E= 0637445m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.		CL		GRAB			1.9			-200: 53% LL: 22 PI: 8
		1									
	1.5 **SANDSTONE**; purple tan, dry, moderate to slight weathering, medium to very hard.										
		2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-83

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 16+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023186m E= 0637660m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0 Exploration terminated at surface due to equipment refusal on sandstone. No groundwater encountered.	1									
		2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 09 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-84

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 16+500 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023152m E= 0637753m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; white tan to red tan, dry to moist.		SM		GRAB			0.3			-200: 16% LL: NV PI: NP
	0.5										
	Exploration terminated at a depth of approximately 0.5 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-85

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 16+720 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023047m E= 0637948m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan, dry to moist.		SM		GRAB			0.2			-200: 14% LL: NV PI: NP
	0.3										
	SANDSTONE; white tan, dry, moderate to slight weathering, hard to very hard.										
	0.5										
	Exploration terminated at a depth of approximately 0.5 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1									
		2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-86

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 16+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4023002m E= 0638016m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan, dry to moist.		SM		GRAB			1.0			-200: 28% LL: 17 PI: 2
	1.1	1									
	Exploration terminated at a depth of approximately 1.1 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-87

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 17+000 1 Meter Left
GPS: UTM NAD 83 Z-12 N= 4022893m E= 0638185m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan to white tan, dry to moist.		SM		GRAB			0.8			-200: 22% LL: 17 PI: 2
	0.9										
	Exploration terminated at a depth of approximately 0.9 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-88

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 17+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022793m E= 0638353m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND WITH GRAVEL; red tan, dry to moist.		SM		GRAB			1.0			-200: 37% LL: 22 PI: 7
	0.3										
	SANDSTONE; withe tan, dry, severe to slight weathering, soft to very hard.										
	1.1	1									
	Exploration terminated at a depth of approximately 1.1 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-89

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 17+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022686m E= 0638520m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan, dry to moist.		SM		GRAB			0.5			-200: 20% LL: NV PI: NP
	1.5	1									
	Exploration terminated at a depth of approximately 1.5 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-90

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 17+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022579m E= 0638687m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist, trace gravel.	1	CL		GRAB			1.6			-200: 59% LL: 25 PI: 11
	1.5 **SANDSTONE**; white tan, dry, moderate to slight weathering, soft to hard.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-91

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 17+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022475m E= 0638856m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan, dry to moist.		SC SM		GRAB			1.5			-200: 36% LL: 20 PI: 6
	1.5	1									
	SANDSTONE; pink, dry, moderately severe to slight weathering, soft to moderately hard.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-92

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 18+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022392m E= 0639040m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TESTS: TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			2.0			-200: 53% LL: 24 PI: 12
		2									
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-93

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 18+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022351m E= 0639239m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist, trace gravel.		SC		GRAB			1.8			-200: 43% LL: 23 PI: 10
	0.8										
	SANDSTONE; white tan, dry, moderate to slight weathering, soft to very hard.	1									
	2	2									
	Exploration terminated at a depth of approximately 2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-94

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 18+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022333m E= 0639437m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan, dry to moist.		SC SM		GRAB			1.2			-200: 33% LL: 19 PI: 4
	1.5	1									
	SANDSTONE; red tan to tan, dry, moderately to slightly weathered, soft to moderately hard.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE_99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-95

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 18+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022309m E= 0639635m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY CLAYEY SILT; red tan, dry to moist.		CL ML		GRAB			1.6			-200: 51% LL: 23 PI: 6
	1.2	1									
	1.4 **SANDSTONE**; wite tan, dry, moderate to slight weathering, soft to very hard.										
	Exploration terminated at a depth of approximately 1.4 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-96

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 18+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022288m E= 0639834m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan to green tan, dry to moist.	1	SC SM		GRAB			1.1			-200: 31% LL: 18 PI: 4
	2.4 **SANDSTONE**; white tan, dry, moderate to slight weathering, moderately hard to very hard. 2.6	2									
	Exploration terminated at a depth of approximately 2.6 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-97

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 19+025 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022261m E= 0640060m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan to pink, dry to moist.		SM		GRAB			1.2			-200: 41% LL: 20 PI: 3
		1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-98

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 19+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022245m E= 0640234m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	LEAN CLAY WITH SAND; red tan, dry to moist.		CL		GRAB			1.3			-200: 71% LL: 24 PI: 11
	0.3										
	SANDSTONE; red tan to pink, dry to moist, very severe to moderate weathering, soft to moderately hard.	1									
		2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-99

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 19+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022213m E= 0640437m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan to gray, dry to moist, hard lense at 8 feet.	1	SC SM		GRAB			0.6			-200: 32% LL: 19 PI: 4
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-100

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 19+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022173m E= 0640624m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan to pink tan, dry to moist.	1	SC SM		GRAB			1.1			-200: 43% LL: 20 PI: 6
	2.1										
	SANDSTONE; pink, dry, severe to slight weathering, soft to moderately hard.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-101

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 19+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022128m E= 0640819m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILTY SAND; red tan, dry to moist.	1	SM		GRAB			1.1			-200: 33% LL: 20 PI: 2
	2.7										
	SANDSTONE; white tan, dry, moderate to slight weathering, soft to hard.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-102

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 20+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022093m E= 0641015m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	0.2 **SILTY SAND WITH GRAVEL**; red tan, dry to moist.		SM		GRAB			0.7			-200: 22% LL: NV PI: NP
	SANDSTONE; withe tan, moderate to slight weathering, hard to very hard.										
	0.6 Exploration terminated at a depth of approximately 0.6 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	1 2 3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-103

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 20+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022051m E= 0641212m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.		SC		GRAB			1.8			-200: 41% LL: 23 PI: 8
	0.9										
	SANDSTONE; white tan, dry, moderate to slight weathering, hard to very hard.	1									
	1.2										
	Exploration terminated at a depth of approximately 1.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09
BORING COMPLETED	10-16-09
RIG CME-75	FOREMAN HMW
APPROVED KMP	JOB # 69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-104

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 20+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4022011m E= 0641407m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan, dry to moist.	1	SC SM		GRAB			1.2			-200: 33% LL: 19 PI: 4
	1.5 Exploration terminated at a depth of approximately 1.5 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-105

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 20+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021972m E= 0641603m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan to white tan, dry to moist, trace gravel.		SC		GRAB			0.8			-200: 44% LL: 24 PI: 9
	0.6										
	SANDSTONE; white tan, dry, moderate to slight weathering, medium to very hard.	1									
	1.5										
	Exploration terminated at a depth of approximately 1.5 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-106

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 20+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021924m E= 0641793m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan to purple tan, dry to moist.	1	SC SM		GRAB			0.9			-200: 33% LL: 19 PI: 4
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-107

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 21+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021803m E= 0641953m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SILT; red tan to white tan, dry to moist, trace sand.	1	ML		GRAB			1.6			-200: 88% LL: 18 PI: 3
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-108

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 21+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021621m E= 0642034m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TESTS: TEST RESULTS
	CLAYEY SAND; red tan to purple tan, dry to moist, trace gravel.	1	SC		GRAB			1.7			-200: 49% LL: 22 PI: 8
	2.4	2									
	Exploration terminated at a depth of approximately 2.4 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-109

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 21+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021424m E= 0642022m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan, dry to moist.	1	SC SM		GRAB			1.4			-200: 42% LL: 22 PI: 5
	Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-110

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 21+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021223m E= 0642010m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan, dry to moist.		SC SM		GRAB			1.5			-200: 42% LL: 23 PI: 7
	1.1	1									
	Exploration terminated at a depth of approximately 1.1 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-111

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 21+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021024m E= 0641997m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan, dry to moist.	1	SC SM		GRAB			1.7			-200: 46% LL: 22 PI: 5
	2.6 **SANDSTONE**; white tan, dry, severe to moderate weathering, very soft to medium hardness.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREH_ _99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-112

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 22+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020828m E=0642031m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan, dry to moist.	1	SC SM		GRAB			1.5			-200: 34% LL: 20 PI: 4
	2.6										
	SANDSTONE; white tan, dry, severe to moderate weathering, soft to medium hard.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters below existing ground surfac. No groundwater encountered.										

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-113

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 22+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020641m E= 0642107m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist, trace gravel.		SC		GRAB			1.7			-200: 49% LL: 23 PI: 8
	1.1	1									
	SANDSTONE; red tan to tan, dry, moderatley severe to slight weathering, soft to very hard.										
	1.8	2									
	Exploration terminated at a depth of approximately 1.8 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-114

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 22+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020460m E= 0642189m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan to tan, dry to moist.		SC		GRAB			2.6			-200: 46% LL: 23 PI: 10
	0.6										
	SANDSTONE; tan, dry, moderately severe to slight weathering, soft to very hard.	1									
	1.5										
	Exploration terminated at a depth of approximately 1.5 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BORE-99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-115

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 22+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020278m E= 0642274m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			3.2			-200: 67% LL: 30 PI: 16
	2.4 **LEAN CLAY**; white tan, dry to moist.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-116

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 22+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020132m E= 0642406m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			1.7			-200: 50% LL: 23 PI: 6
	2.6										
	SANDSTONE; white tan, dry, severe to moderate weathering, soft to medium hardness.	2									
	3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-117

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 23+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4020042m E= 0642581m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND TO SANDY LEAN CLAY; red tan, dry to moist.		SC CL		GRAB			1.0			-200: 50% LL: 22 PI: 9
		1									
		2									
	2.9										
	SANDSTONE; white tan, dry, moderate to slight weathering, moderately hard to hard. 3	3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-118

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 23+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019972m E= 0642770m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist, trace gravel.		SC		GRAB			2.1			-200: 38% LL: 27 PI: 12
	0.6										
	SANDSTONE; white tan, dry, severe to slight weathering, soft to hard.	1									
	1.2										
	Exploration terminated at a depth of approximately 1.2 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-119

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 23+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019904m E= 0642958m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	1	CL		GRAB			3.7			-200: 62% LL: 28 PI: 13
	2.6 **LEAN CLAY**; white tan, dry to moist, silty.	2									
	3 Exploration terminated at a depth of approximately 3 meters below existing ground surface. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-120

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 23+600 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019837m E= 0643146m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SILTY SAND; red tan, dry to moist.	1	SC SM		GRAB			1.2			-200: 35% LL: 22 PI: 5
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-121

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 23+800 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019750m E= 0643324m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan to purple tan, dry to moist.	1	CL		GRAB			3.2			-200: 56% LL: 27 PI: 12
		2									
		3									
	Exploration terminated at a depth of approximately 3 meters 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.

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-122

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 24+000 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019665m E= 0643502m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan to white tan, dry to moist, trace gravel.		SC		GRAB			1.8			-200: 31% LL: 28 PI: 13
	0.6 **SANDSTONE**; white tan, dry, moderate to slight weathering, hard to very hard. 0.8	1									
	Exploration terminated at a depth of approximately 0.8 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	2									
		3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-123

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 - Many Farms toward Tsaile**

Boring Location: Station 24+200 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019570m E= 0643681m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	SANDY LEAN CLAY; red tan, dry to moist.	0	CL		GRAB			2.0			-200: 57% LL: 14 PI: 9
		1									
		2									
	SANDSTONE; purple tan, dry to moist, severe to slight weathering, soft to very hard.	2									
		2.4									
	Exploration terminated at a depth of approximately 2.4 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. RB-124

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 - Many Farms toward Tsaile

Boring Location: Station 24+400 On Centerline
GPS: UTM NAD 83 Z-12 N= 4019563m E= 0643879m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa	TEST RESULTS
	CLAYEY SAND; red tan, dry to moist.	1	SC		GRAB			1.8			-200: 22% LL: 28 PI: 17
	1.5 **SANDSTONE**; red tan to tan, dry to moist, severe to slight weathering, soft, to hard.	2									
	2.4 Exploration terminated at a depth of approximately 2.4 meters below existing ground surface due to equipment refusal on sandstone. No groundwater encountered.	3									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-16-09		
BORING COMPLETED	10-16-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 LOGS OF ROAD BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. M-1

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 Many Farms to Tsaile

Boring Location: Station 4+650 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021404m E= 0628414m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa
	POORLY GRADED SAND; red tan, moist.									
	1.5									
	LEAN CLAY; red brown, moist, trace to with sand.									
	4.6									
	LEAN CLAY; red brown, moist to wet, silty. ▽									
	7.6									
	CLAYEY SAND; red brown, wet, fine to course grained.									
	Sandstone lense.									
	Continued Next Page									

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

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

WATER LEVEL OBSERVATIONS, m		
WL	▽ 6.9	▽
WL	▽	▽
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREH...09 MYSTERY BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. M-1

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 Many Farms to Tsaile

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa
	CLAYEY SAND; red brown, wet, fine to course grained.	19								
		20								
		21								
	21.6									
	22.1 **SANDSTONE**; hard to very hard, suspected bedrock.	22								
	Exploration terminated at a depth of approxiately 22.1 meters below existing ground surface due to equipment refusal on suspected sandstone.									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽ 6.9	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-13-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 MYSTERY BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. M-2

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 Many Farms to Tsaile

Boring Location: Station 4+700 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021442m E= 0628437m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m^3	TESTS: UNCONFINED STRENGTH, kPa
	LEAN CLAY; red tan, moist to wet, trace to with sand.	1–6								
	6.9 ▽	7								
	CLAYEY SAND TO SANDY LEAN CLAY; red brown, wet.	7–17								
	Thin cemented zones.	17								
	Continued Next Page	18								

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

WATER LEVEL OBSERVATIONS, m		
WL	▽ 6.9	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE - 99 MYSTERY BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. M-2

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 Many Farms to Tsaile**

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa
	CLAYEY SAND TO SANDY LEAN CLAY; red brown, wet.	19 20 21 22 23 24 25 26 27 28 29 30								
	30.5 Exploration terminated at a depth of approximately 30.5 meters below existing ground surface.									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽ 6.9	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-13-09		
BORING COMPLETED	10-14-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 MYSTERY BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. M-3

CLIENT
Bureau of Indian Affairs

SITE
Many Farms, Arizona

PROJECT
N8084 Many Farms to Tsaile

Boring Location: Station 4+750 On Centerline
GPS: UTM NAD 83 Z-12 N= 4021480m E= 0628460m

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa
	CLAYEY SILTY SAND; red tan, dry to moist.	1 2 3								
3	**CLAYEY SAND**; red tan to red brown, moist to wet. ▽	4 5 6 7 8 9 10 11 12 13 14 15 16 17 18								

Continued Next Page

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

WATER LEVEL OBSERVATIONS, m		
WL	▽ 6.9	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 99 MYSTERY BORINGS.GPJ TERRACON.GDT 1/5/10

LOG OF BORING NO. M-3

CLIENT: **Bureau of Indian Affairs**

SITE: **Many Farms, Arizona**

PROJECT: **N8084 Many Farms to Tsaile**

GRAPHIC LOG	DESCRIPTION	DEPTH, m.	USCS SYMBOL	SAMPLES: CORE SIZE	SAMPLES: TYPE	SAMPLES: RECOVERY	SAMPLES: BLOW COUNTS, n	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT kN/m³	TESTS: UNCONFINED STRENGTH, kPa
	19.2	19								
	CLAYSTONE; red, moist to wet, soft to hard, complete weathering to fresh.	20								
		21								
		22								
		23								
		24								
		25								
		26								
		27								
		28								
		29								
	30.5	30								
	Exploration terminated at a depth of approximately 30.5 meters below existing ground surface.									

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

WATER LEVEL OBSERVATIONS, m		
WL	▽ 6.9	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-15-09		
BORING COMPLETED	10-15-09		
RIG	CME-75	FOREMAN	HMW
APPROVED	KMP	JOB #	69095030

BOREHOLE 69 MYSTERY BORINGS.GPJ TERRACON.GDT 1/5/10

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		
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	0 - 1	Very Soft
500 – 1,000	2 - 4	Soft
1,000 – 2,000	4 - 8	Medium Stiff
2,000 – 4,000	8 -15	Stiff
4,000 – 8,000	15 - 30	Very Stiff
8,000+	> 30	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

Terracon

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.

Terracon

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 ≥ 4 and 1 ≤ Cc ≤ 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 ≥ 6 and 1 ≤ Cc ≤ 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 / Liquid limit - not dried	< 0.75	OL	Organic clay[K,L,M,N] / 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 / Liquid limit - not dried	< 0.75	OH	Organic clay[K,L,M,P] / 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.

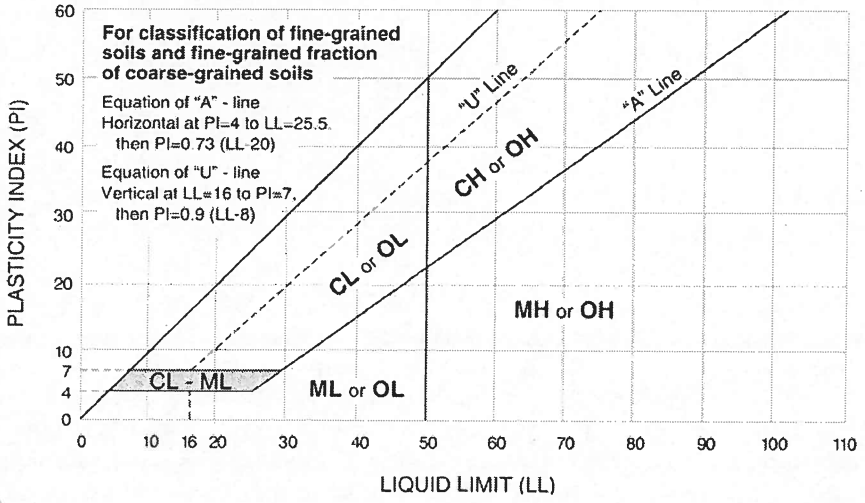
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[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.



Terracon

Laboratory Testing

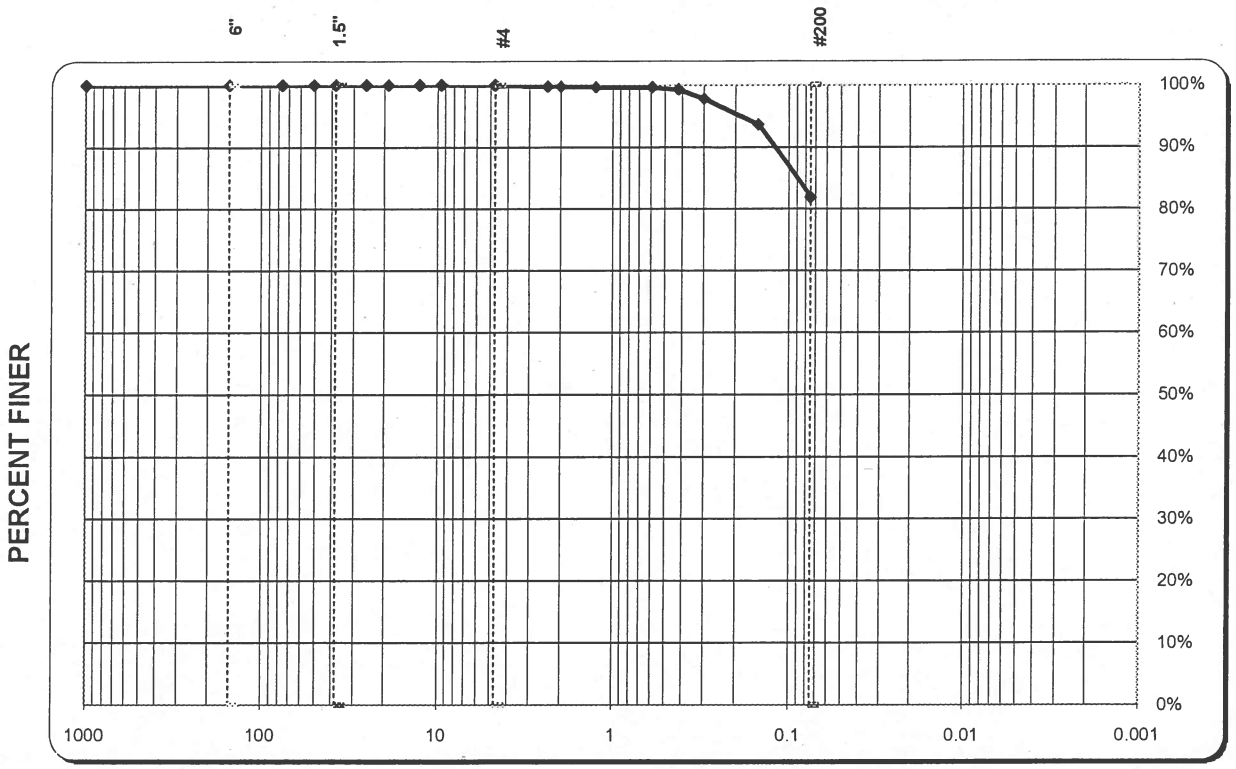
Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in general accordance with the Unified Soil Classification System (USCS) described in Appendix A. Samples of bedrock were classified in accordance with the general notes for Bedrock Classification. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. Selected bulk samples of the site soils were tested in the laboratory. The laboratory test results were used for the geotechnical engineering analyses, and the development of pavement and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Sieve Analysis
- Atterberg Limits
- Soluble Chlorides
- Soluble Sulfates
- Minimum Resistivity
- In-situ Water Content
- Modified Proctor
- Remolded Expansion/Swell
- pH

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	99	94	82.0
Specification								

% GRAVEL =	0.0	D_{85} = 0.1	D_{15} =
% SAND =	18.0	D_{60} =	D_{10} =
% SILT & CLAY =	82.0	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-1 @ 0-1.2m

Liquid Limit: 33

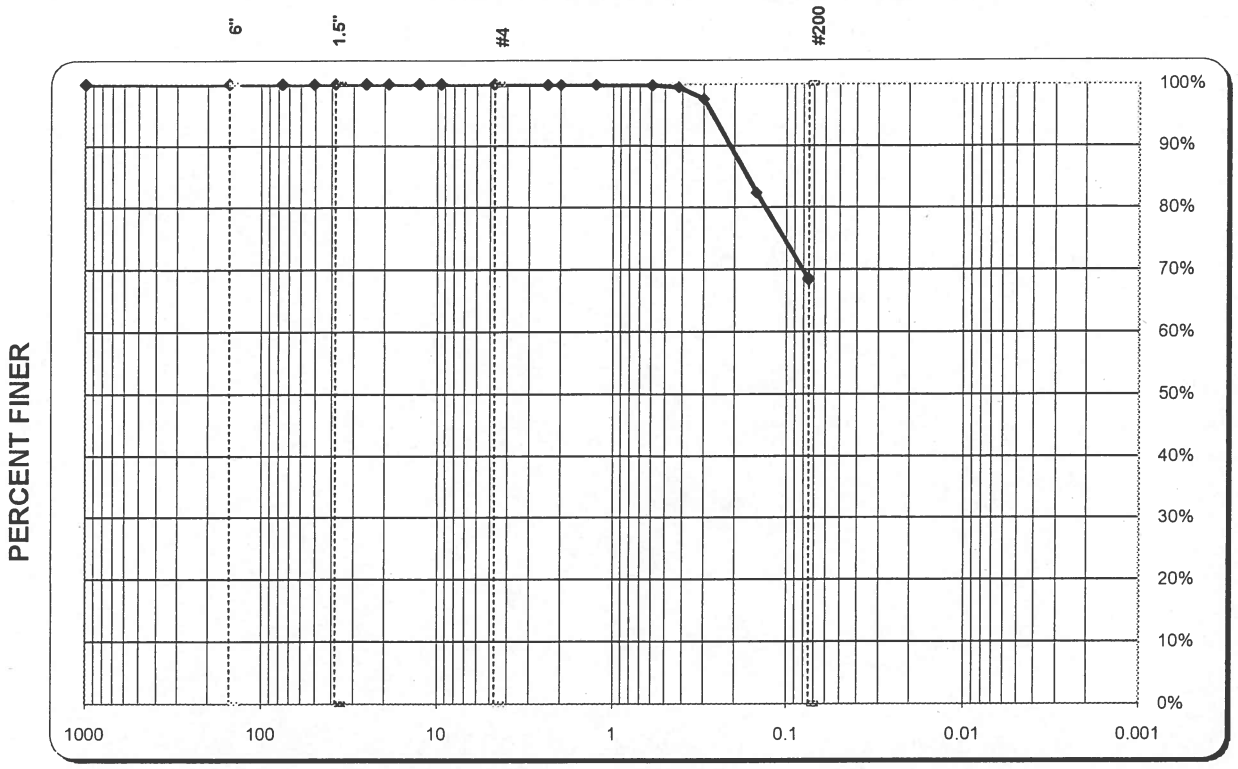
Plasticity Index: 20

USCS Classification: CL

Material Description: Lean Clay with Sand

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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	99	82	68.5
Specification								

% GRAVEL =	0.0	D_{85} = 0.2	D_{15} =
% SAND =	31.5	D_{60} =	D_{10} =
% SILT & CLAY =	68.5	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-2 @ 0-1.2m

Liquid Limit: 27

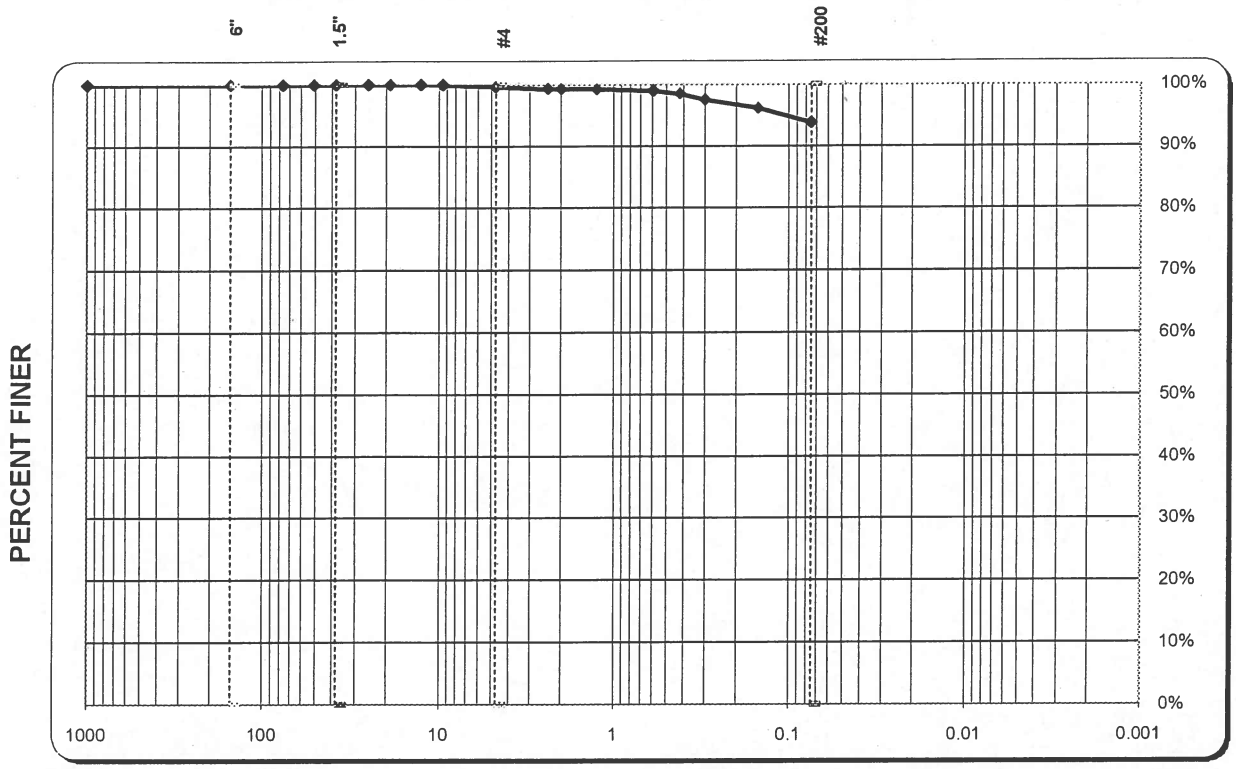
Plasticity Index: 16

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	100	99	98	96	93.8
Specification								

% GRAVEL =	0.3	D_{85} =	D_{15} =
% SAND =	5.9	D_{60} =	D_{10} =
% SILT & CLAY =	93.8	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-3 @ 0-1.2m

Liquid Limit: 52

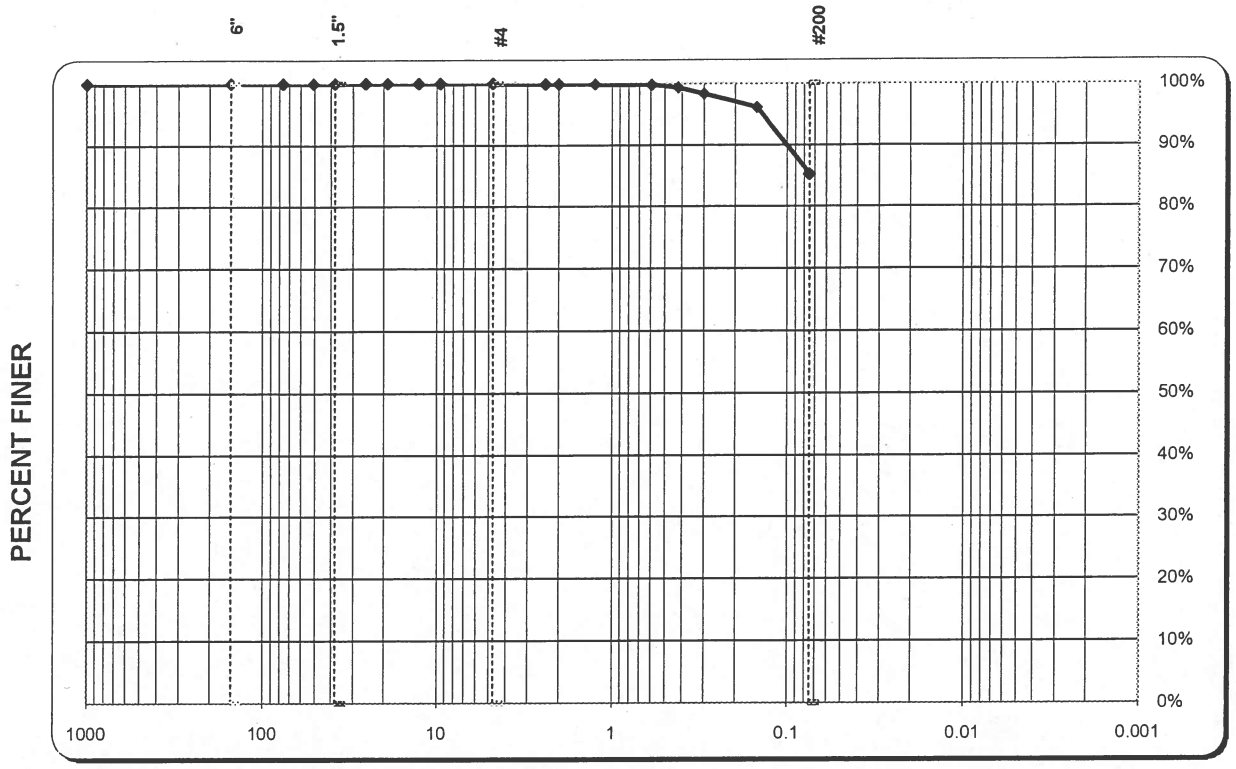
Plasticity Index: 35

USCS Classification: CH

Material Description: Fat 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	100	100	99	96	85.3
Specification								

% GRAVEL =	0.0	D_{85} =	D_{15} =
% SAND =	14.7	D_{60} =	D_{10} =
% SILT & CLAY =	85.3	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-4 @ 0-1.2m

Liquid Limit: 38

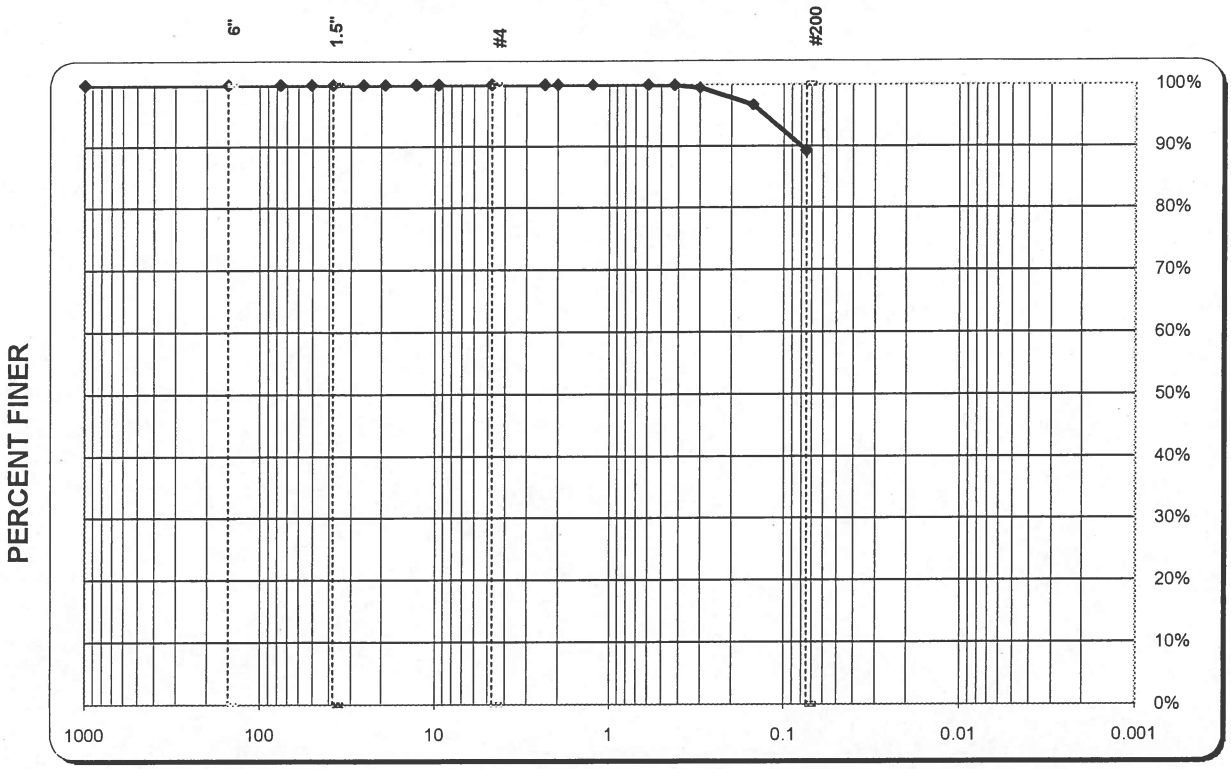
Plasticity Index: 23

USCS Classification: CL

Material Description: 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	100	100	100	97	89.2
Specification								

% GRAVEL =	0.0	D_{85} =	D_{15} =
% SAND =	10.8	D_{60} =	D_{10} =
% SILT & CLAY =	89.2	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-5 @ 0-1.2m

Liquid Limit: 50

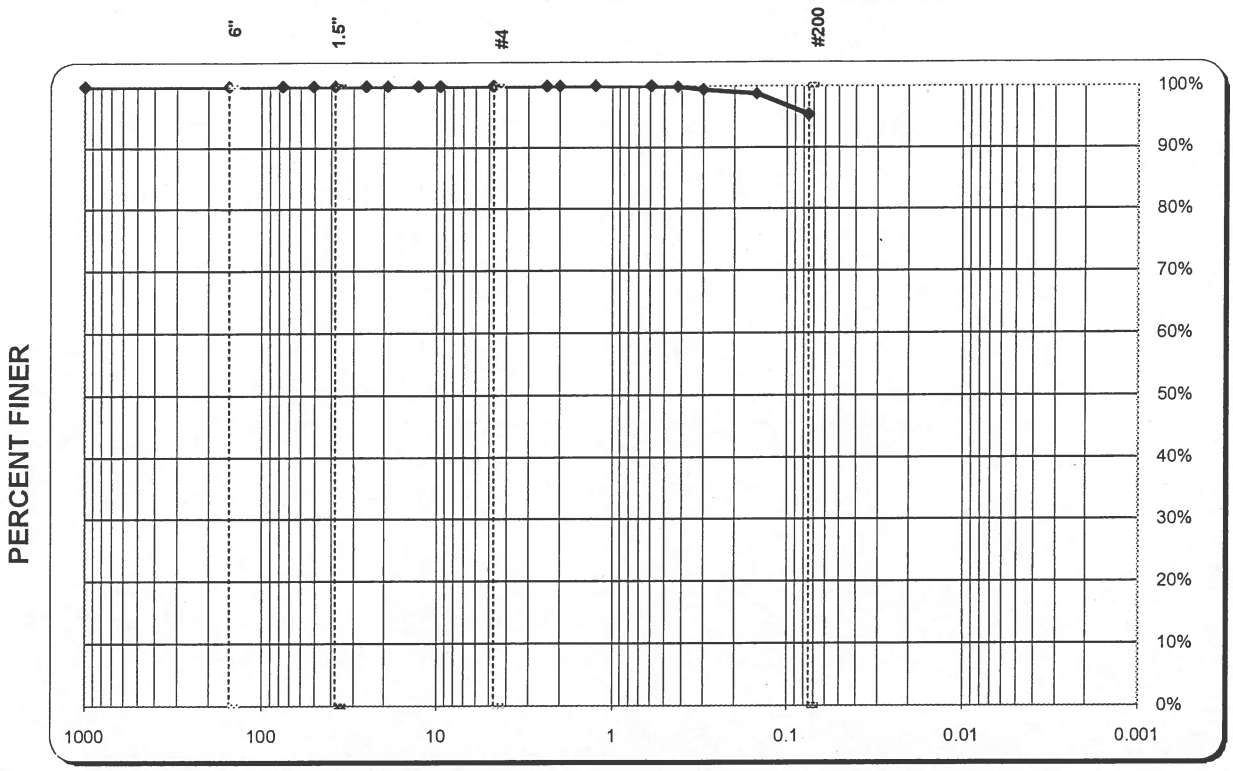
Plasticity Index: 35

USCS Classification: CH

Material Description: Fat 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	100	100	100	99	95.4
Specification								

% GRAVEL =	0.0	D_{85} =	D_{15} =
% SAND =	4.6	D_{60} =	D_{10} =
% SILT & CLAY =	95.4	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-6 @ 0-1.2m

Liquid Limit: 50

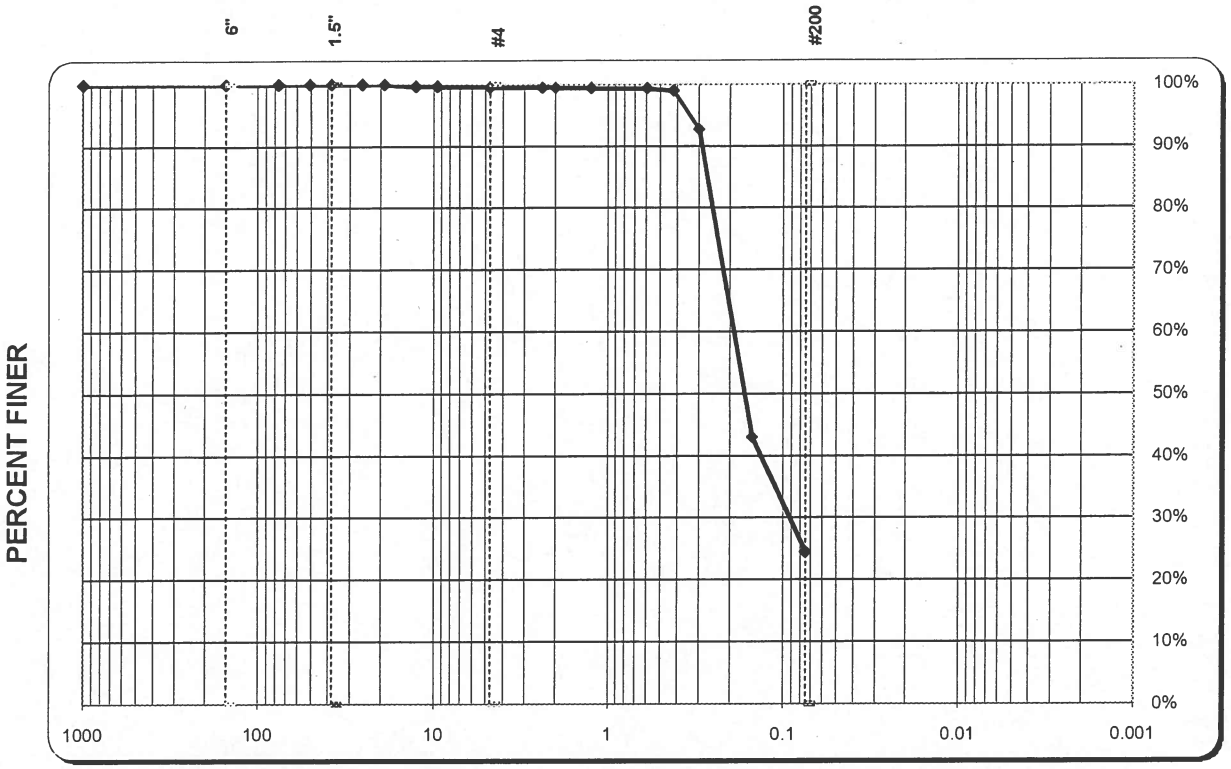
Plasticity Index: 35

USCS Classification: CH

Material Description: Fat 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	100	99	99	43	24.5
Specification								

% GRAVEL =	0.5	D_{85} = 0.3	D_{15} =
% SAND =	75.0	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	24.5	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-7 @ 0-0.6m

Liquid Limit: NV

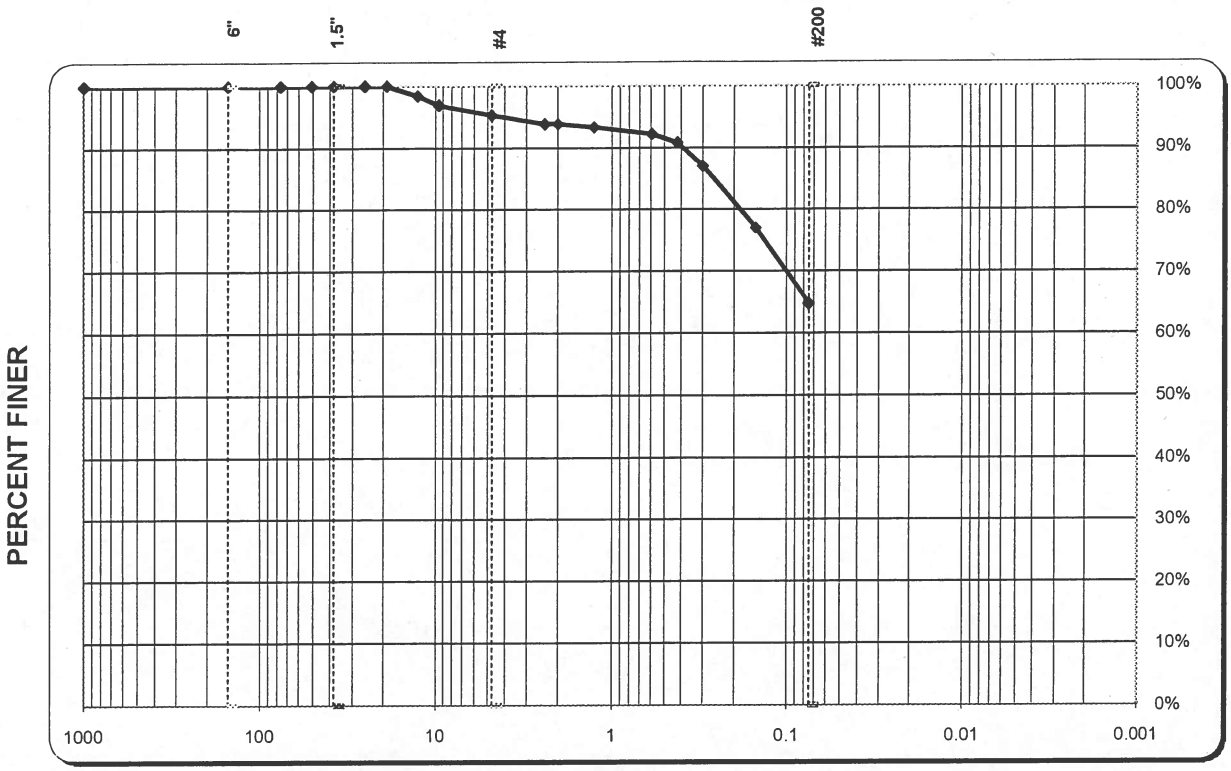
Plasticity Index: NP

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	97	95	94	91	77	64.8
Specification								

% GRAVEL =	4.7	D_{85} = 0.3	D_{15} =
% SAND =	30.5	D_{60} =	D_{10} =
% SILT & CLAY =	64.8	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-8 @ 0-1.2m

Liquid Limit: 37

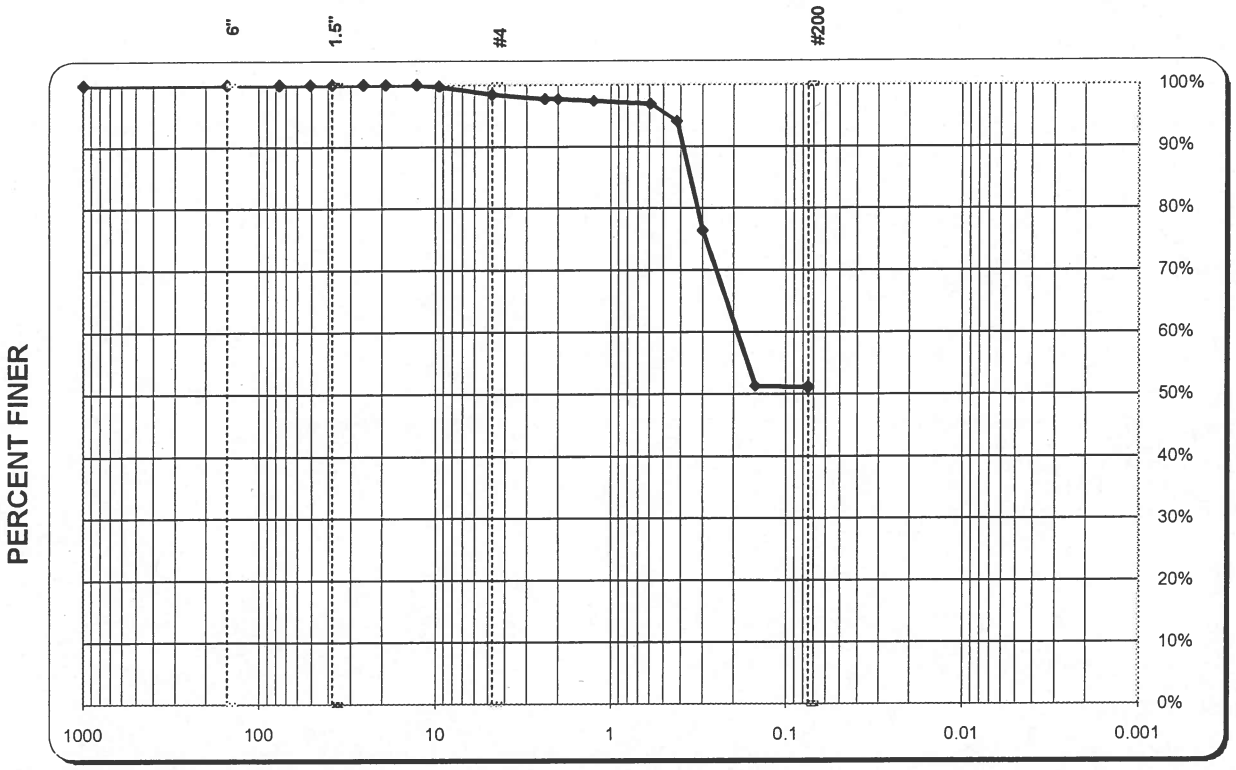
Plasticity Index: 23

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	98	98	94	51	51.1
Specification								

% GRAVEL =	1.6	D_{85} = 0.4	D_{15} =
% SAND =	47.3	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	51.1	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-9 @ 0-0.6m

Liquid Limit: 39

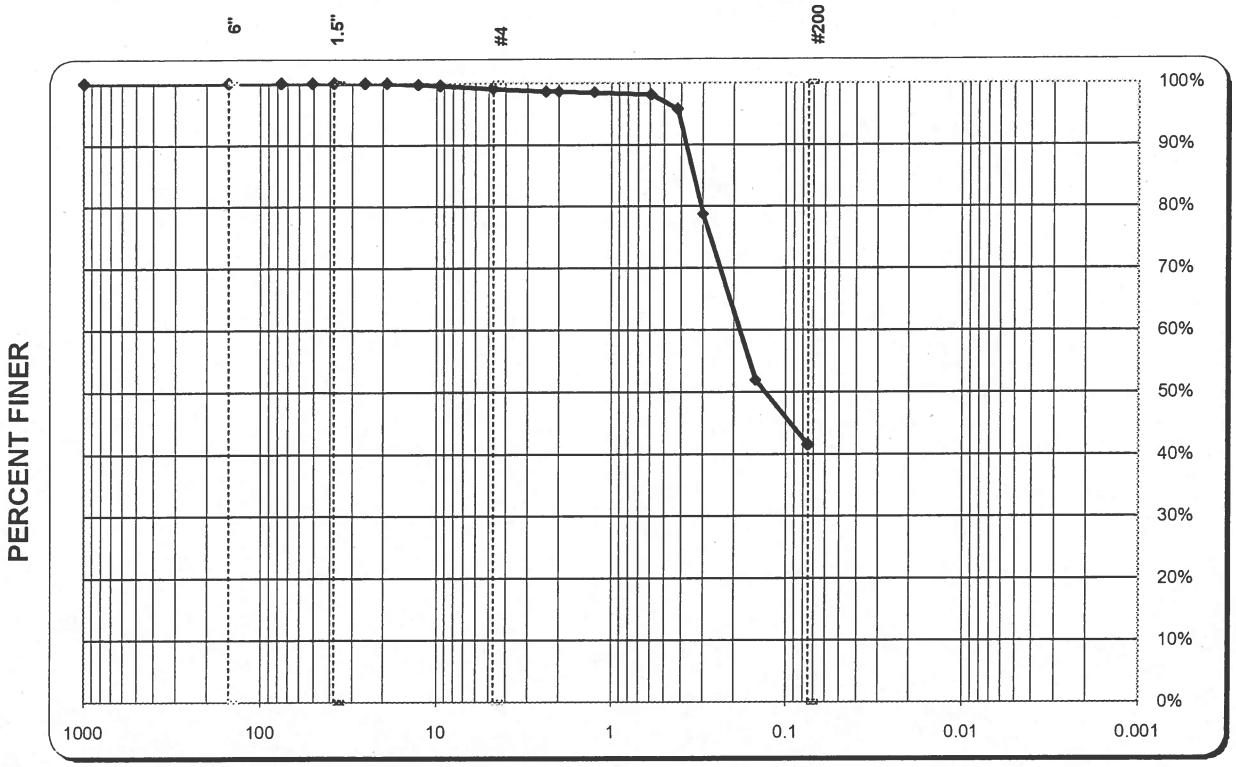
Plasticity Index: 21

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	100	99	99	96	52	41.5
Specification								

% GRAVEL =	0.9	D_{85} = 0.3	D_{15} =
% SAND =	57.6	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	41.5	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-10 @ 0-0.5m

Liquid Limit: 35

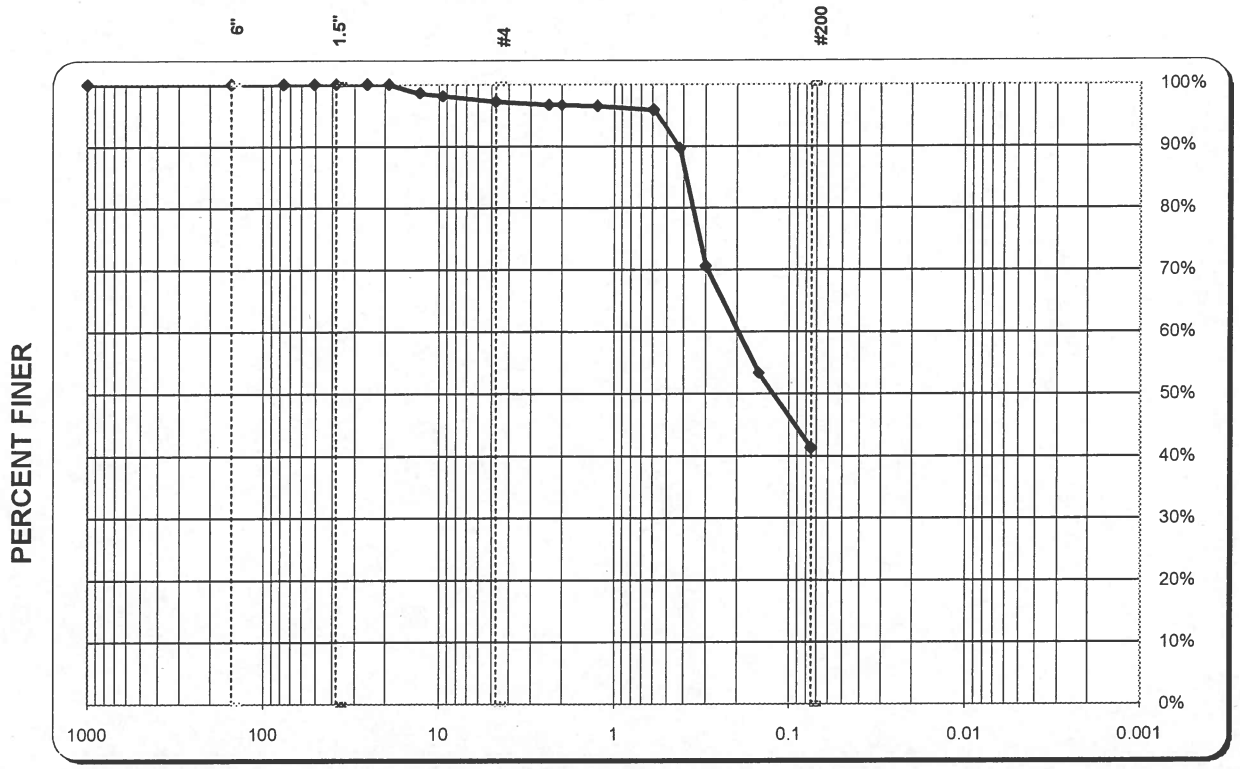
Plasticity Index: 17

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	98	97	97	90	53	41.3
Specification								

% GRAVEL =	2.8	D_{85} = 0.4	D_{15} =
% SAND =	55.9	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	41.3	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-11 @ 0-1.2m

Liquid Limit: 37

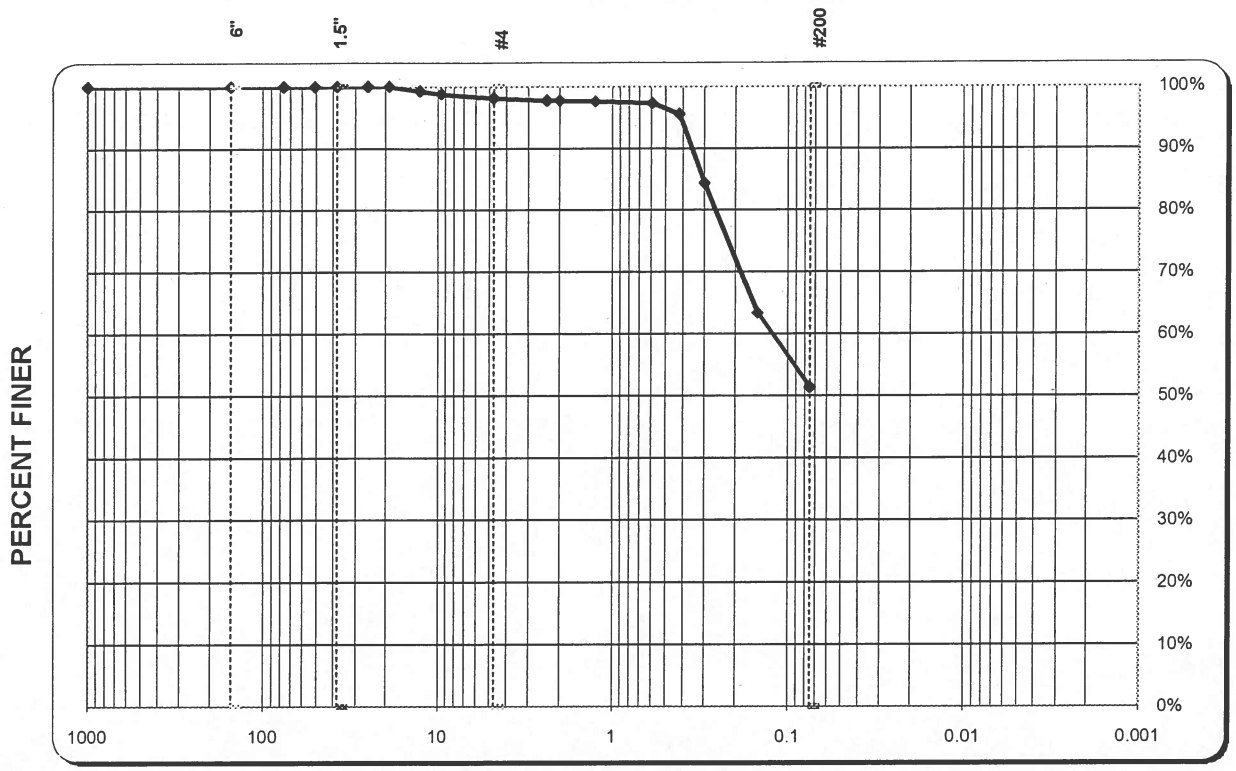
Plasticity Index: 20

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	99	98	98	96	63	51.4
Specification								

% GRAVEL =	1.9	D_{85} = 0.3	D_{15} =
% SAND =	46.8	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	51.4	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-12 @ 0-0.3m

Liquid Limit: 52

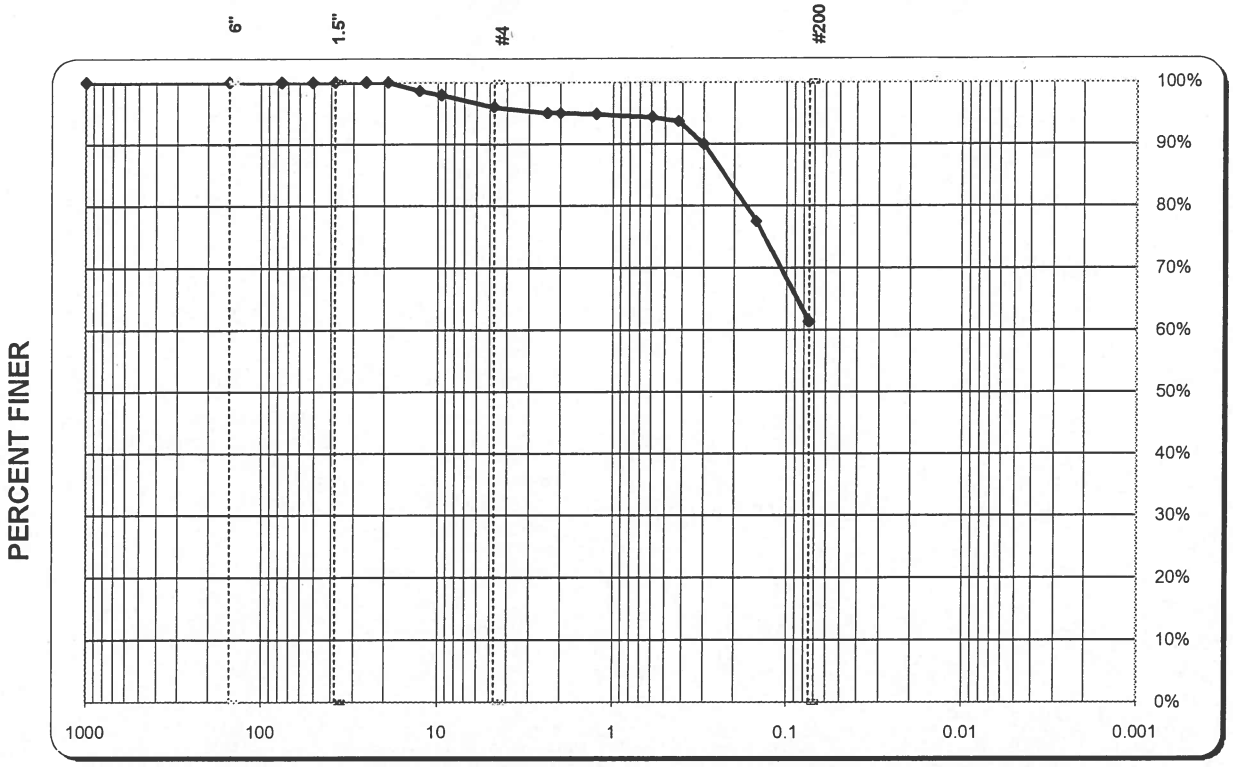
Plasticity Index: 23

USCS Classification: MH

Material Description: Sandy Elastic Silt

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	98	96	95	94	78	61.4
Specification								

% GRAVEL =	4.0	D_{85} = 0.2	D_{15} =
% SAND =	34.6	D_{60} =	D_{10} =
% SILT & CLAY =	61.4	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-13 @ 0-0.9m

Liquid Limit: 42

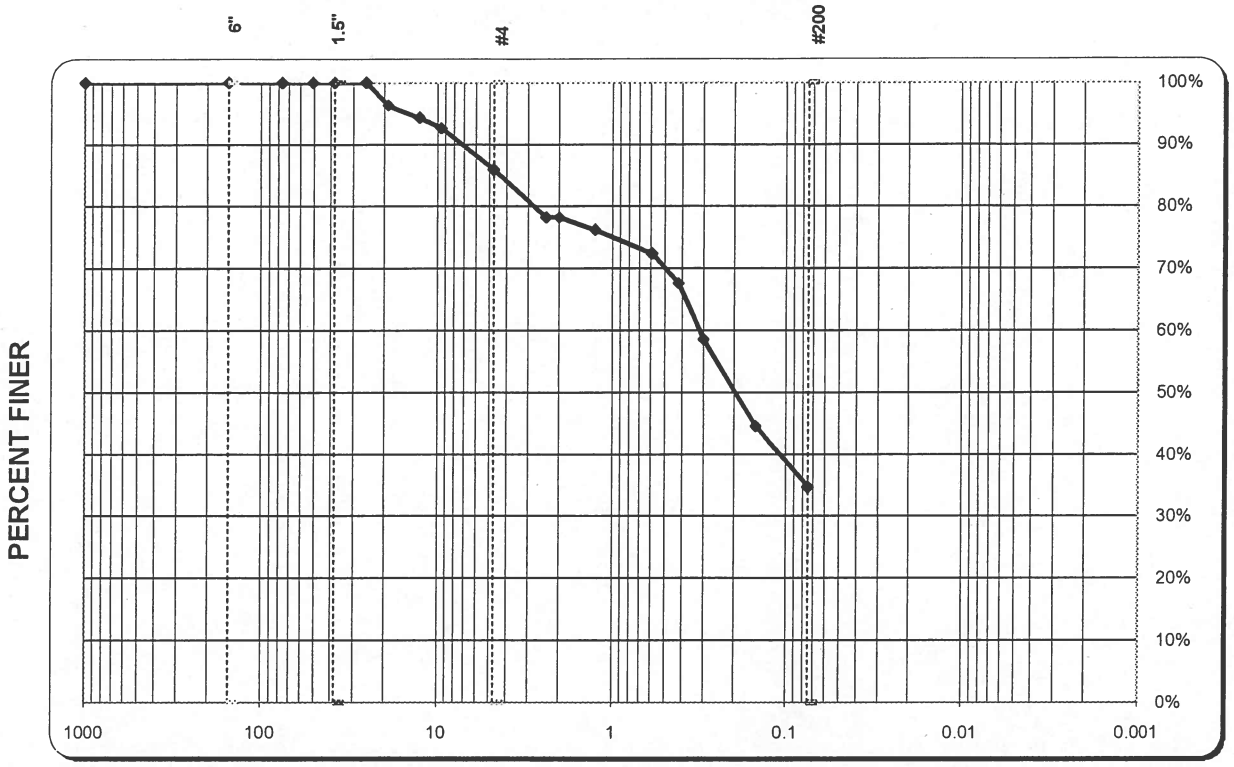
Plasticity Index: 27

USCS Classification: Sandy Lean Clay

Material Description: CL

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	96	93	86	78	68	45	34.7
Specification								

% GRAVEL =	14.0	D_{85} = 4.3	D_{15} =
% SAND =	51.2	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	34.7	D_{50} = 0.2	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-14 @ 0-1.2m

Liquid Limit: 30

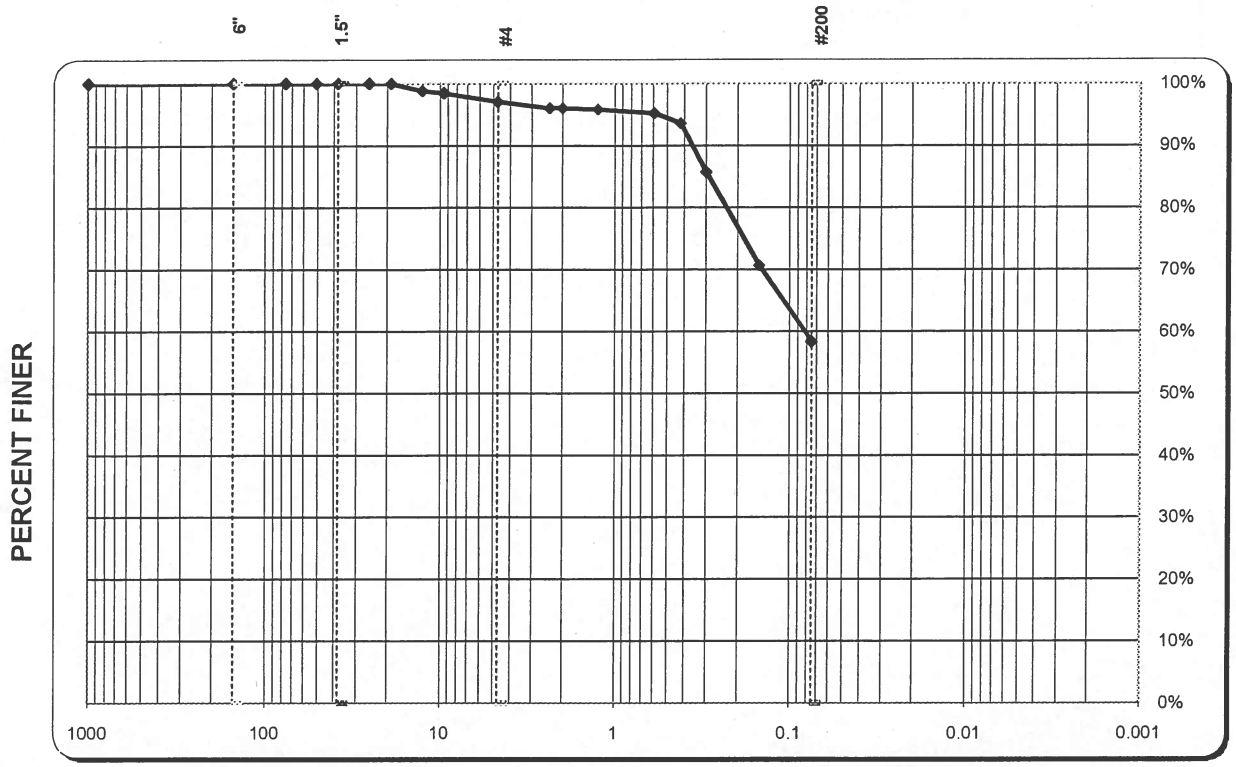
Plasticity Index: 17

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	98	97	96	94	71	58.4
Specification								

% GRAVEL =	2.9	D_{85} = 0.3	D_{15} =
% SAND =	38.7	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	58.4	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-15 @ 0-1.2m

Liquid Limit: 30

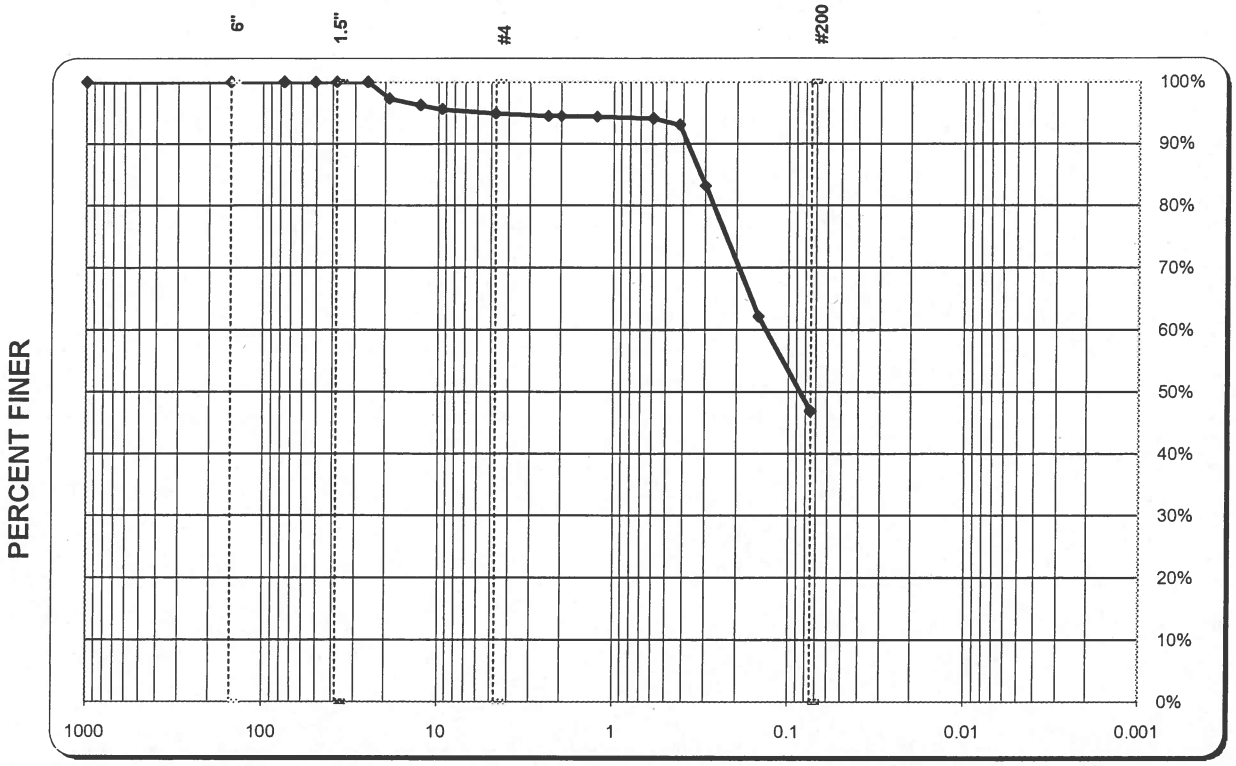
Plasticity Index: 17

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	97	96	95	94	93	62	46.9
Specification								

% GRAVEL =	5.1	D_{85} = 0.3	D_{15} =
% SAND =	48.0	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	46.9	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-16 @ 0-0.2m

Liquid Limit: 39

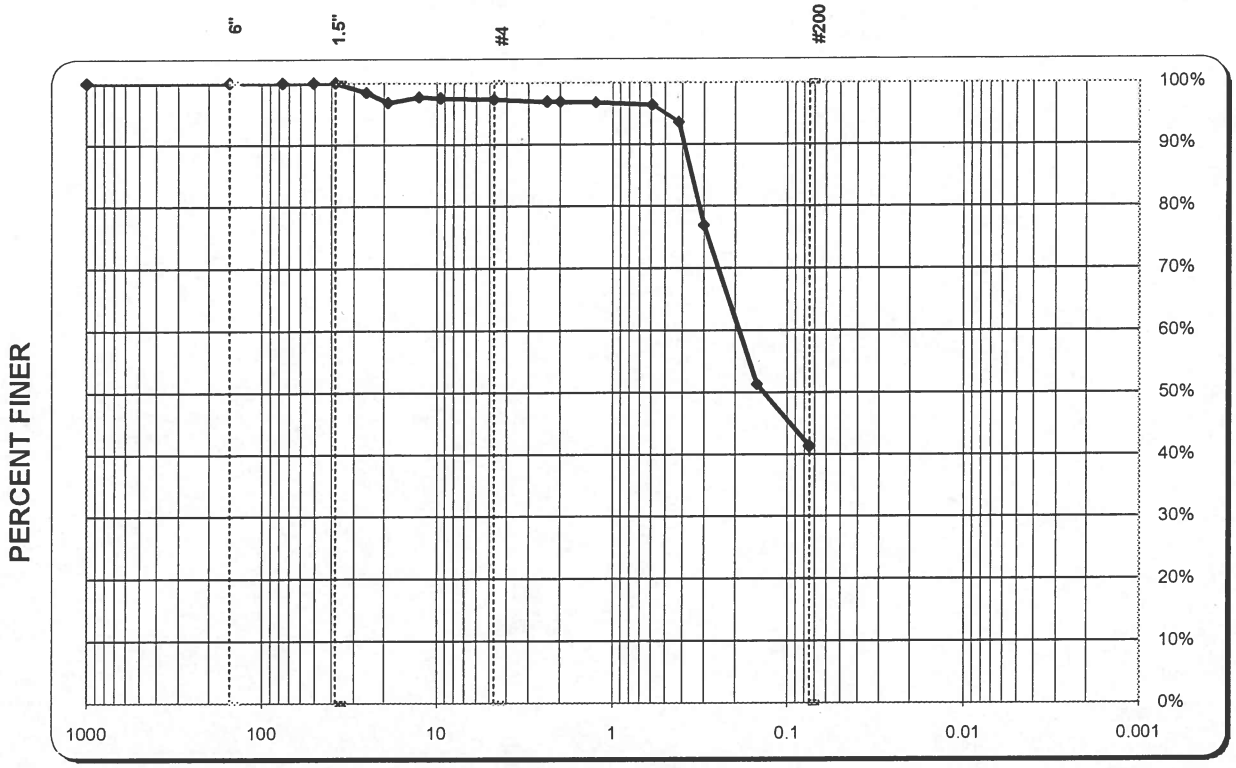
Plasticity Index: 19

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	97	98	97	97	94	51	41.3
Specification								

% GRAVEL =	2.7	D_{85} = 0.4	D_{15} =
% SAND =	55.9	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	41.3	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-17 @ 0-1.2m

Liquid Limit: 39

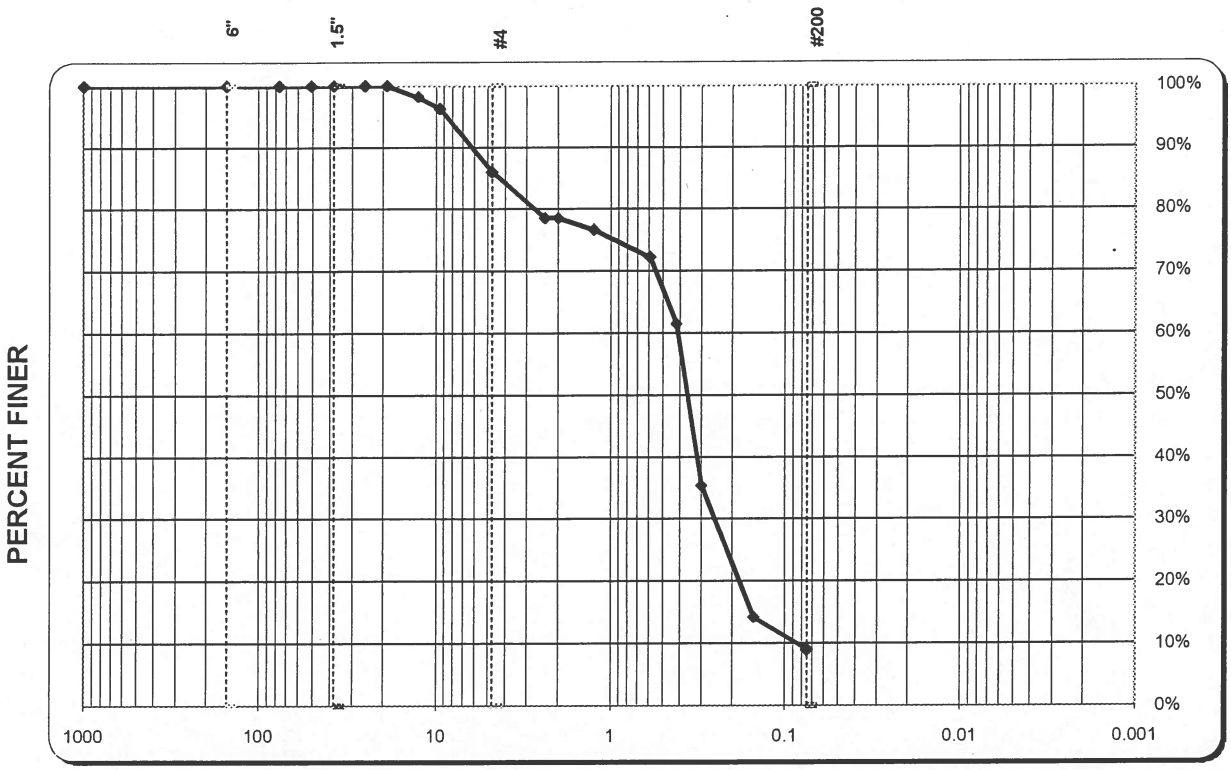
Plasticity Index: 19

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	96	86	79	62	14	9.0
Specification								

% GRAVEL =	14.0	D_{85} = 4.2	D_{15} = 0.2
% SAND =	77.1	D_{60} = 0.4	D_{10} = 0.1
% SILT & CLAY =	9.0	D_{50} = 0.4	C_U = 4.8
		D_{30} = 0.3	C_C = 1.8

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-18 @ 0.2-1.2m

Liquid Limit: NV

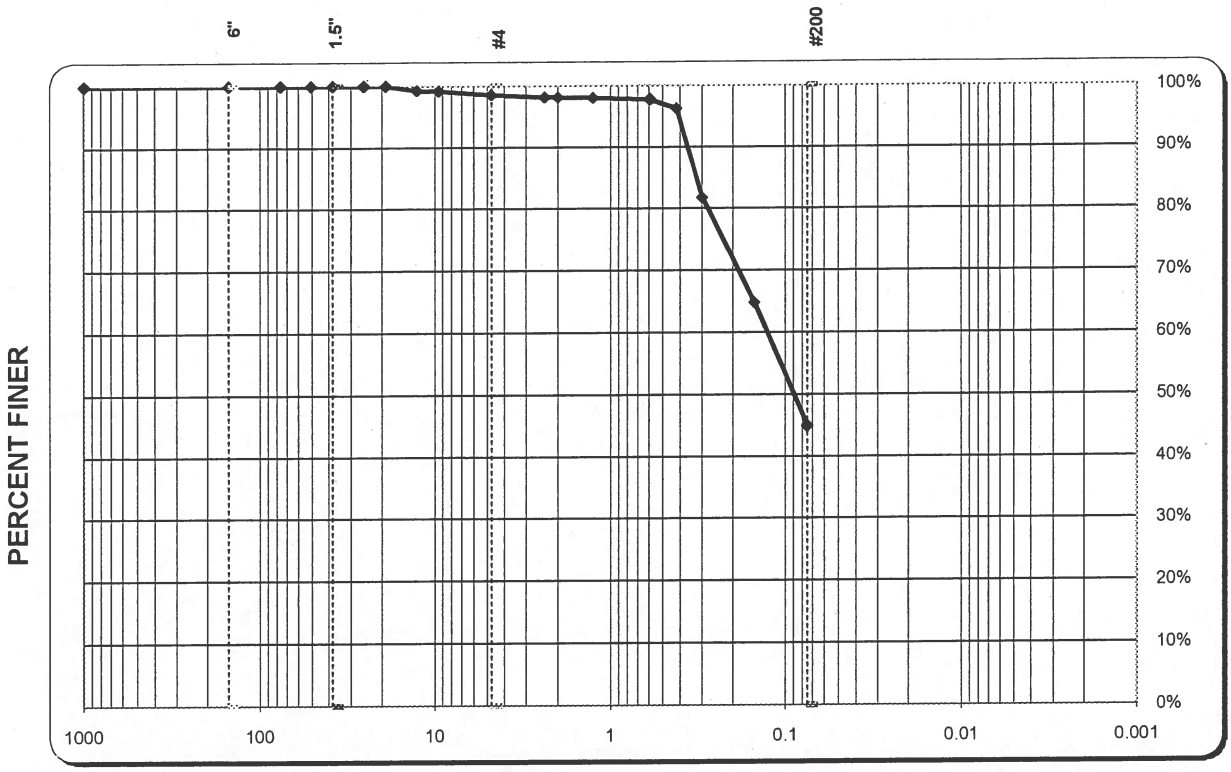
Plasticity Index: NP

USCS Classification: SP-SC

Material Description: Poorly Graded Sand with 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	99	99	98	96	65	45.0
Specification								

% GRAVEL =	1.5	D_{85} = 0.3	D_{15} =
% SAND =	53.6	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	45.0	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-19 @ 0-1.2m

Liquid Limit: 45

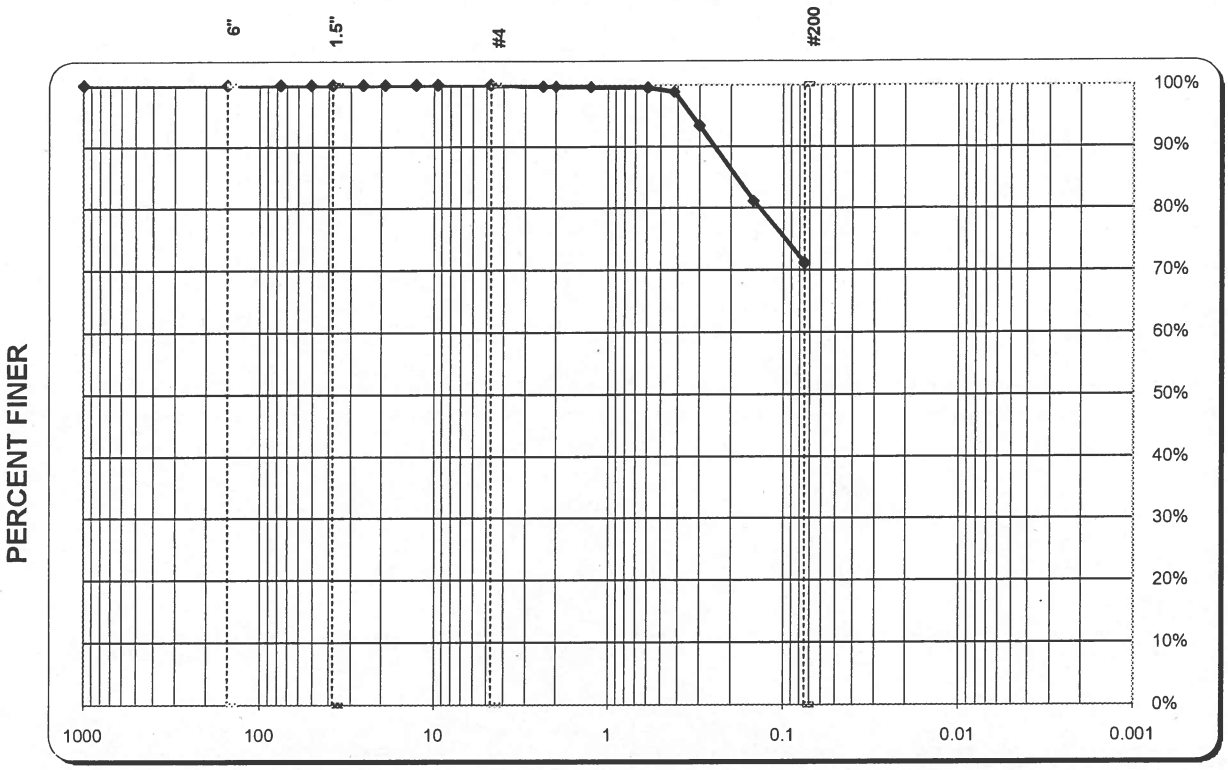
Plasticity Index: 28

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	100	99	81	71.2
Specification								

% GRAVEL =	0.0	D_{85} = 0.2	D_{15} =
% SAND =	28.8	D_{60} =	D_{10} =
% SILT & CLAY =	71.2	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-20 @ 0-0.3m

Liquid Limit: 53

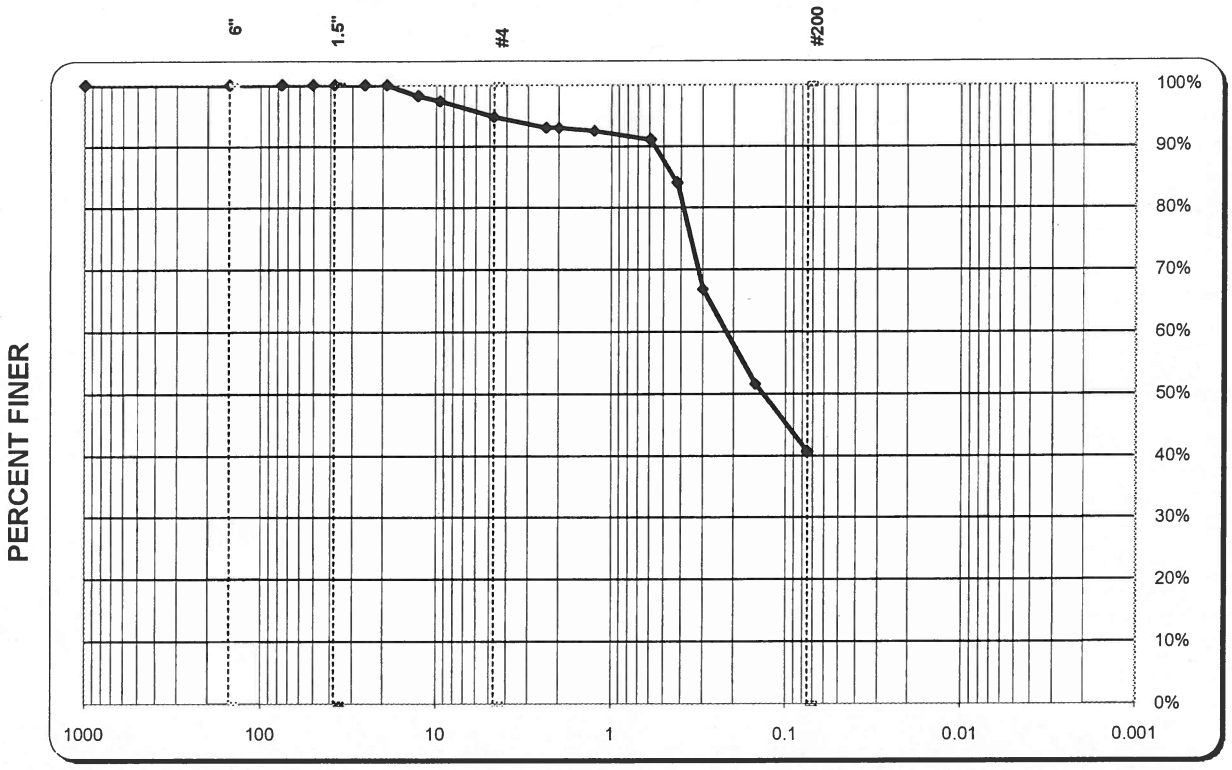
Plasticity Index: 30

USCS Classification: CH

Material Description: Fat 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	100	97	95	93	84	52	40.7
Specification								

% GRAVEL =	5.2	D_{85} = 0.4	D_{15} =
% SAND =	54.1	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	40.7	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-21 @ 0-1.2m

Liquid Limit: 28

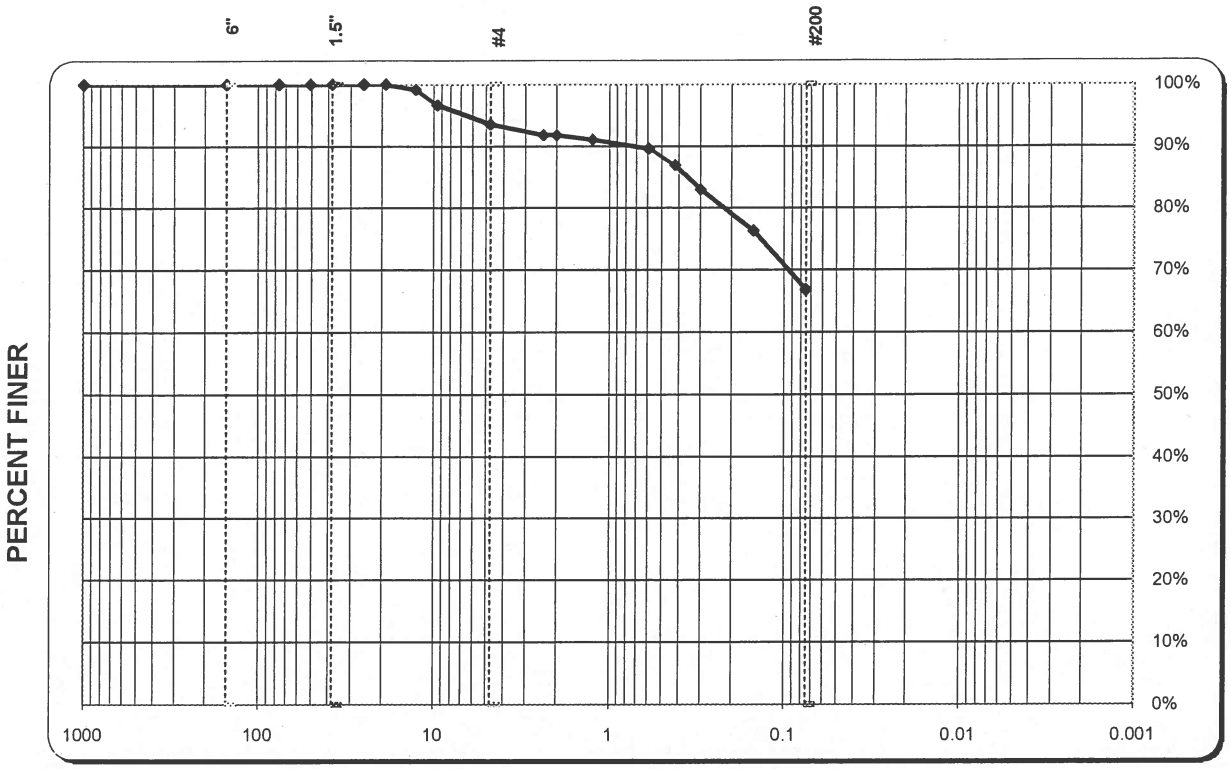
Plasticity Index: 19

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	97	94	92	87	76	66.8
Specification								

% GRAVEL =	6.5	D_{85} = 0.4	D_{15} =
% SAND =	26.7	D_{60} =	D_{10} =
% SILT & CLAY =	66.8	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-22 @ 0-1.2m

Liquid Limit: 38

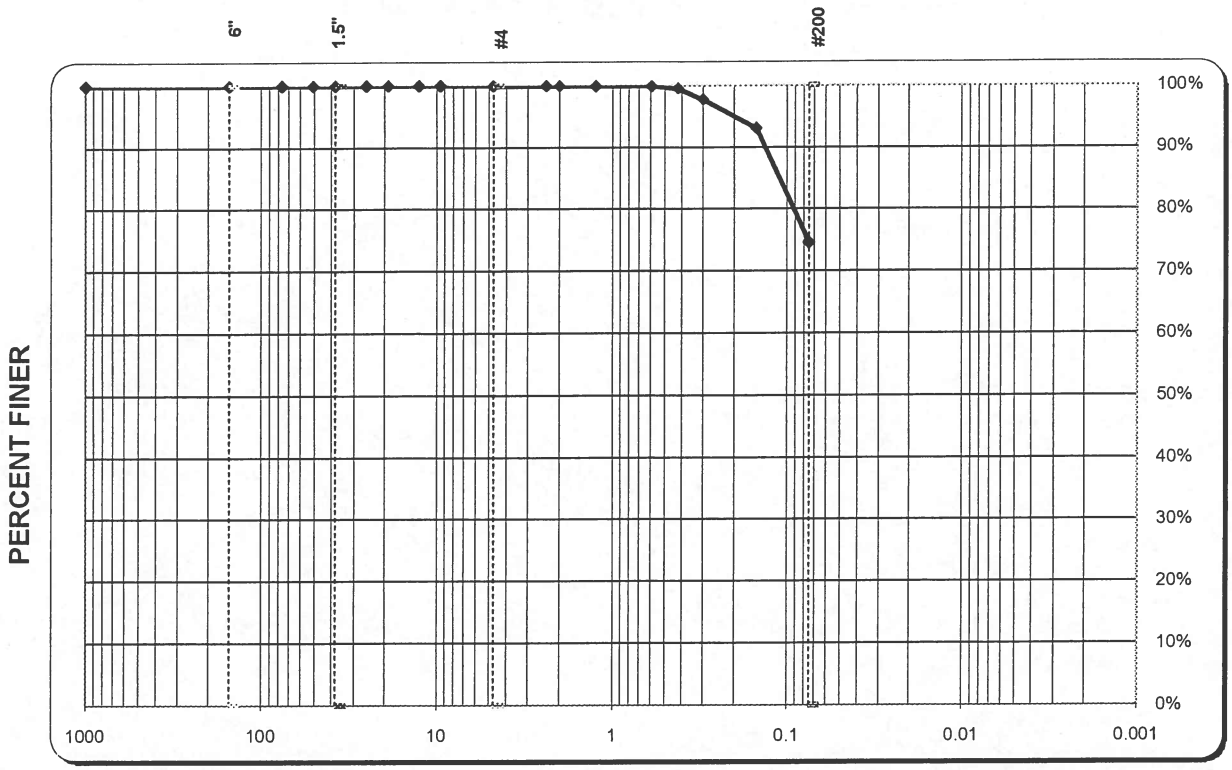
Plasticity Index: 25

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	100	100	100	100	99	93	74.6
Specification								

% GRAVEL =	0.1	D_{85} = 0.1	D_{15} =
% SAND =	25.4	D_{60} =	D_{10} =
% SILT & CLAY =	74.6	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-23 @ 0-1.2m

Liquid Limit: 33

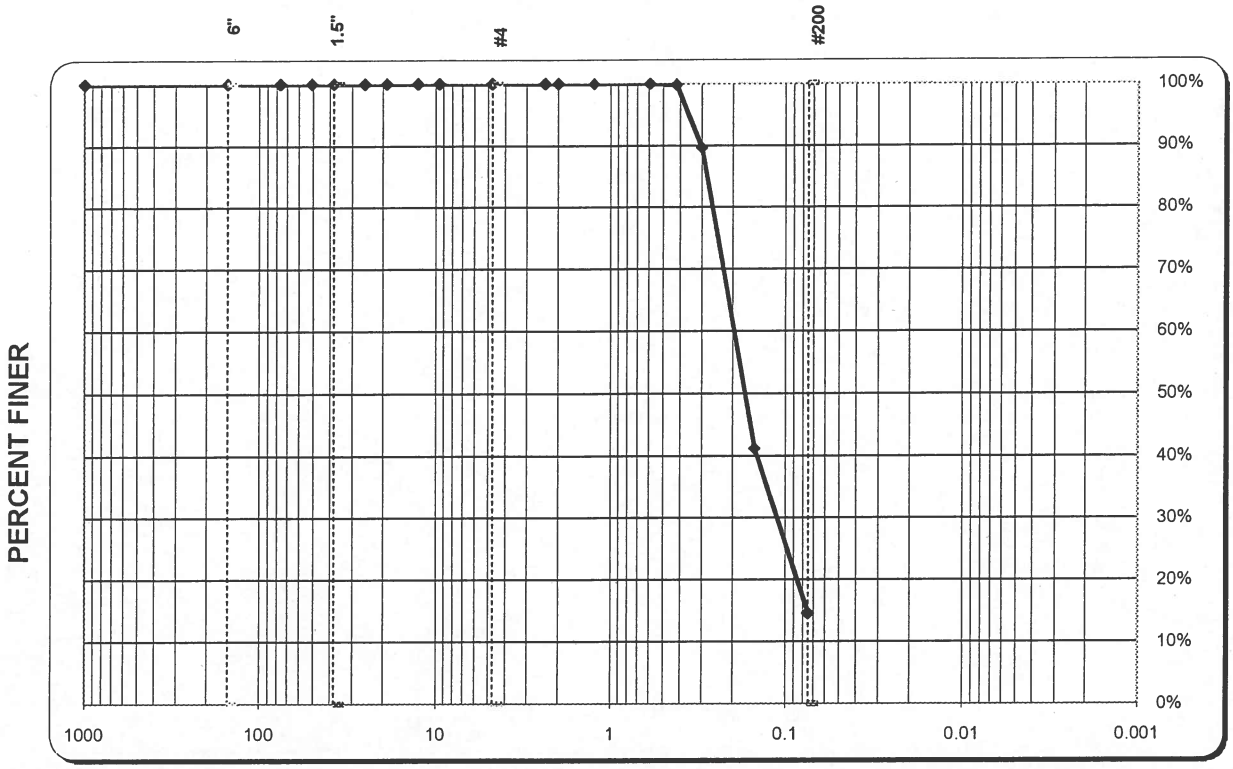
Plasticity Index: 21

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	100	100	100	100	100	41	14.5
Specification								

% GRAVEL =	0.0	D_{85} = 0.3	D_{15} = 0.1
% SAND =	85.5	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	14.5	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-24 @ 0-1.2m

Liquid Limit: NV

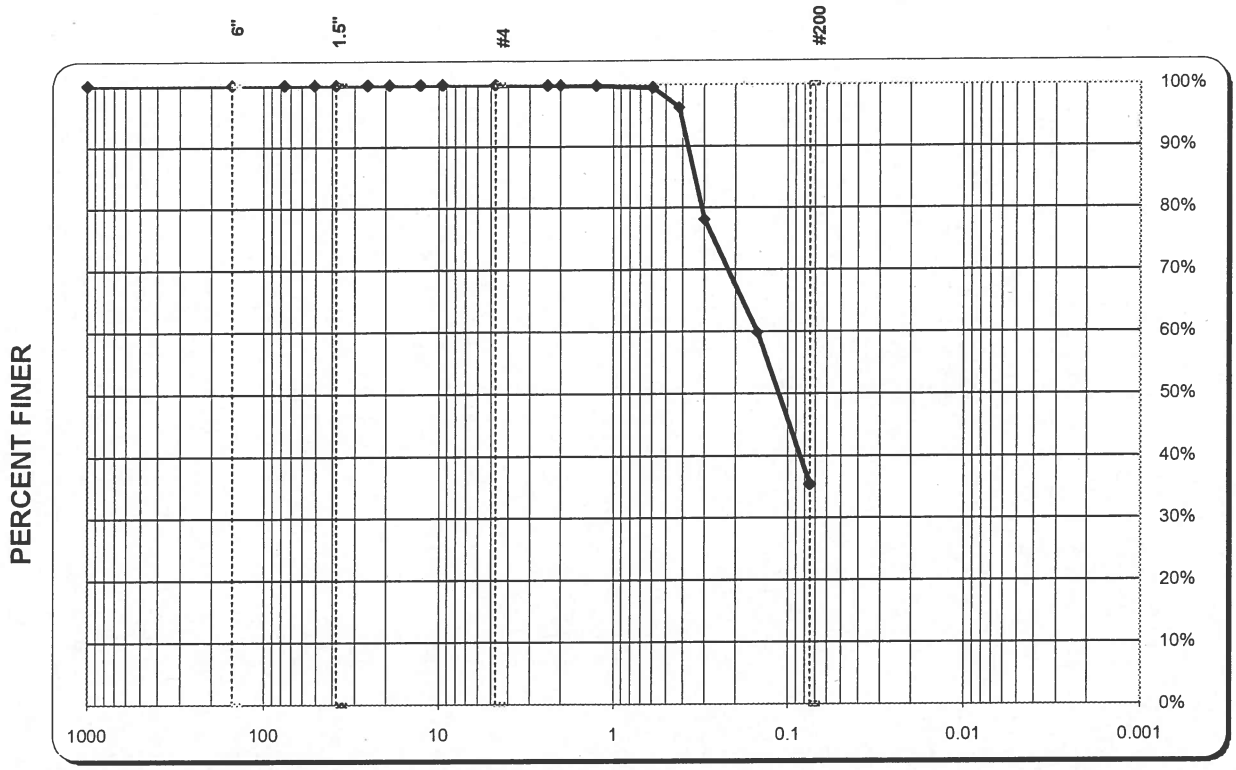
Plasticity Index: NP

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	96	60	35.4
Specification								

% GRAVEL =	0.0	D_{85} = 0.3	D_{15} =
% SAND =	64.5	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	35.4	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-25 @ 0-1.2m

Liquid Limit: 19

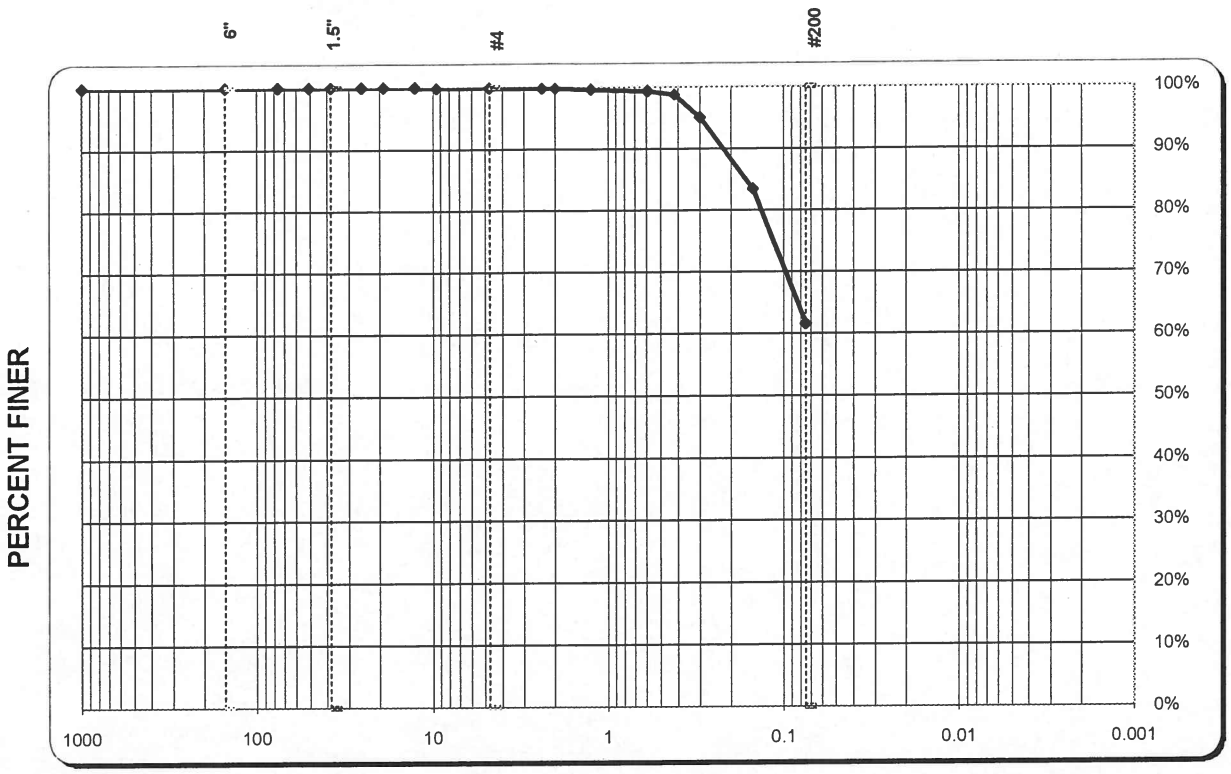
Plasticity Index: 5

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	100	99	83	61.6
Specification								

% GRAVEL =	0.2	D_{85} = 0.2	D_{15} =
% SAND =	38.3	D_{60} =	D_{10} =
% SILT & CLAY =	61.6	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-26 @ 0-1.2m

Liquid Limit: 24

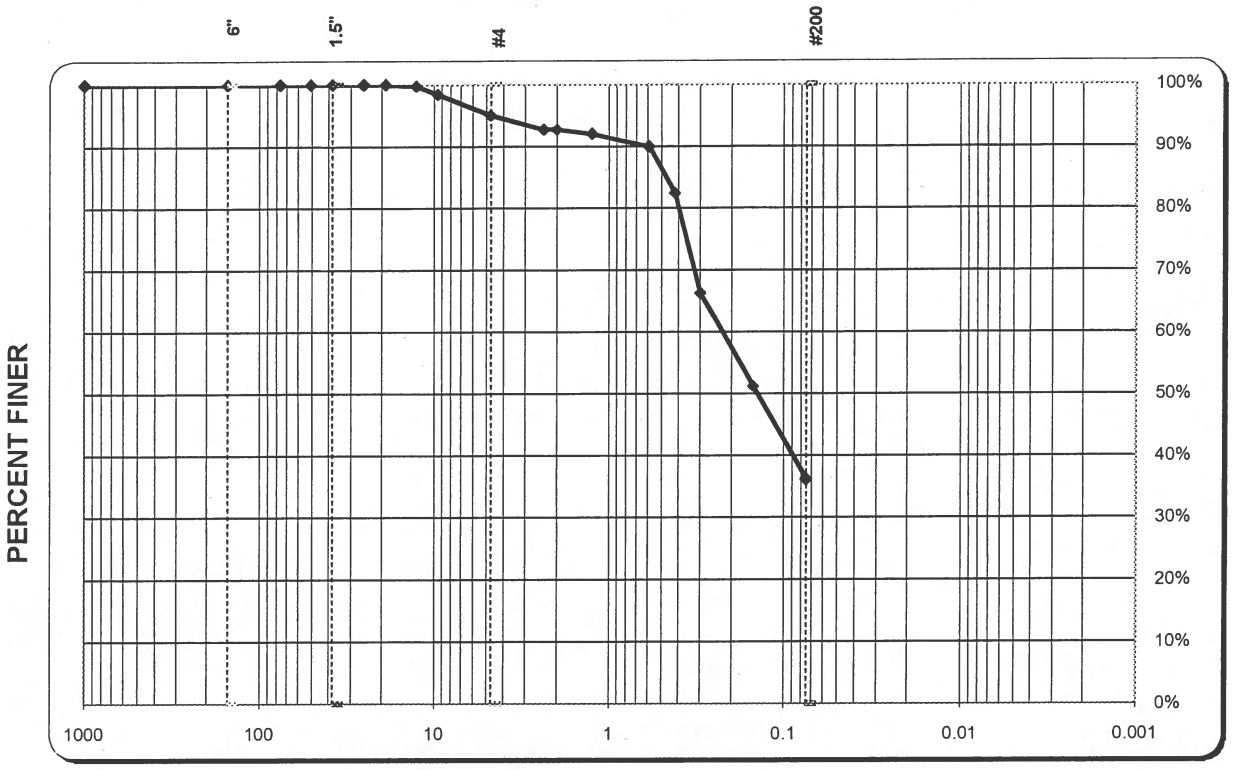
Plasticity Index: 12

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	98	95	93	82	51	36.2
Specification								

% GRAVEL =	5.0	D_{85} = 0.5	D_{15} =
% SAND =	58.8	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	36.2	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-27 @ 0-0.9m

Liquid Limit: 28

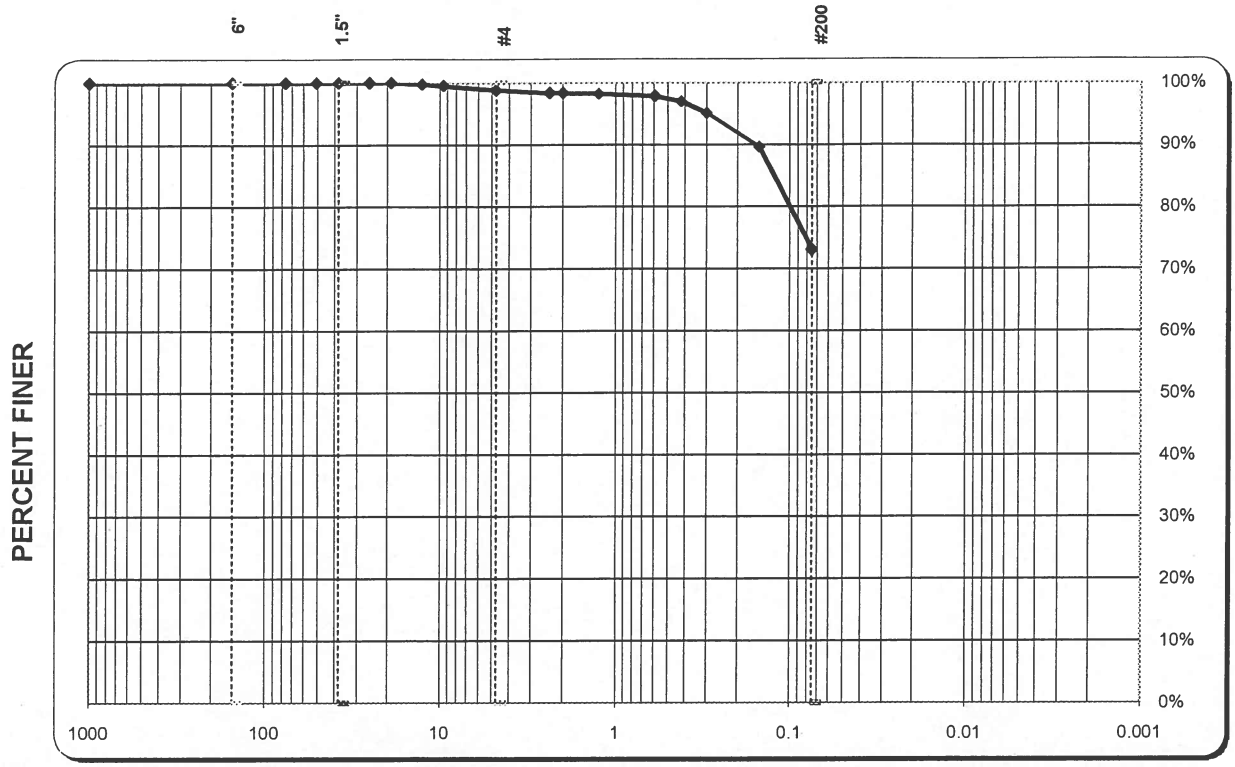
Plasticity Index: 16

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	97	90	73.1
Specification								

% GRAVEL =	1.2	D_{85} = 0.1	D_{15} =
% SAND =	25.7	D_{60} =	D_{10} =
% SILT & CLAY =	73.1	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-28 @ 0-0.2m

Liquid Limit: 42

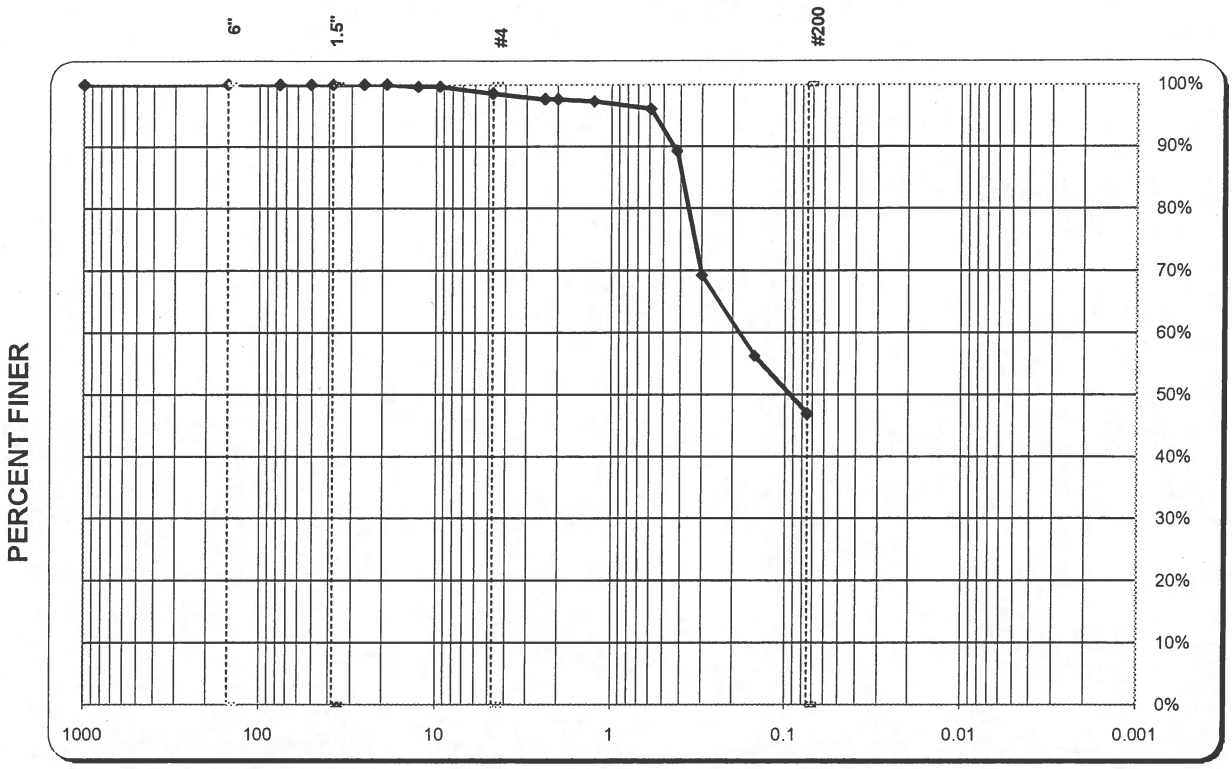
Plasticity Index: 26

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	100	100	99	98	89	56	47.0
Specification								

% GRAVEL =	1.5	D_{85} = 0.4	D_{15} =
% SAND =	51.6	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	47.0	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-29 @ 0-0.2m

Liquid Limit: 30

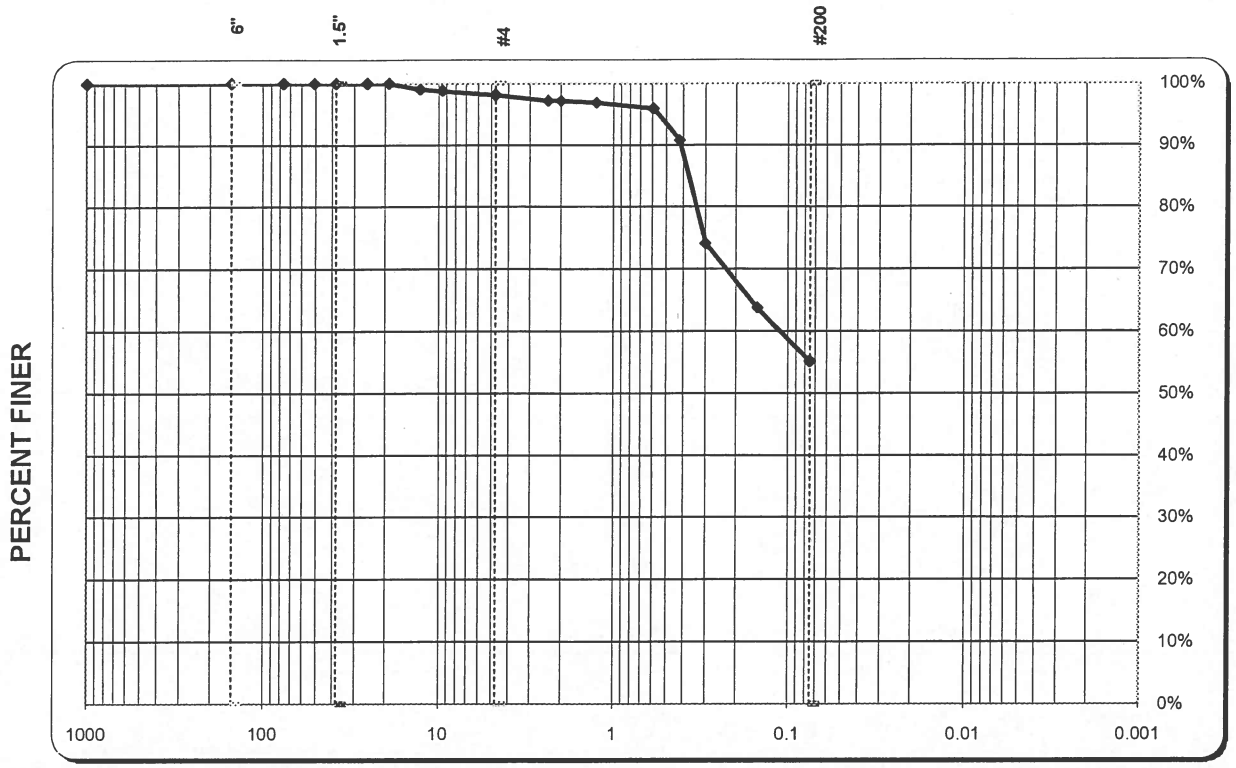
Plasticity Index: 19

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	99	98	97	91	64	55.1
Specification								

% GRAVEL =	1.9	D_{85} = 0.4	D_{15} =
% SAND =	43.0	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	55.1	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-30 @ 0-0.9m

Liquid Limit: 33

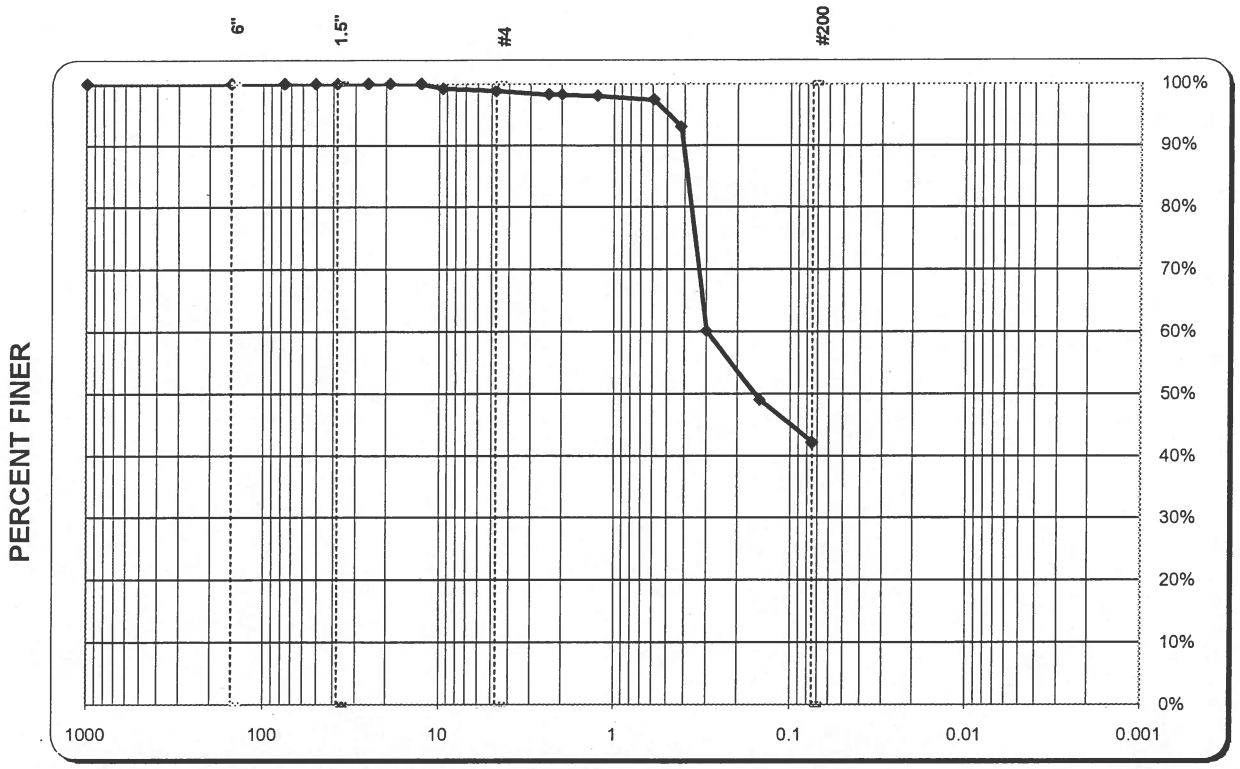
Plasticity Index: 22

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	99	99	98	93	49	42.2
Specification								

% GRAVEL =	1.2	D_{85} = 0.4	D_{15} =
% SAND =	56.6	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	42.2	D_{50} = 0.2	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-31 @ 0-0.9m

Liquid Limit: 42

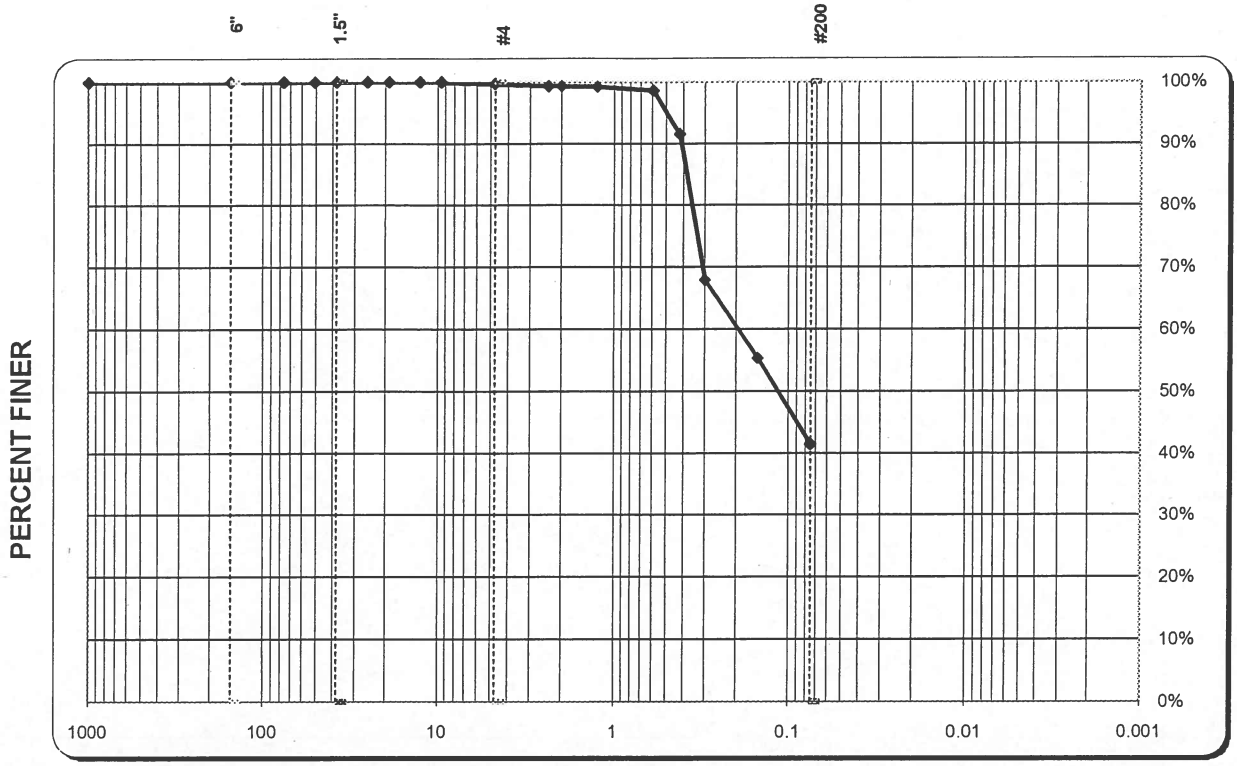
Plasticity Index: 28

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	99	92	55	41.5
Specification								

% GRAVEL =	0.3	D_{85} = 0.4	D_{15} =
% SAND =	58.2	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	41.5	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-32 @ 0-1.2m

Liquid Limit: 30

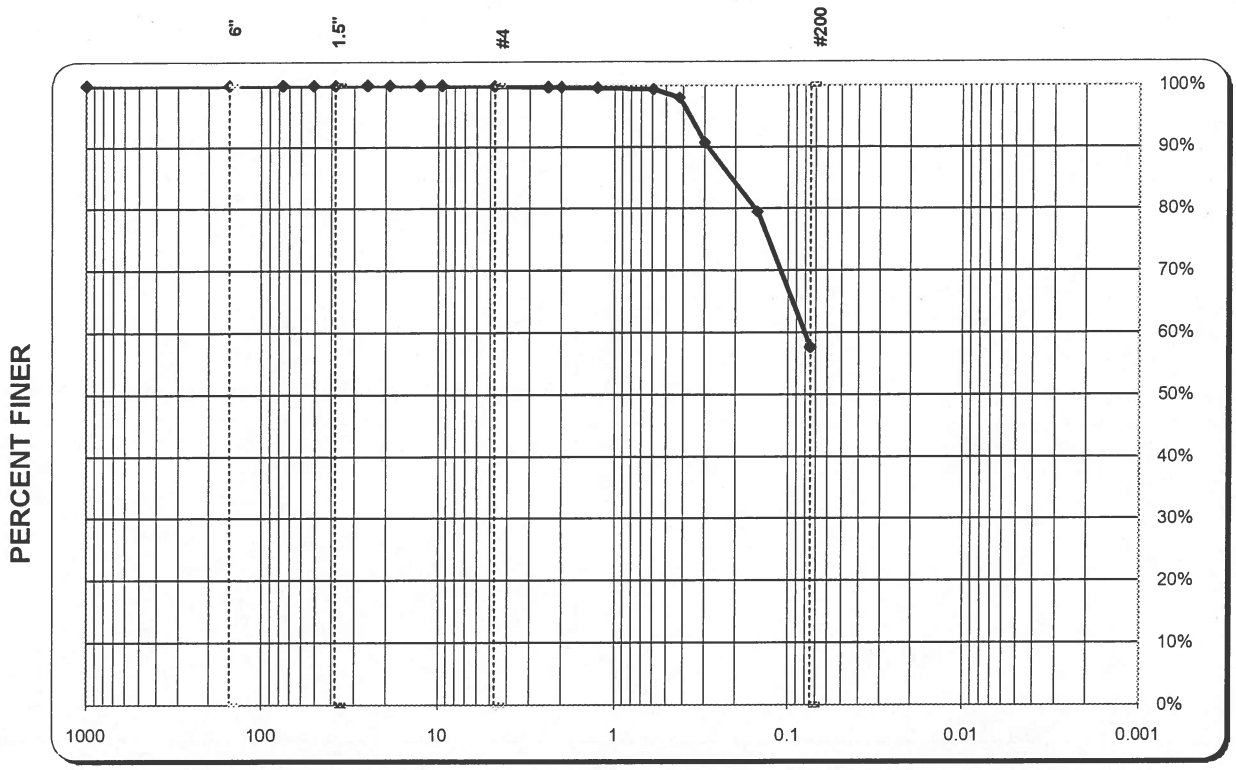
Plasticity Index: 19

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	98	79	57.7
Specification								

% GRAVEL =	0.1	D_{85} = 0.2	D_{15} =
% SAND =	42.2	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	57.7	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-33 @ 0-1.2m

Liquid Limit: 27

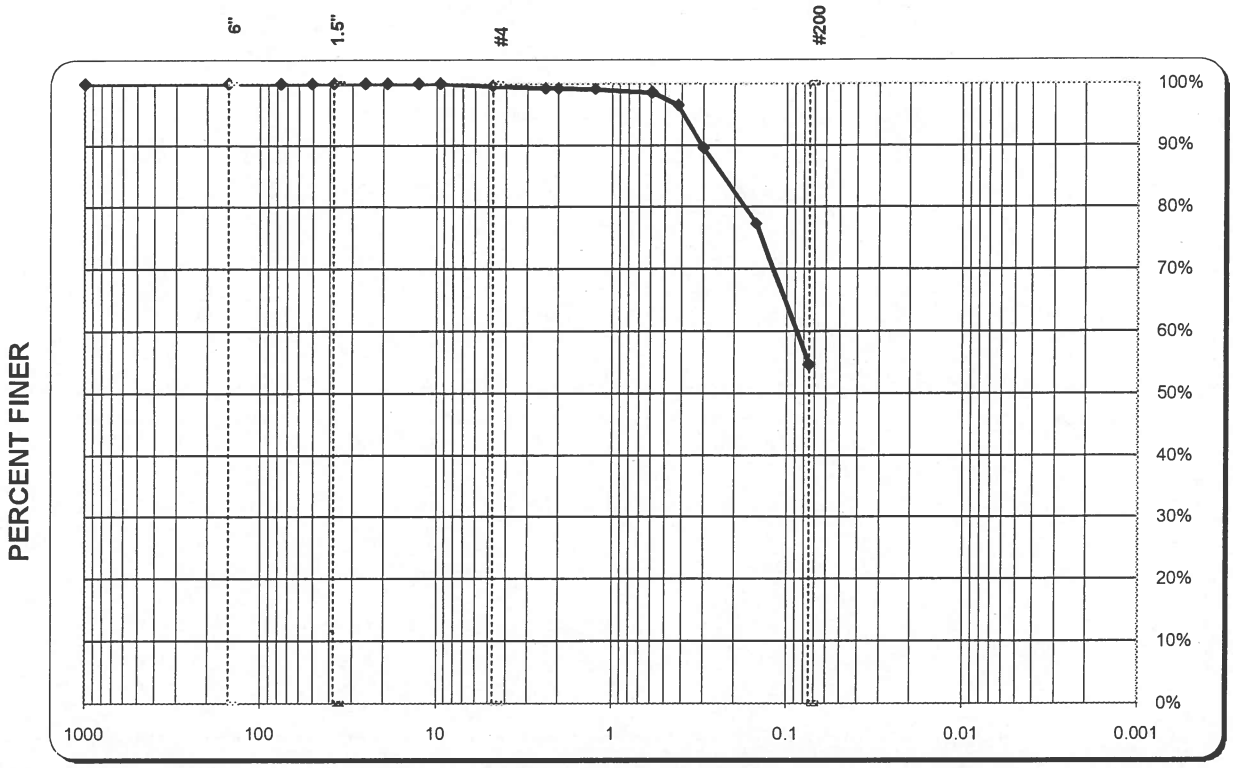
Plasticity Index: 17

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	100	99	96	77	54.7
Specification								

% GRAVEL =	0.4	D_{85} = 0.2	D_{15} =
% SAND =	44.9	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	54.7	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-34 @ 0-1.2m

Liquid Limit: 23

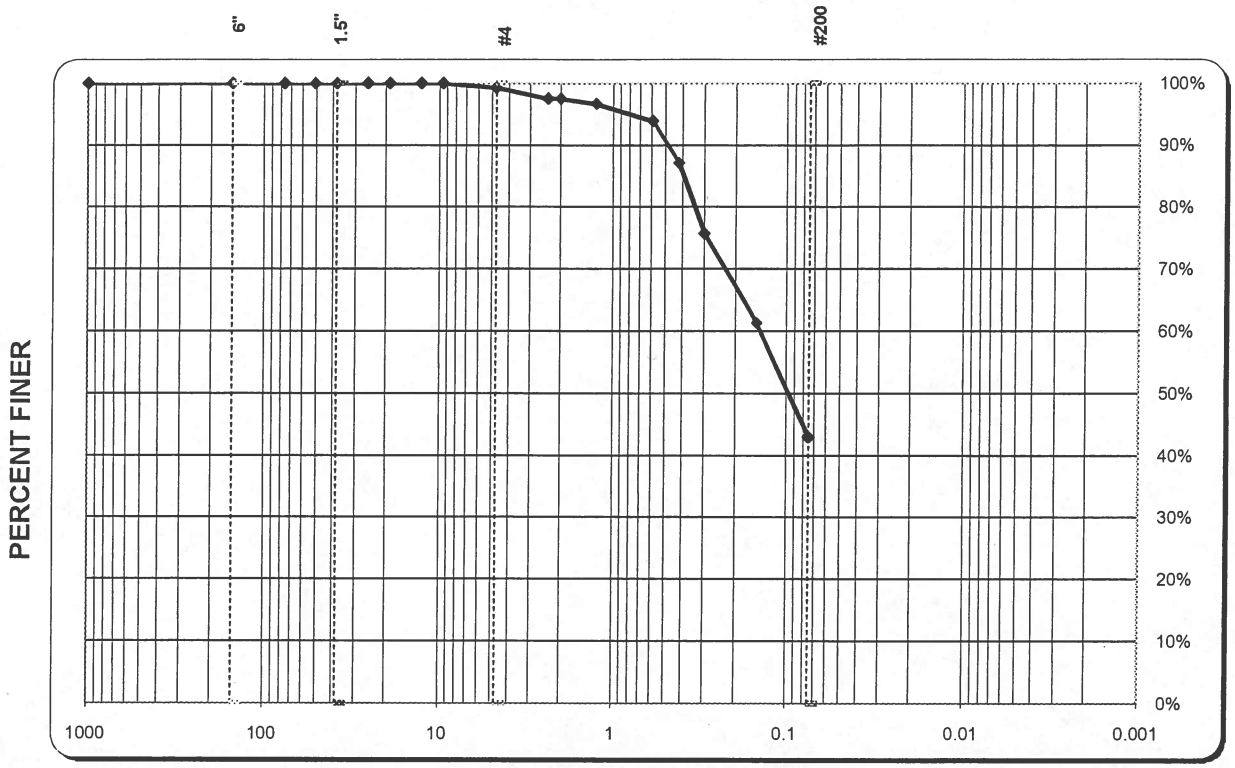
Plasticity Index: 12

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	98	87	61	43.0
Specification								

% GRAVEL =	0.7	D_{85} = 0.4	D_{15} =
% SAND =	56.2	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	43.0	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-35 @ 0-1.2m

Liquid Limit: 25

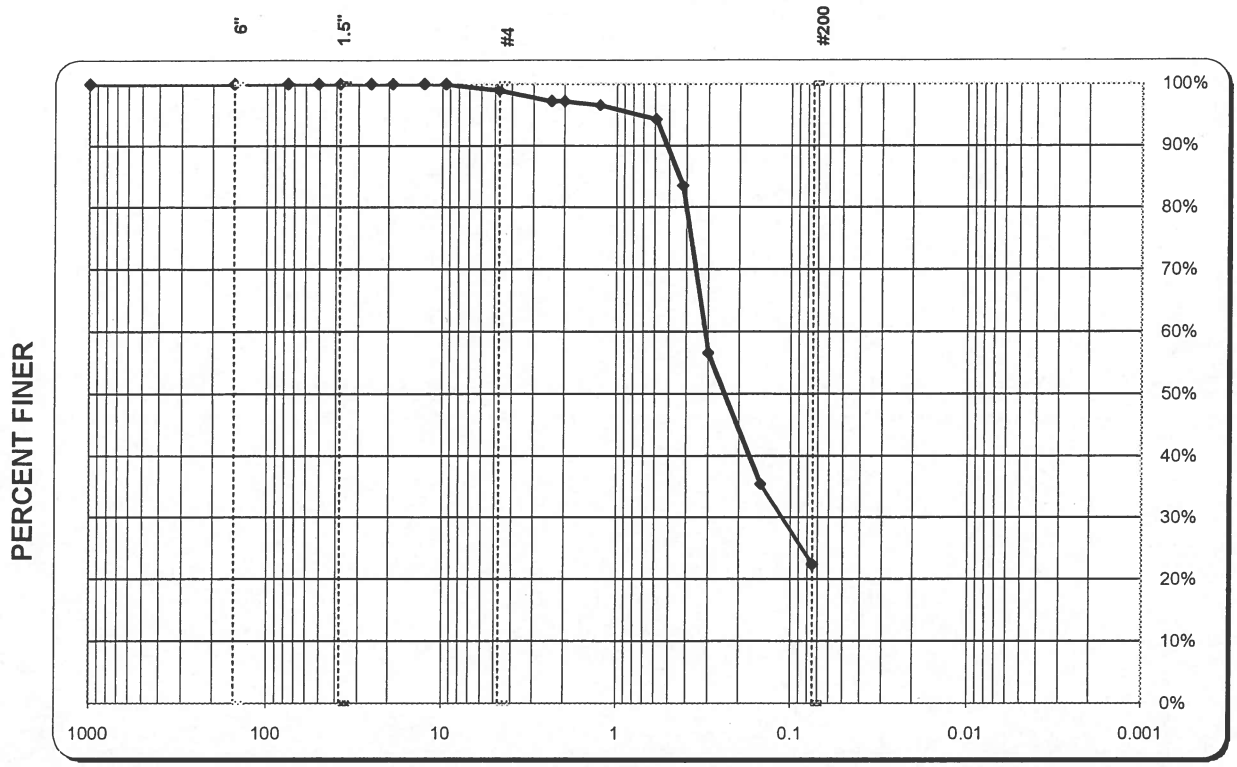
Plasticity Index: 13

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	97	84	35	22.4
Specification								

% GRAVEL =	1.0	D_{85} = 0.4	D_{15} =
% SAND =	76.6	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	22.4	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-36 @ 0-1.2m

Liquid Limit: 20

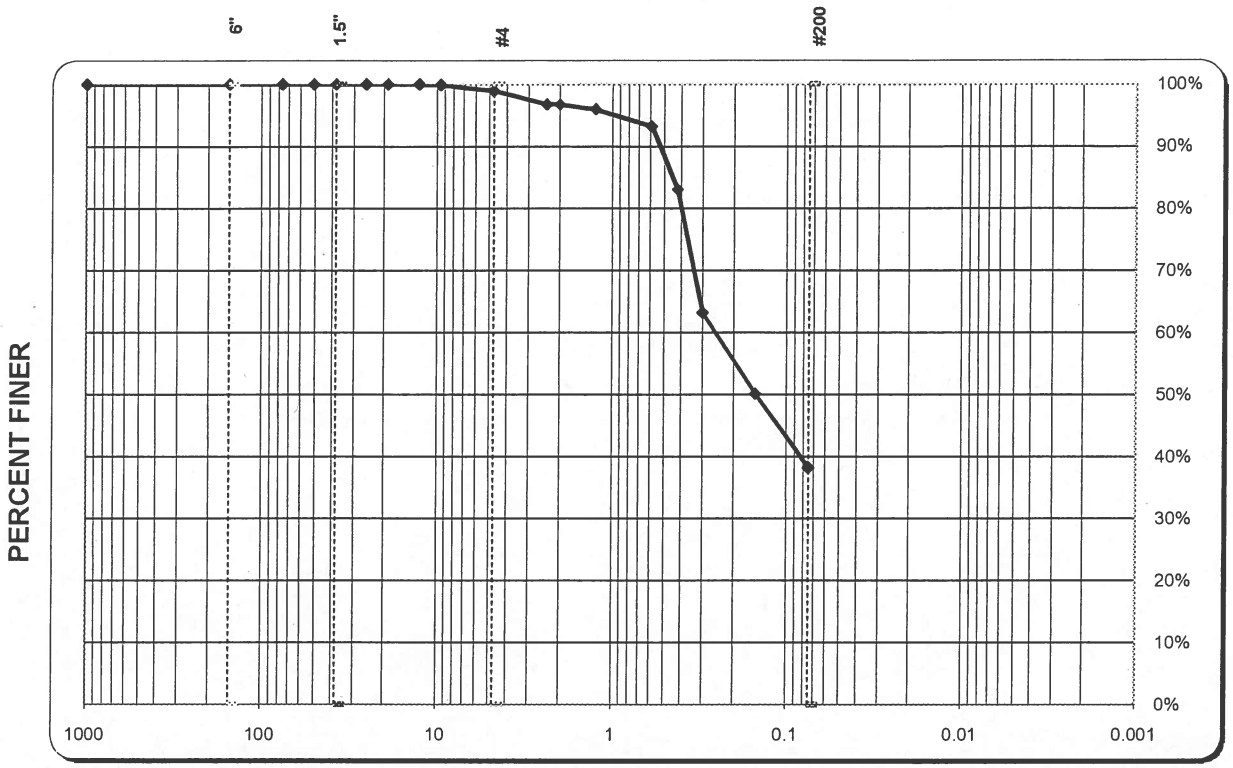
Plasticity Index: 4

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	99	97	83	50	38.2
Specification								

% GRAVEL =	1.1	D_{85} = 0.4	D_{15} =
% SAND =	60.7	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	38.2	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-37 @ 0-1.2m

Liquid Limit: 30

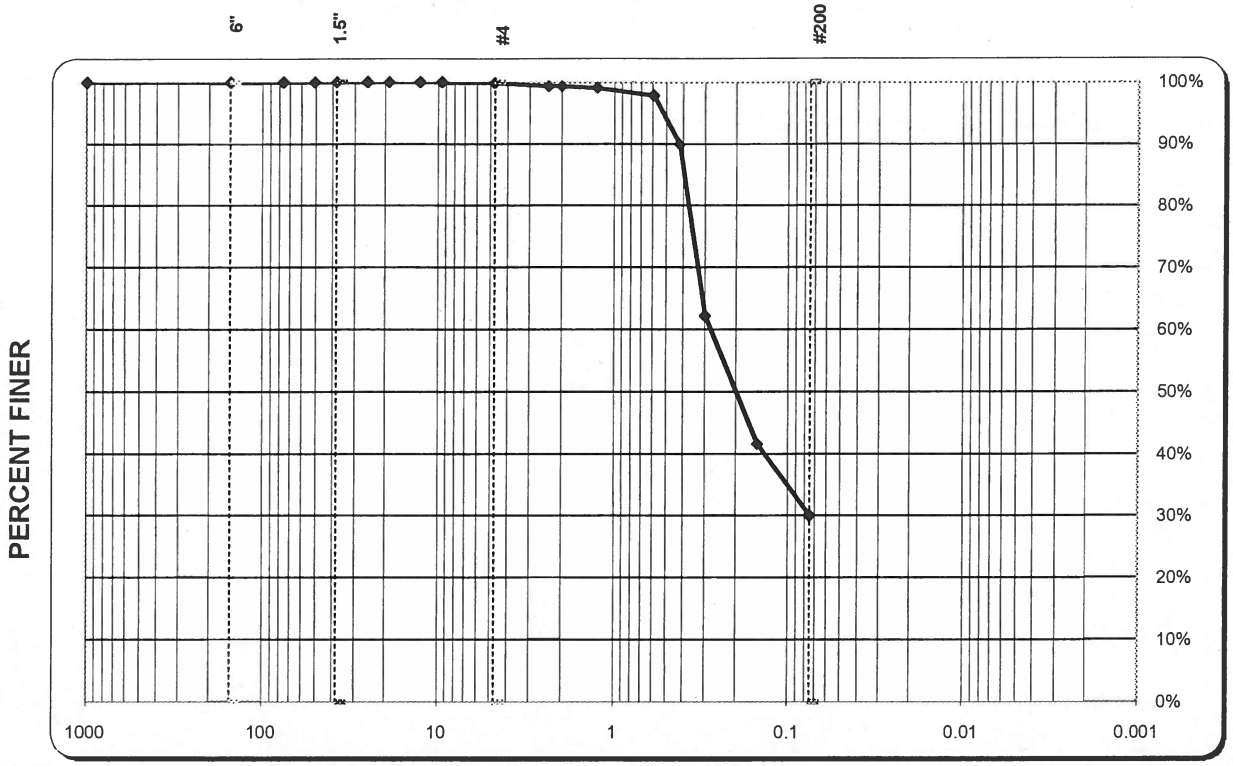
Plasticity Index: 18

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	90	42	30.1
Specification								

% GRAVEL =	0.2	D_{85} = 0.4	D_{15} =
% SAND =	69.8	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	30.1	D_{50} = 0.2	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-38 @ 0-1.2m

Liquid Limit: 27

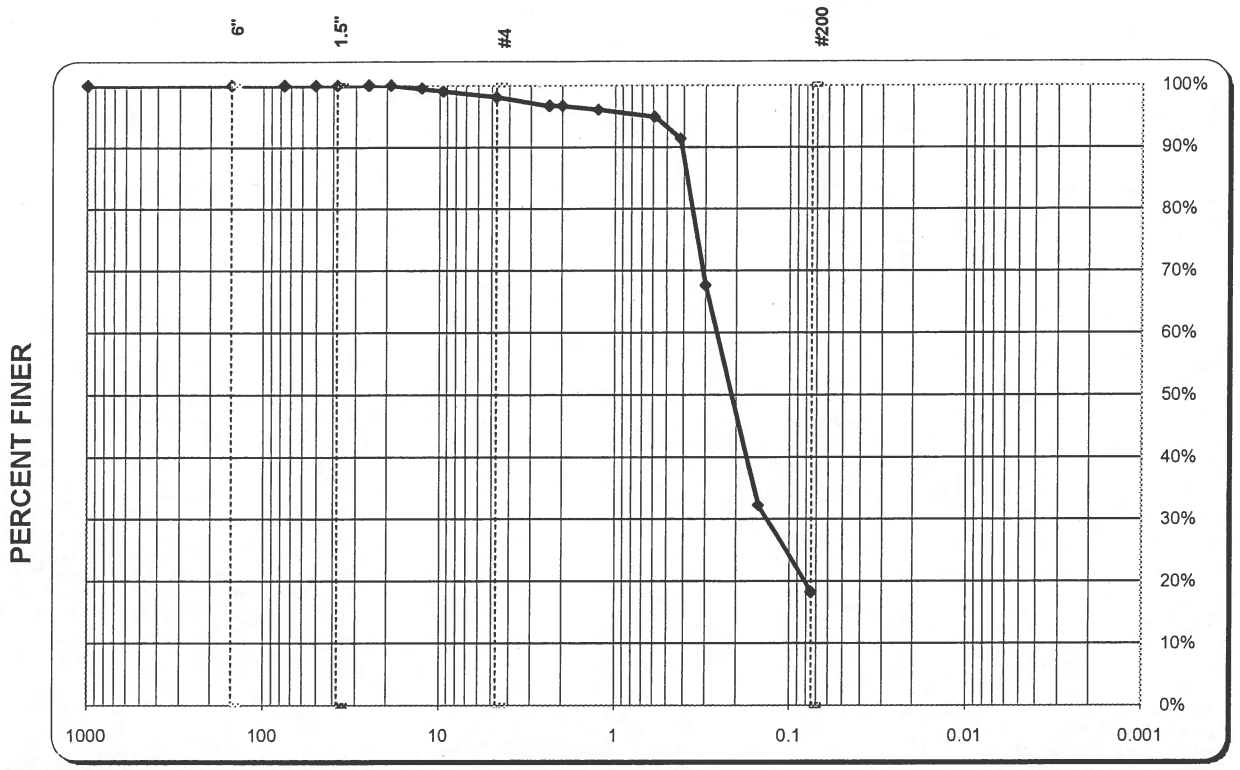
Plasticity Index: 15

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	99	98	97	91	32	18.3
Specification								

% GRAVEL =	1.9	D_{85} = 0.4	D_{15} =
% SAND =	79.8	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	18.3	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-39 @ 0-1.2m

Liquid Limit: 19

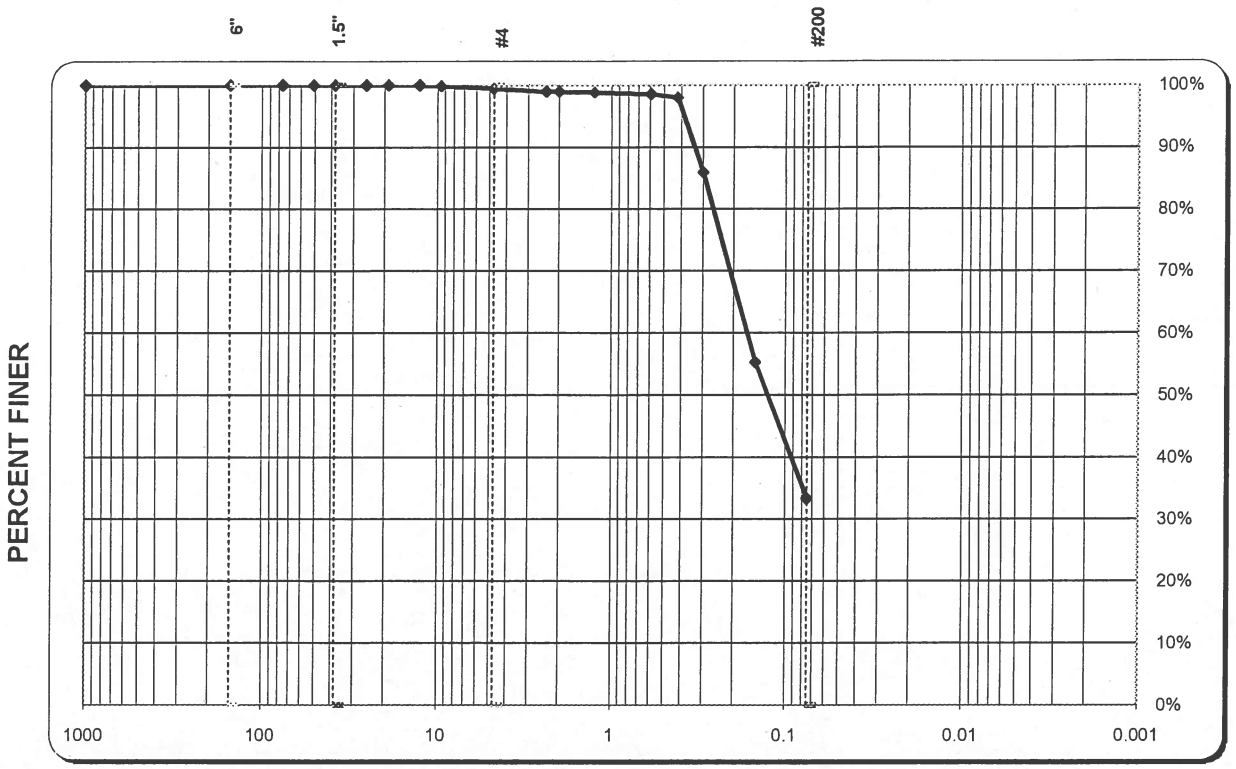
Plasticity Index: 2

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	99	99	98	55	33.3
Specification								

% GRAVEL =	0.6	D_{85} = 0.3	D_{15} =
% SAND =	66.1	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	33.3	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-40 @ 0-1.2m

Liquid Limit: 23

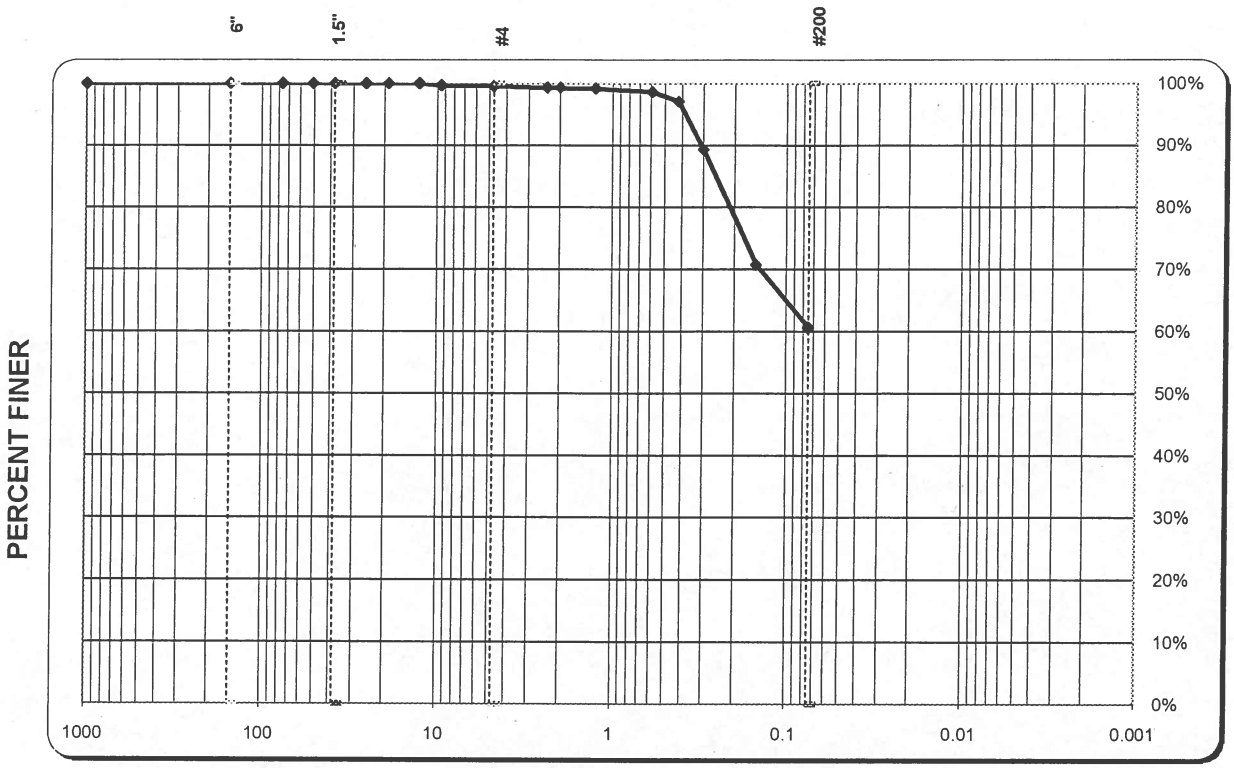
Plasticity Index: 8

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	97	71	60.7
Specification								

% GRAVEL =	0.4	D_{85} = 0.3	D_{15} =
% SAND =	38.9	D_{60} =	D_{10} =
% SILT & CLAY =	60.7	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-41 @ 0-1.2m

Liquid Limit: 42

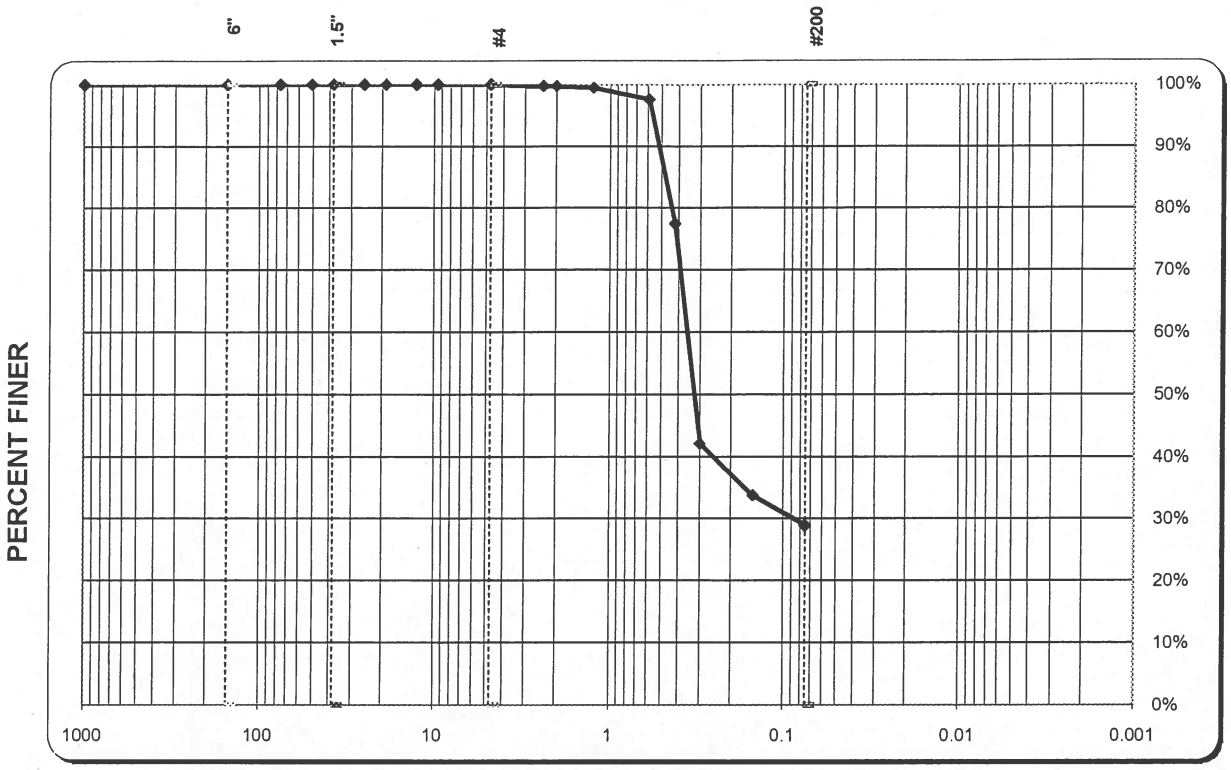
Plasticity Index: 27

USCS Classification: Clayey Sand

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	100	100	78	34	29.0
Specification								

% GRAVEL =	0.0	D_{85} = 0.5	D_{15} =
% SAND =	71.0	D_{60} = 0.4	D_{10} =
% SILT & CLAY =	29.0	D_{50} = 0.3	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-42 @ 0-1.2m

Liquid Limit: 47

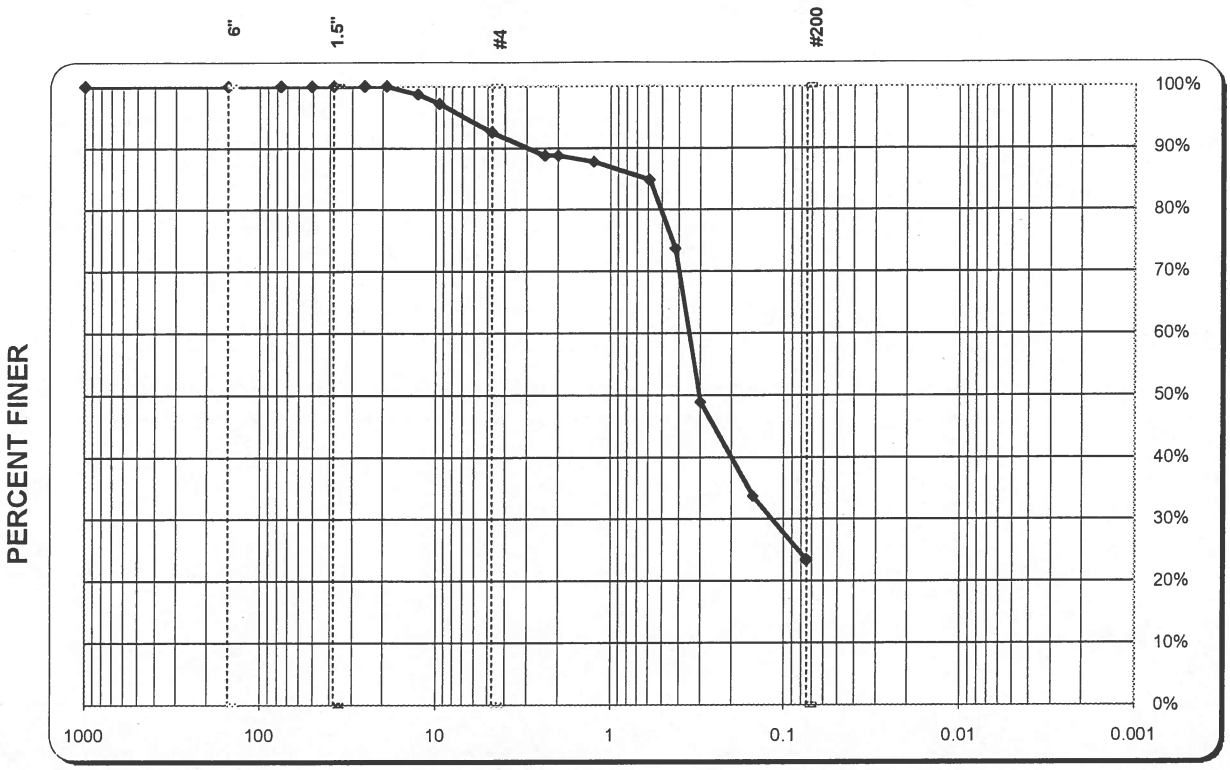
Plasticity Index: 32

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	97	93	89	74	34	23.4
Specification								

% GRAVEL =	7.4	D_{85} = 0.6	D_{15} =
% SAND =	69.1	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	23.4	D_{50} = 0.3	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-43 @ 0-1.2m

Liquid Limit: 23

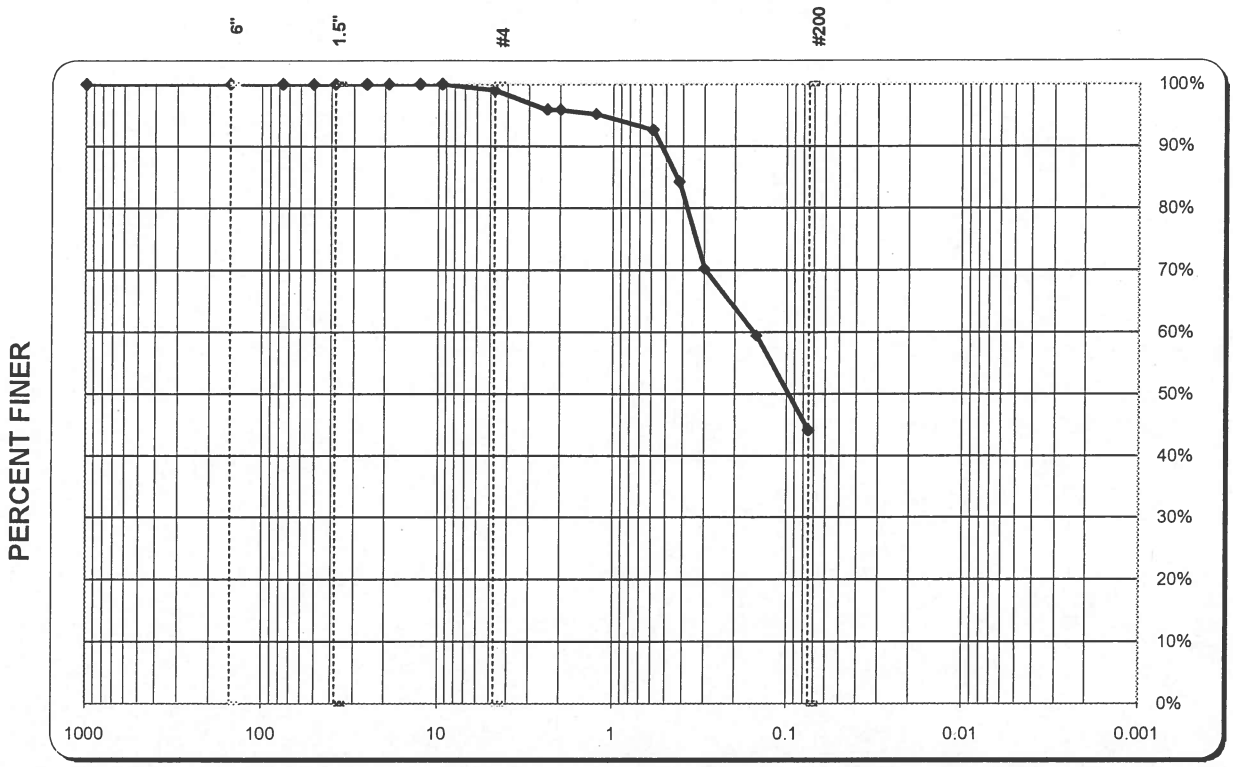
Plasticity Index: 10

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	96	84	59	44.1
Specification								

% GRAVEL =	1.0	D_{85} = 0.4	D_{15} =
% SAND =	54.9	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	44.1	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-44 @ 0-1.2m

Liquid Limit: 25

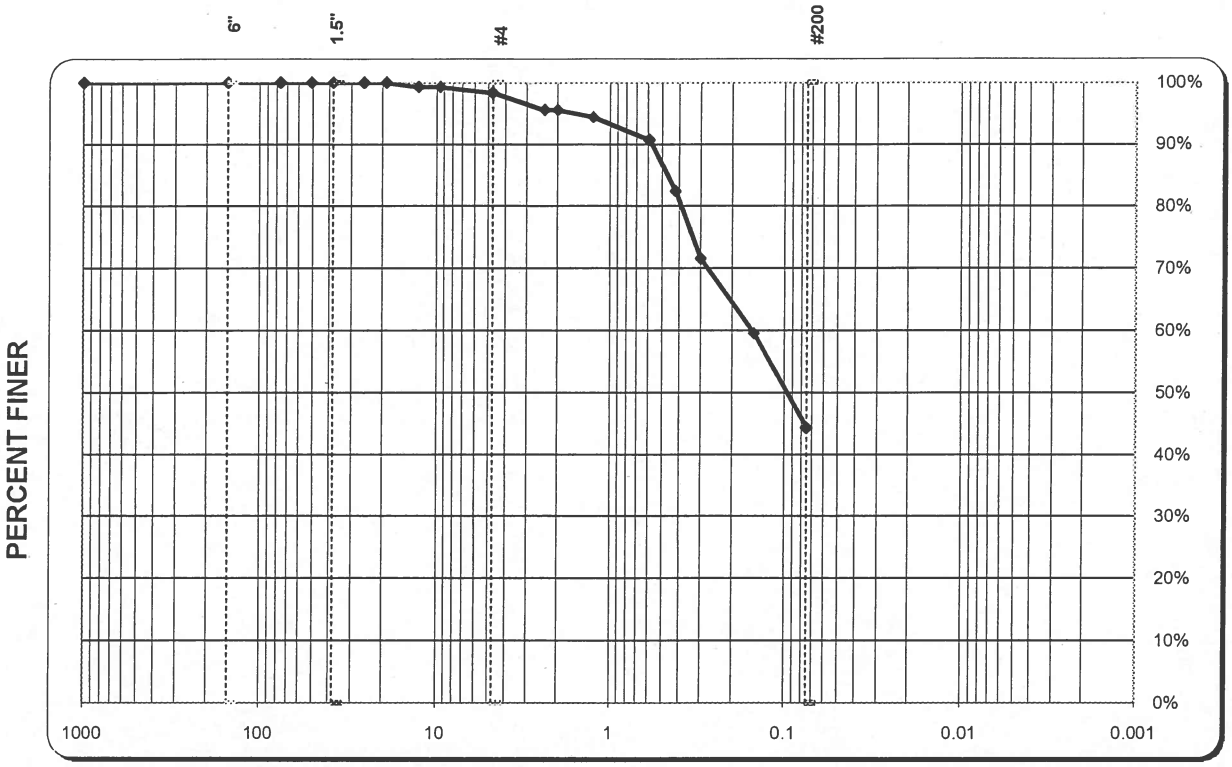
Plasticity Index: 14

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	99	98	96	82	60	44.4
Specification								

% GRAVEL =	1.7	D_{85} = 0.5	D_{15} =
% SAND =	54.0	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	44.4	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-45 @ 0-1.2m

Liquid Limit: 37

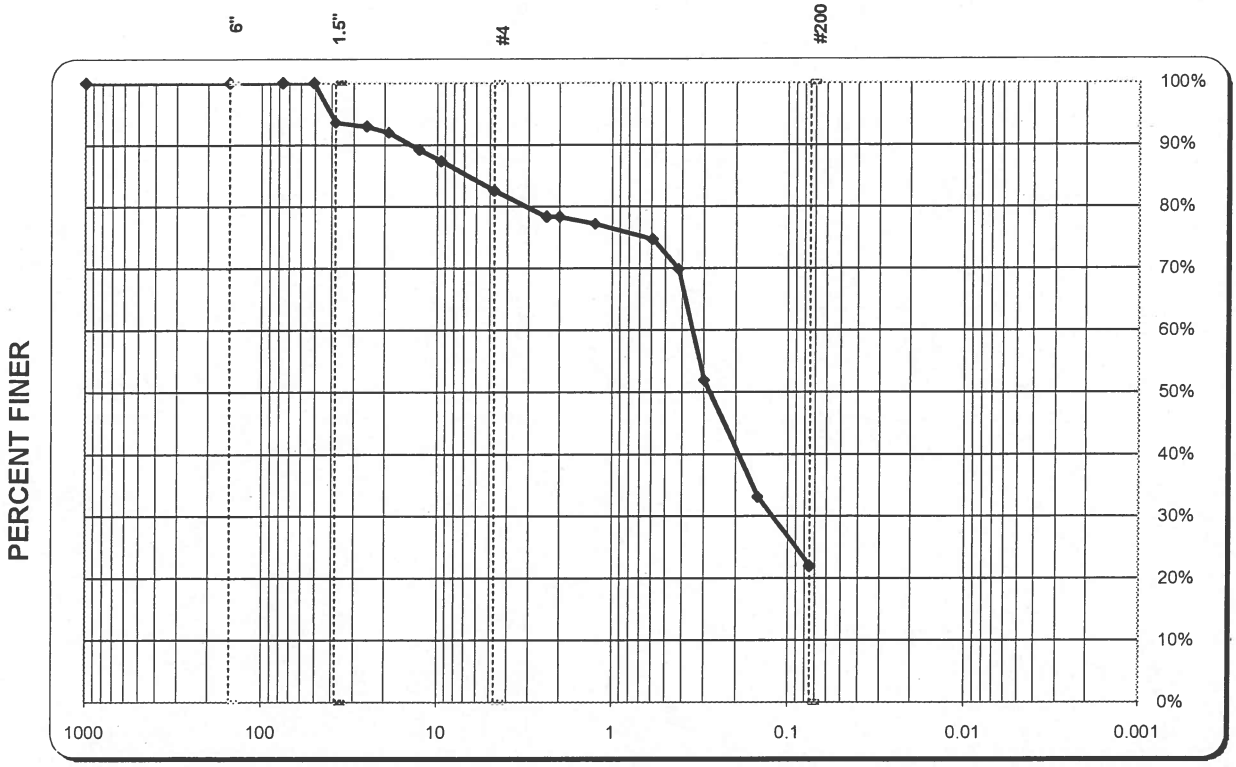
Plasticity Index: 23

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	92	87	83	78	70	33	22.1
Specification								

% GRAVEL =	17.4	D_{85} = 6.8	D_{15} =
% SAND =	60.5	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	22.1	D_{50} = 0.3	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-46 @ 0-0.3m

Liquid Limit: 19

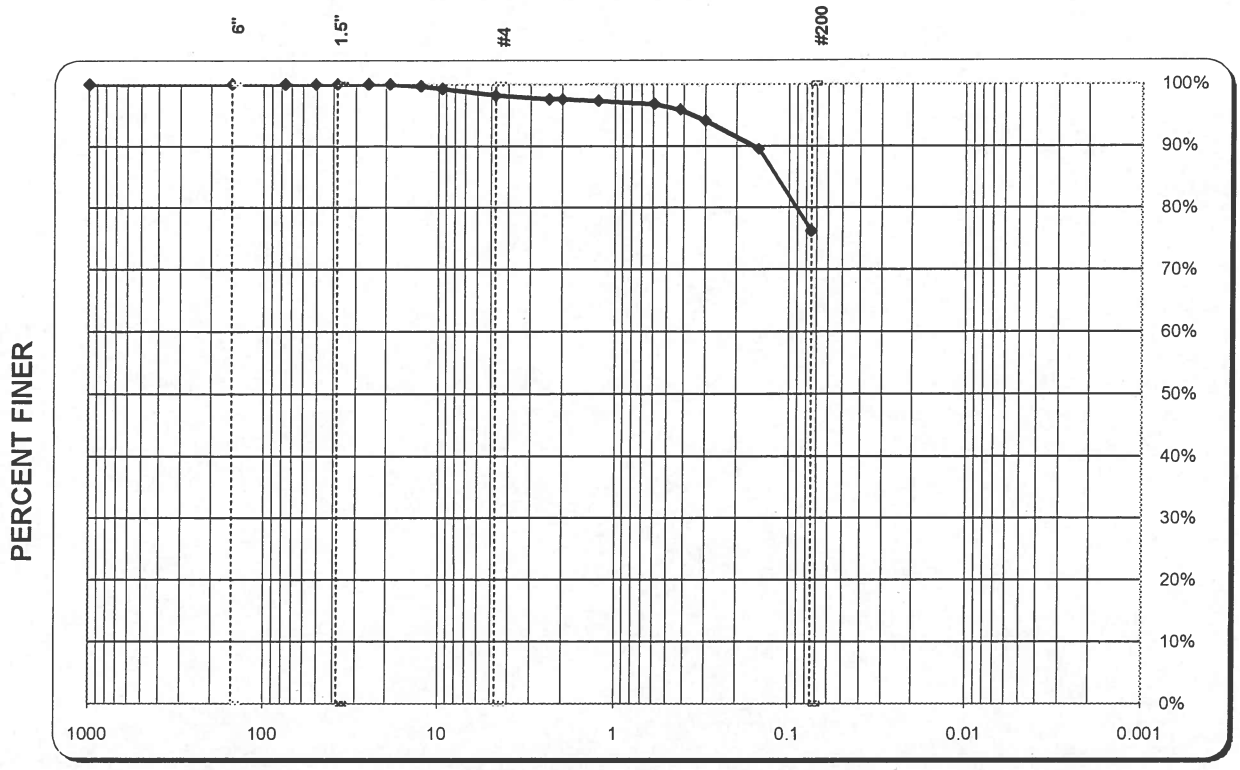
Plasticity Index: 6

USCS Classification: SC-SM

Material Description: Clayey Silty Sand with Gravel

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	98	96	90	76.3
Specification								

% GRAVEL =	1.8	D_{85} = 0.1	D_{15} =
% SAND =	21.9	D_{60} =	D_{10} =
% SILT & CLAY =	76.3	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-47 @ 0-1.2m

Liquid Limit: 37

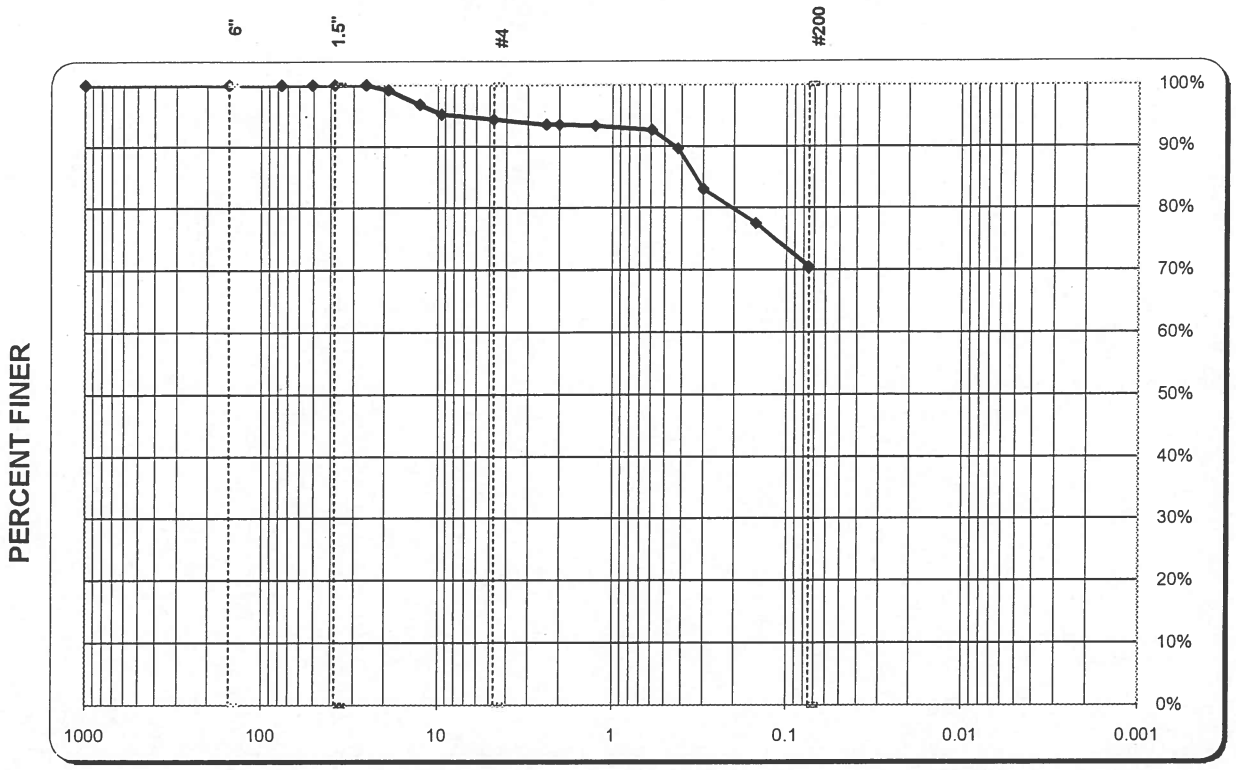
Plasticity Index: 22

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	95	94	94	90	78	70.5
Specification								

% GRAVEL =	5.6	D_{85} = 0.3	D_{15} =
% SAND =	23.9	D_{60} =	D_{10} =
% SILT & CLAY =	70.5	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-48 @ 0-0.6m

Liquid Limit: 38

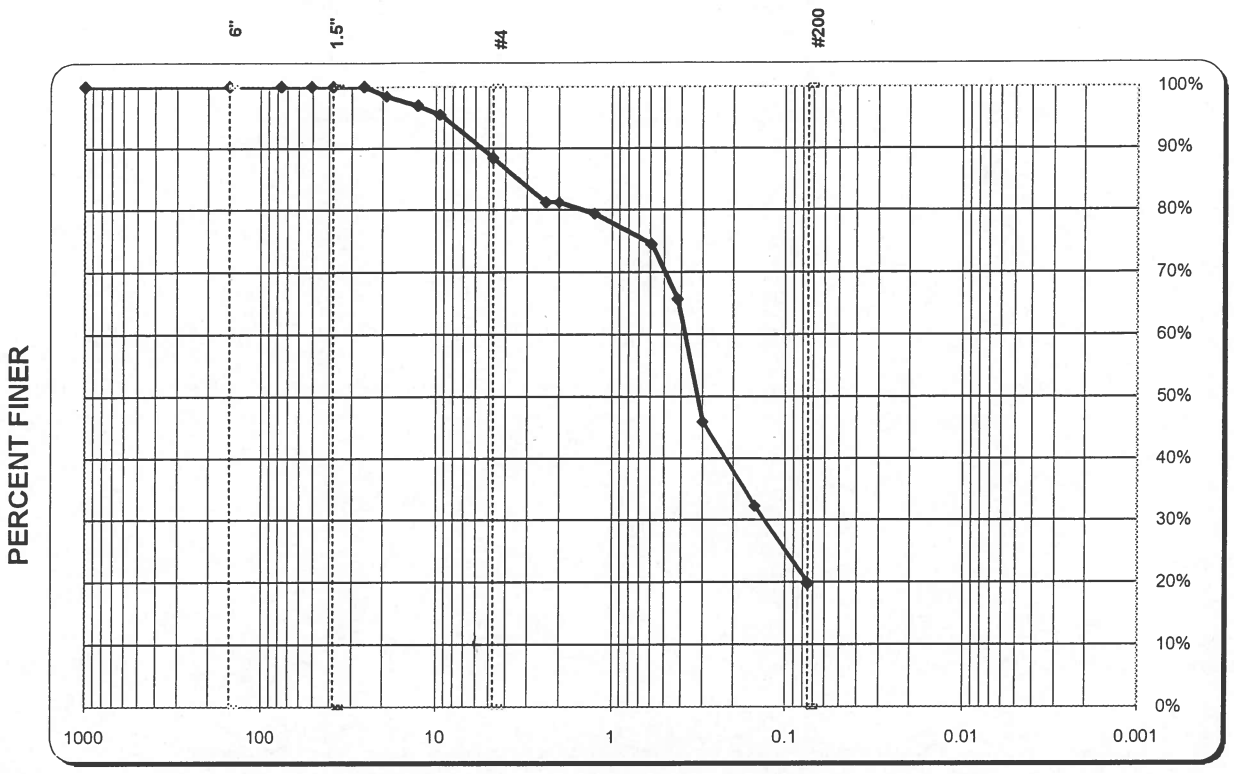
Plasticity Index: 22

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	98	95	88	81	66	32	19.9
Specification								

% GRAVEL =	11.6	D_{85} = 3.1	D_{15} =
% SAND =	68.5	D_{60} = 0.4	D_{10} =
% SILT & CLAY =	19.9	D_{50} = 0.3	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-49 @ 0-1.2m

Liquid Limit: NV

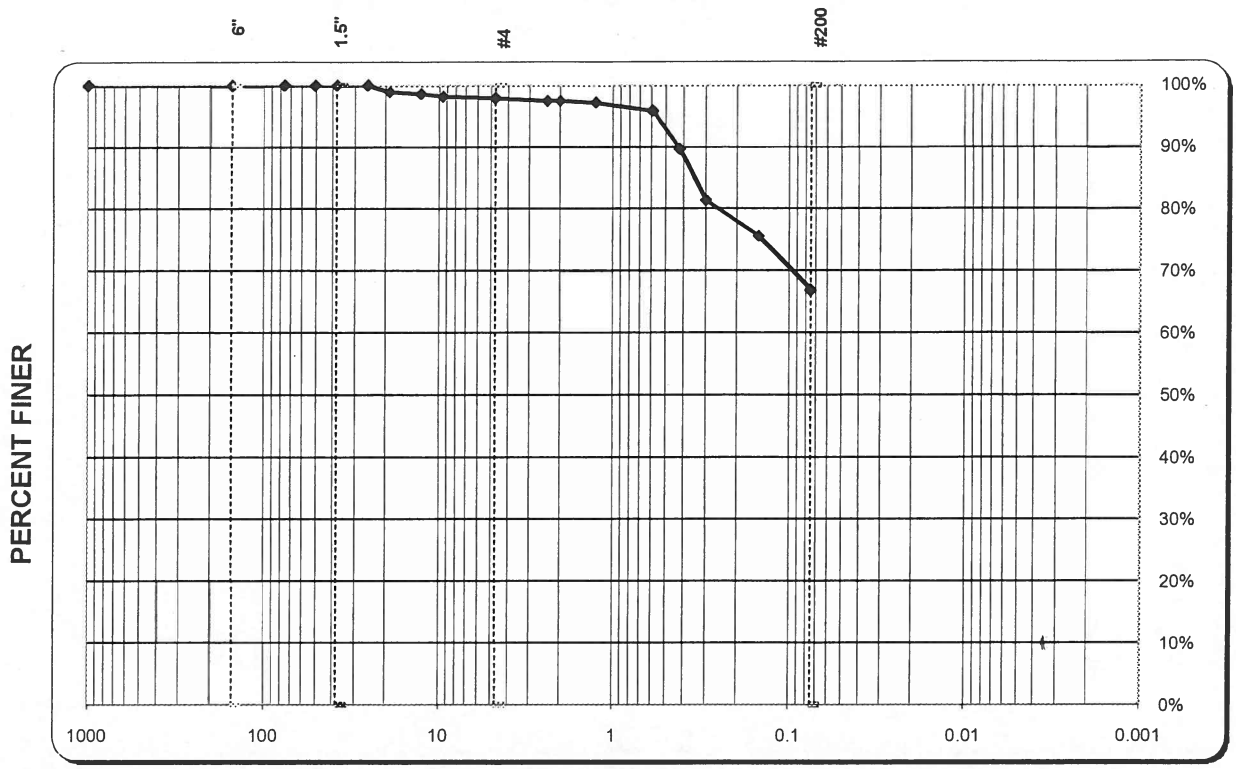
Plasticity Index: NP

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	98	98	97	90	76	66.9
Specification								

% GRAVEL =	2.1	D_{85} = 0.3	D_{15} =
% SAND =	31.1	D_{60} =	D_{10} =
% SILT & CLAY =	66.9	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-50 @ 0-1.2m

Liquid Limit: 33

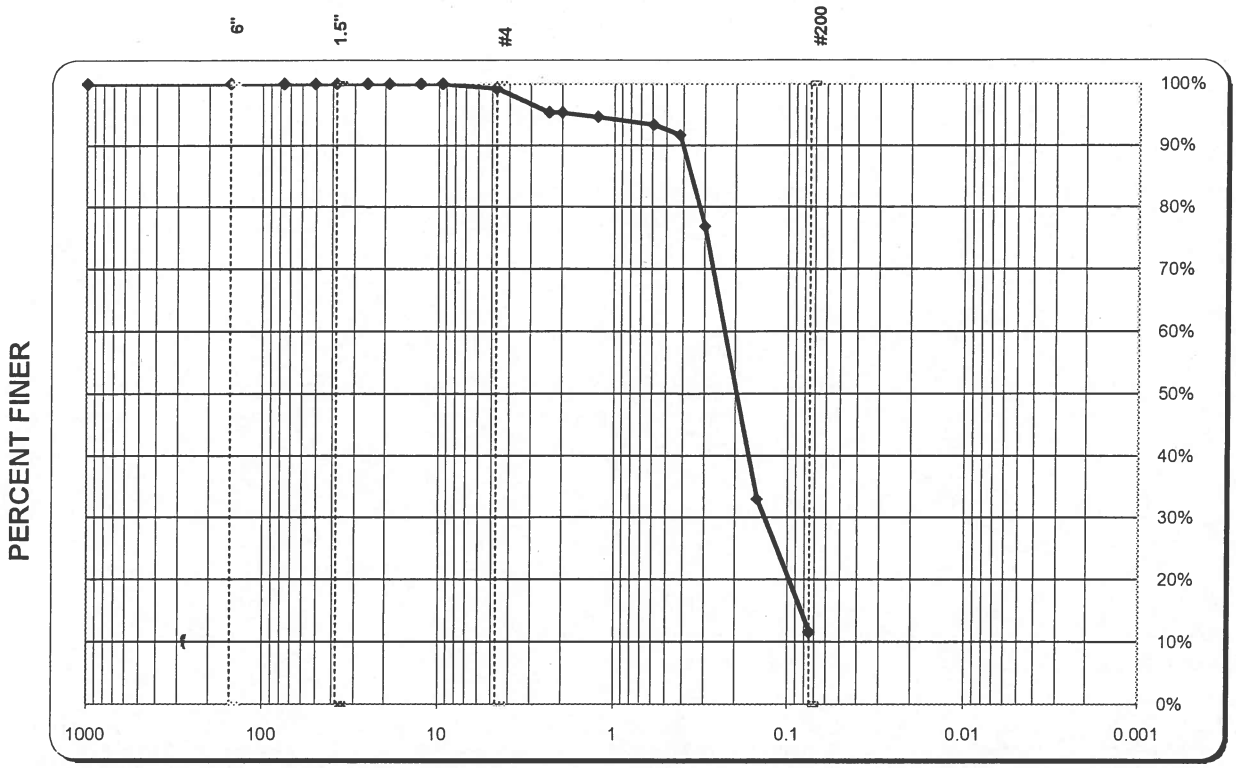
Plasticity Index: 20

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	95	92	33	11.6
Specification								

% GRAVEL =	0.8	D_{85} = 0.4	D_{15} = 0.1
% SAND =	87.6	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	11.6	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-51 @ 0-1.2m

Liquid Limit: NV

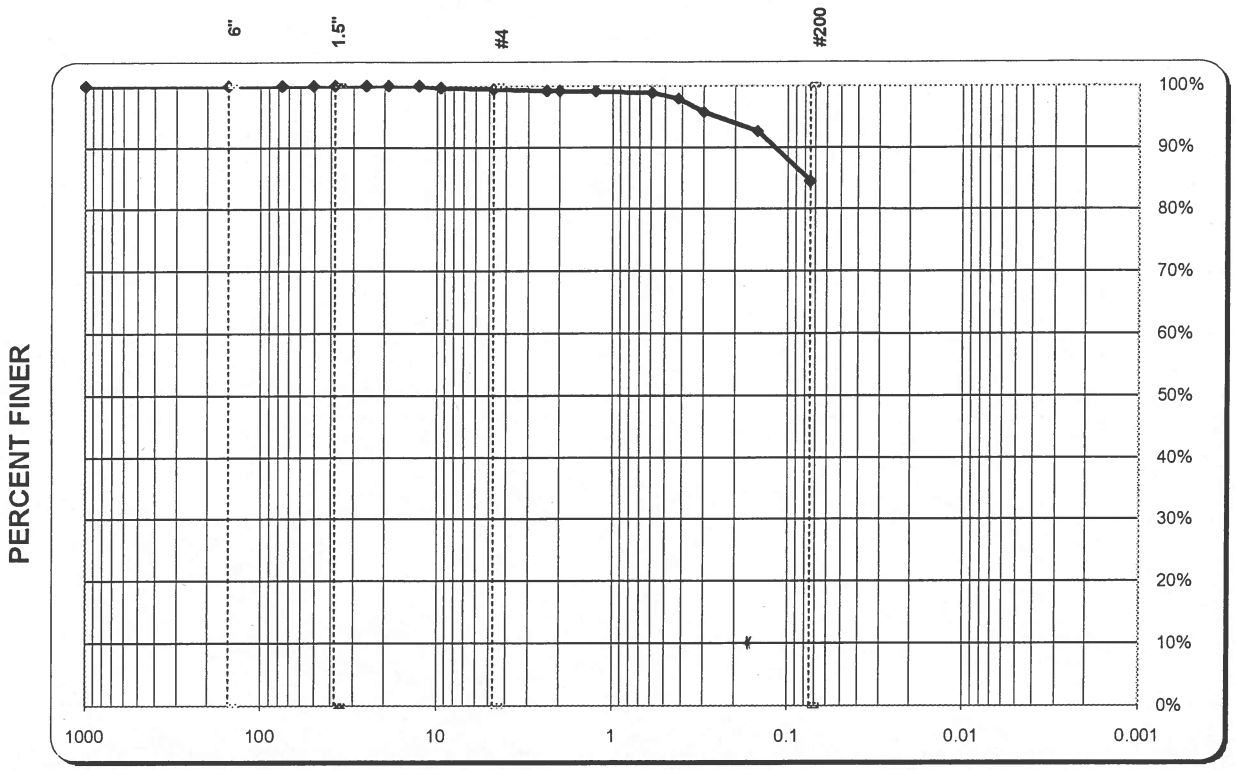
Plasticity Index: NP

USCS Classification: SP-SM

Material Description: Poorly Graded Sand with Silt

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	98	93	84.6
Specification								

% GRAVEL =	0.6	D_{85} = 0.1	D_{15} =
% SAND =	14.9	D_{60} =	D_{10} =
% SILT & CLAY =	84.6	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-52 @ 0-1.2m

Liquid Limit: 44

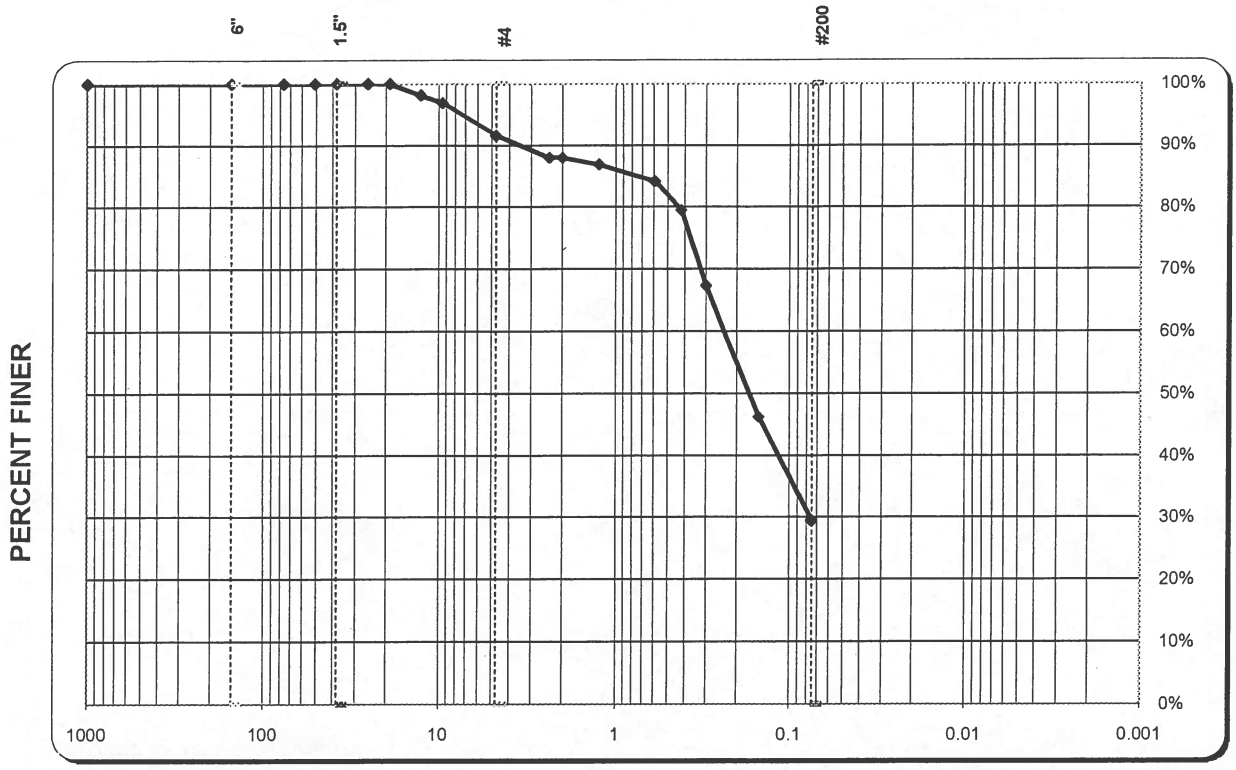
Plasticity Index: 28

USCS Classification: CL

Material Description: 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	97	92	88	79	46	29.5
Specification								

% GRAVEL =	8.4	D_{85} = 0.8	D_{15} =
% SAND =	62.1	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	29.5	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-53 @ 0-0.2m

Liquid Limit: NV

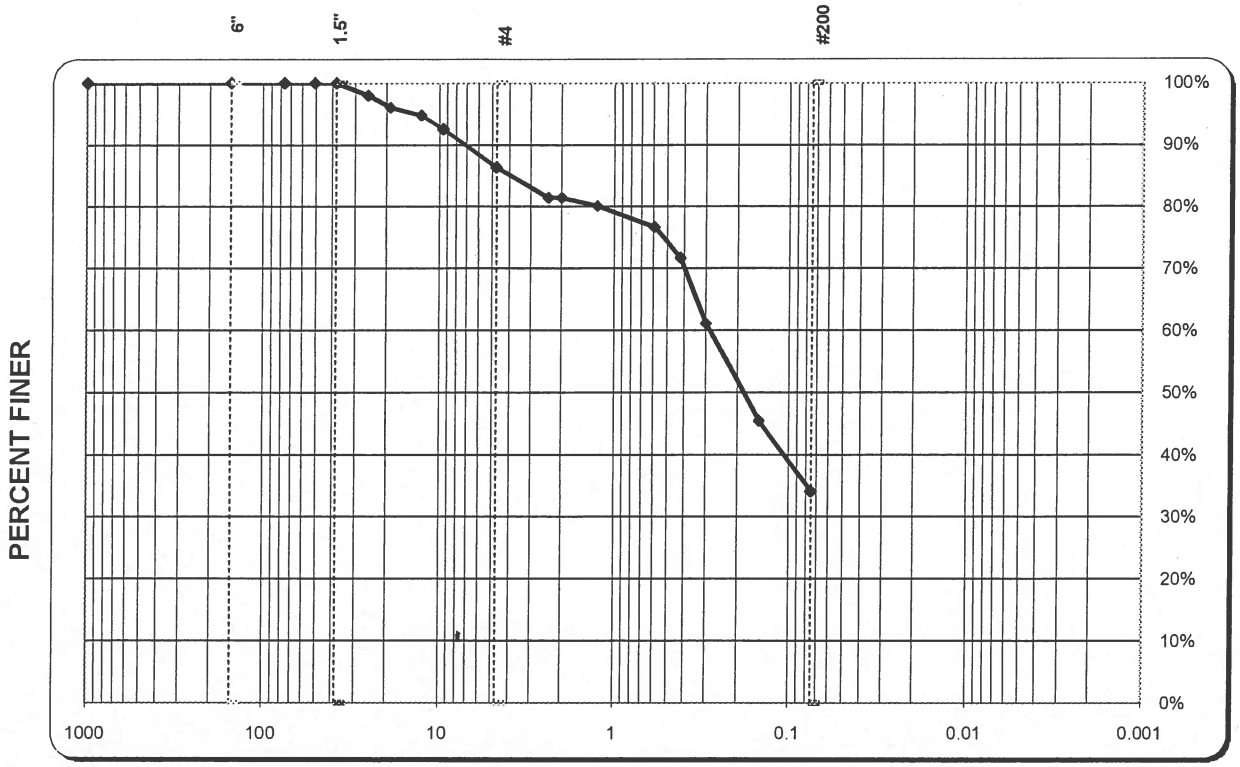
Plasticity Index: NP

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	96	93	86	82	72	45	34.1
Specification								

% GRAVEL =	13.6	D_{85} = 3.7	D_{15} =
% SAND =	52.2	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	34.1	D_{50} = 0.2	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-54 @ 0-0.2m

Liquid Limit: 19

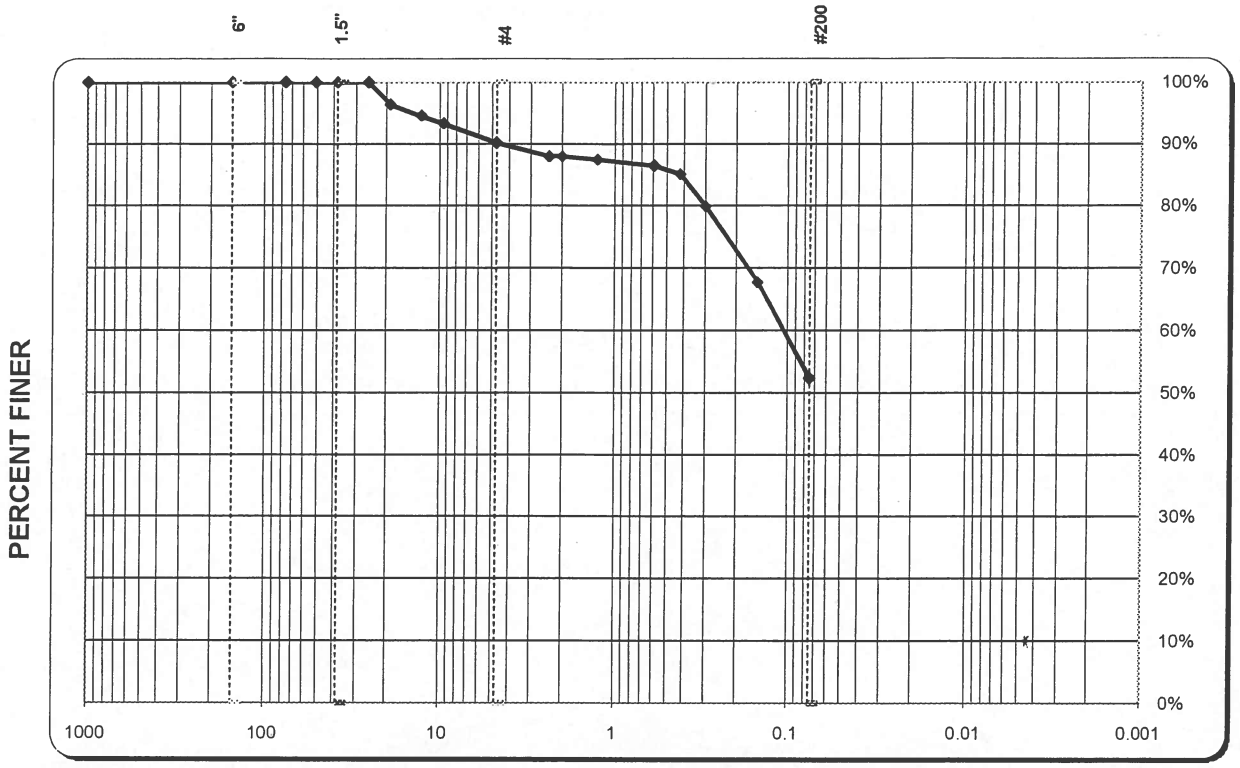
Plasticity Index: 9

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	96	93	90	88	85	68	52.4
Specification								

% GRAVEL =	9.8	D_{85} = 0.4	D_{15} =
% SAND =	37.8	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	52.4	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-55 @ 0-0.2m

Liquid Limit: 25

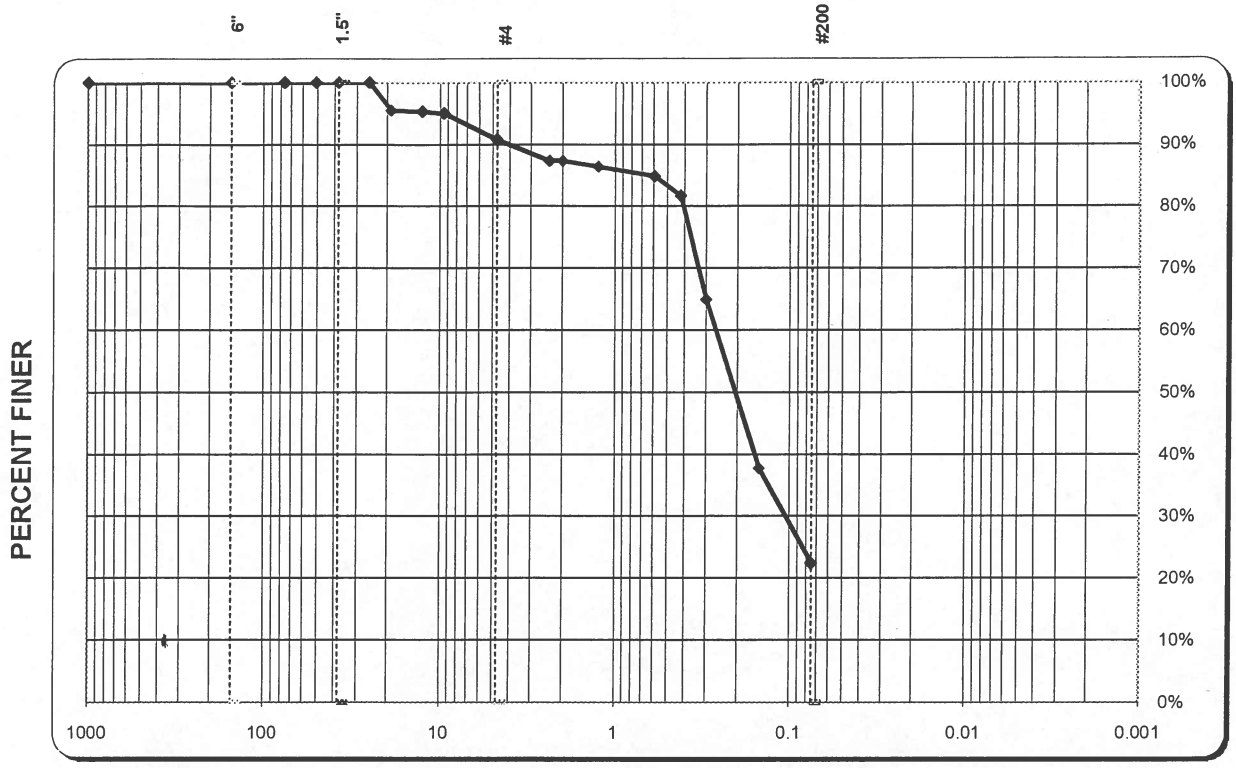
Plasticity Index: 13

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	96	95	91	87	82	38	22.5
Specification								

% GRAVEL =	9.2	D_{85} = 0.6	D_{15} =
% SAND =	68.3	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	22.5	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-56 @ 0-1.2m

Liquid Limit: 16

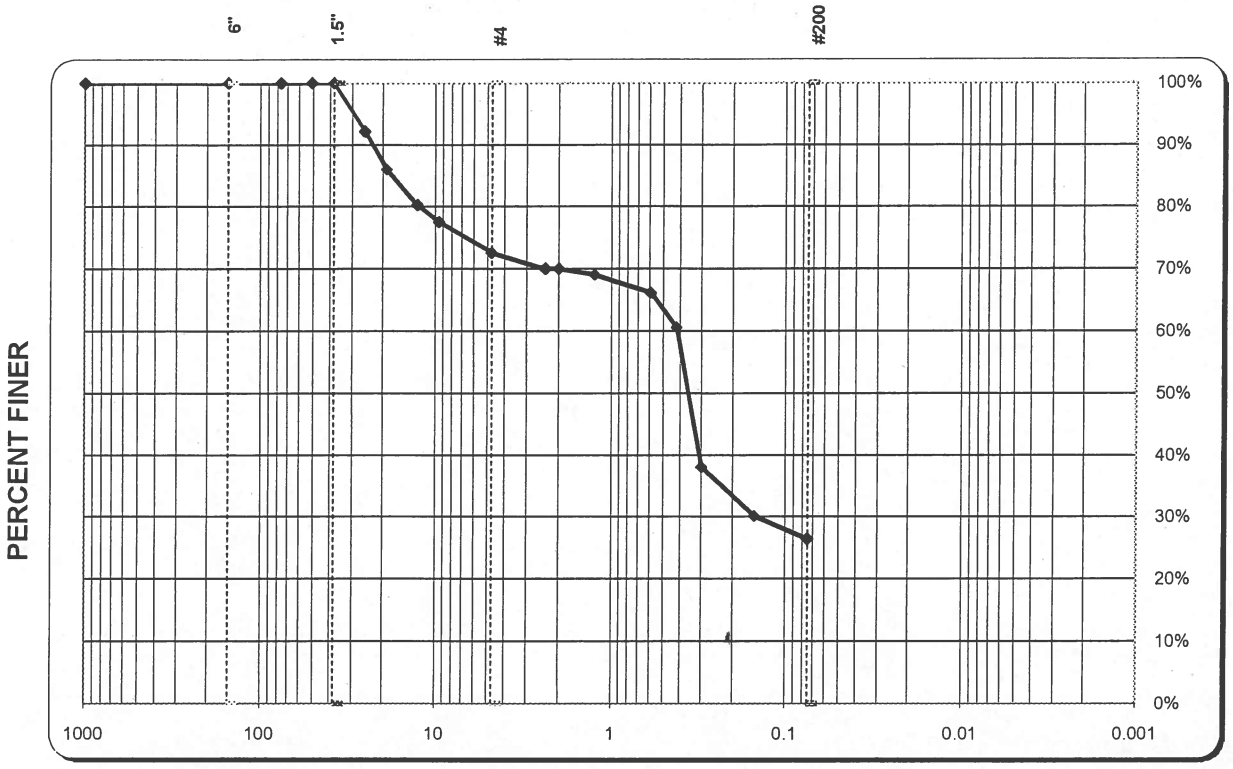
Plasticity Index: 1

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	86	78	73	70	61	30	26.5
Specification								

% GRAVEL =	27.4	D_{85} = 17.8	D_{15} =
% SAND =	46.1	D_{60} = 0.4	D_{10} =
% SILT & CLAY =	26.5	D_{50} = 0.4	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-57 @ 0-0.9m

Liquid Limit: 21

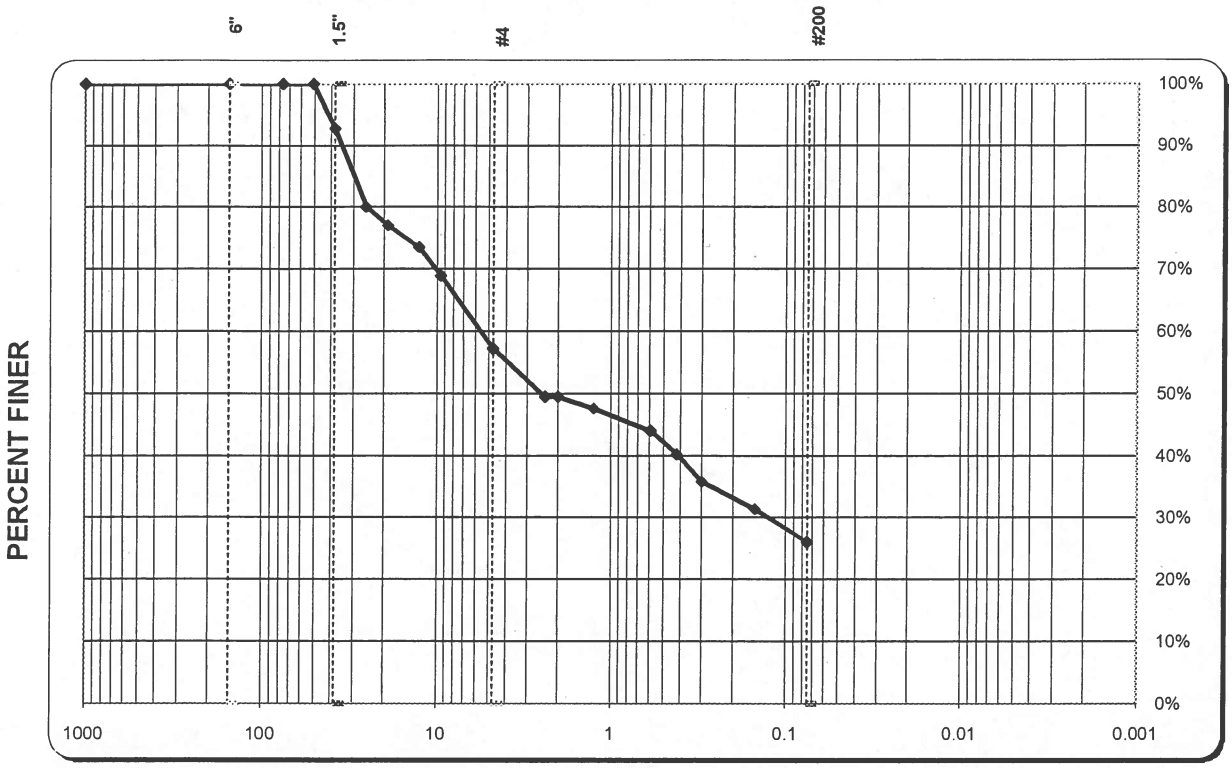
Plasticity Index: 10

USCS Classification: SC

Material Description: Clayey Sand with Gravel

Terracon

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100	77	69	57	49	40	31	26.1
Specification								

% GRAVEL =	42.7	D_{85} = 29.8	D_{15} =
% SAND =	31.2	D_{60} = 5.6	D_{10} =
% SILT & CLAY =	26.1	D_{50} = 2.1	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-58 @ 0-0.6m

Liquid Limit: 26

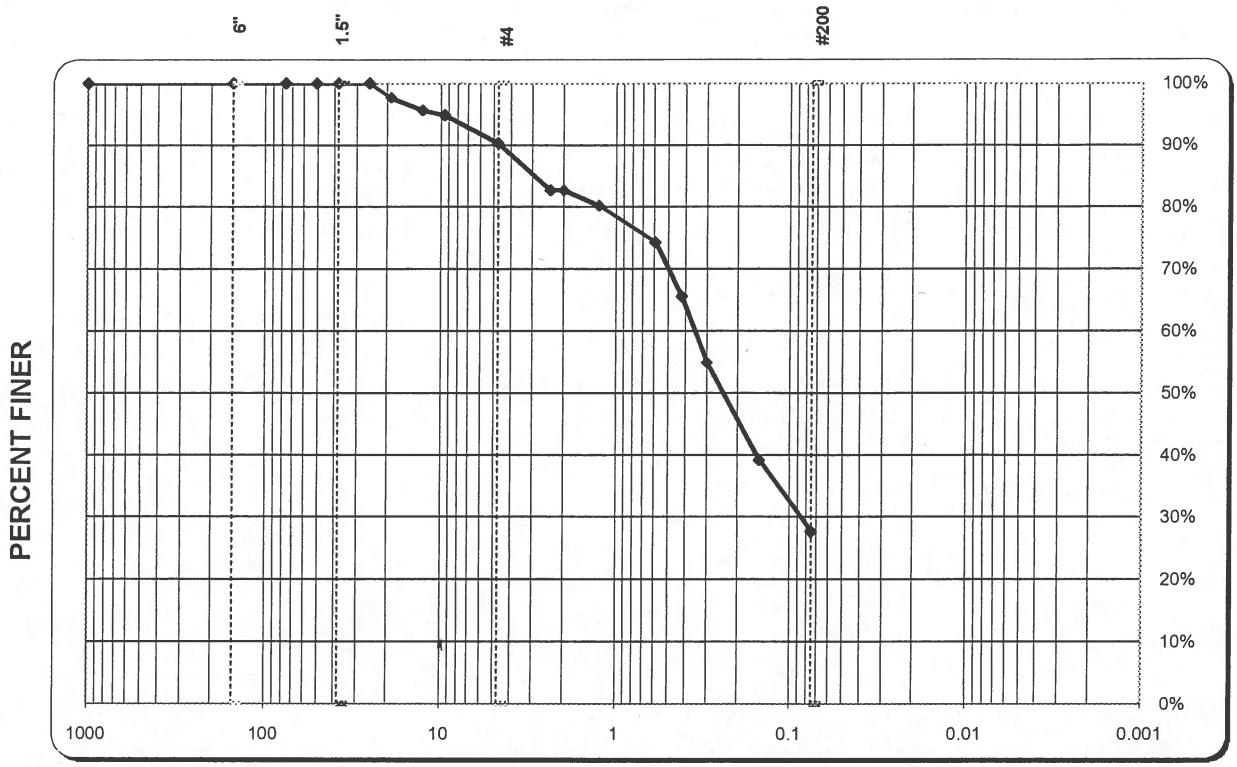
Plasticity Index: 15

USCS Classification: SC

Material Description: Gravelly 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	98	95	90	83	66	39	27.7
Specification								

% GRAVEL =	9.7	D_{85} = 2.6	D_{15} =
% SAND =	62.6	D_{60} = 0.4	D_{10} =
% SILT & CLAY =	27.7	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-59 @ 0-0.2m

Liquid Limit: 19

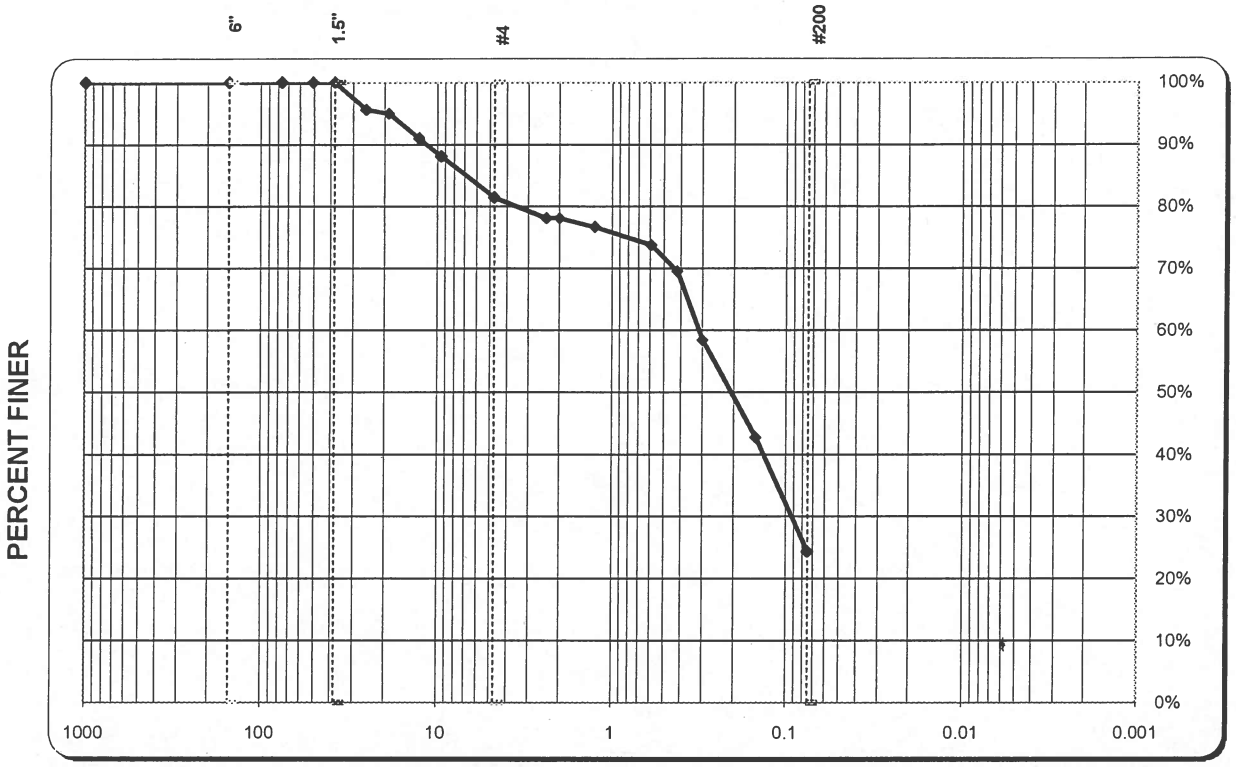
Plasticity Index: 5

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	95	88	82	78	70	43	24.4
Specification								

% GRAVEL =	18.5	D_{85} = 6.9	D_{15} =
% SAND =	57.1	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	24.4	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-60 @ 0-0.2m

Liquid Limit: 18

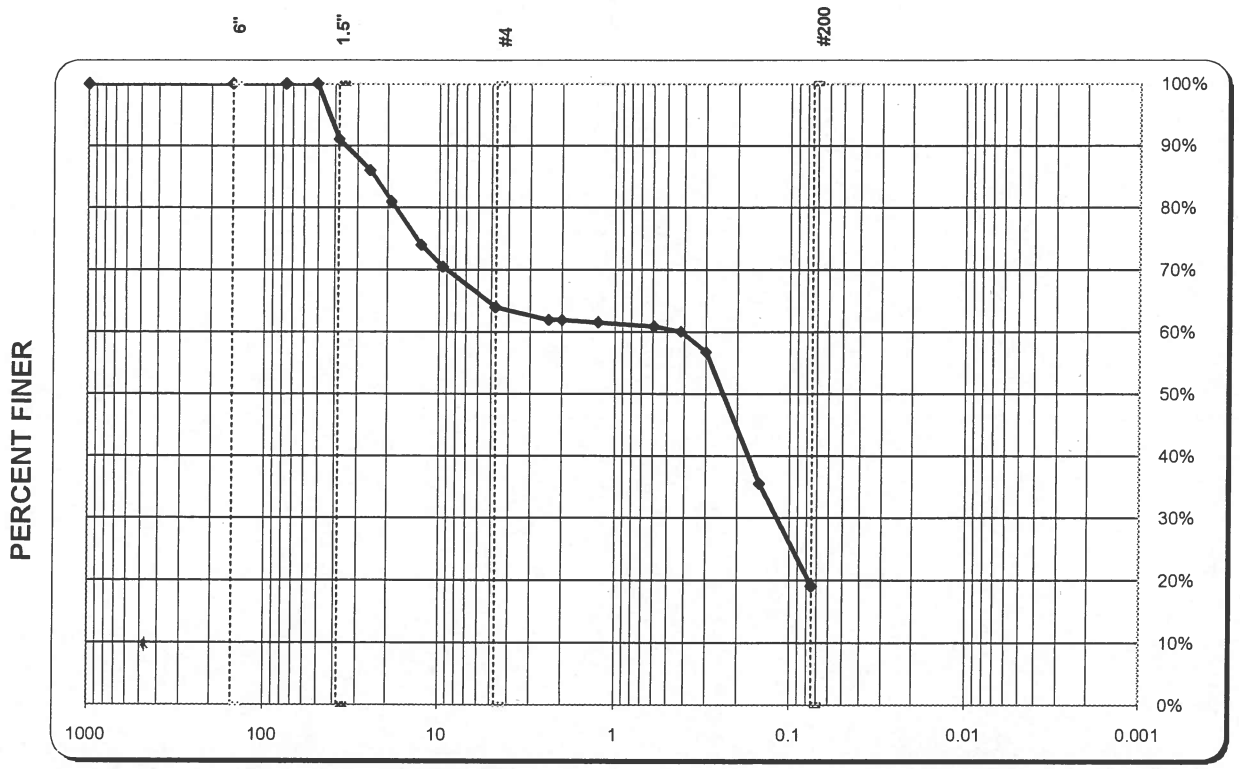
Plasticity Index: 3

USCS Classification: SM

Material Description: Silty Sand with Gravel

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	81	71	64	62	60	36	19.1
Specification								

% GRAVEL =	36.0	D_{85} = 24.0	D_{15} =
% SAND =	44.9	D_{60} = 0.4	D_{10} =
% SILT & CLAY =	19.1	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-61 @ 0-0.2m

Liquid Limit: NV

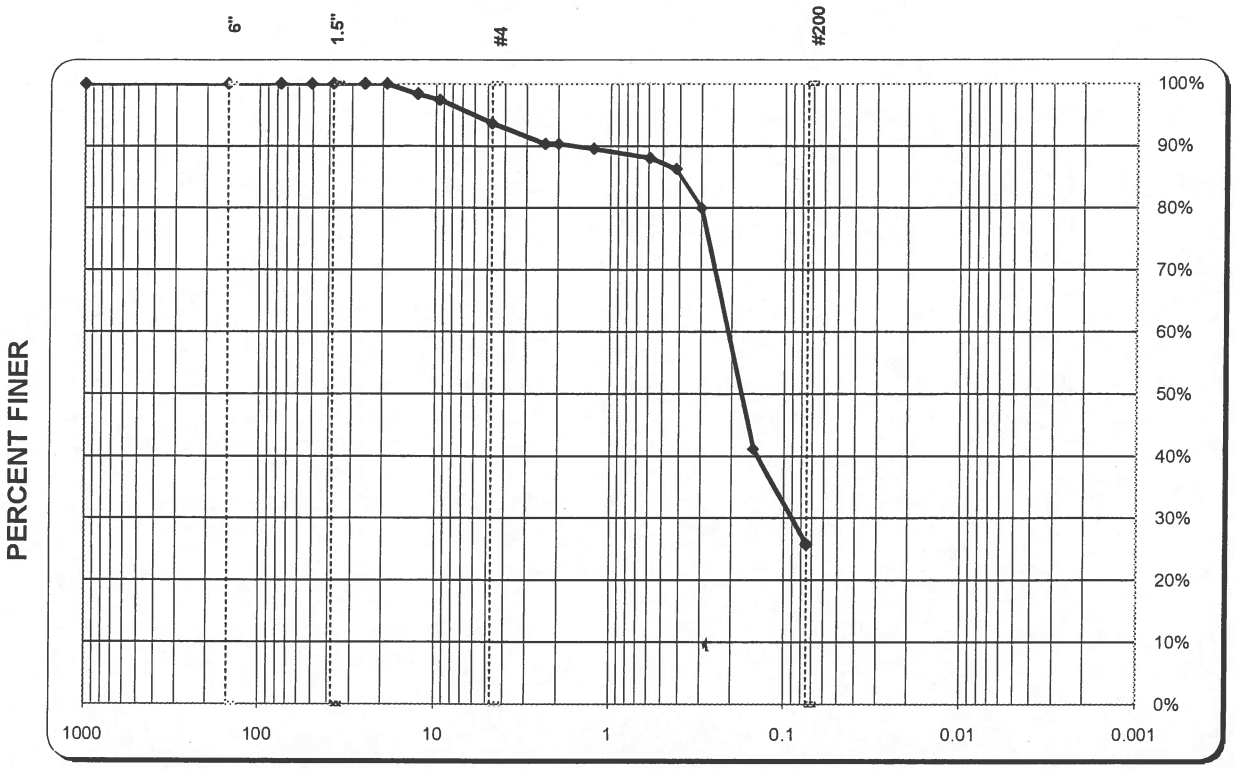
Plasticity Index: NP

USCS Classification: SM

Material Description: Gravelly 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	97	94	90	86	41	25.8
Specification								

% GRAVEL =	6.4	D_{85} = 0.4	D_{15} =
% SAND =	67.8	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	25.8	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-62 @ 0-0.2m

Liquid Limit: 19

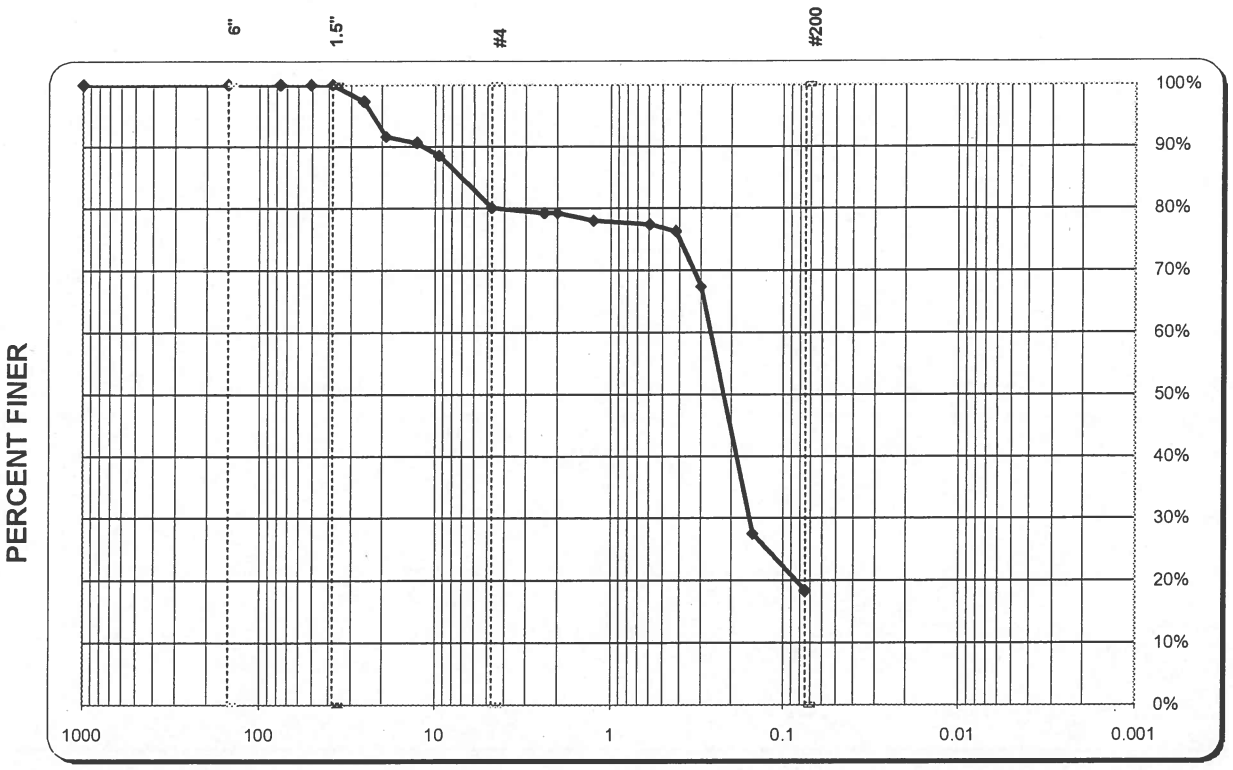
Plasticity Index: 2

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	92	88	80	79	76	28	18.5
Specification								

% GRAVEL =	19.9	D_{85} = 7.1	D_{15} =
% SAND =	61.7	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	18.5	D_{50} = 0.2	C_U =
		D_{30} = 0.2	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-63 @ 0-0.9m

Liquid Limit: NV

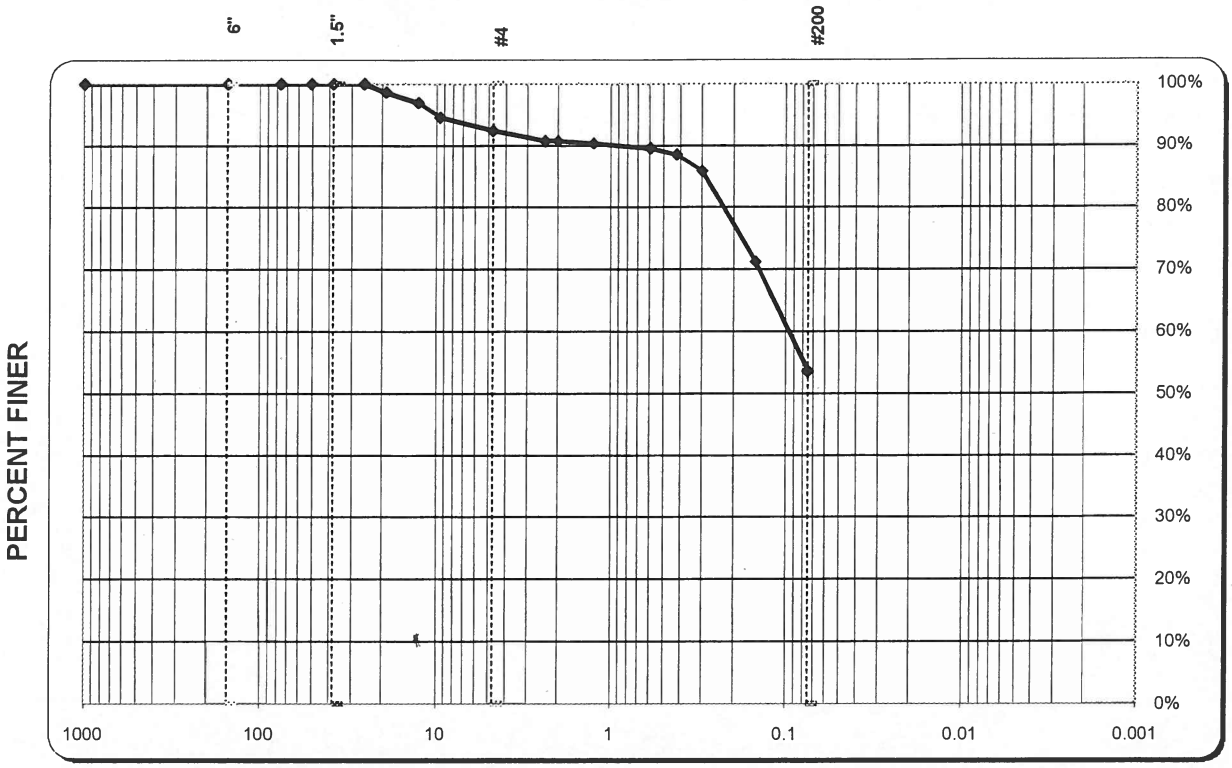
Plasticity Index: NP

USCS Classification: SM

Material Description: Silty Sand with Gravel

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	95	92	91	89	71	53.7
Specification								

% GRAVEL =	7.6	D_{85} = 0.3	D_{15} =
% SAND =	38.7	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	53.7	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-64 @ 0-0.2m

Liquid Limit: 27

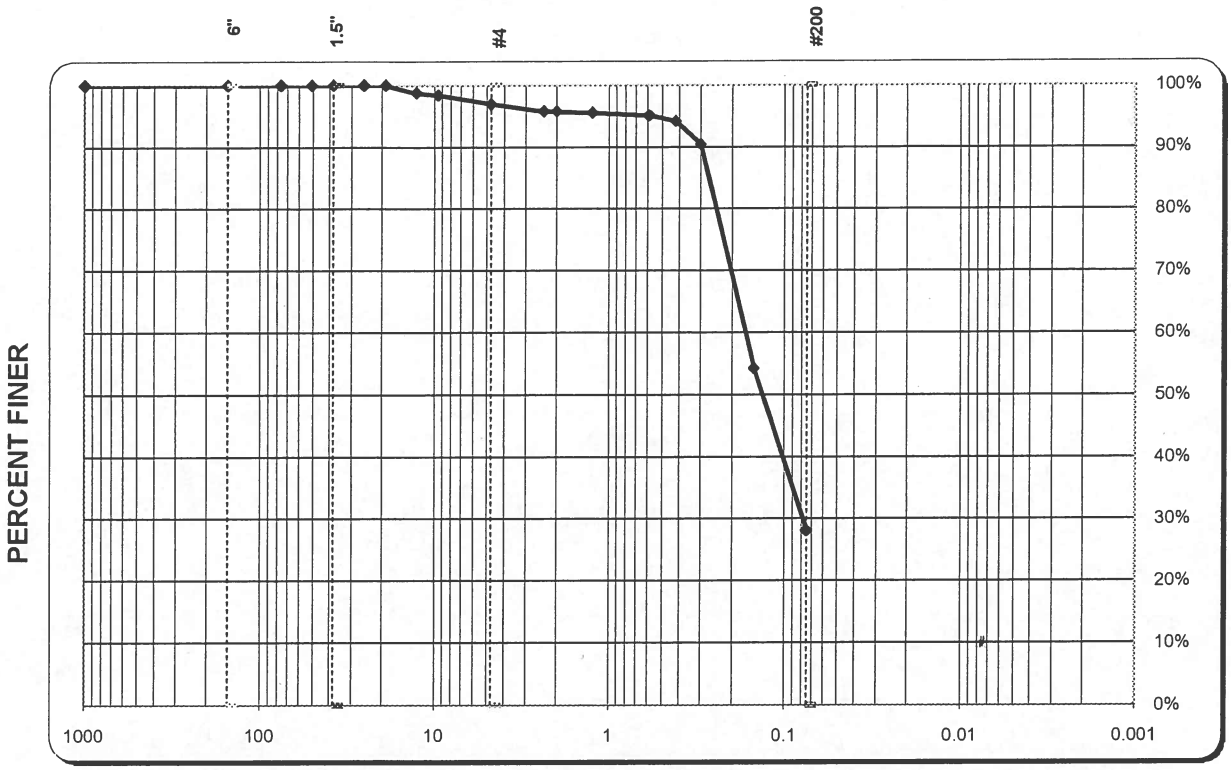
Plasticity Index: 14

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	98	97	96	94	54	28.2
Specification								

% GRAVEL =	3.1	D_{85} = 0.3	D_{15} =
% SAND =	68.8	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	28.2	D_{50} = 0.1	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-65 @ 0-0.2m

Liquid Limit: NV

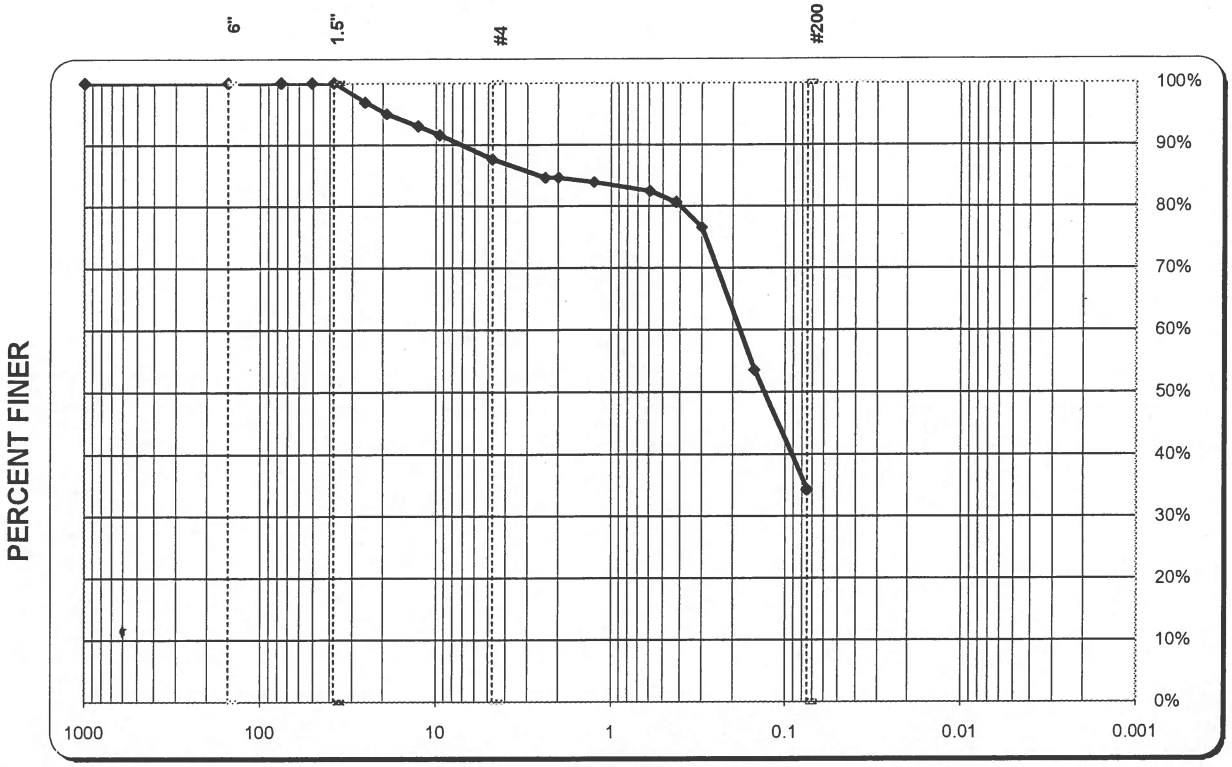
Plasticity Index: NP

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	95	92	88	85	81	54	34.4
Specification								

% GRAVEL =	12.3	D_{85} = 2.2	D_{15} =
% SAND =	53.3	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	34.4	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-66 @ 0-0.6m

Liquid Limit: 21

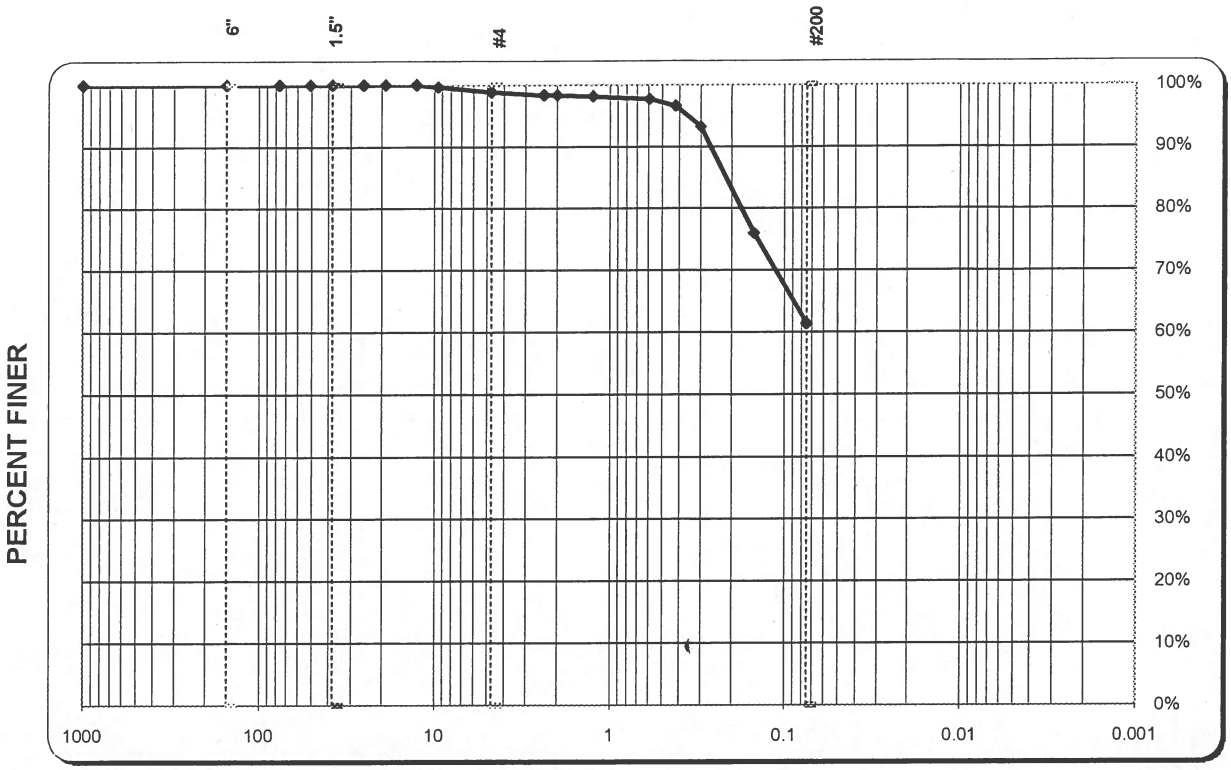
Plasticity Index: 7

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	99	98	97	76	61.4
Specification								

% GRAVEL =	1.2	D_{85} = 0.2	D_{15} =
% SAND =	37.4	D_{60} =	D_{10} =
% SILT & CLAY =	61.4	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-67 @ 0-1.2m

Liquid Limit: 32

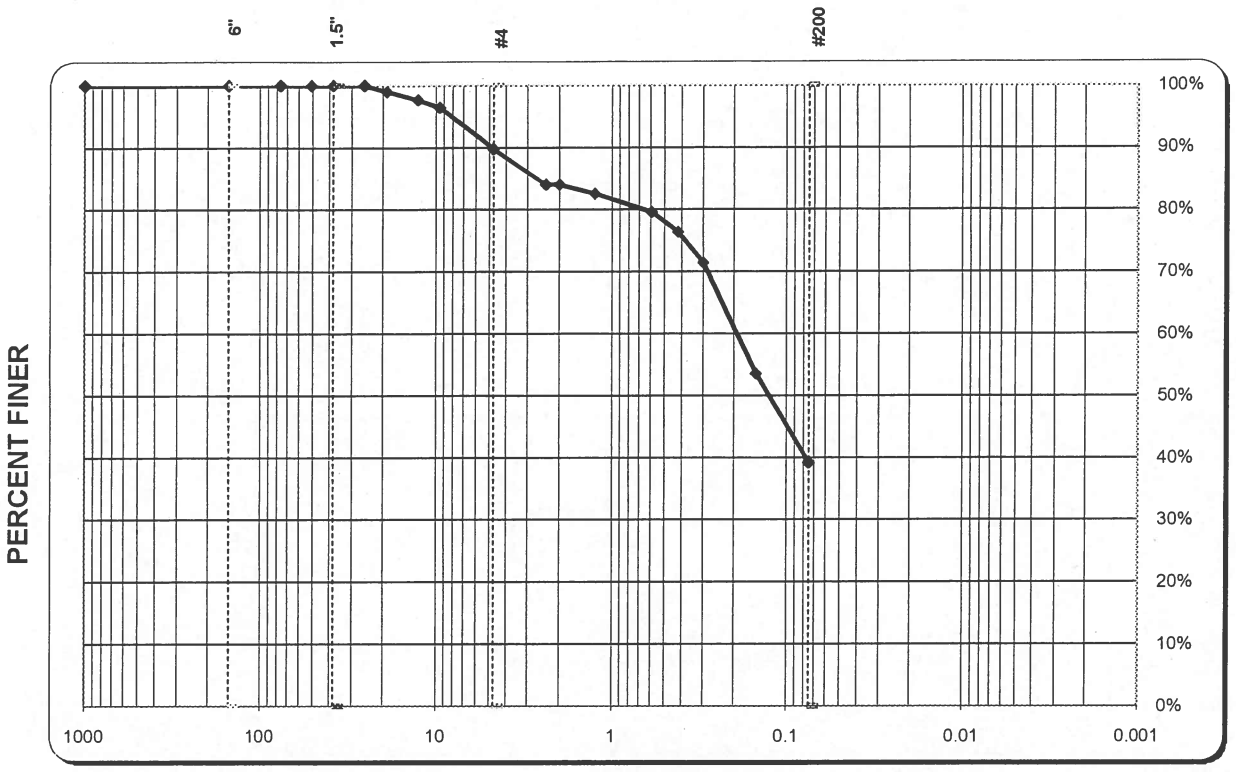
Plasticity Index: 20

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	99	96	90	84	76	54	39.2
Specification								

% GRAVEL =	10.2	D_{85} = 2.3	D_{15} =
% SAND =	50.6	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	39.2	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-68 @ 0-0.9m

Liquid Limit: 25

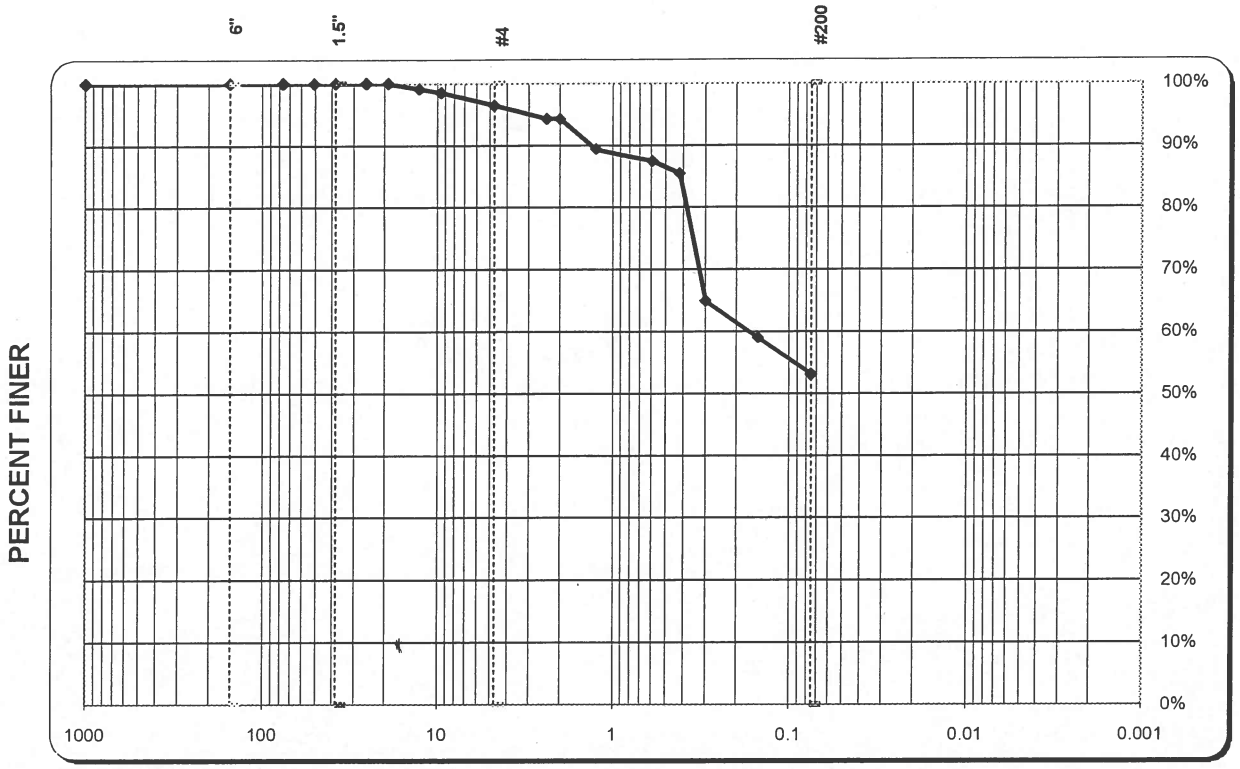
Plasticity Index: 14

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	98	96	94	85	59	53.1
Specification								

% GRAVEL =	3.6	D_{85} = 0.4	D_{15} =
% SAND =	43.3	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	53.1	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-69 @ 0-1.2m

Liquid Limit: 30

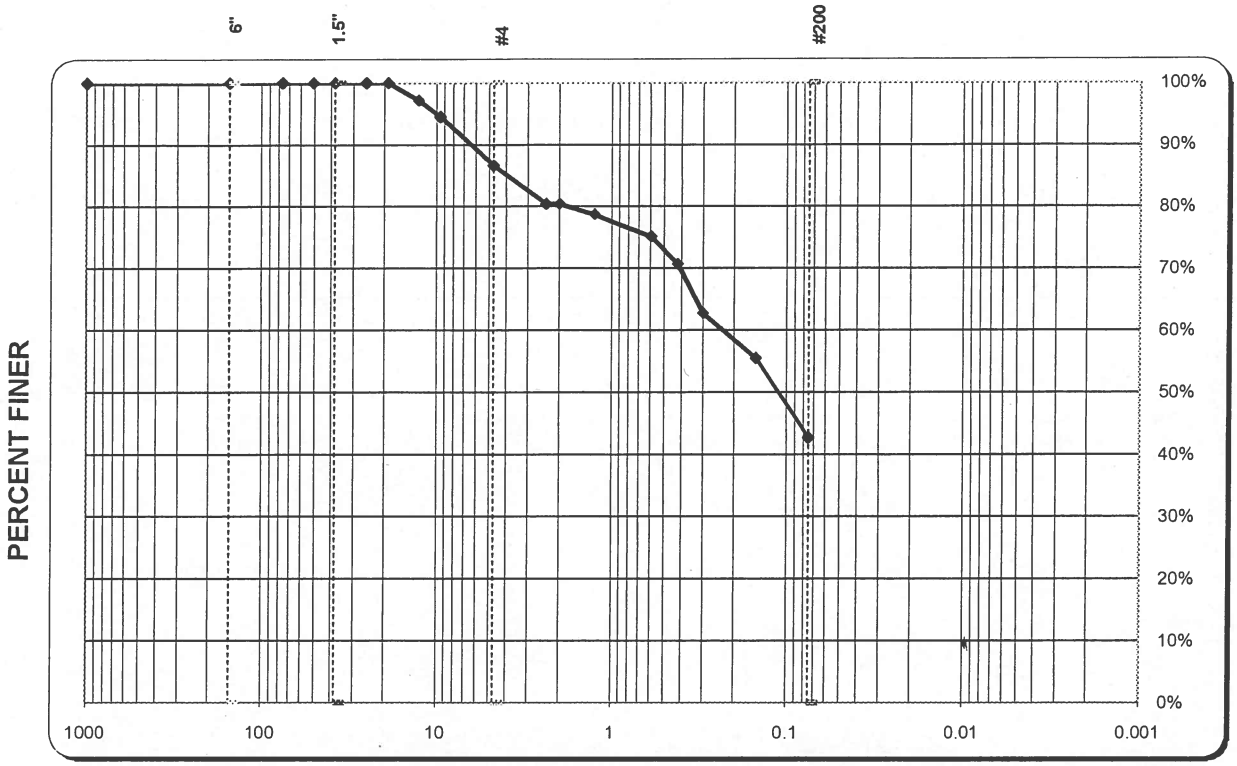
Plasticity Index: 19

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	95	87	80	71	55	42.7
Specification								

% GRAVEL =	13.3	D_{85} = 3.8	D_{15} =
% SAND =	44.0	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	42.7	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-70 @ 0-1.2m

Liquid Limit: 23

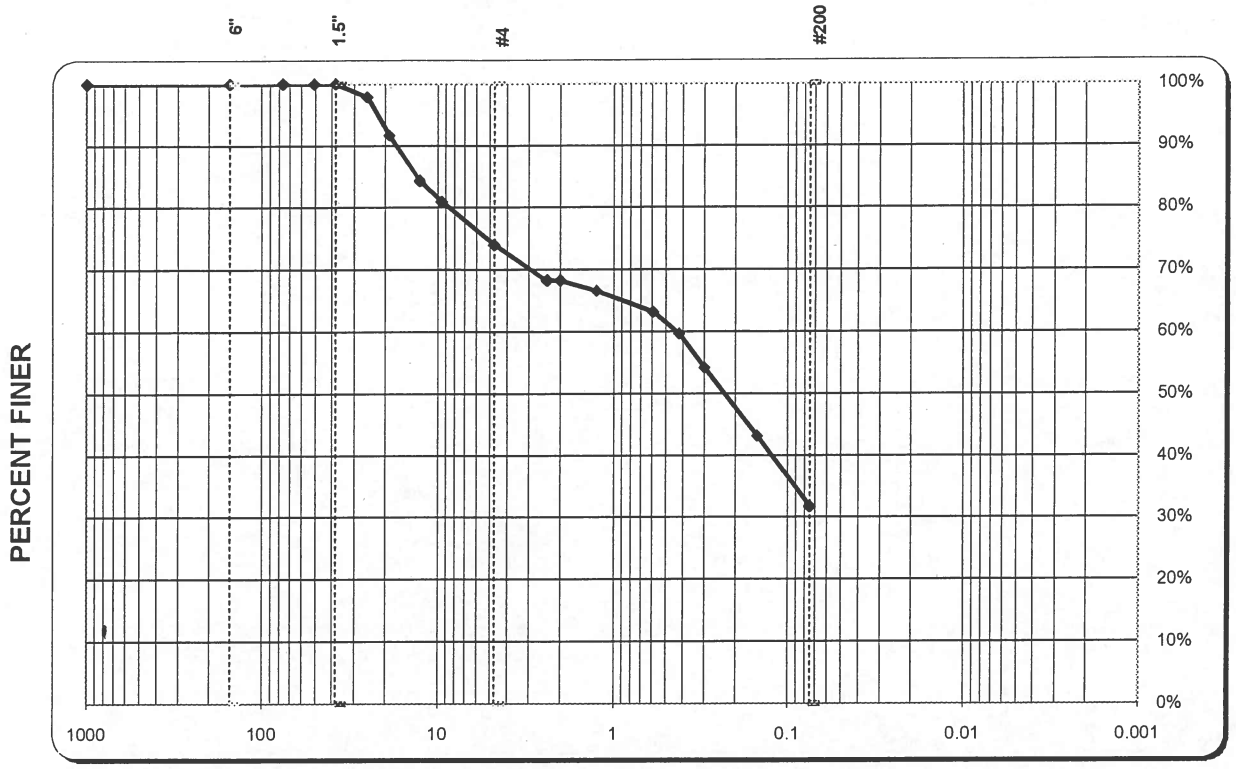
Plasticity Index: 11

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	92	81	74	68	60	43	31.8
Specification								

% GRAVEL =	26.0	D_{85} = 13.2	D_{15} =
% SAND =	42.2	D_{60} = 0.4	D_{10} =
% SILT & CLAY =	31.8	D_{50} = 0.2	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-71 @ 0-0.6m

Liquid Limit: 21

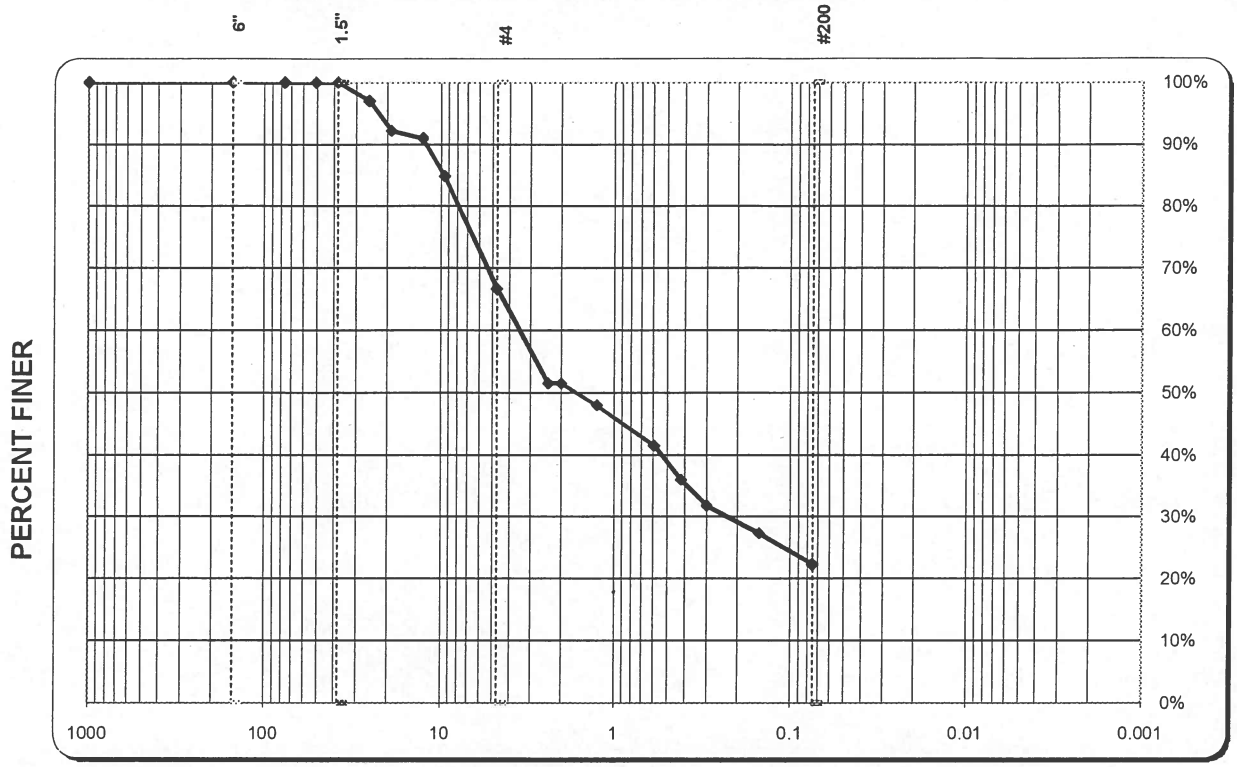
Plasticity Index: 10

USCS Classification: SC

Material Description: Clayey Sand with Gravel

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	92	85	67	52	36	27	22.3
Specification								

% GRAVEL =	33.3	D_{85} = 9.6	D_{15} =
% SAND =	44.4	D_{60} = 3.2	D_{10} =
% SILT & CLAY =	22.3	D_{50} = 1.7	C_U =
		D_{30} = 0.2	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-72 @ 0-0.3m

Liquid Limit: 24

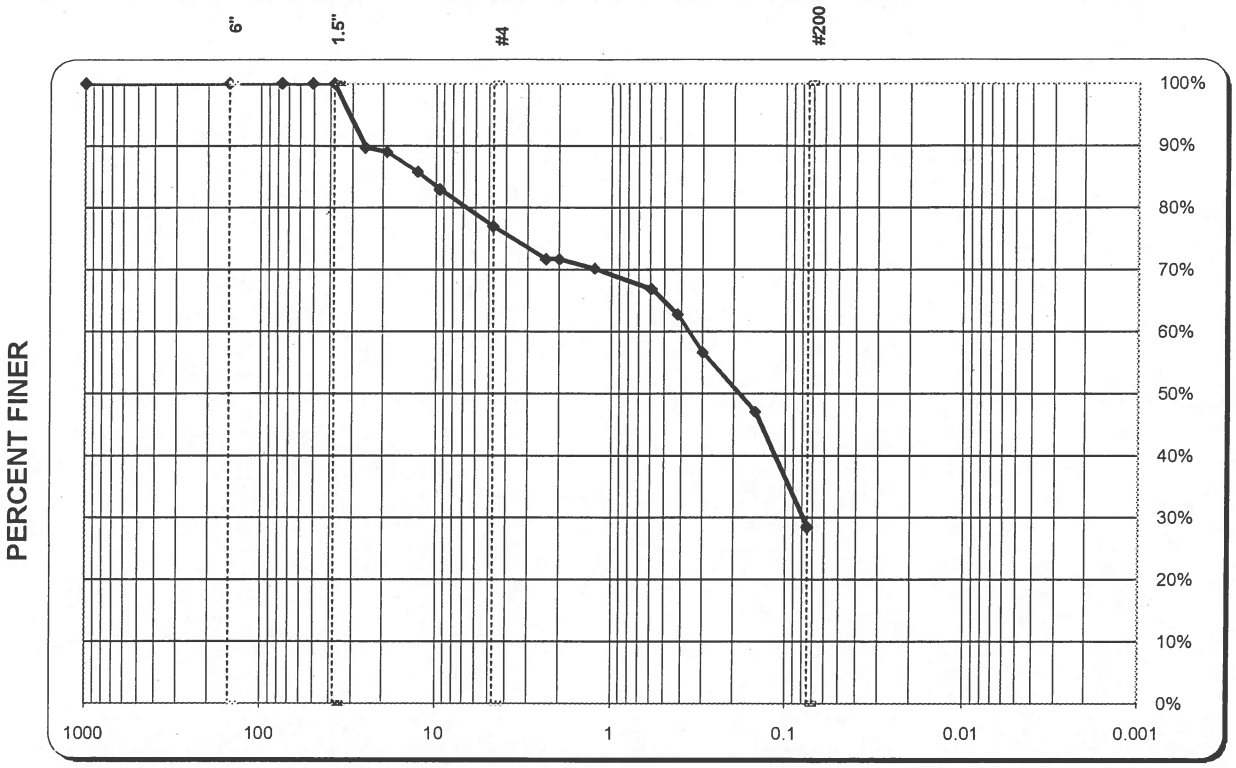
Plasticity Index: 11

USCS Classification: SC

Material Description: Gravelly 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	89	83	77	72	63	47	28.6
Specification								

% GRAVEL =	23.0	D_{85} = 11.7	D_{15} =
% SAND =	48.4	D_{60} = 0.4	D_{10} =
% SILT & CLAY =	28.6	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-74 @ 0-0.5m

Liquid Limit: 21

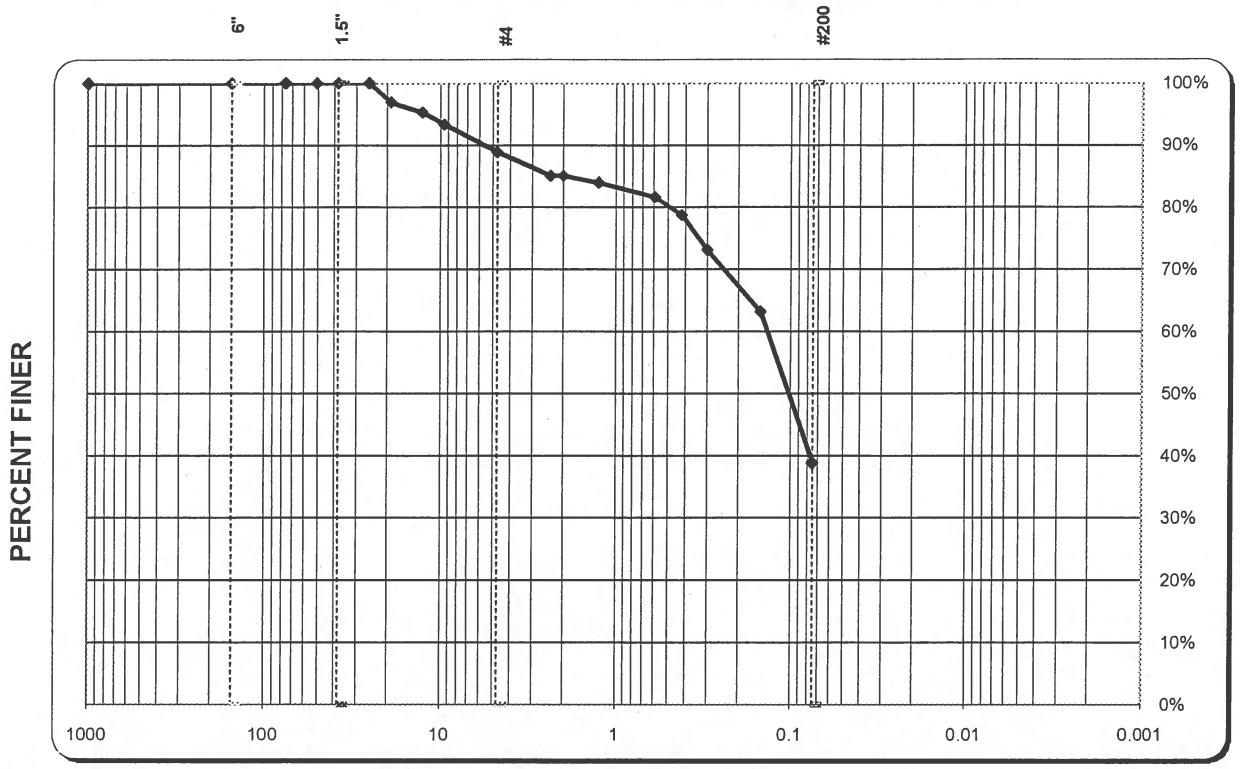
Plasticity Index: 8

USCS Classification: SC

Material Description: Clayey Sand with Gravel

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	97	93	89	85	79	63	38.9
Specification								

% GRAVEL =	11.1	D_{85} = 1.9	D_{15} =
% SAND =	50.0	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	38.9	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-75 @ 0-1.2m

Liquid Limit: 23

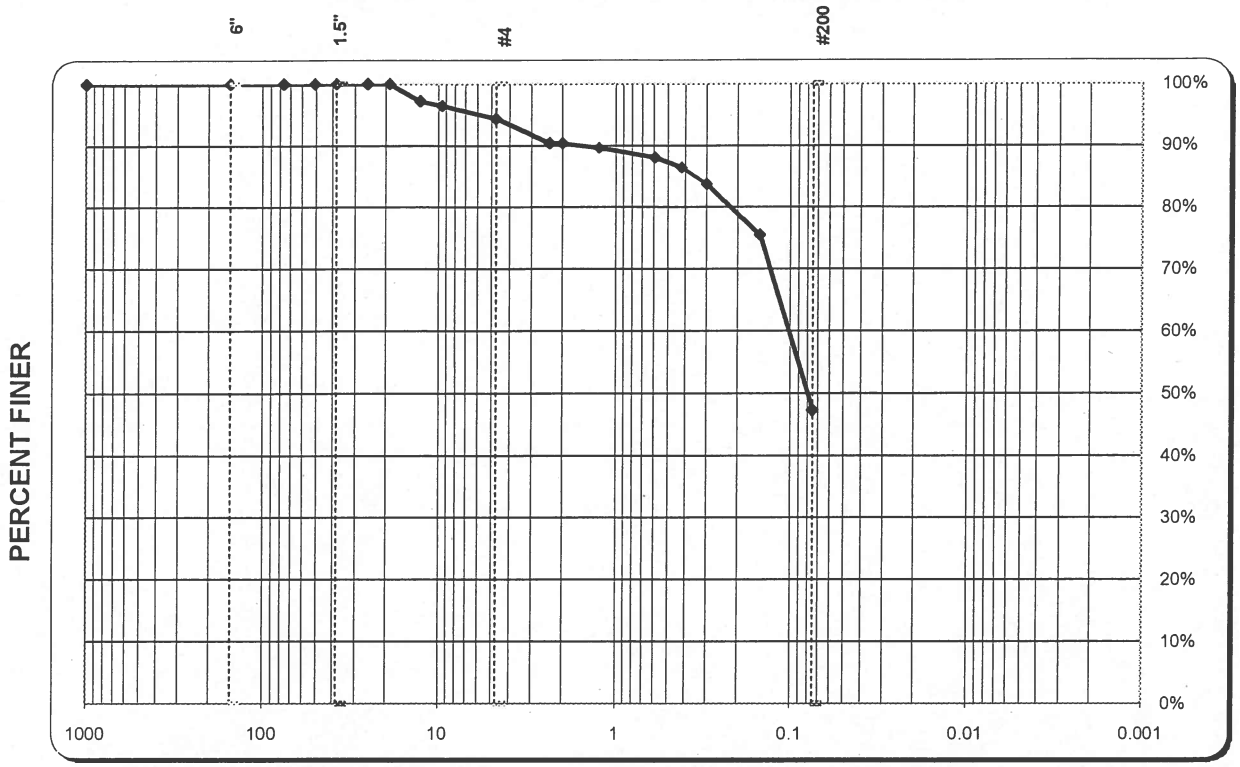
Plasticity Index: 11

USCS Classification: SC

Material Description: Clayey Sand with Gravel

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	96	94	90	86	76	47.3
Specification								

% GRAVEL =	5.6	D_{85} = 0.4	D_{15} =
% SAND =	47.1	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	47.3	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-76 @ 0-1.2m

Liquid Limit: 26

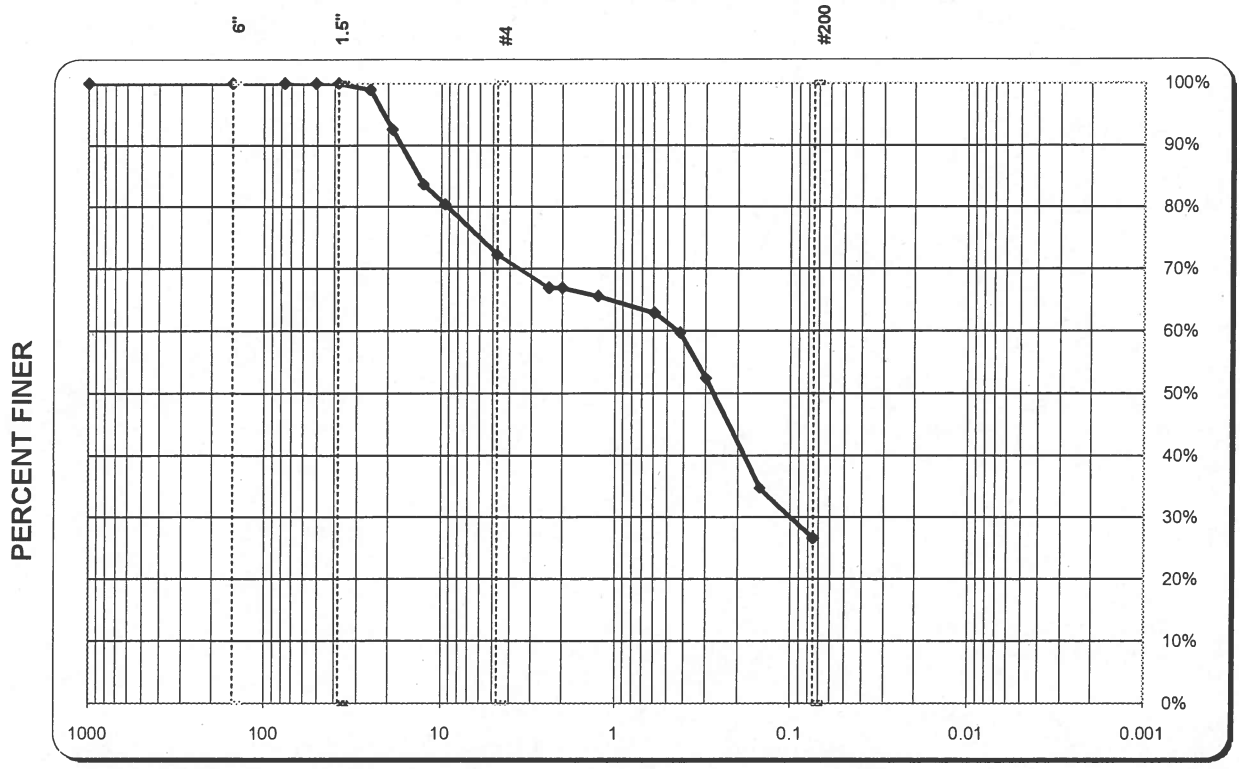
Plasticity Index: 15

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	93	80	72	67	60	35	26.7
Specification								

% GRAVEL =	27.8	D_{85} = 13.5	D_{15} =
% SAND =	45.6	D_{60} = 0.4	D_{10} =
% SILT & CLAY =	26.7	D_{50} = 0.3	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-77 @ 0-0.6m

Liquid Limit: 20

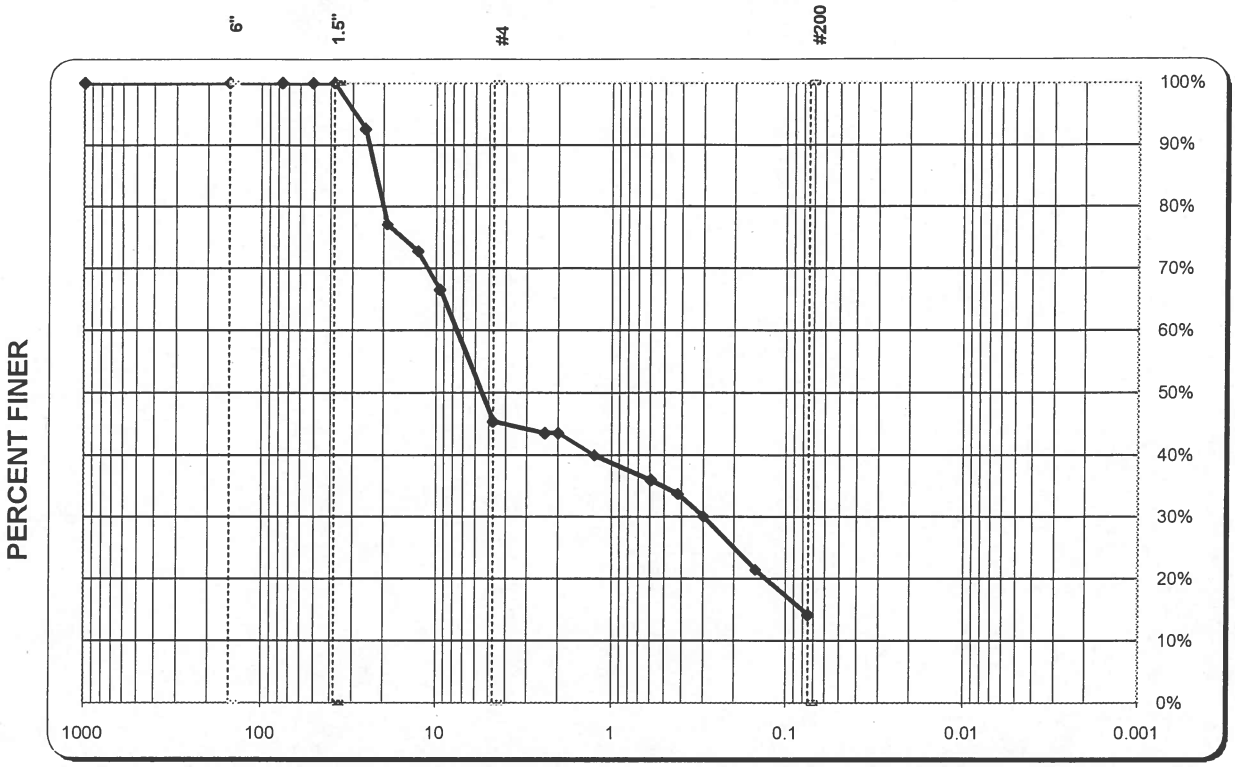
Plasticity Index: 9

USCS Classification: SC

Material Description: Clayey Sand with Gravel

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	77	67	45	44	34	21	14.2
Specification								

% GRAVEL =	54.6	D_{85} = 22.1	D_{15} = 0.1
% SAND =	31.2	D_{60} = 7.7	D_{10} =
% SILT & CLAY =	14.2	D_{50} = 5.5	C_U =
		D_{30} = 0.3	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-78 @ 0-0.3m

Liquid Limit: 19

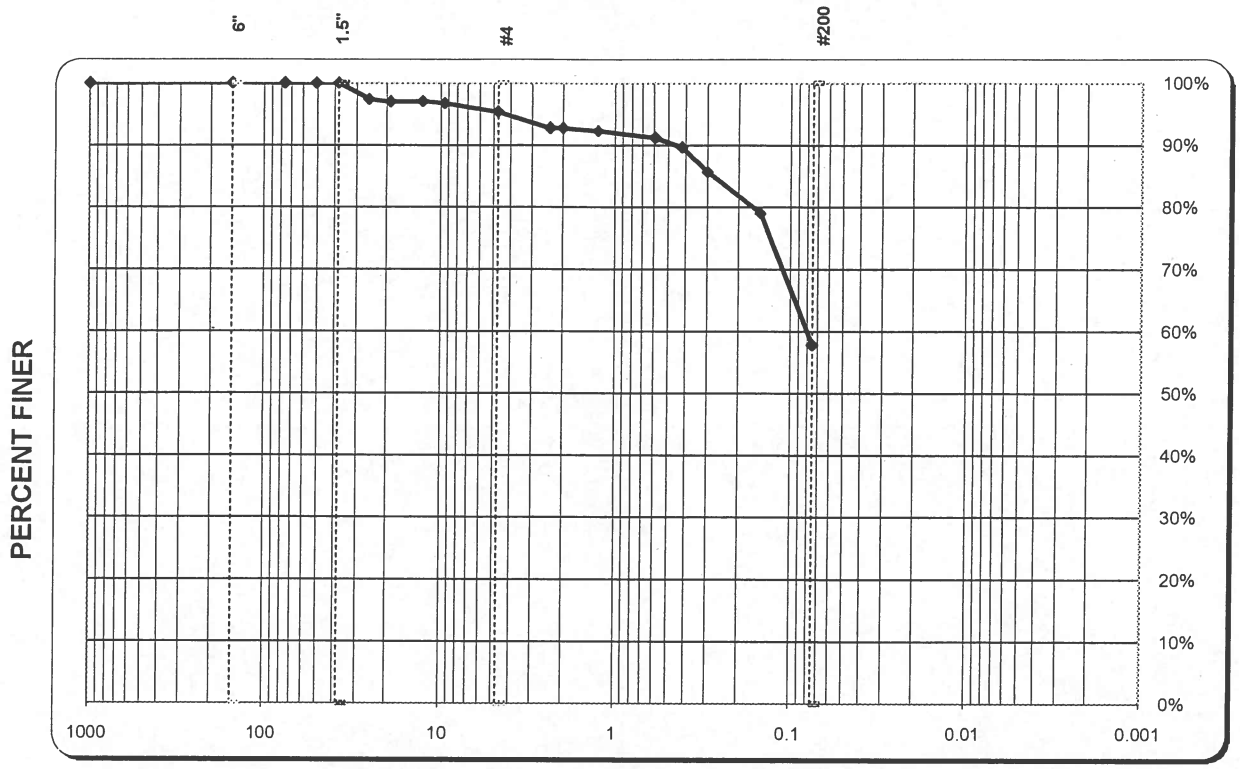
Plasticity Index: 3

USCS Classification: GM

Material Description: Silty Gravel 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	97	97	95	93	90	79	57.9
Specification								

% GRAVEL =	4.6	D_{85} = 0.3	D_{15} =
% SAND =	37.5	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	57.9	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-79 @ 0-0.9m

Liquid Limit: 30

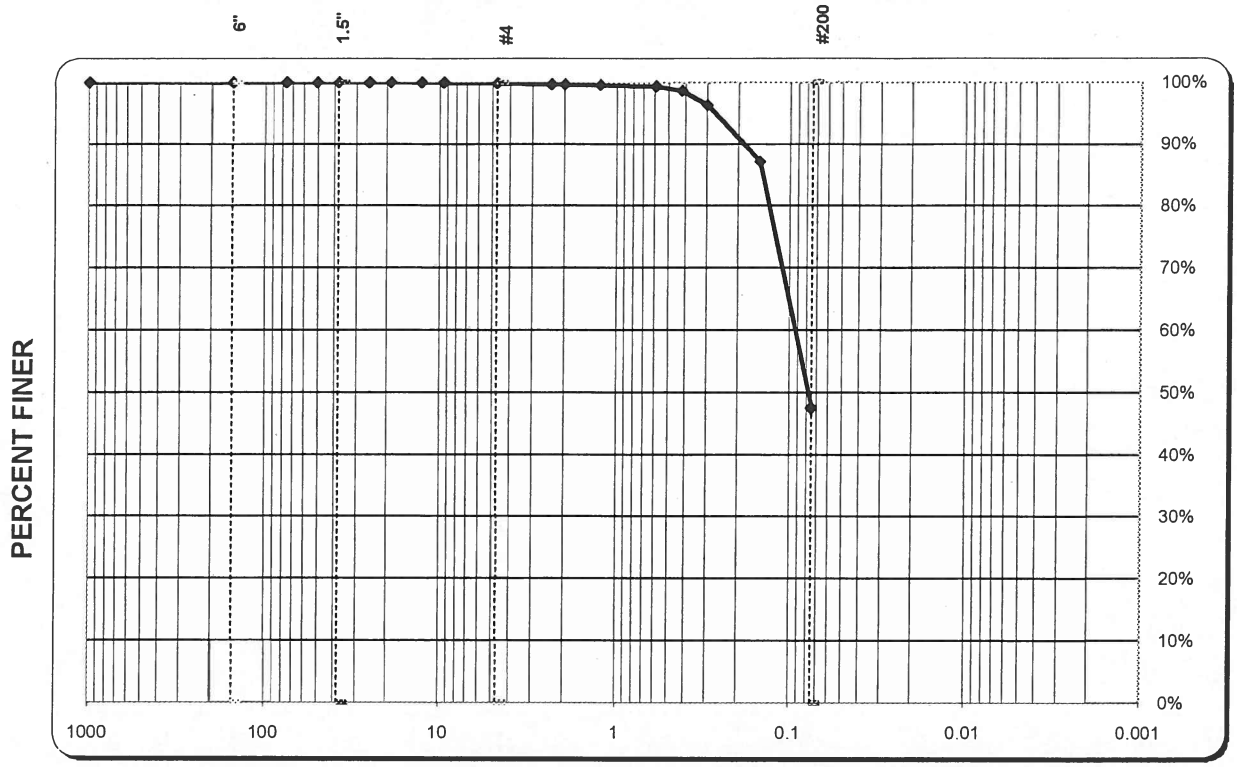
Plasticity Index: 18

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	100	100	99	87	47.6
Specification								

% GRAVEL =	0.1	D_{85} = 0.1	D_{15} =
% SAND =	52.3	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	47.6	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-80 @ 0-1.2m

Liquid Limit: 23

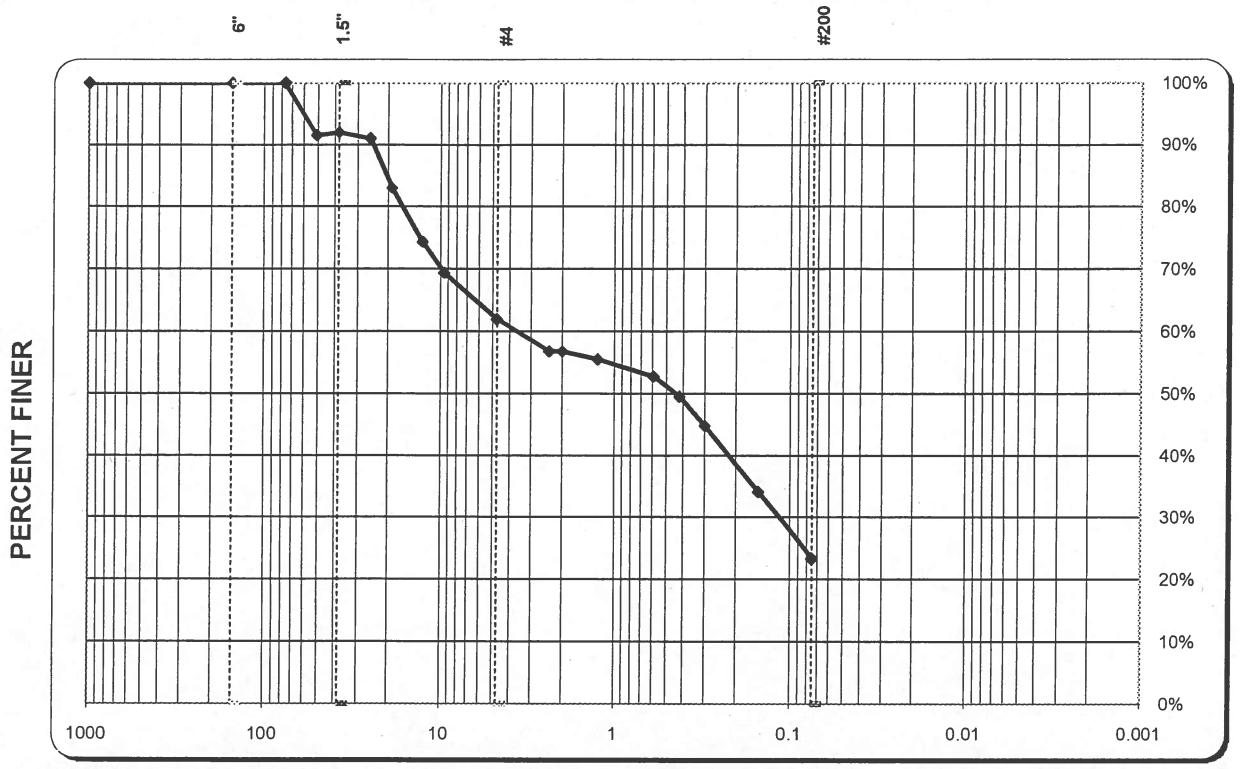
Plasticity Index: 10

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)	92	83	69	62	57	50	34	23.4
Specification								

% GRAVEL =	38.0	D_{85} = 20.5	D_{15} =
% SAND =	38.6	D_{60} = 3.4	D_{10} =
% SILT & CLAY =	23.4	D_{50} = 0.4	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-81 @ 0-0.6m

Liquid Limit: 19

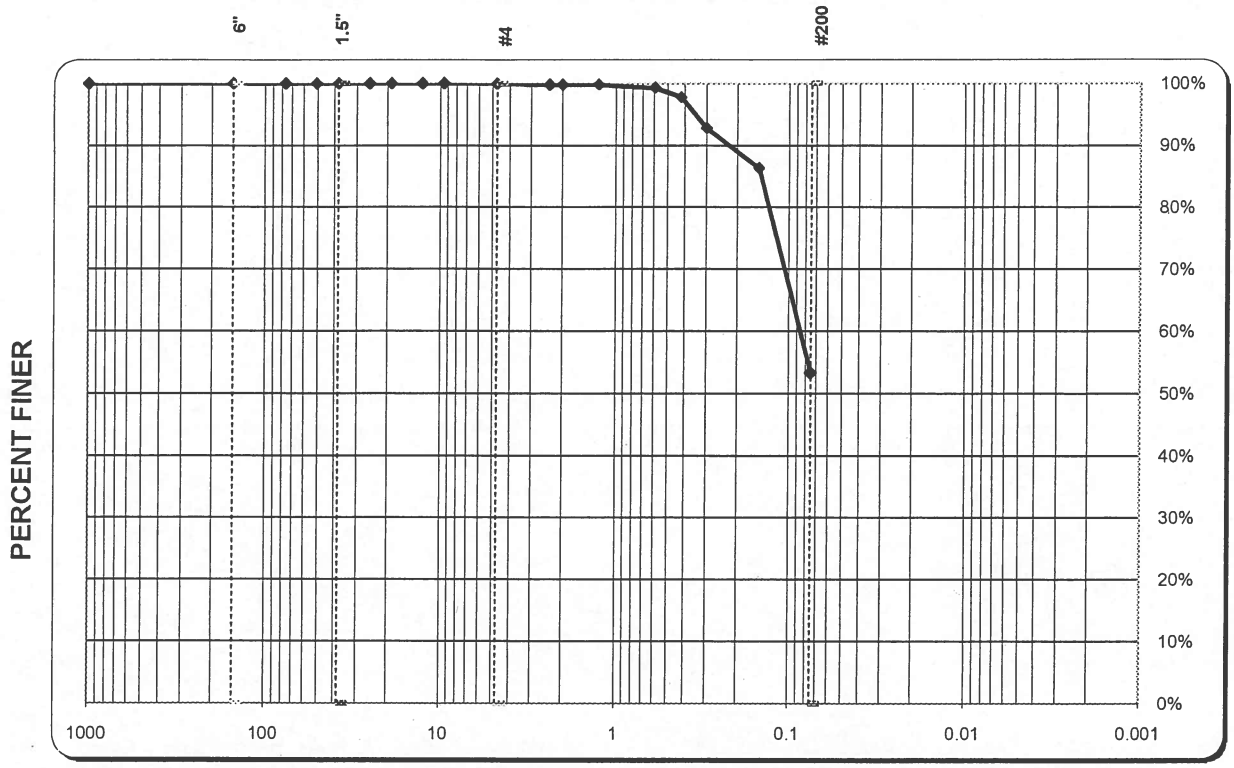
Plasticity Index: 6

USCS Classification: SC-SM

Material Description: Gravelly 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	100	98	86	53.3
Specification								

% GRAVEL =	0.1	D_{85} = 0.1	D_{15} =
% SAND =	46.7	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	53.3	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-82 @ 0-1.2m

Liquid Limit: 22

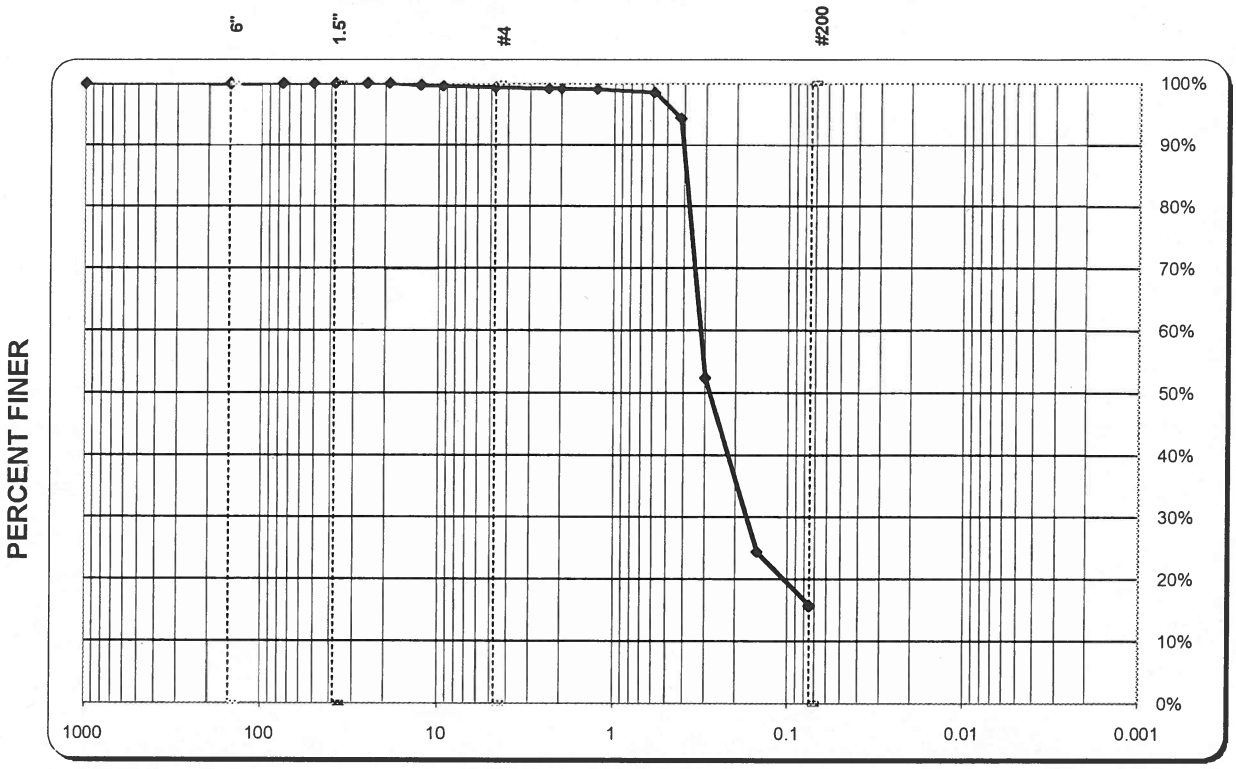
Plasticity Index: 8

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	99	94	24	15.7
Specification								

% GRAVEL =	0.7	D_{85} = 0.4	D_{15} =
% SAND =	83.6	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	15.7	D_{50} = 0.3	C_U =
		D_{30} = 0.2	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-84 @ 0-0.5m

Liquid Limit: NV

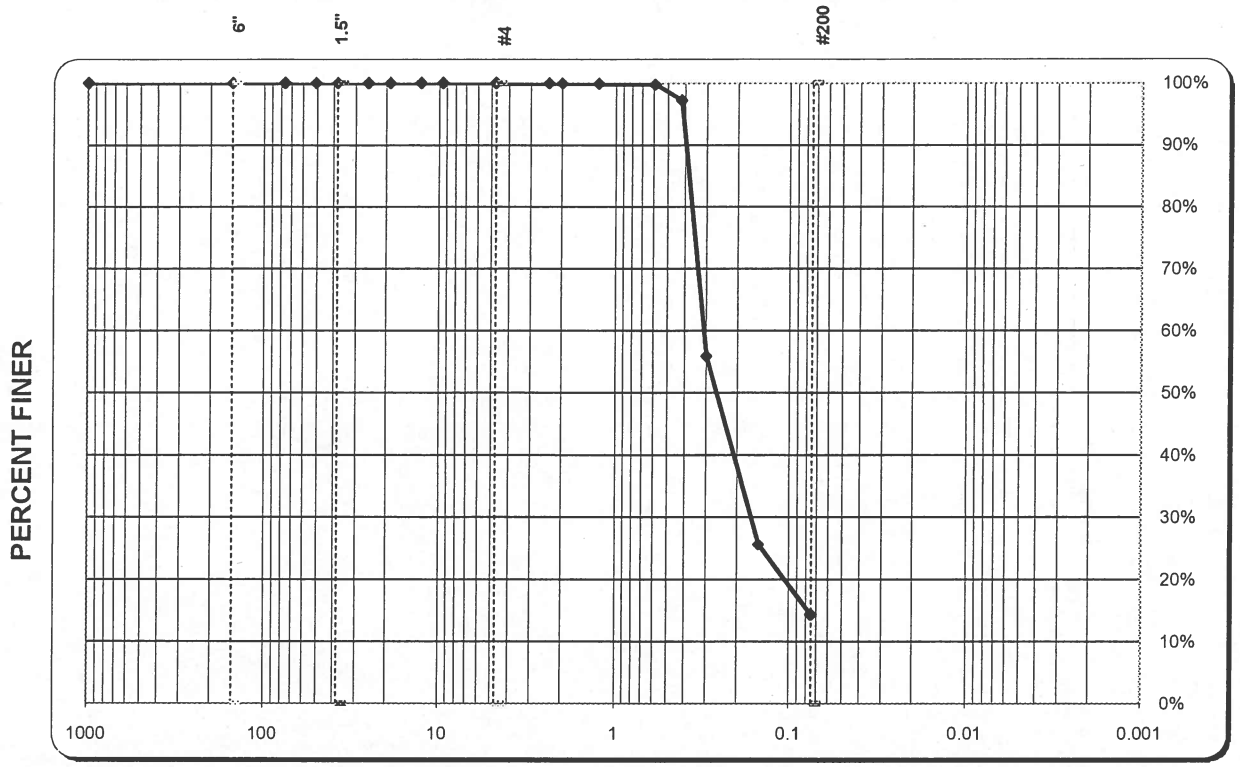
Plasticity Index: NP

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	97	26	14.4
Specification								

% GRAVEL =	0.0	D_{85} = 0.4	D_{15} = 0.1
% SAND =	85.6	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	14.4	D_{50} = 0.3	C_U =
		D_{30} = 0.2	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-85 @ 0-0.3m

Liquid Limit: NV

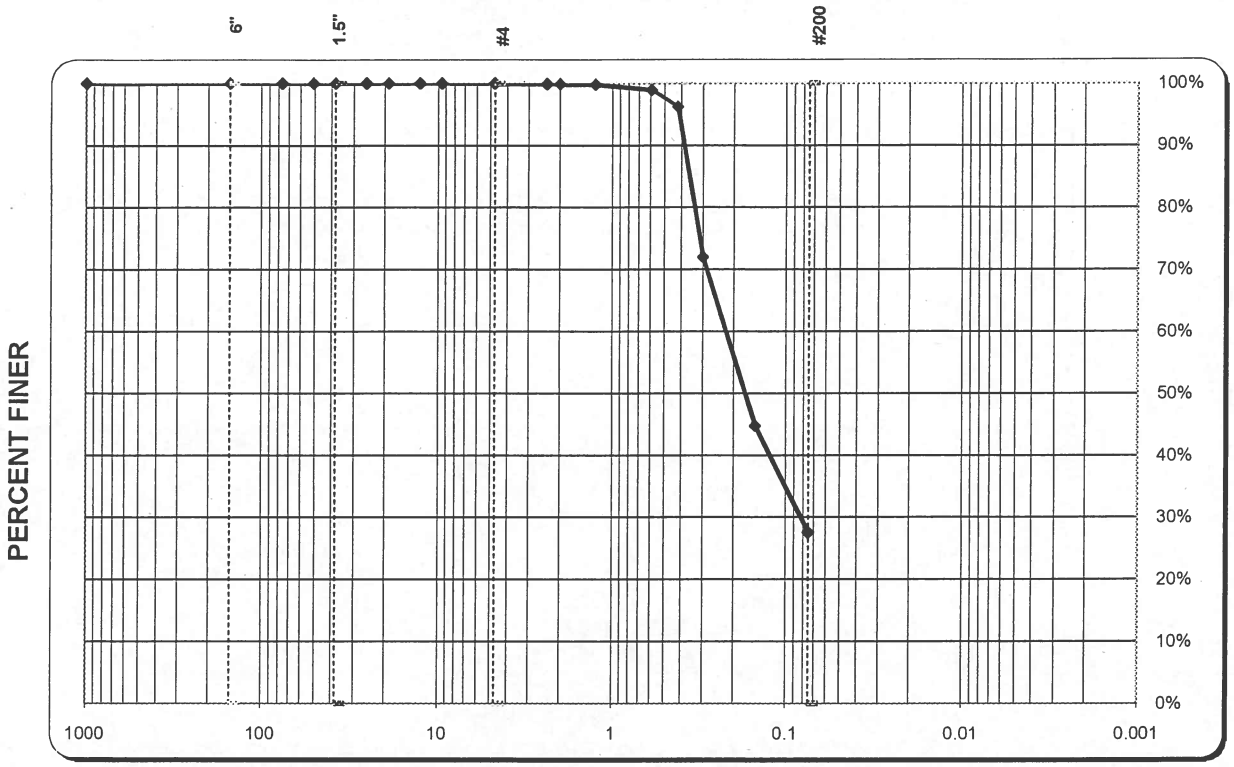
Plasticity Index: NP

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	96	45	27.6
Specification								

% GRAVEL =	0.0	D_{85} = 0.4	D_{15} =
% SAND =	72.4	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	27.6	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-86 @ 0-1.1m

Liquid Limit: 17

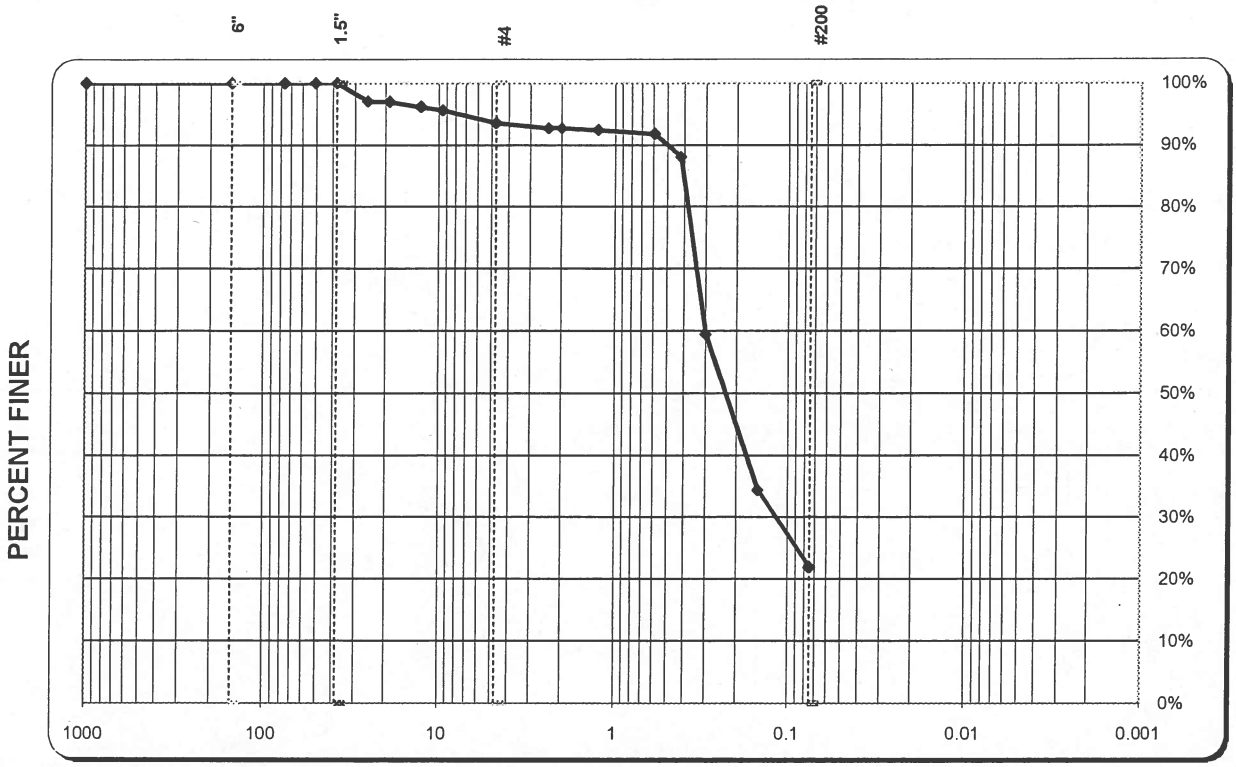
Plasticity Index: 2

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	97	96	94	93	88	34	22.0
Specification								

% GRAVEL =	6.4	D_{85} = 0.4	D_{15} =
% SAND =	71.6	D_{60} = 0.3	D_{10} =
% SILT & CLAY =	22.0	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-87 @ 0-0.9m

Liquid Limit: 17

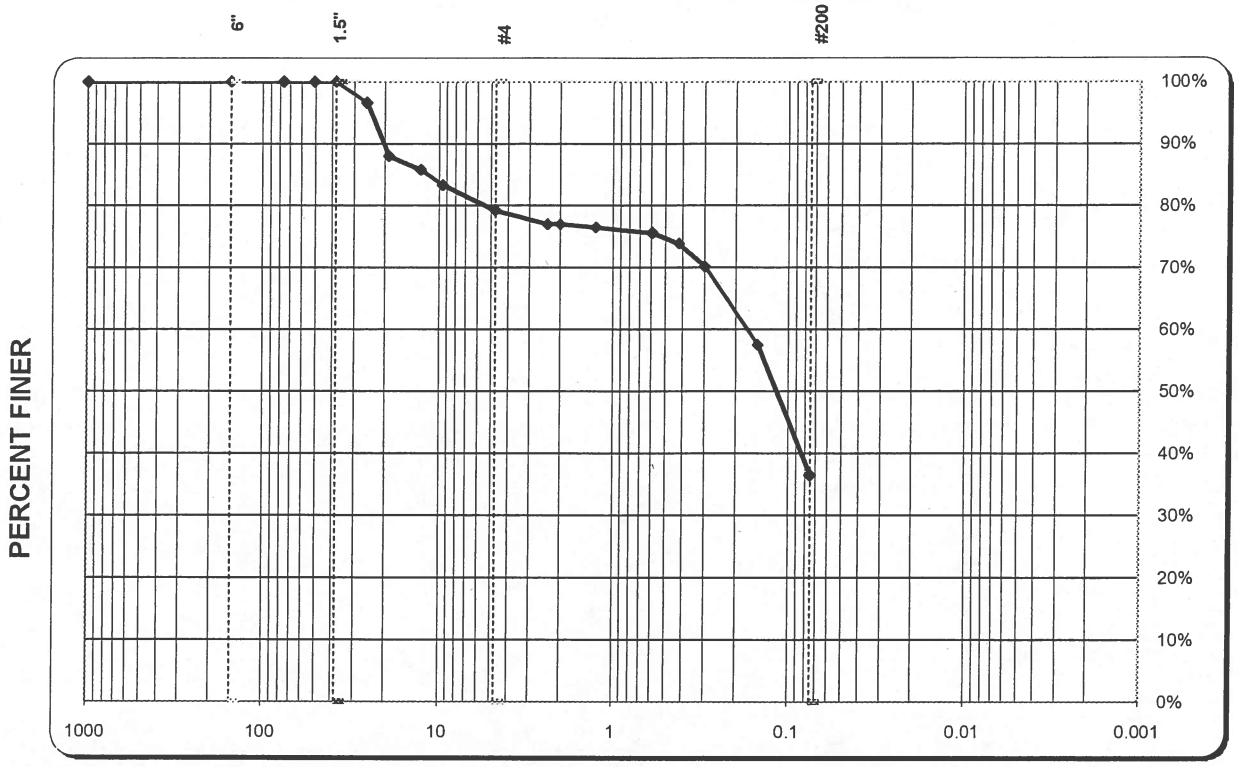
Plasticity Index: 2

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	88	83	79	77	74	57	36.5
Specification								

% GRAVEL =	20.7	D_{85} = 11.6	D_{15} =
% SAND =	42.8	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	36.5	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-88 @ 0-1.1m

Liquid Limit: 22

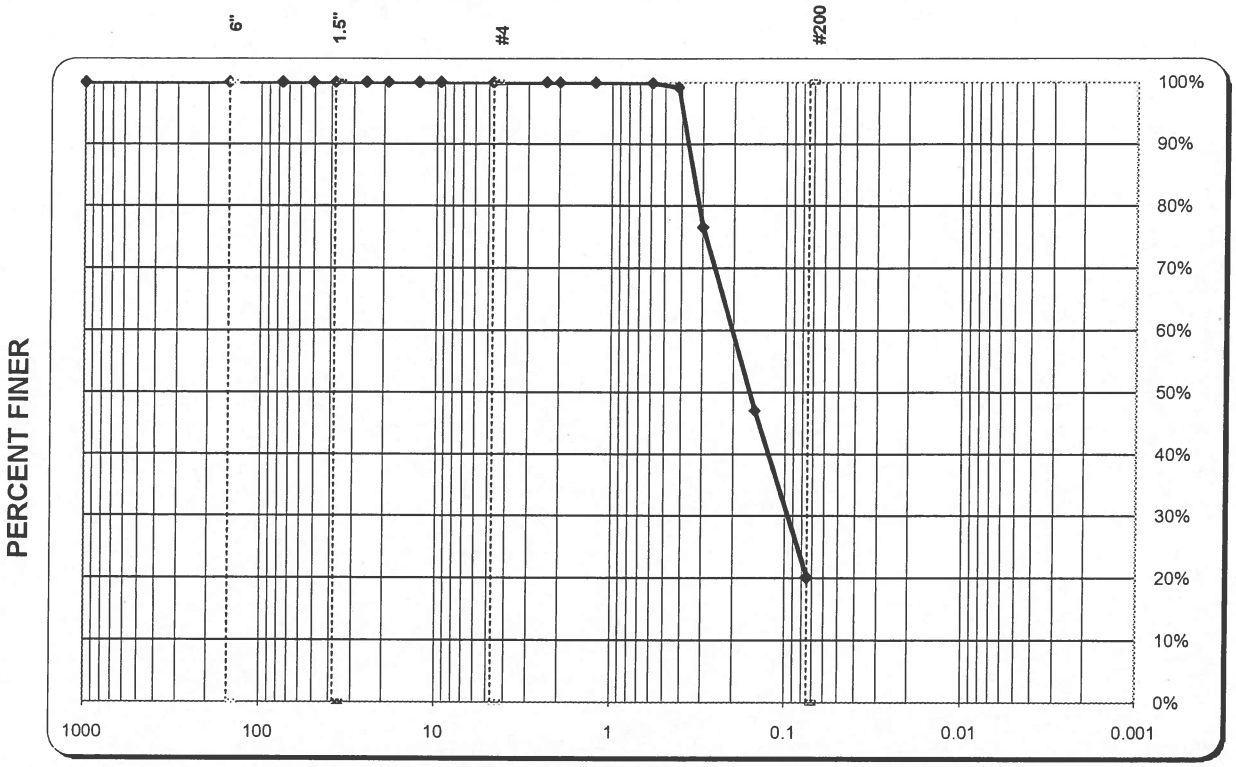
Plasticity Index: 7

USCS Classification: SM

Material Description: Silty Sand with Gravel

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	99	47	20.1
Specification								

% GRAVEL =	0.0	D_{85} = 0.3	D_{15} =
% SAND =	79.8	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	20.1	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-89 @ 0-0.9m

Liquid Limit: NV

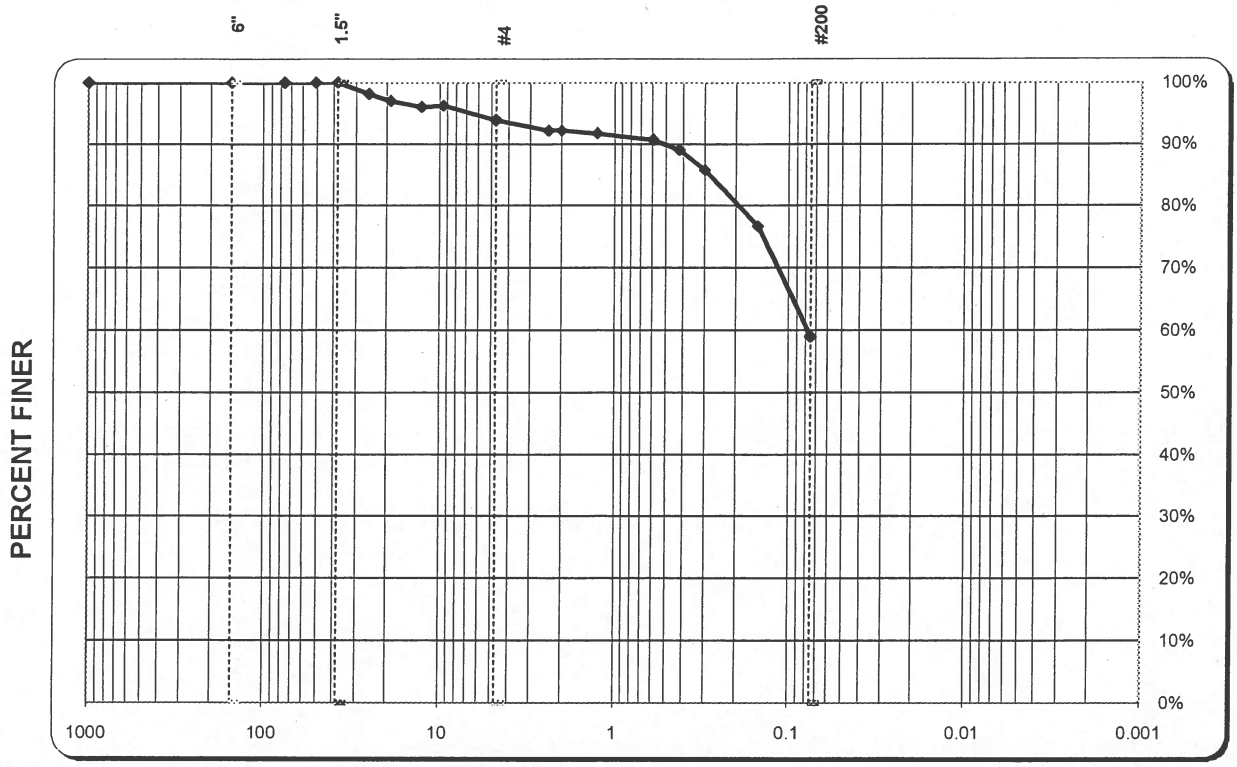
Plasticity Index: NP

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	97	96	94	92	89	77	59.0
Specification								

% GRAVEL =	6.1	D_{85} = 0.3	D_{15} =
% SAND =	34.9	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	59.0	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-90 @ 0-1.2m

Liquid Limit: 25

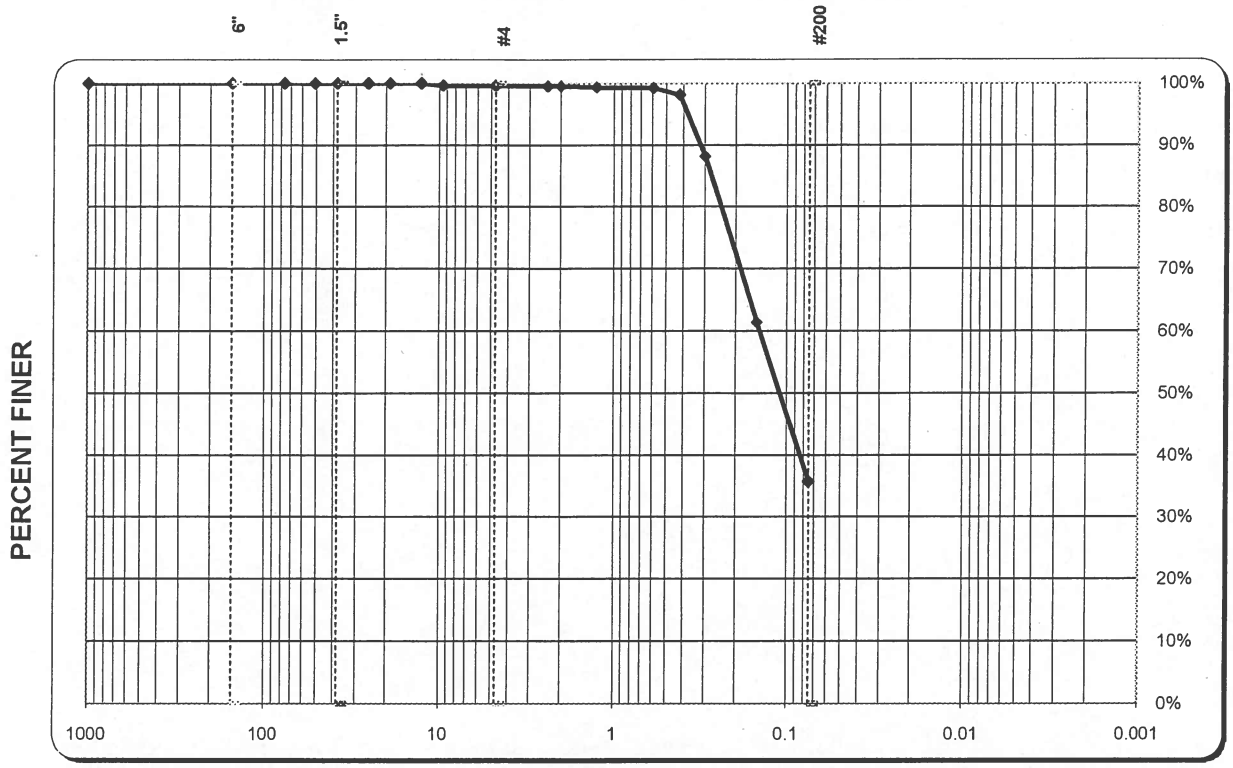
Plasticity Index: 11

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	100	100	98	61	35.8
Specification								

% GRAVEL =	0.4	D_{85} = 0.3	D_{15} =
% SAND =	63.8	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	35.8	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-91 @ 0-1.2m

Liquid Limit: 20

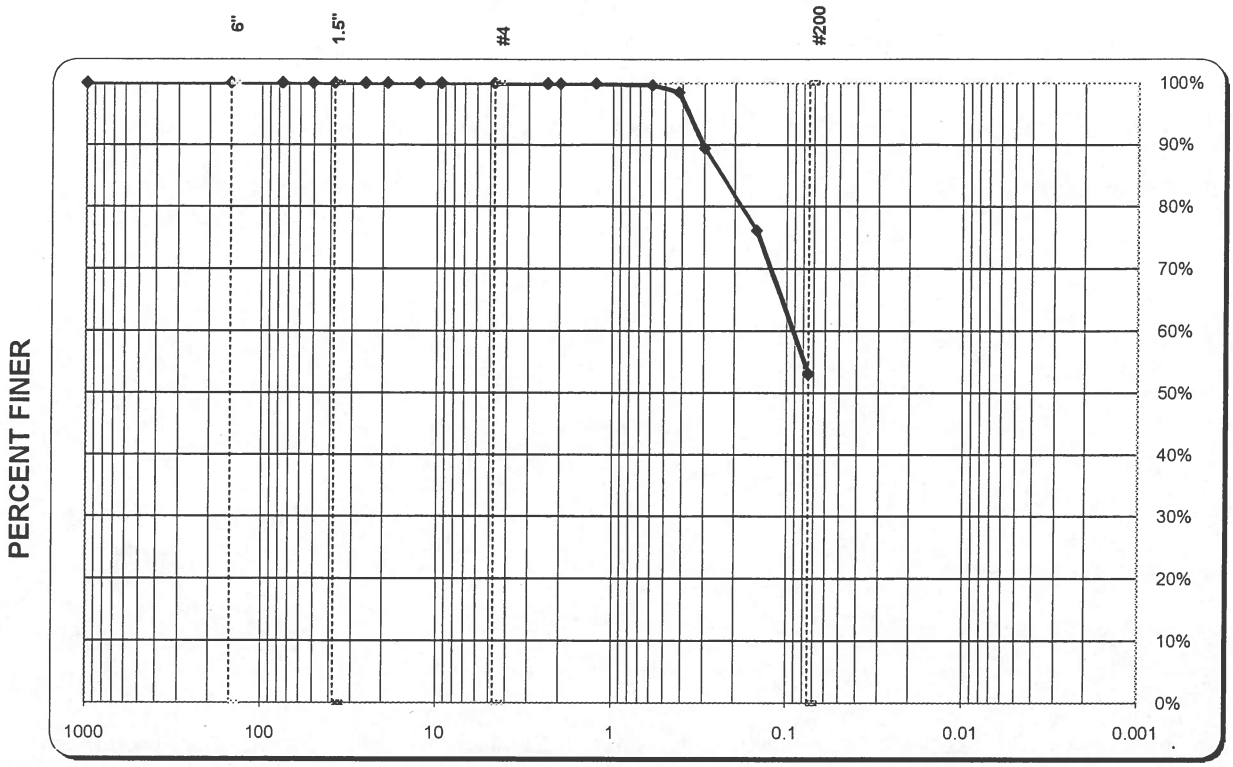
Plasticity Index: 6

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	100	99	76	53.1
Specification								

% GRAVEL =	0.0	D_{85} = 0.2	D_{15} =
% SAND =	46.8	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	53.1	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-92 @ 0-1.2m

Liquid Limit: 24

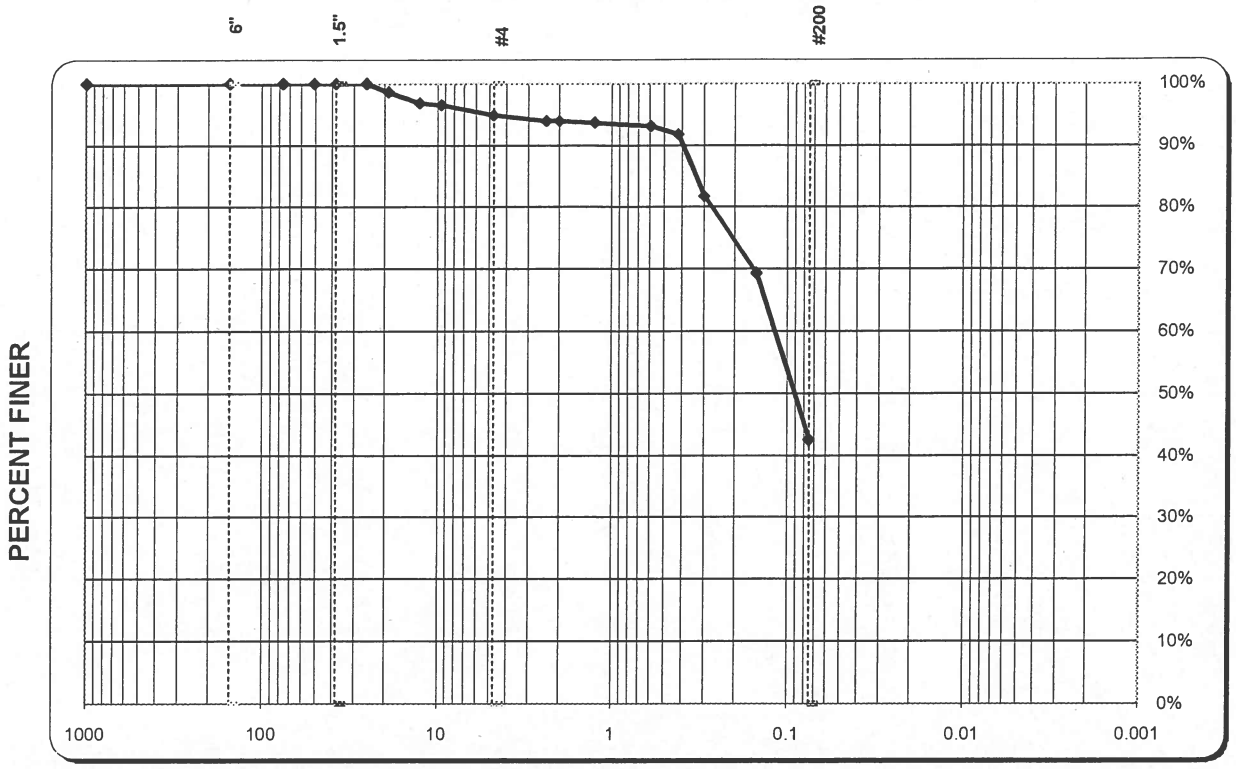
Plasticity Index: 12

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	99	97	95	94	92	69	42.6
Specification								

% GRAVEL =	5.1	D_{85} = 0.3	D_{15} =
% SAND =	52.3	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	42.6	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-93 @ 0-0.8m

Liquid Limit: 23

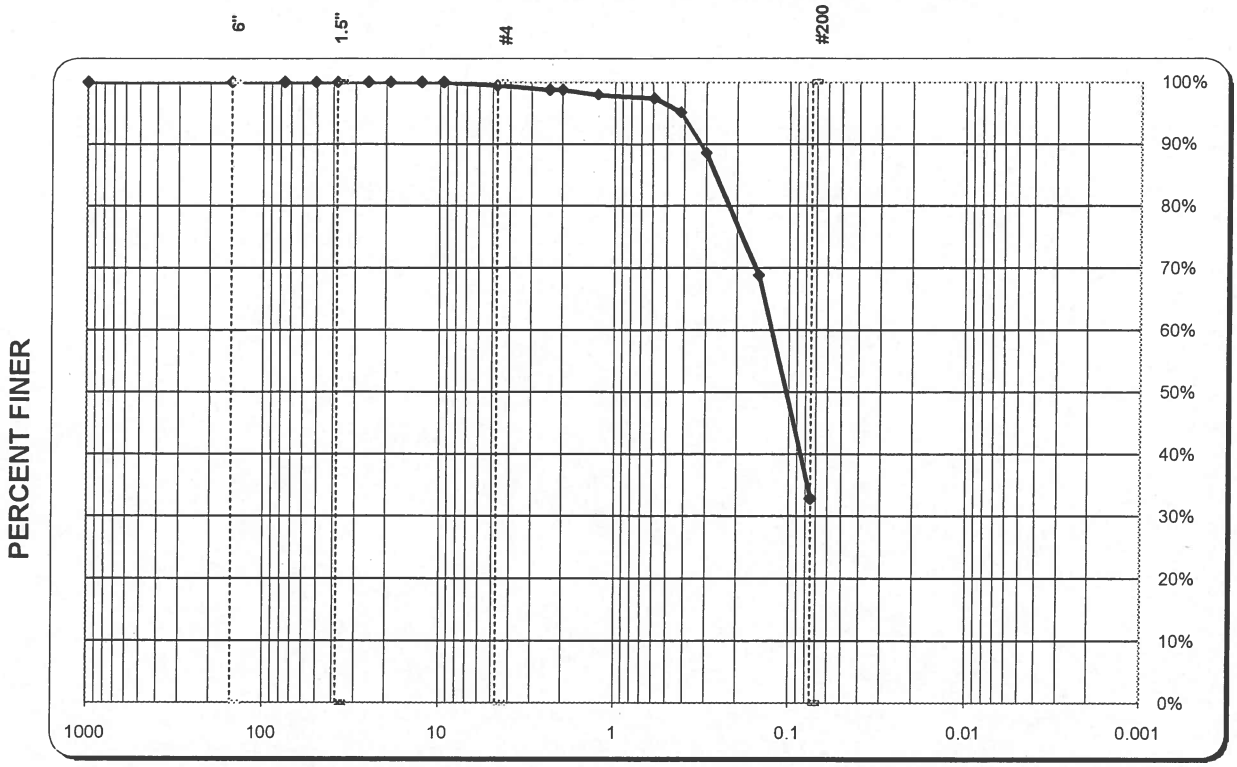
Plasticity Index: 10

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	99	95	69	32.8
Specification								

% GRAVEL =	0.6	D_{85} = 0.3	D_{15} =
% SAND =	66.6	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	32.8	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-94 @ 0-1.2m

Liquid Limit: 19

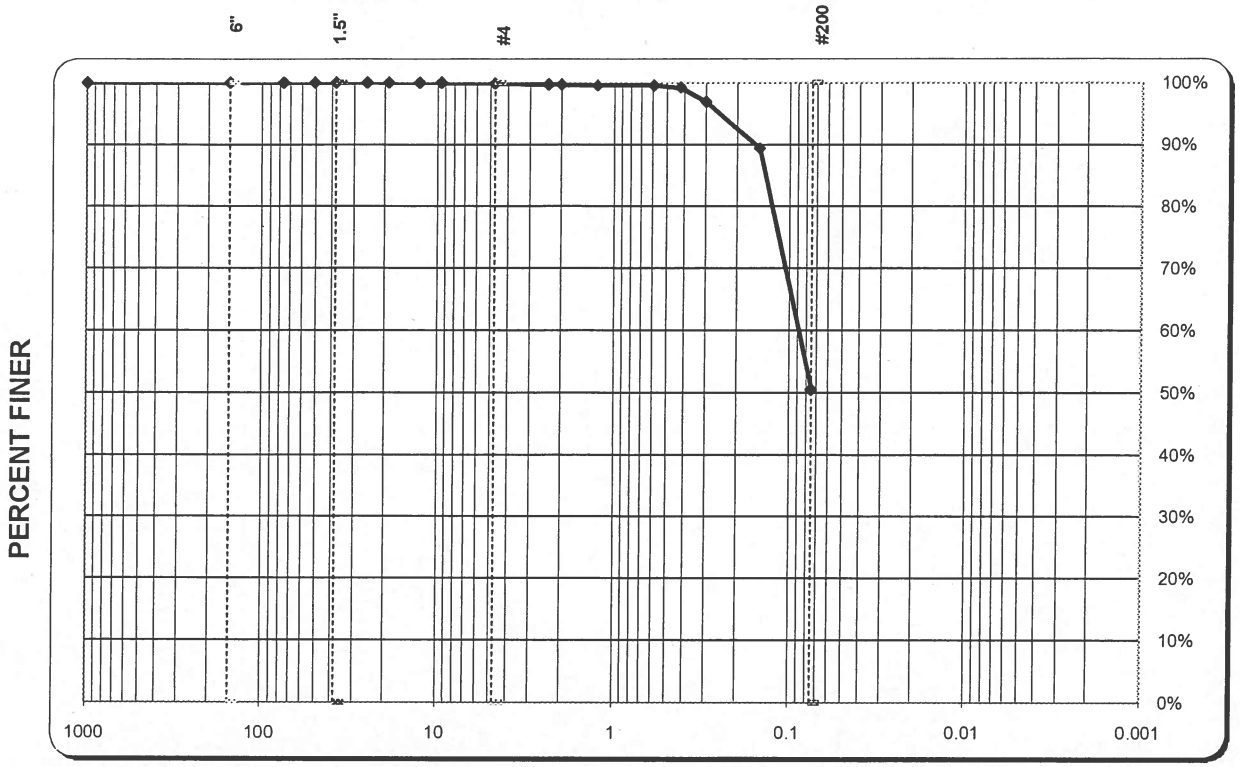
Plasticity Index: 4

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	100	99	89	50.6
Specification								

% GRAVEL =	0.2	D_{85} = 0.1	D_{15} =
% SAND =	49.3	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	50.6	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-95 @ 0-0.9m

Liquid Limit: 23

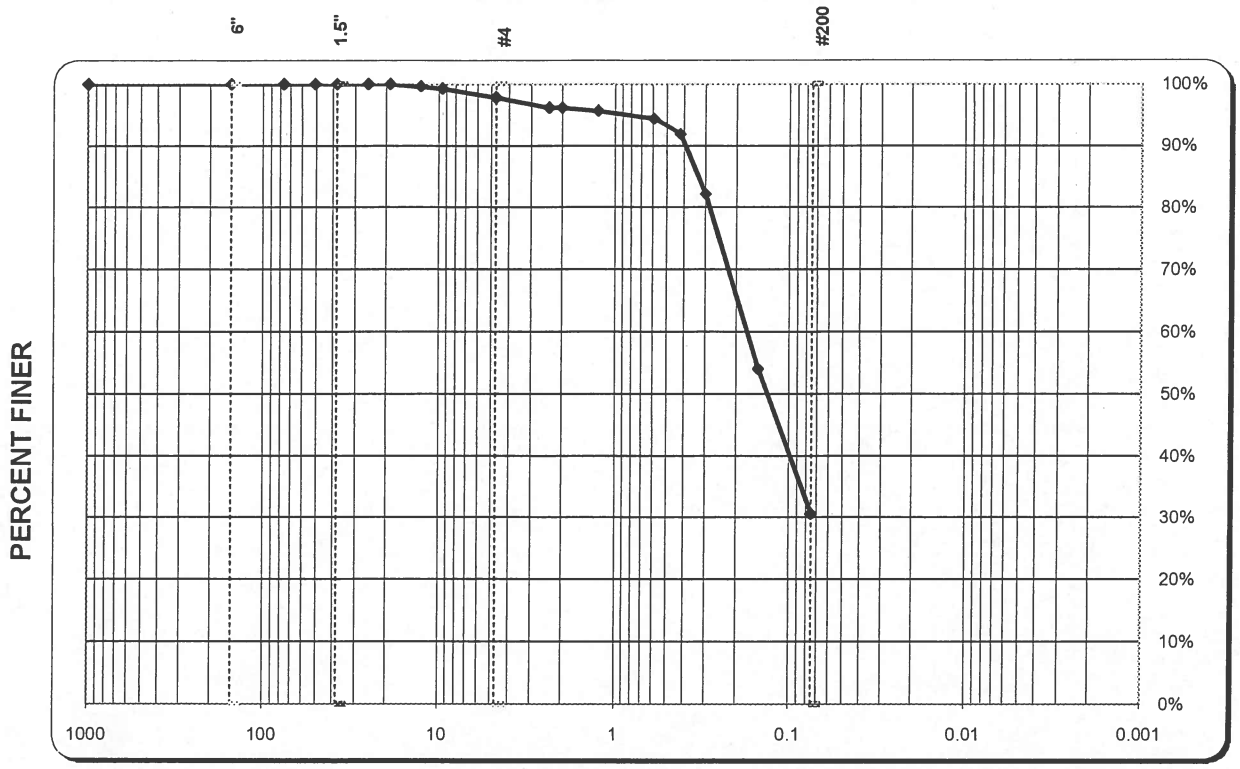
Plasticity Index: 6

USCS Classification: CL-ML

Material Description: Sandy Clayey Silt

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	99	98	96	92	54	30.6
Specification								

% GRAVEL =	2.2	D_{85} = 0.3	D_{15} =
% SAND =	67.3	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	30.6	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-96 @ 0-1.2m

Liquid Limit: 18

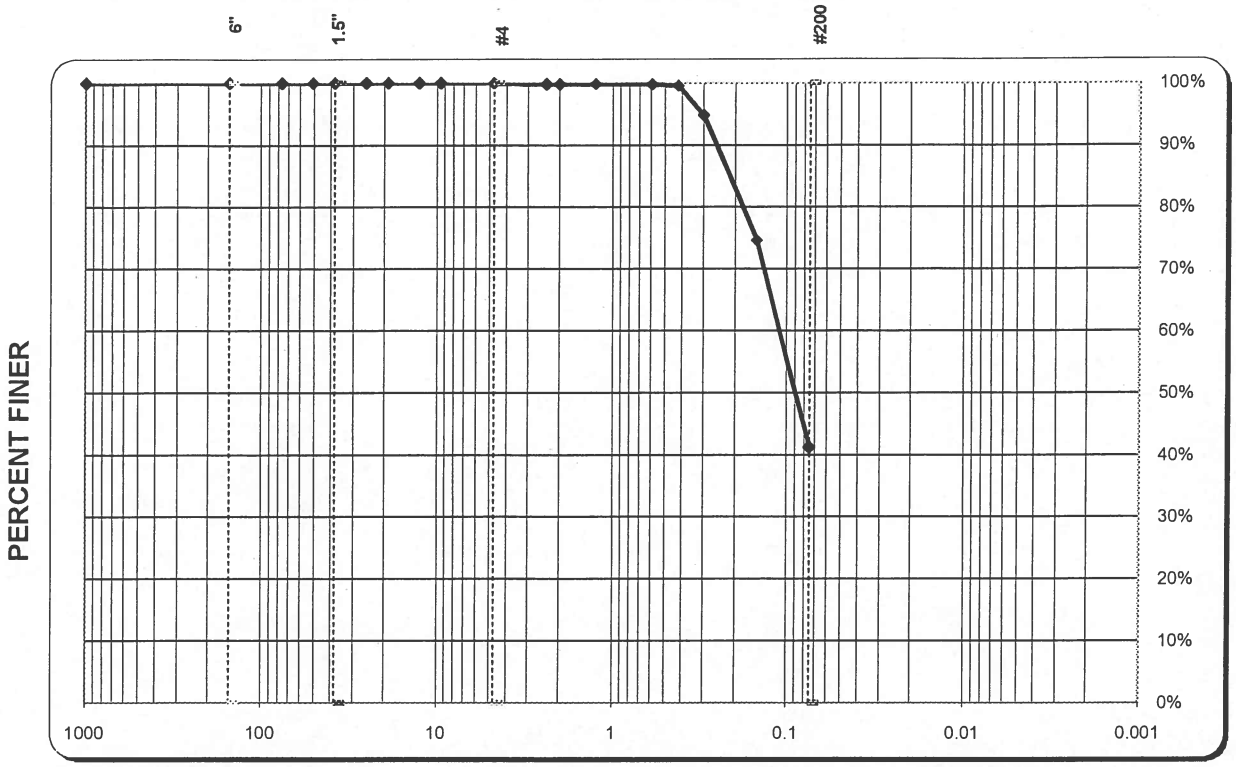
Plasticity Index: 4

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	100	100	75	41.2
Specification								

% GRAVEL =	0.1	D_{85} = 0.2	D_{15} =
% SAND =	58.7	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	41.2	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-97 @ 0-1.2m

Liquid Limit: 20

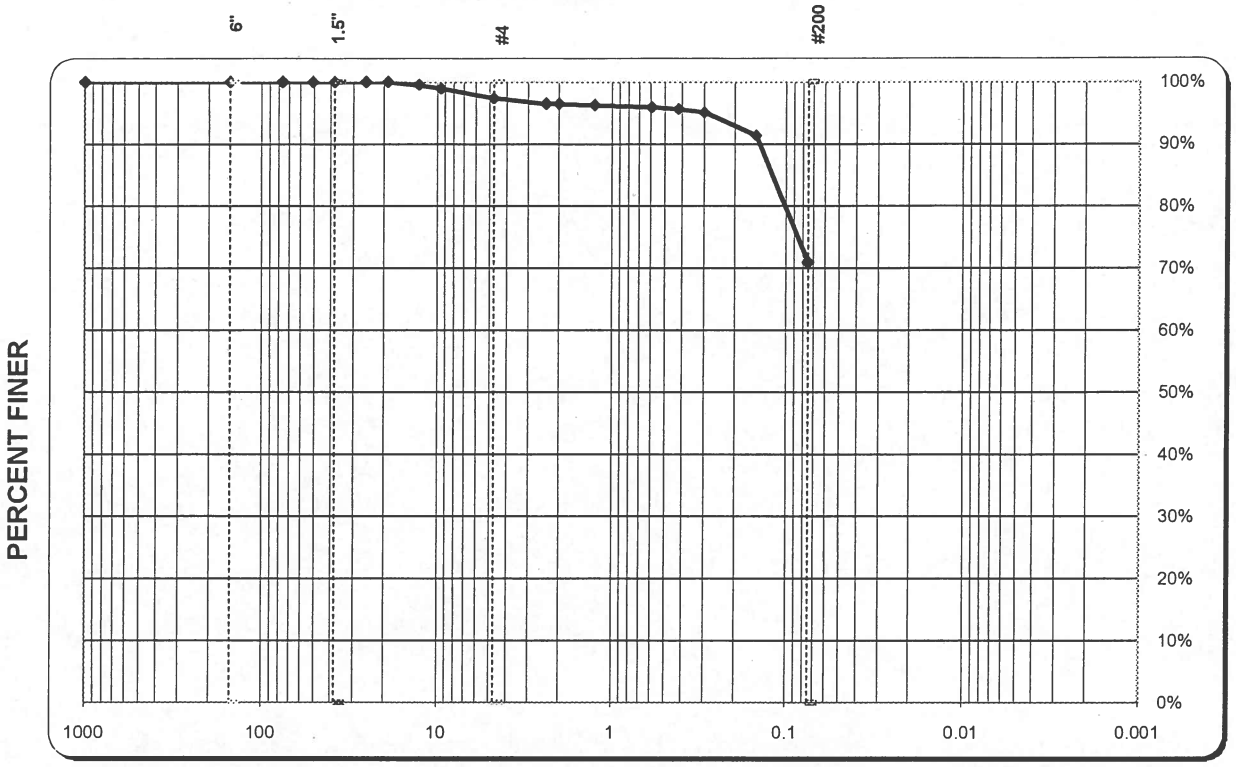
Plasticity Index: 3

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	99	97	96	96	91	71.0
Specification								

% GRAVEL =	2.6	D_{85} = 0.1	D_{15} =
% SAND =	26.4	D_{60} =	D_{10} =
% SILT & CLAY =	71.0	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-98 @ 0-0.3m

Liquid Limit: 24

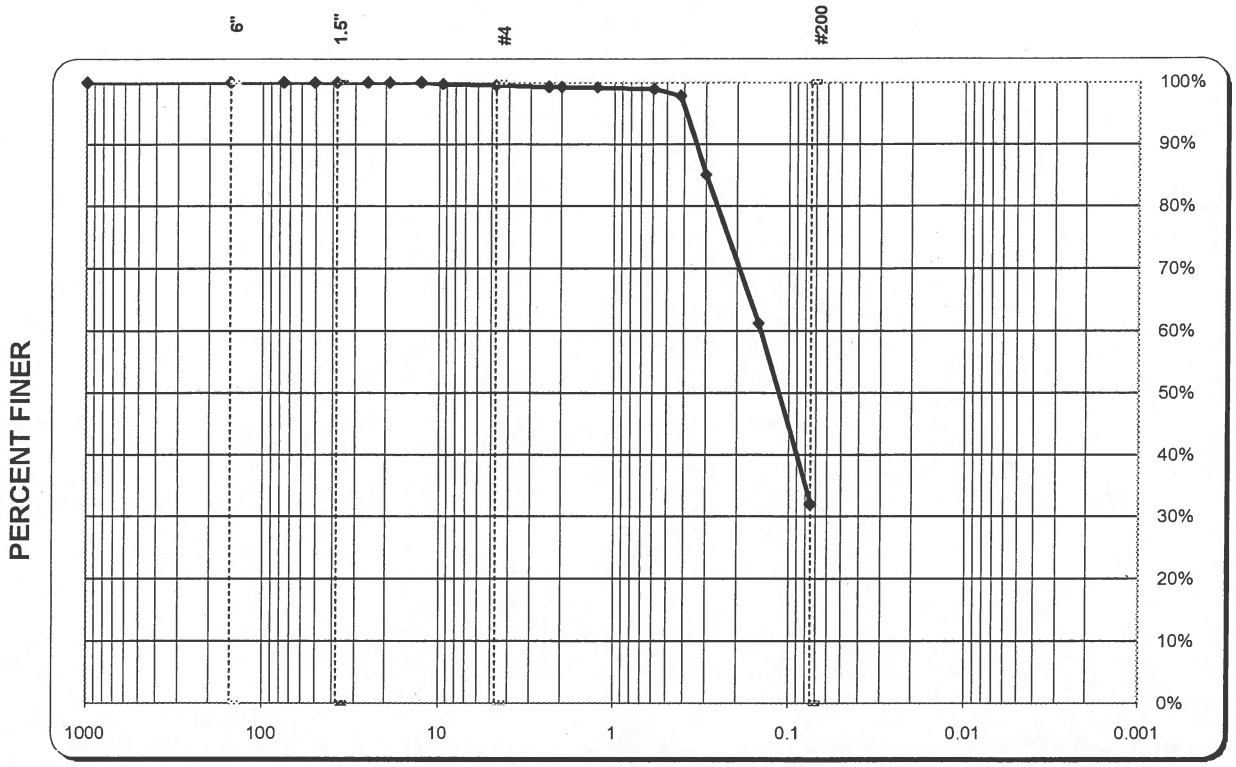
Plasticity Index: 11

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	100	100	100	99	98	61	32.1
Specification								

% GRAVEL =	0.5	D_{85} = 0.3	D_{15} =
% SAND =	67.5	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	32.1	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-99 @ 0-1.2m

Liquid Limit: 19

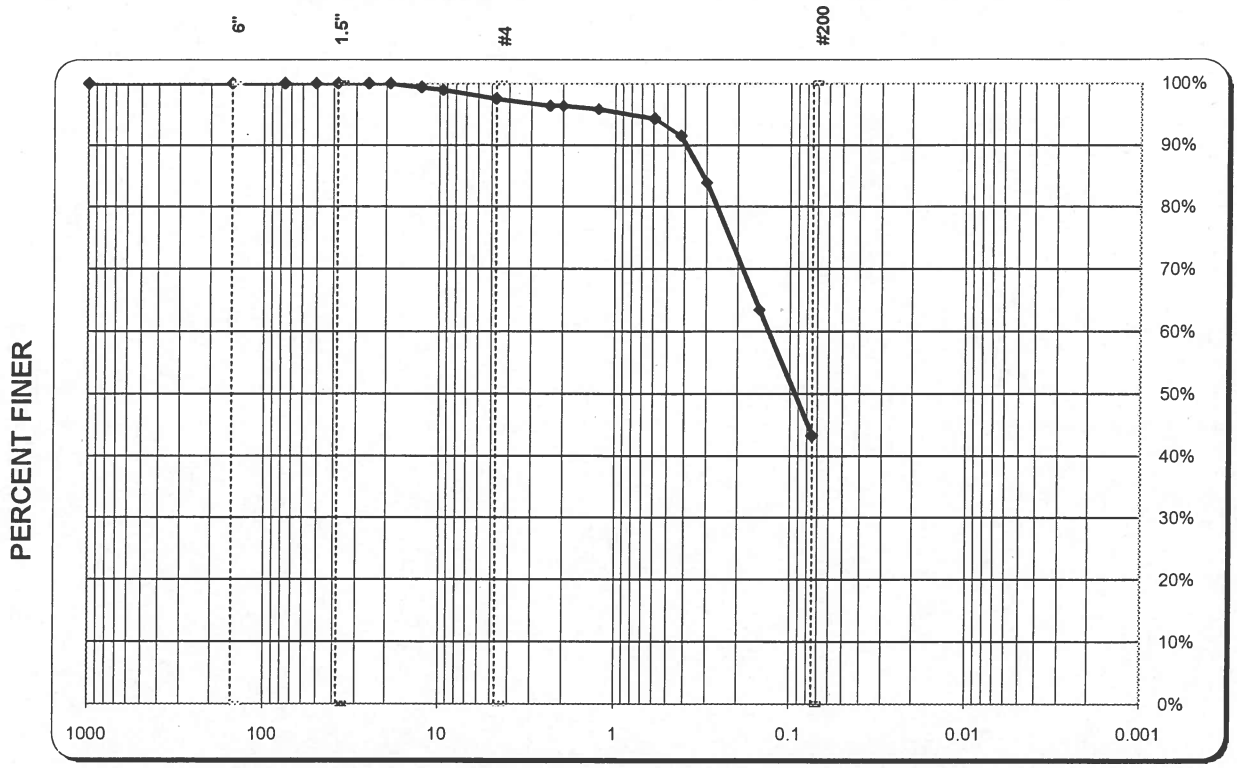
Plasticity Index: 4

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	99	98	96	92	63	43.3
Specification								

% GRAVEL =	2.5	D_{85} = 0.3	D_{15} =
% SAND =	54.2	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	43.3	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-100 @ 0-1.2m

Liquid Limit: 20

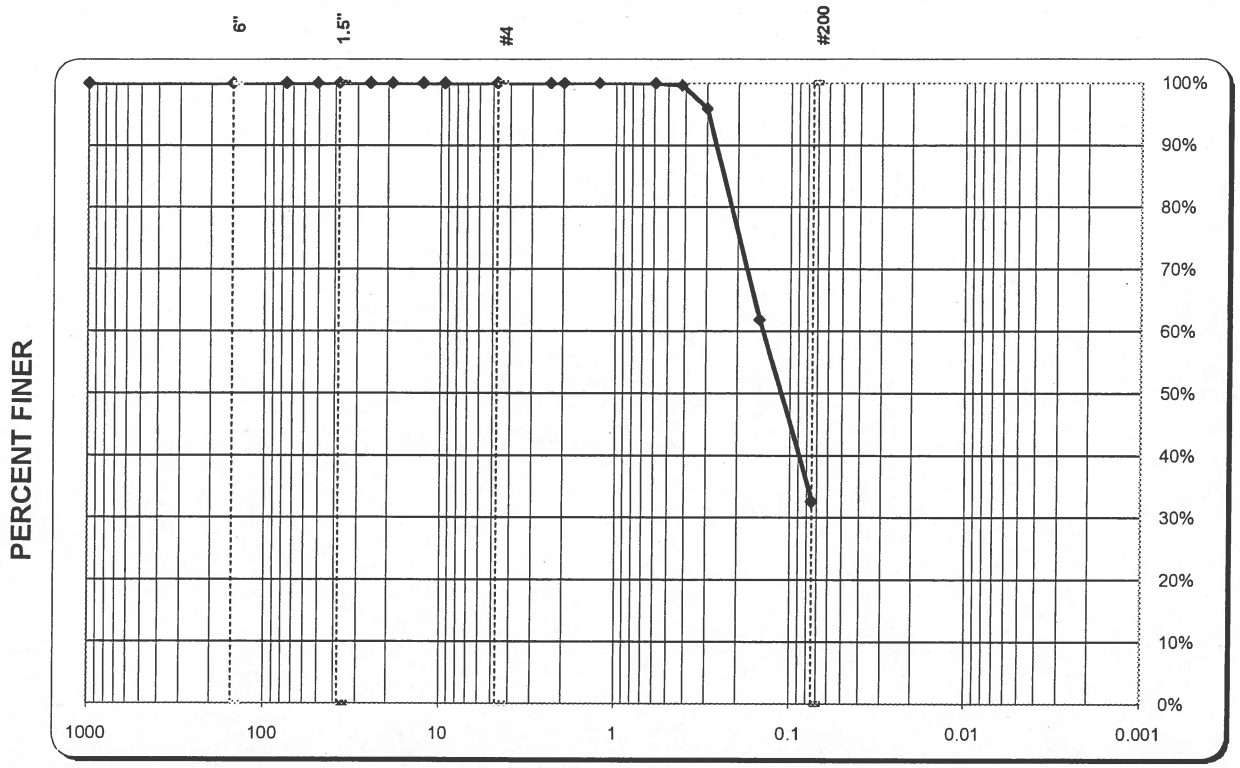
Plasticity Index: 6

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	100	100	62	32.7
Specification								

% GRAVEL =	0.0	D_{85} = 0.2	D_{15} =
% SAND =	67.3	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	32.7	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-101 @ 0-1.2m

Liquid Limit: 20

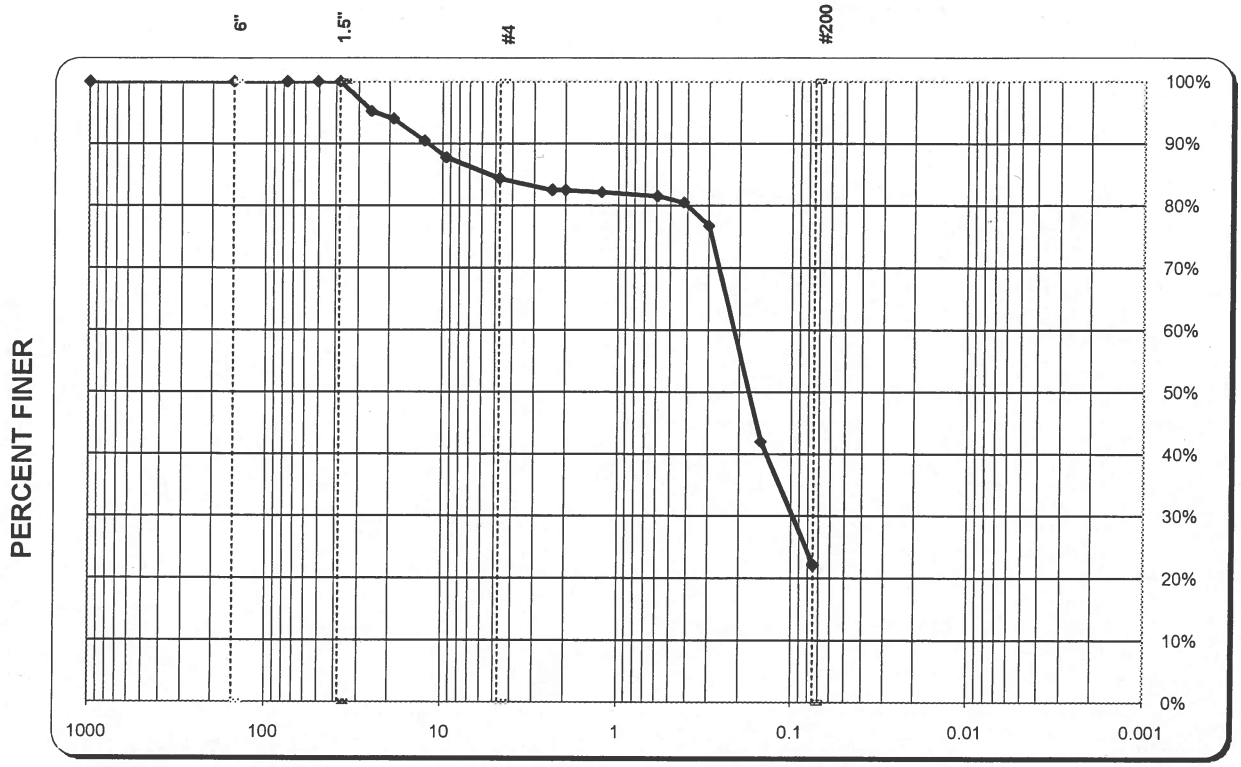
Plasticity Index: 2

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	94	88	84	83	81	42	22.2
Specification								

% GRAVEL =	15.6	D_{85} = 5.4	D_{15} =
% SAND =	62.2	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	22.2	D_{50} = 0.2	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-102 @ 0-0.2m

Liquid Limit: NV

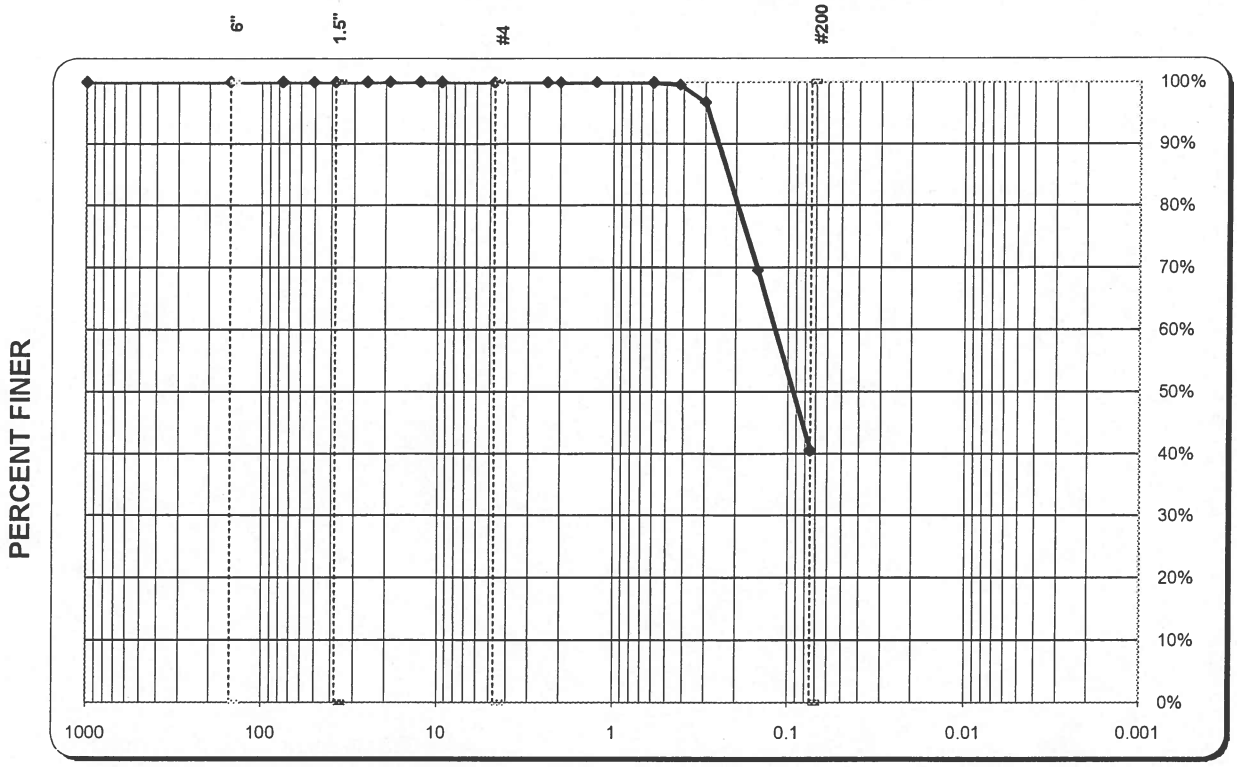
Plasticity Index: NP

USCS Classification: SM

Material Description: Silty Sand with Gravel

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	100	70	40.5
Specification								

% GRAVEL =	0.0	D_{85} = 0.2	D_{15} =
% SAND =	59.4	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	40.5	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-103 @ 0-0.9m

Liquid Limit: 23

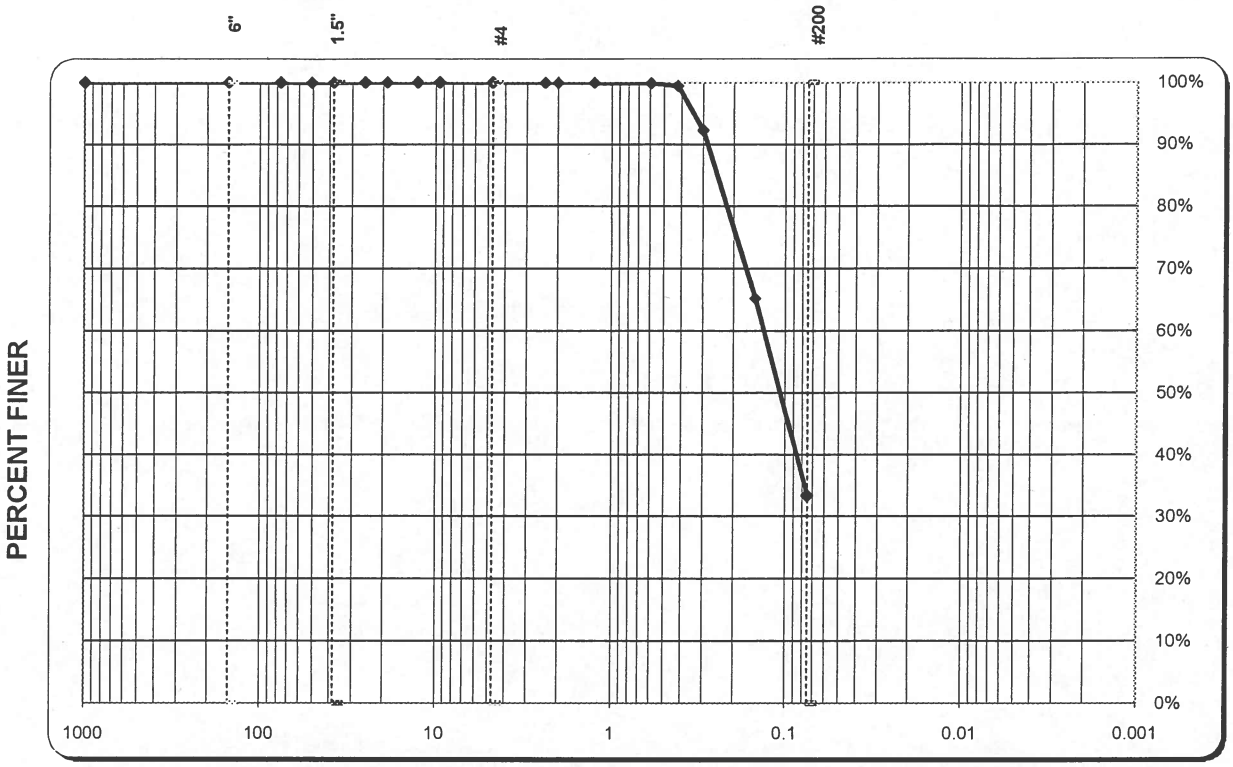
Plasticity Index: 8

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	100	99	65	33.4
Specification								

% GRAVEL =	0.0	D_{85} = 0.2	D_{15} =
% SAND =	66.6	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	33.4	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-104 @ 0-1.2m

Liquid Limit: 19

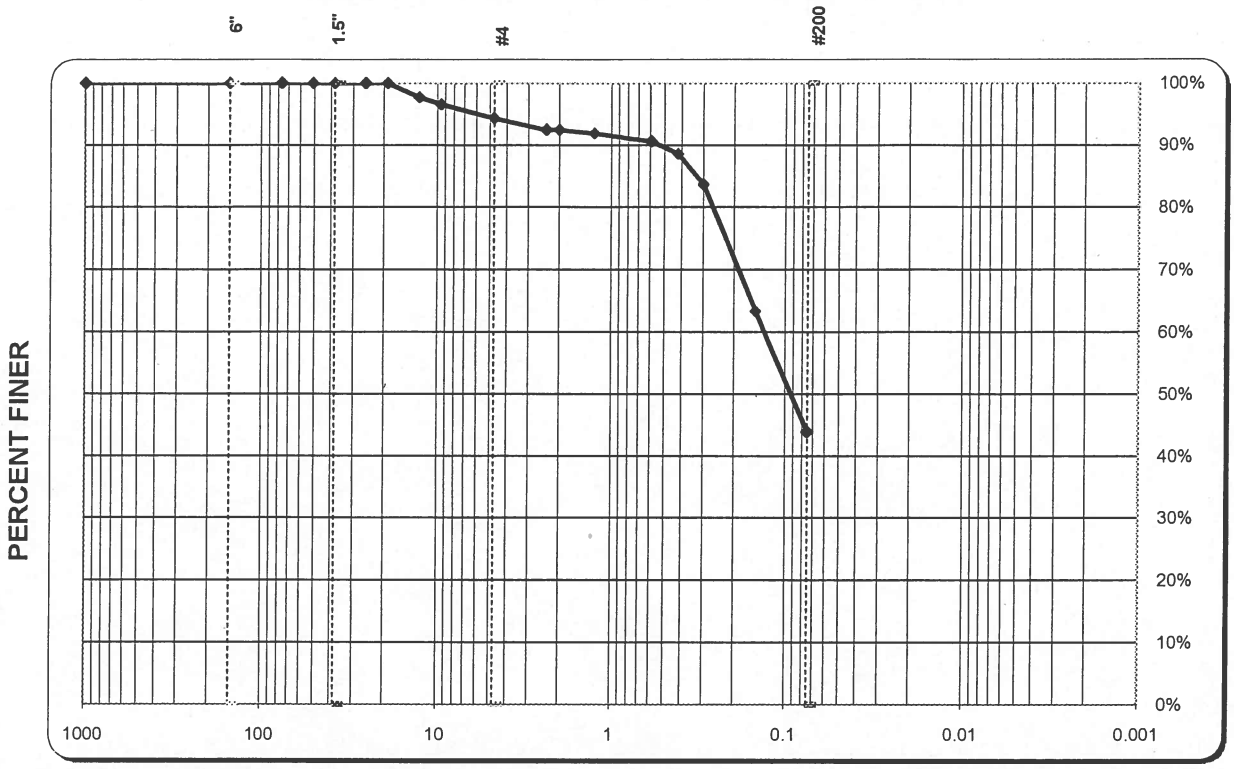
Plasticity Index: 4

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	97	94	92	89	63	43.9
Specification								

% GRAVEL =	5.7	D_{85} = 0.3	D_{15} =
% SAND =	50.4	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	43.9	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-105 @ 0-0.6m

Liquid Limit: 24

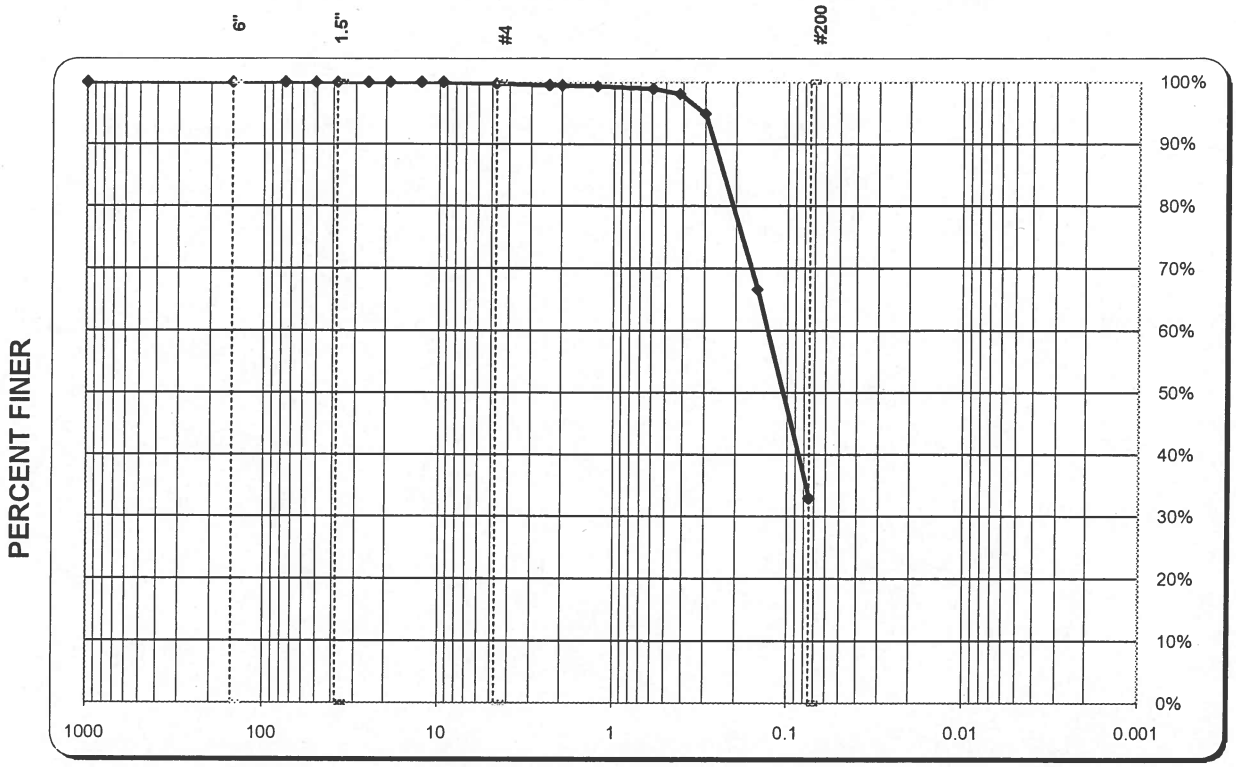
Plasticity Index: 9

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	98	67	33.0
Specification								

% GRAVEL =	0.3	D_{85} = 0.2	D_{15} =
% SAND =	66.7	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	33.0	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-106 @ 0-1.2m

Liquid Limit: 19

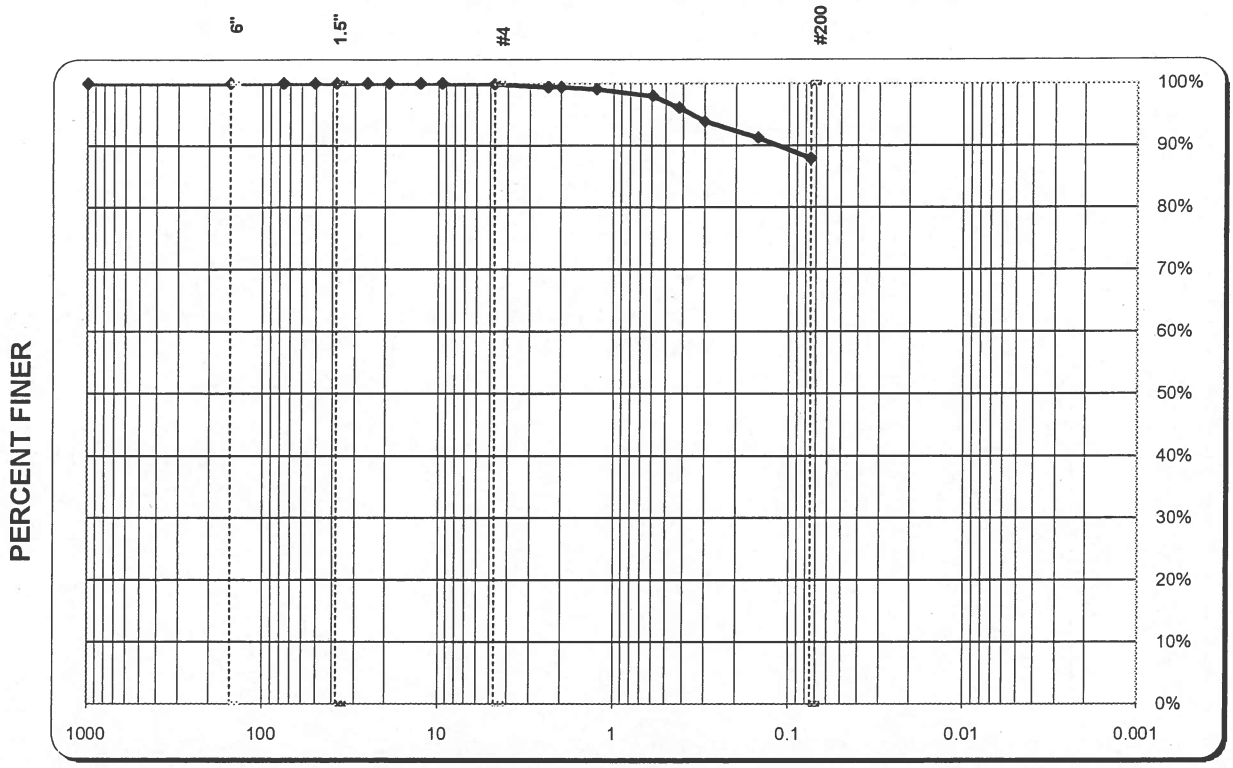
Plasticity Index: 4

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	96	91	87.9
Specification								

% GRAVEL =	0.2	D_{85} =	D_{15} =
% SAND =	11.9	D_{60} =	D_{10} =
% SILT & CLAY =	87.9	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-107 @ 0-1.2m

Liquid Limit: 18

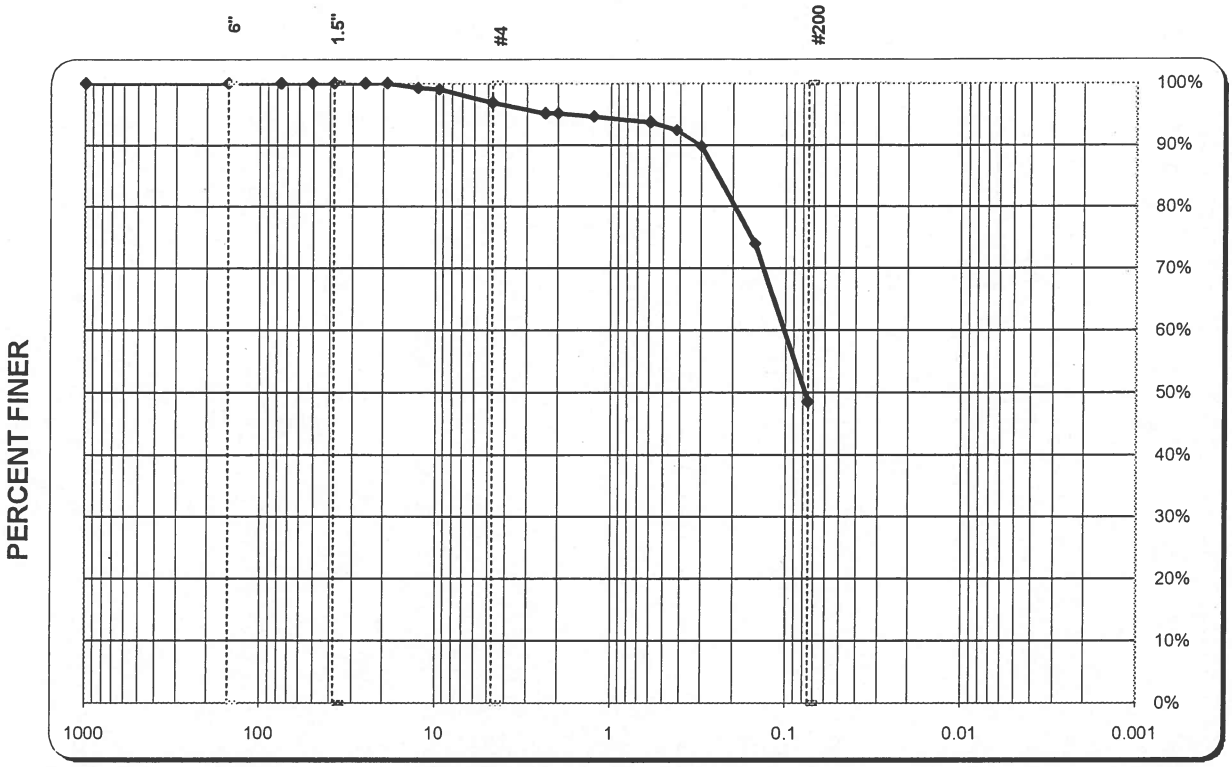
Plasticity Index: 3

USCS Classification: ML

Material Description: Silt

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	99	97	95	92	74	48.5
Specification								

% GRAVEL =	3.1	D_{85} = 0.2	D_{15} =
% SAND =	48.4	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	48.5	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-108 @ 0-1.2m

Liquid Limit: 22

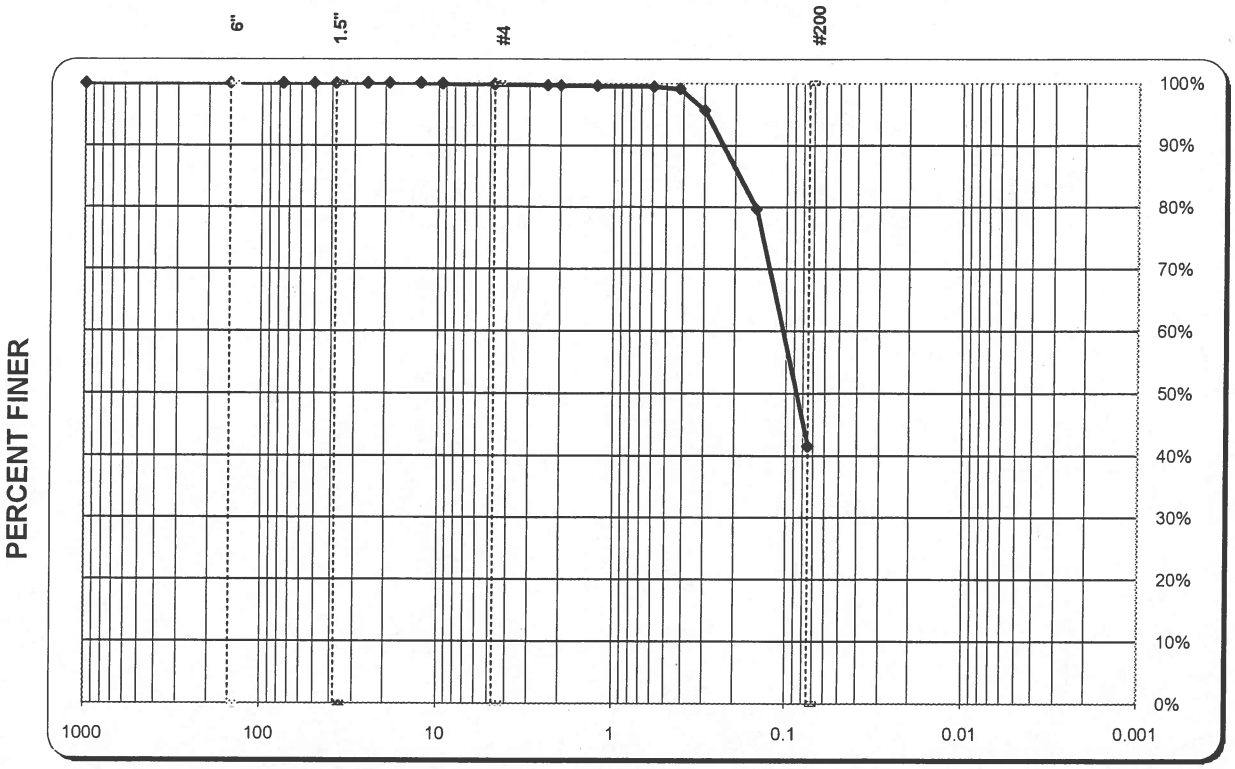
Plasticity Index: 8

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	100	99	80	41.5
Specification								

% GRAVEL =	0.2	D_{85} = 0.2	D_{15} =
% SAND =	58.2	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	41.5	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-109 @ 0-1.2m

Liquid Limit: 22

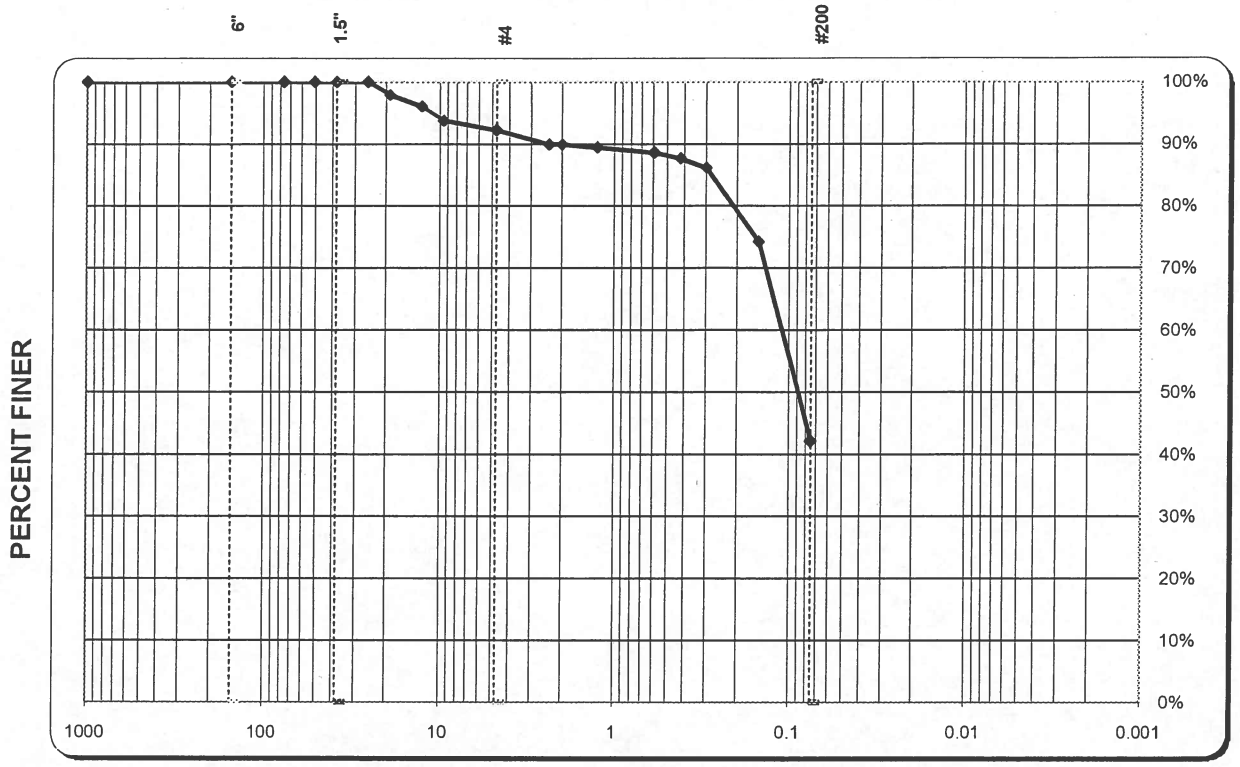
Plasticity Index: 5

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	98	94	92	90	88	74	42.2
Specification								

% GRAVEL =	7.8	D_{85} = 0.3	D_{15} =
% SAND =	50.1	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	42.2	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-110 @ 0-1.1m

Liquid Limit: 23

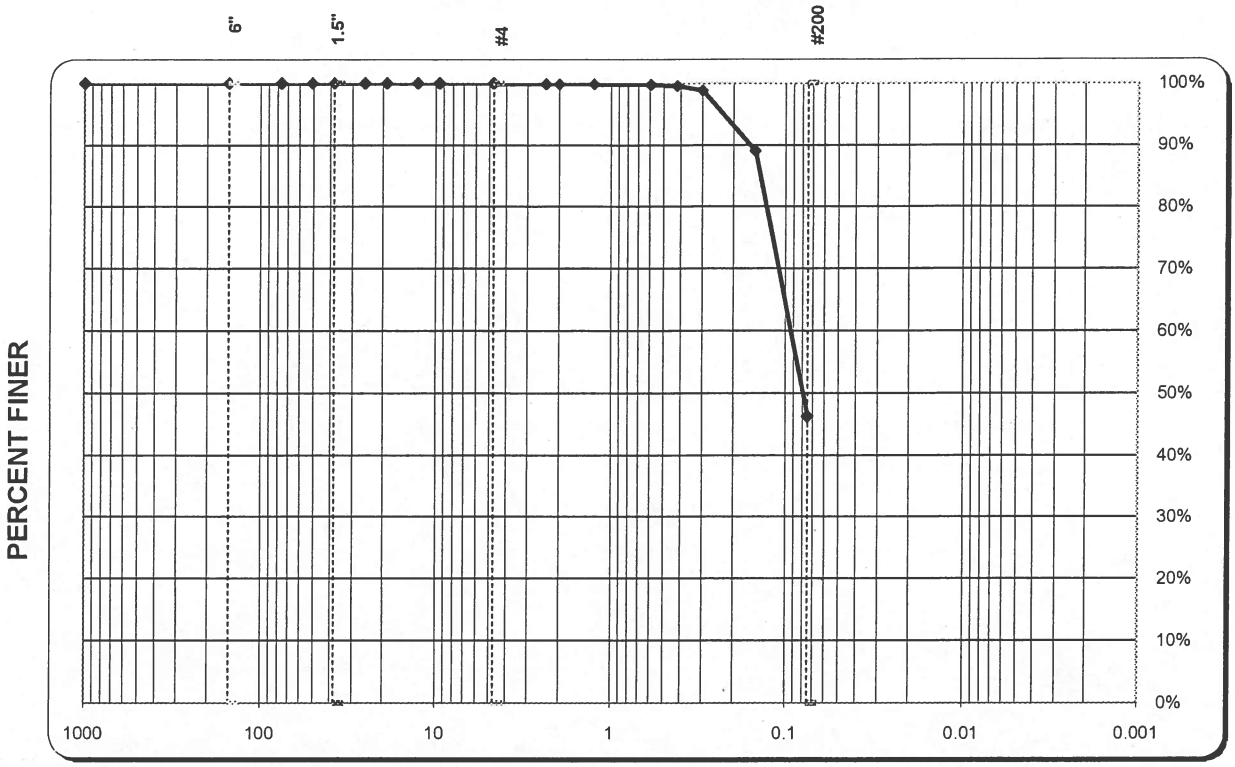
Plasticity Index: 7

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	100	100	89	46.3
Specification								

% GRAVEL =	0.0	D_{85} = 0.1	D_{15} =
% SAND =	53.7	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	46.3	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-111 @ 0-1.2m

Liquid Limit: 22

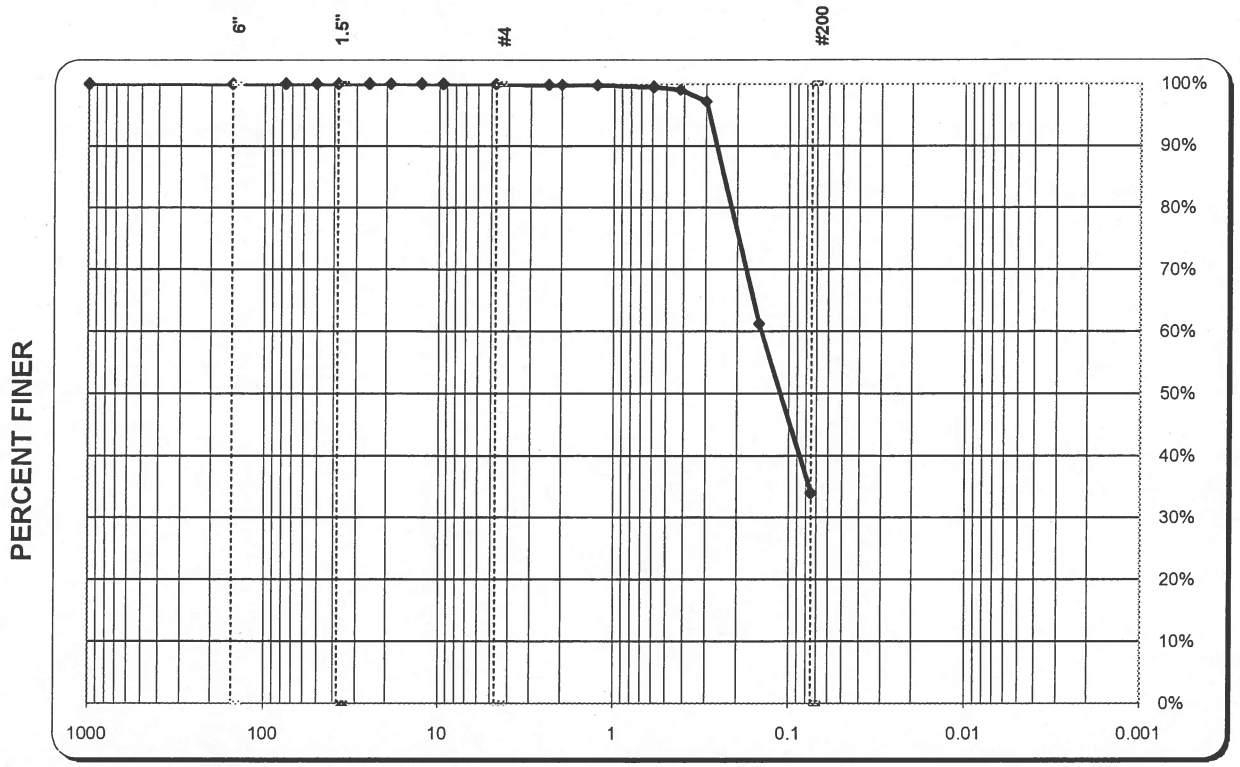
Plasticity Index: 5

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	100	99	61	34.0
Specification								

% GRAVEL =	0.1	D_{85} = 0.2	D_{15} =
% SAND =	66.0	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	34.0	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-112 @ 0-1.2m

Liquid Limit: 20

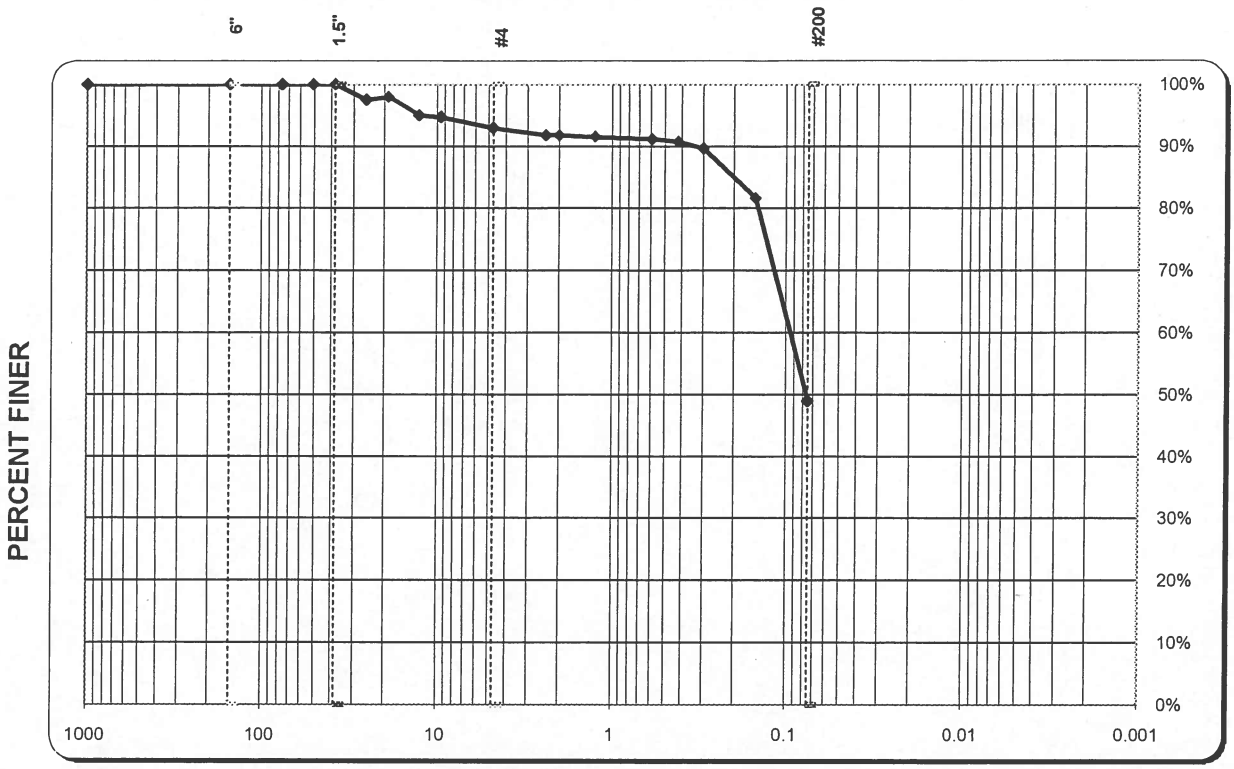
Plasticity Index: 4

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	98	95	93	92	91	82	49.0
Specification								

% GRAVEL =	7.0	D_{85} = 0.2	D_{15} =
% SAND =	44.0	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	49.0	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-113 @ 0-0.9m

Liquid Limit: 23

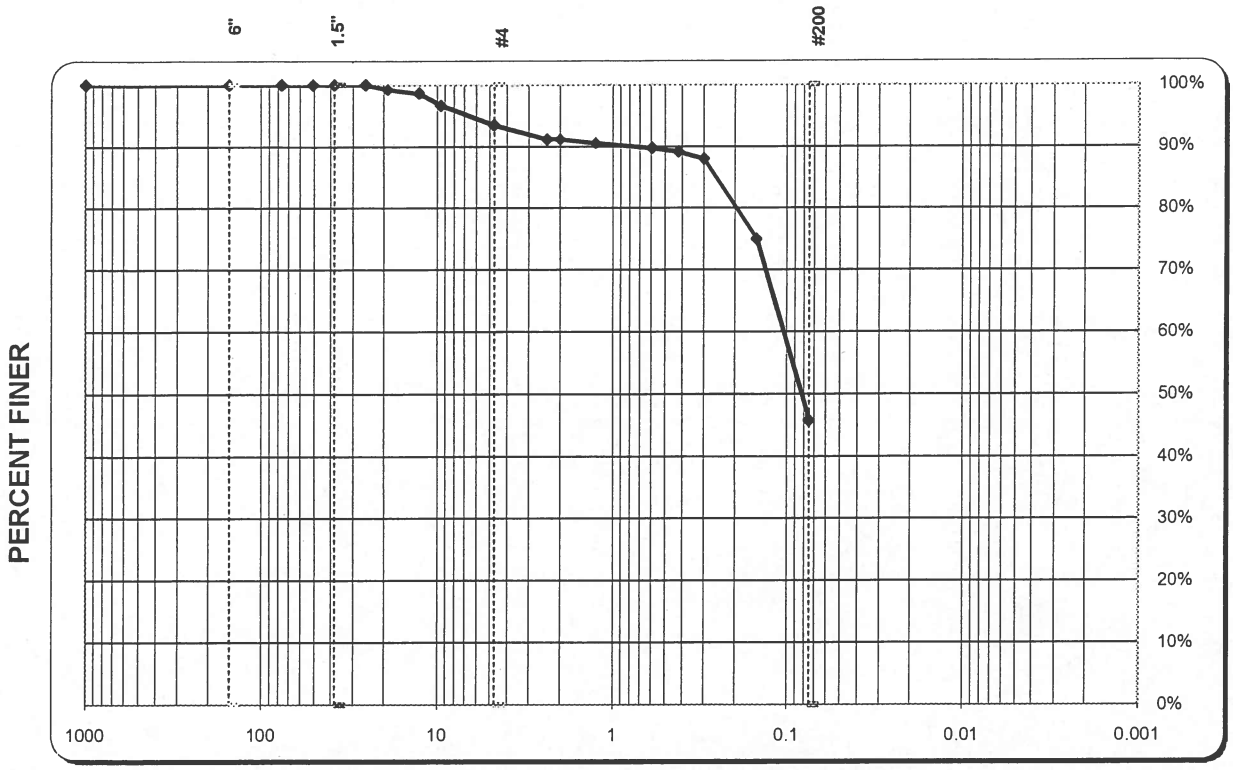
Plasticity Index: 8

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	99	97	93	91	89	75	45.8
Specification								

% GRAVEL =	6.5	D_{85} = 0.3	D_{15} =
% SAND =	47.7	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	45.8	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-114 @ 0-0.6m

Liquid Limit: 23

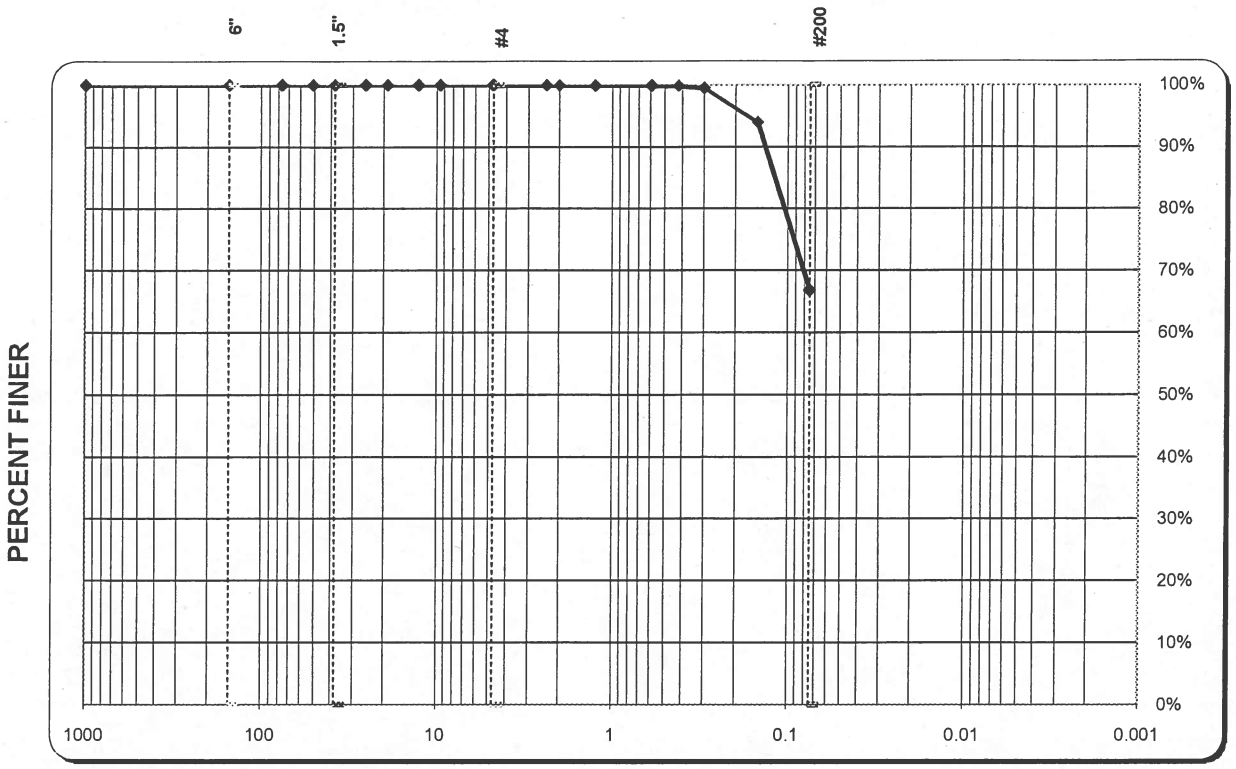
Plasticity Index: 10

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	100	100	94	66.8
Specification								

% GRAVEL =	0.0	D_{85} = 0.1	D_{15} =
% SAND =	33.2	D_{60} =	D_{10} =
% SILT & CLAY =	66.8	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-115 @ 0-1.2m

Liquid Limit: 30

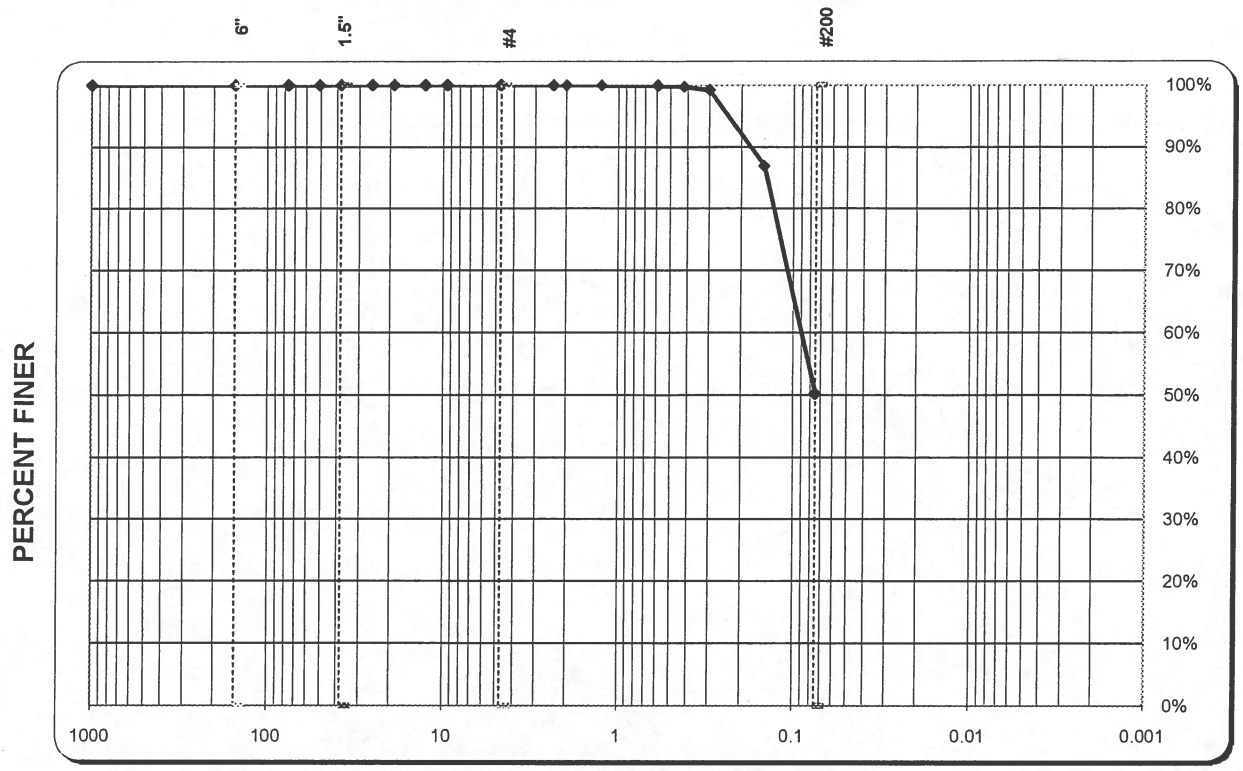
Plasticity Index: 16

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	100	100	100	87	50.3
Specification								

% GRAVEL =	0.0	D_{85} = 0.1	D_{15} =
% SAND =	49.7	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	50.3	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-116 @ 0-1.2m

Liquid Limit: 23

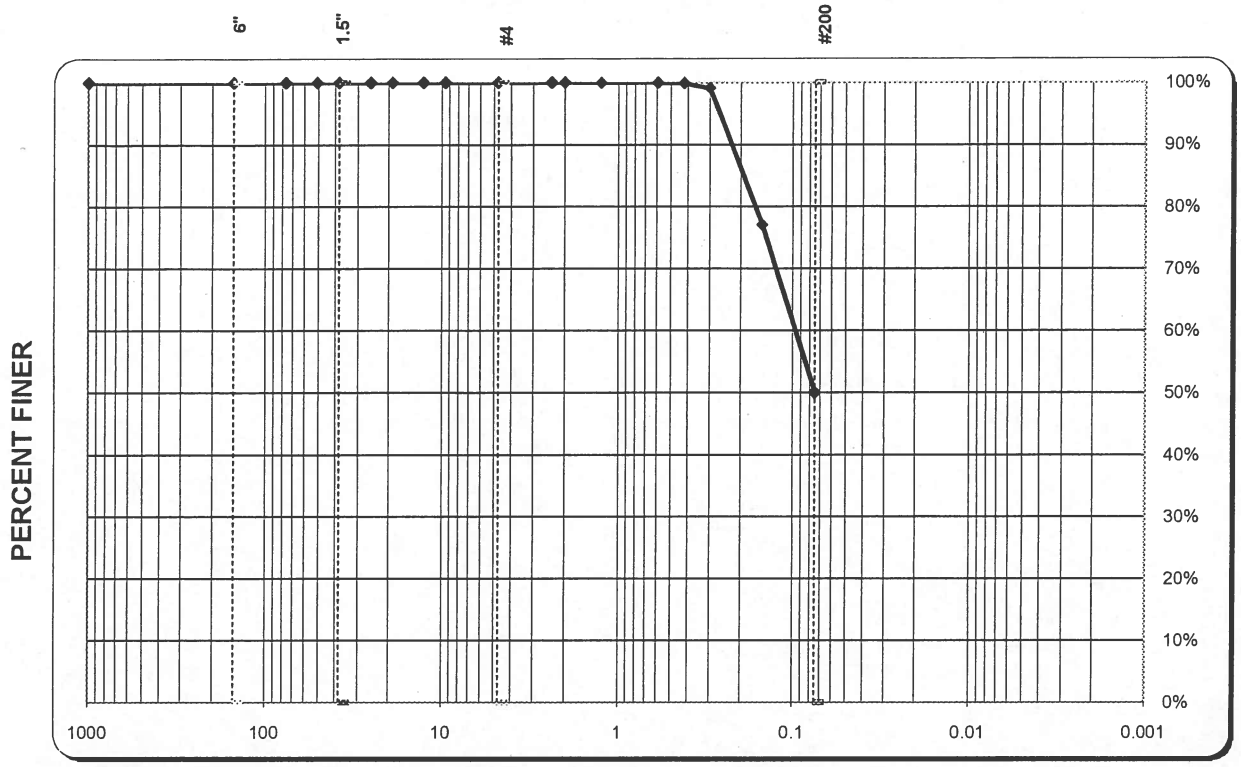
Plasticity Index: 6

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	100	100	100	77	50.0
Specification								

% GRAVEL =	0.0	D_{85} = 0.2	D_{15} =
% SAND =	50.0	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	50.0	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-117 @ 0-1.2m

Liquid Limit: 22

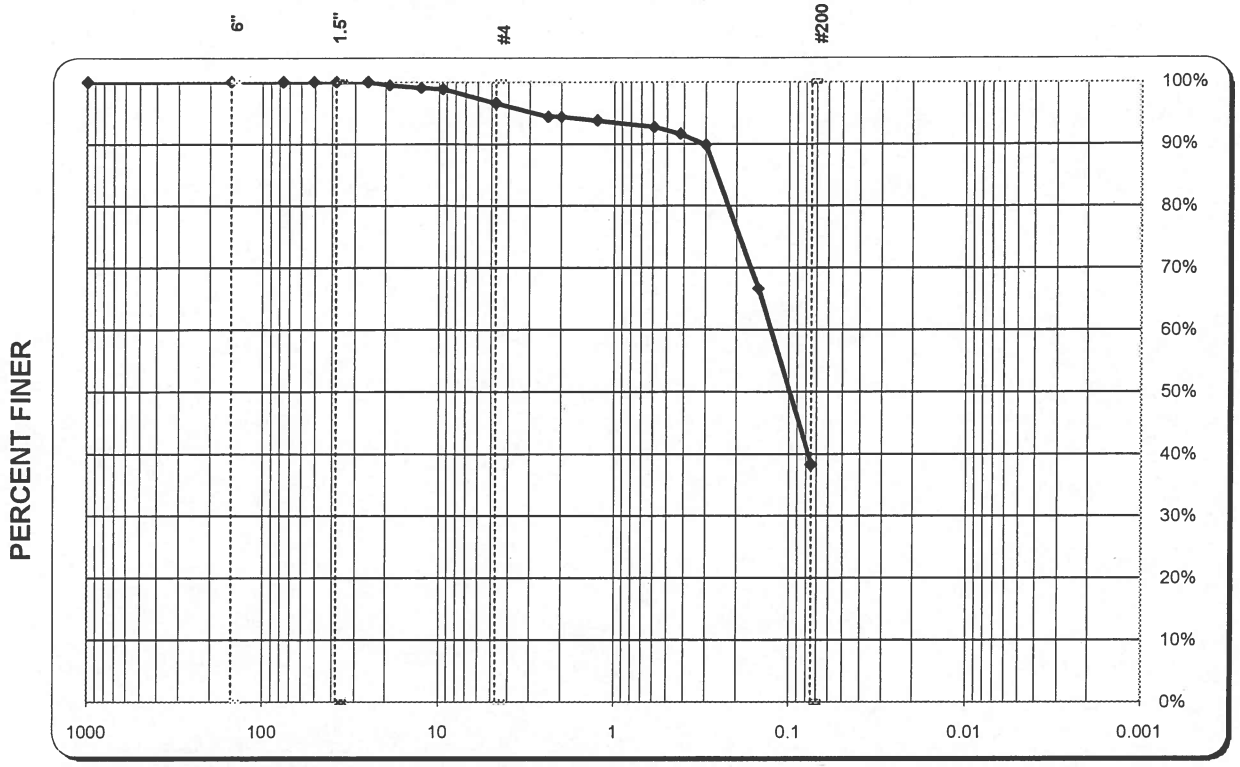
Plasticity Index: 9

USCS Classification: SC to CL

Material Description: Clayey Sand to 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	99	99	97	94	92	67	38.3
Specification								

% GRAVEL =	3.4	D_{85} = 0.3	D_{15} =
% SAND =	58.3	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	38.3	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-118 @ 0-0.6m

Liquid Limit: 27

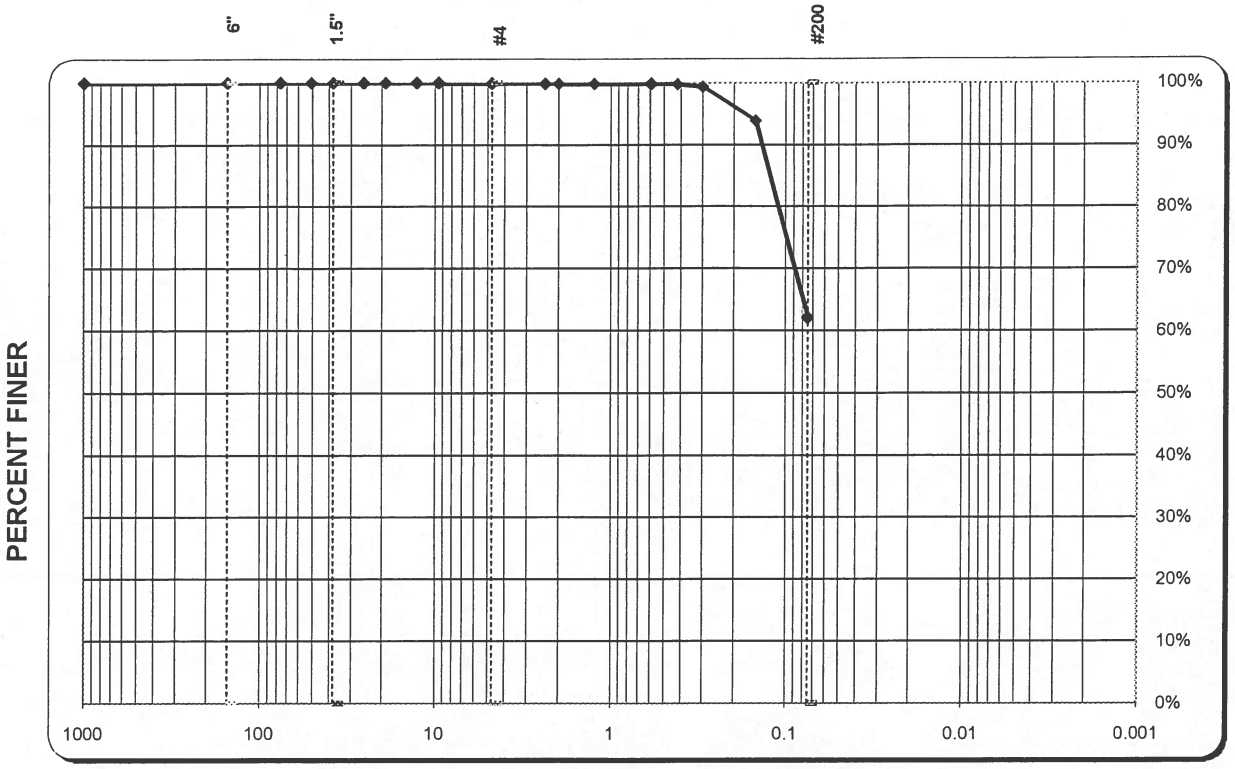
Plasticity Index: 12

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	100	100	94	62.2
Specification								

% GRAVEL =	0.1	D_{85} = 0.1	D_{15} =
% SAND =	37.7	D_{60} =	D_{10} =
% SILT & CLAY =	62.2	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-119 @ 0-1.2m

Liquid Limit: 28

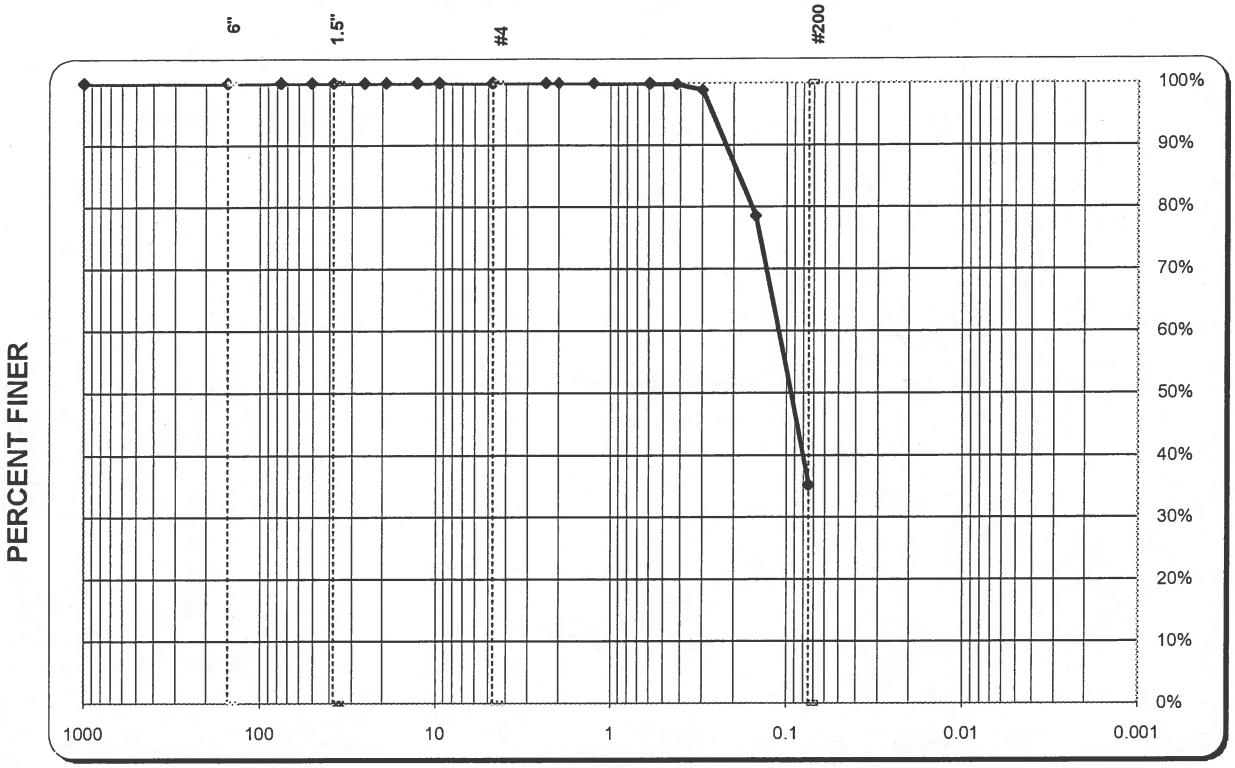
Plasticity Index: 13

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	100	100	79	35.2
Specification								

% GRAVEL =	0.0	D_{85} = 0.2	D_{15} =
% SAND =	64.8	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	35.2	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-120 @ 0-1.2m

Liquid Limit: 22

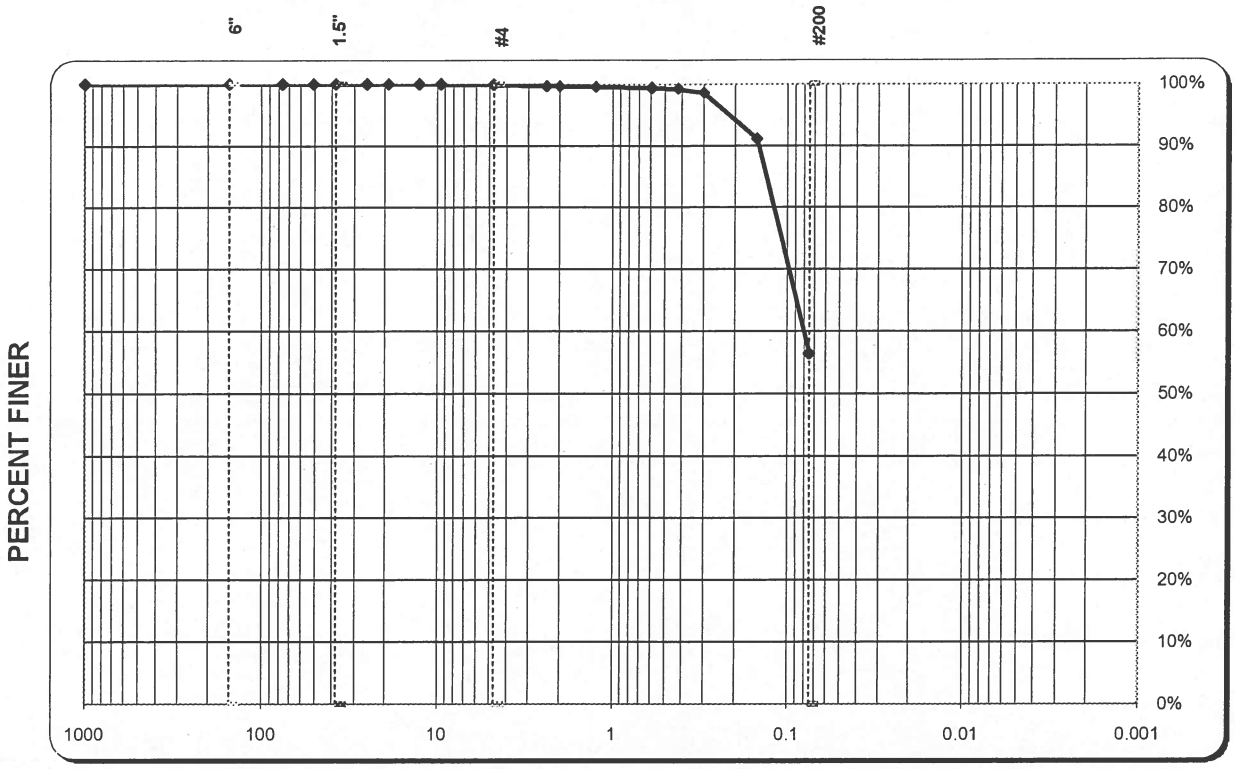
Plasticity Index: 5

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	100	99	91	56.4
Specification								

% GRAVEL =	0.1	D_{85} = 0.1	D_{15} =
% SAND =	43.5	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	56.4	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-121 @ 0-1.2m

Liquid Limit: 27

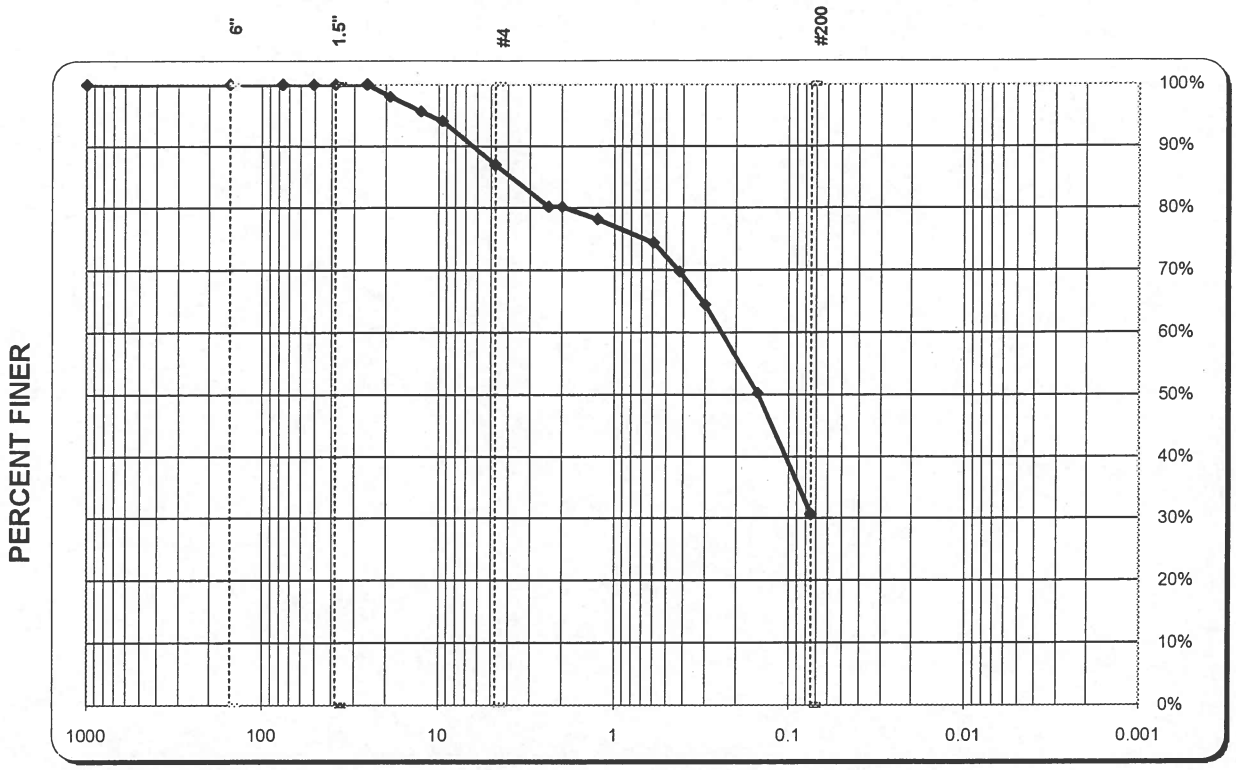
Plasticity Index: 12

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	98	94	87	80	70	50	30.7
Specification								

% GRAVEL =	13.0	D_{85} = 3.7	D_{15} =
% SAND =	56.3	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	30.7	D_{50} = 0.1	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-122 @ 0-0.6m

Liquid Limit: 28

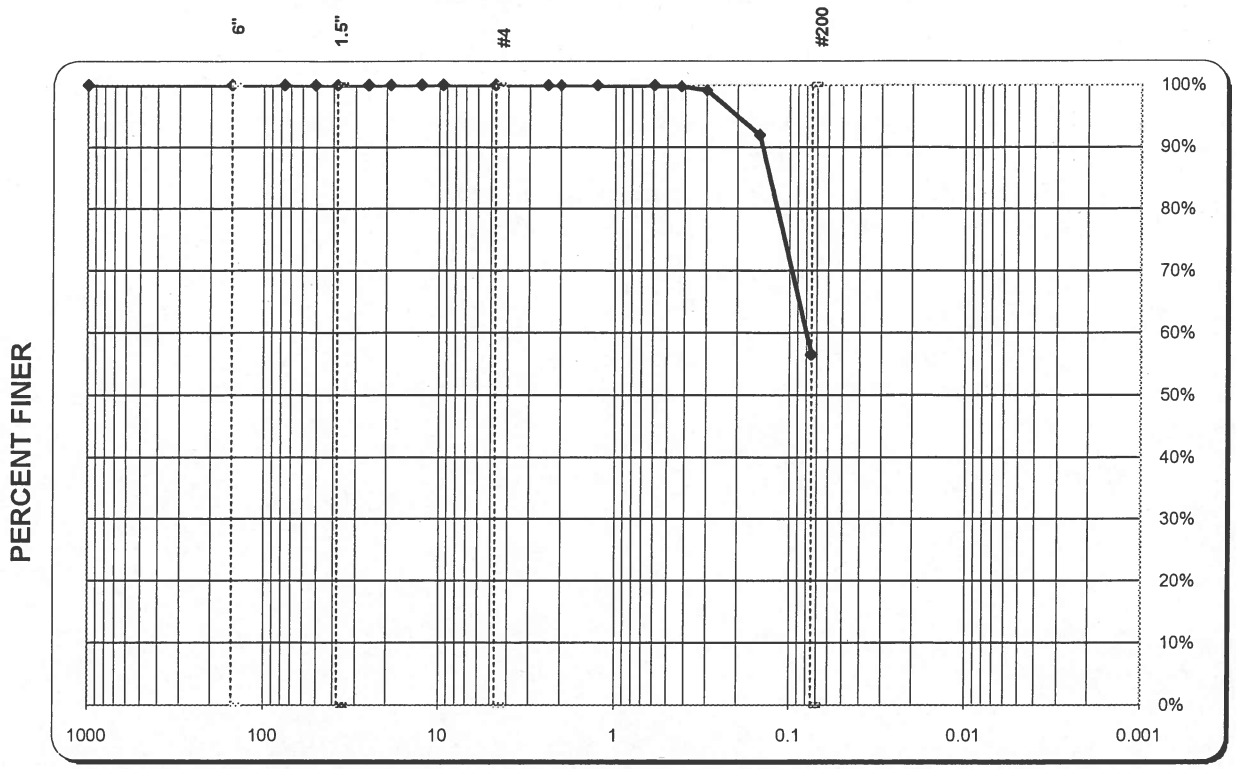
Plasticity Index: 13

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	100	100	92	56.5
Specification								

% GRAVEL =	0.0	D_{85} = 0.1	D_{15} =
% SAND =	43.5	D_{60} = 0.1	D_{10} =
% SILT & CLAY =	56.5	D_{50} =	C_U =
		D_{30} =	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-123 @ 0-1.2m

Liquid Limit: 25

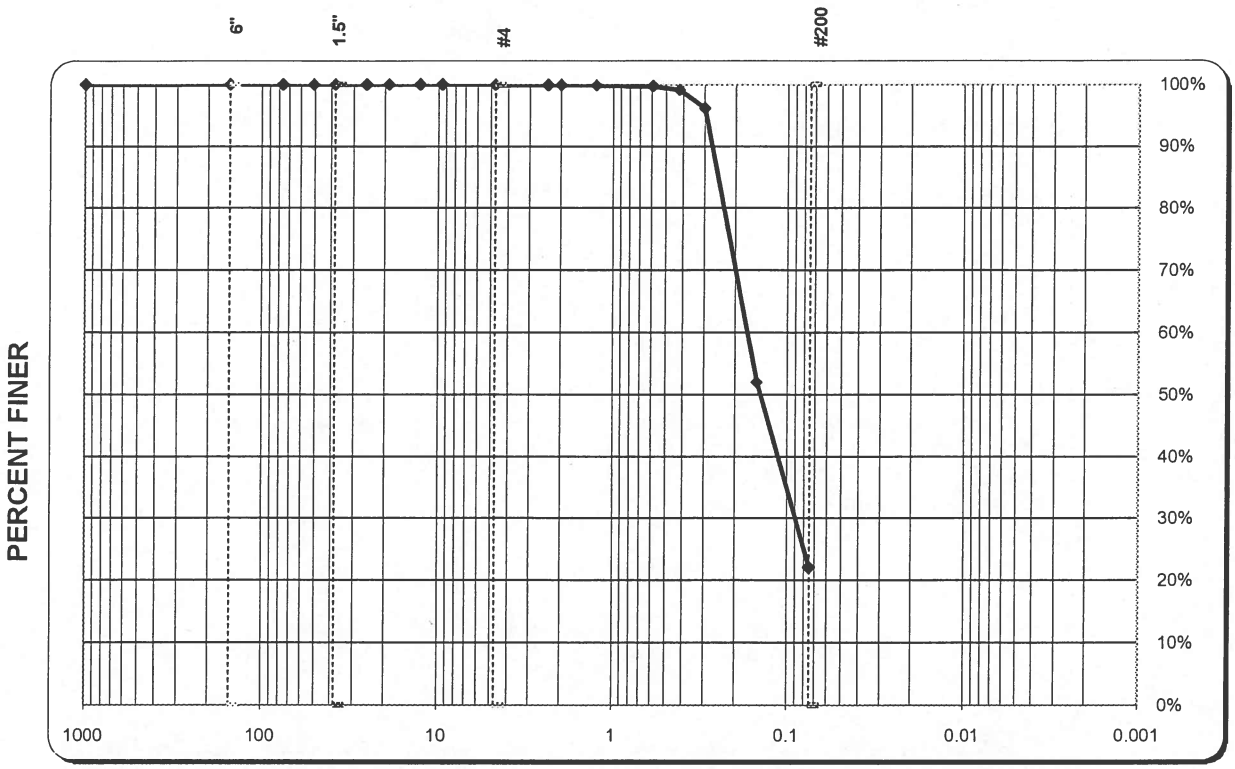
Plasticity Index: 9

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	100	99	52	22.1
Specification								

% GRAVEL =	0.1	D_{85} = 0.3	D_{15} =
% SAND =	77.9	D_{60} = 0.2	D_{10} =
% SILT & CLAY =	22.1	D_{50} = 0.1	C_U =
		D_{30} = 0.1	C_C =

Sample Date: 10/13/2009

Project No.: 69095030

Project Name: BIA, Indian Route 8084, Many Farms, AZ

Report Date: 1/5/2010

Sample Location: RB-124 @ 0-1.2m

Liquid Limit: 28

Plasticity Index: 17

USCS Classification: SC

Material Description: Clayey Sand

Terracon

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-1 @ 0-1.2m
SAMPLE DESCRIPTION:	Clayey Sand to Sandy Clay
MATERIAL CLASSIFICATION:	SC-CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	October 28, 2009
LABORATORY TECHNICIAN:	SC

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
116.9

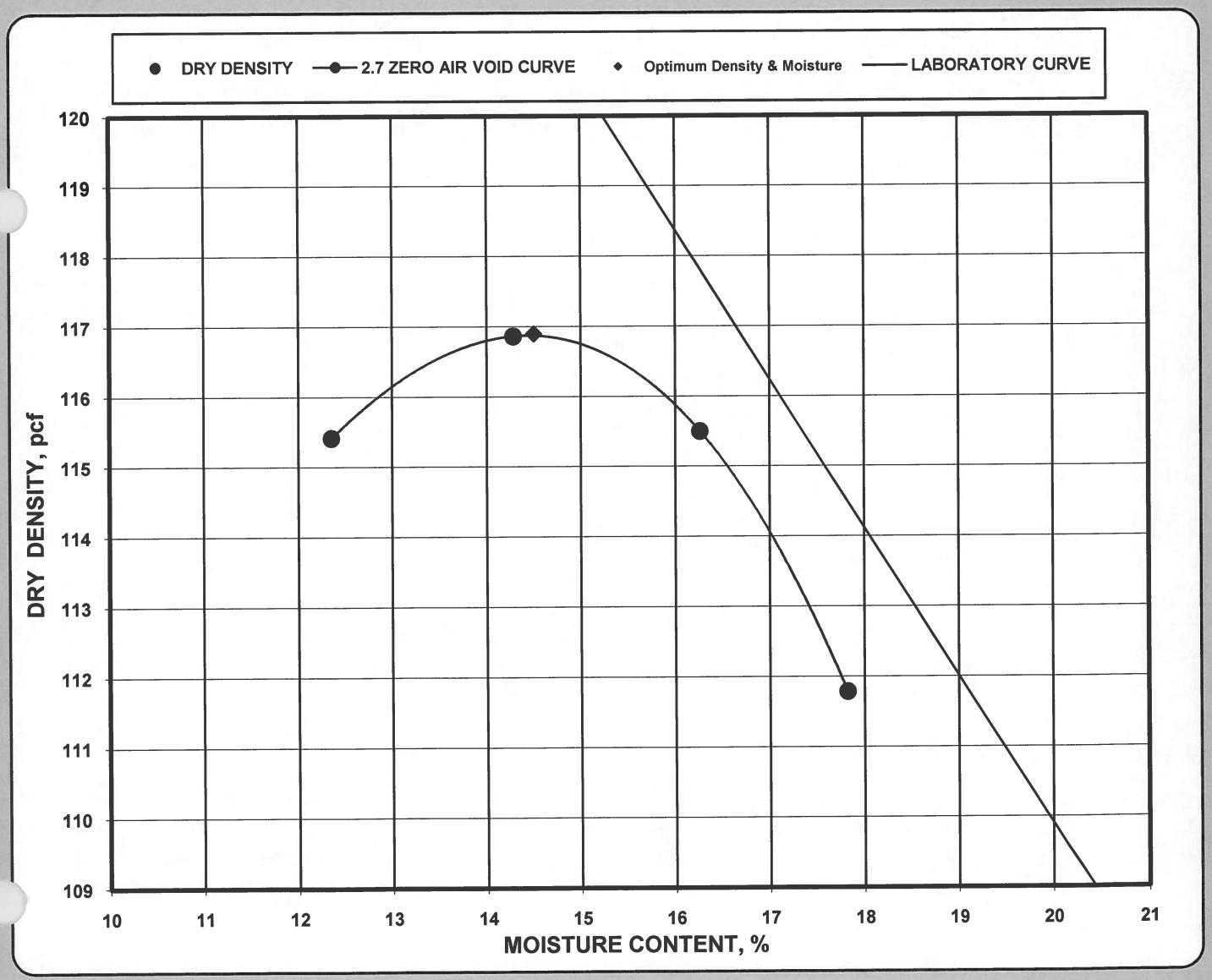
OPTIMUM MOISTURE, %
14.5

Placement Range: 5.2 - 11.2

ATTERBERG LIMITS

LIQUID LIMIT:	22
PLASTICITY INDEX:	9
% PASSING #200:	50

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA	CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084		
PROJECT LOCATION:	Many Farms, Arizona		
PROJECT NUMBER:	69095030		
MATERIAL SOURCE:	RB-5 @ 0-1.2m		
SAMPLE DESCRIPTION:	Fat Clay		
MATERIAL CLASSIFICATION:	CH		
TEST PROCEDURE:	ASTM D1557, Method A		
COMPACTION RAMMER:	Automatic		
DATE PERFORMED:	December 3, 2009		
LABORATORY TECHNICIAN:	RK		

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
111.6

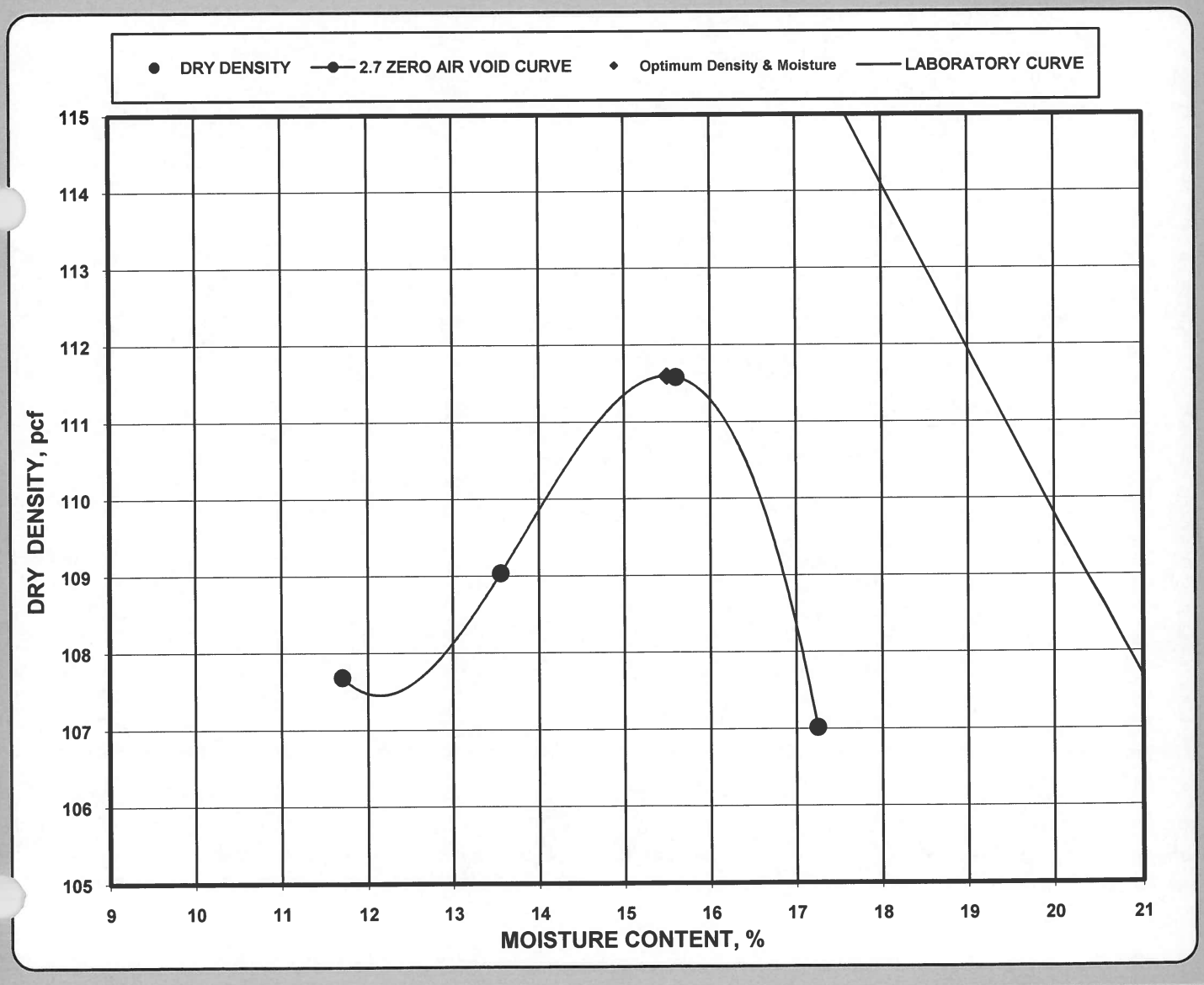
OPTIMUM MOISTURE, %
15.5

Placement Range: 12.5 - 18.5

ATTERBERG LIMITS

LIQUID LIMIT:	50
PLASTICITY INDEX:	35
% PASSING #200:	89

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

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#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-11 @ 0-1.2m
SAMPLE DESCRIPTION:	Clayey Sand
MATERIAL CLASSIFICATION:	SC
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	October 29, 2009
LABORATORY TECHNICIAN:	SC

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
115.5

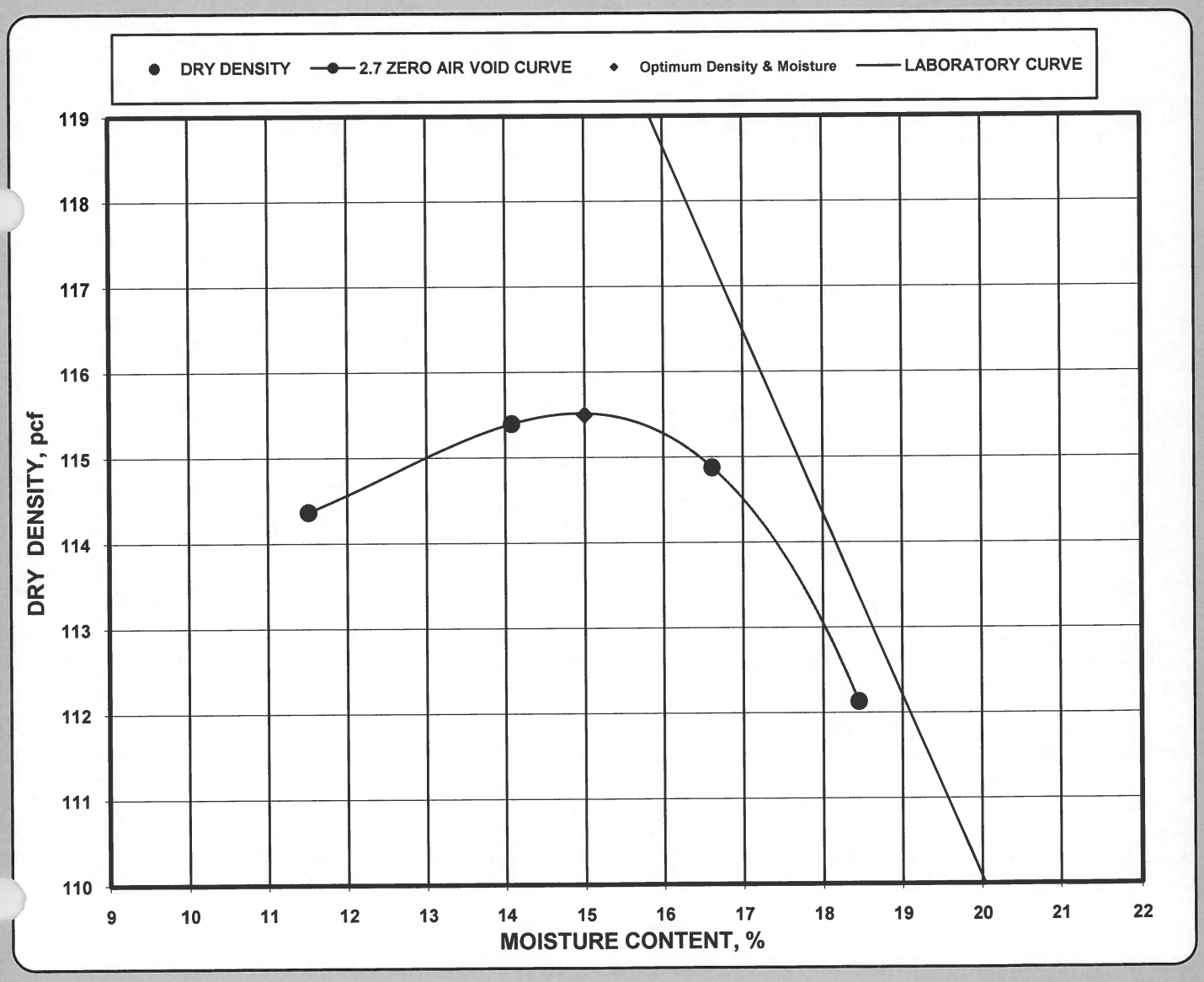
OPTIMUM MOISTURE, %
15.0

Placement Range: 12.0 - 18.0

ATTERBERG LIMITS

LIQUID LIMIT:	37
PLASTICITY INDEX:	20
% PASSING #200:	41

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-13 @ 0-0.9m
SAMPLE DESCRIPTION:	Sandy Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 3, 2009
LABORATORY TECHNICIAN:	RK

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
114.9

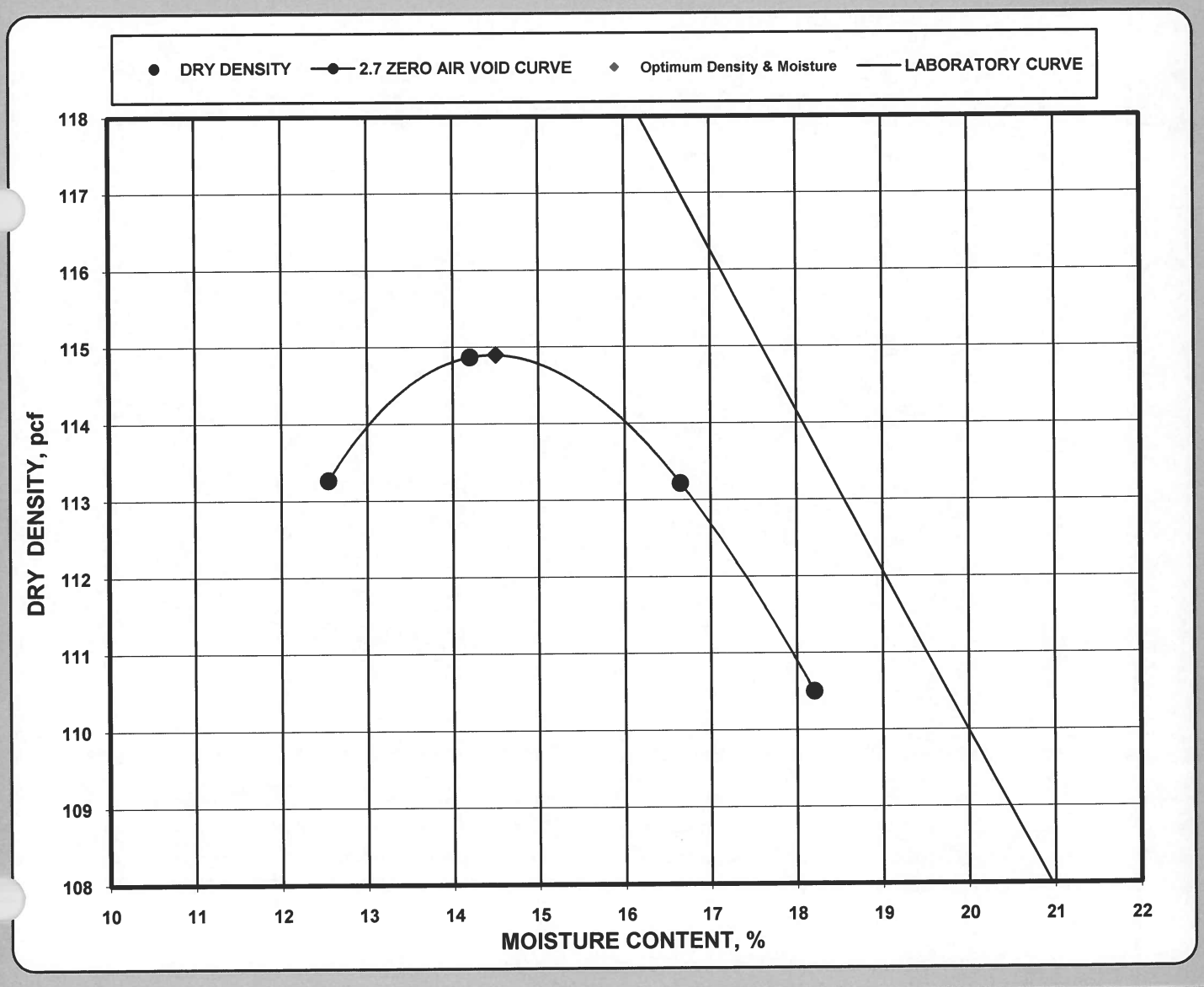
OPTIMUM MOISTURE, %
14.5

Placement Range: 11.5 - 17.5

ATTERBERG LIMITS

LIQUID LIMIT:	42
PLASTICITY INDEX:	27
% PASSING #200:	61

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-18 @ 0.2-1.2m
SAMPLE DESCRIPTION:	Poorly Graded Sand to Clayey Sand
MATERIAL CLASSIFICATION:	SC-CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	November 5, 2009
LABORATORY TECHNICIAN:	SC

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
117.8

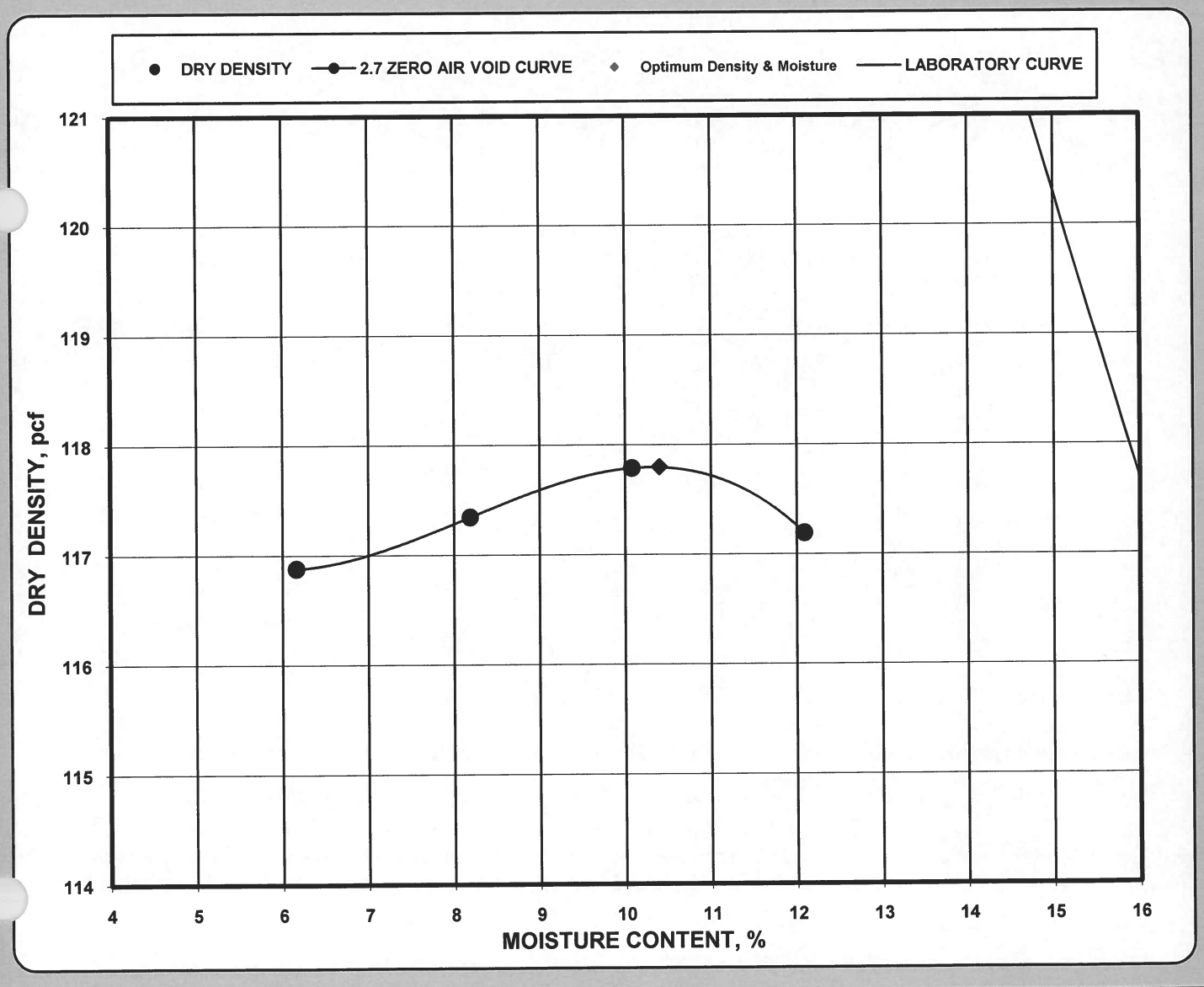
OPTIMUM MOISTURE, %
10.4

Placement Range: 7.4 - 13.4

ATTERBERG LIMITS

LIQUID LIMIT:	NV
PLASTICITY INDEX:	NP
% PASSING #200:	9

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA	CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084		
PROJECT LOCATION:	Many Farms, Arizona		
PROJECT NUMBER:	69095030		
MATERIAL SOURCE:	RB-20 @ 0-0.3m		
SAMPLE DESCRIPTION:	Fat Clay		
MATERIAL CLASSIFICATION:	CH		
TEST PROCEDURE:	ASTM D1557, Method A		
COMPACTION RAMMER:	Automatic		
DATE PERFORMED:	December 3, 2009		
LABORATORY TECHNICIAN:	RK		

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
111.5

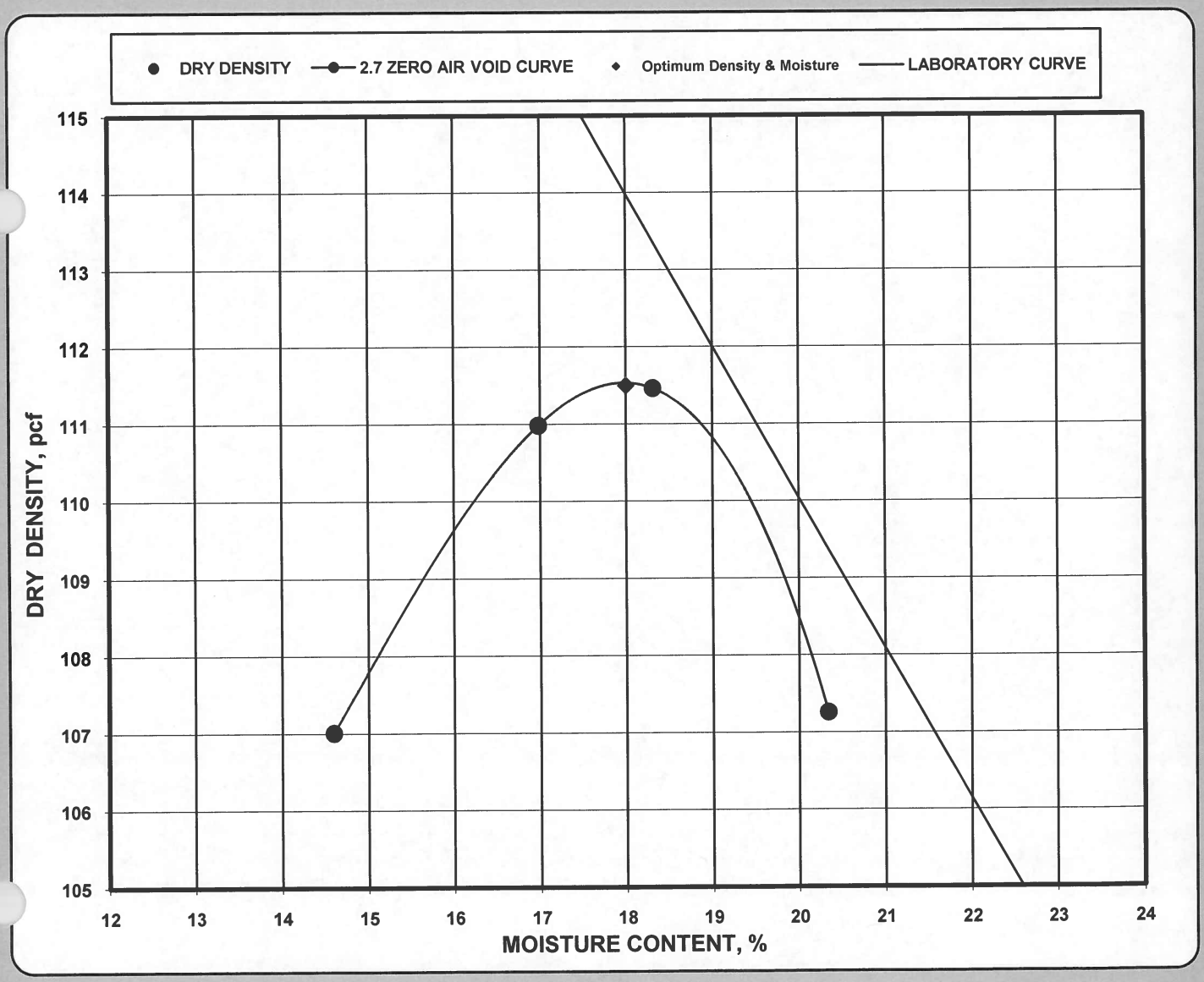
OPTIMUM MOISTURE, %
18.0

Placement Range: 15.0 - 21.0

ATTERBERG LIMITS

LIQUID LIMIT:	53
PLASTICITY INDEX:	30
% PASSING #200:	71

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-22 @ 0-1.2m
SAMPLE DESCRIPTION:	Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	October 28, 2009
LABORATORY TECHNICIAN:	SC

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
121.5

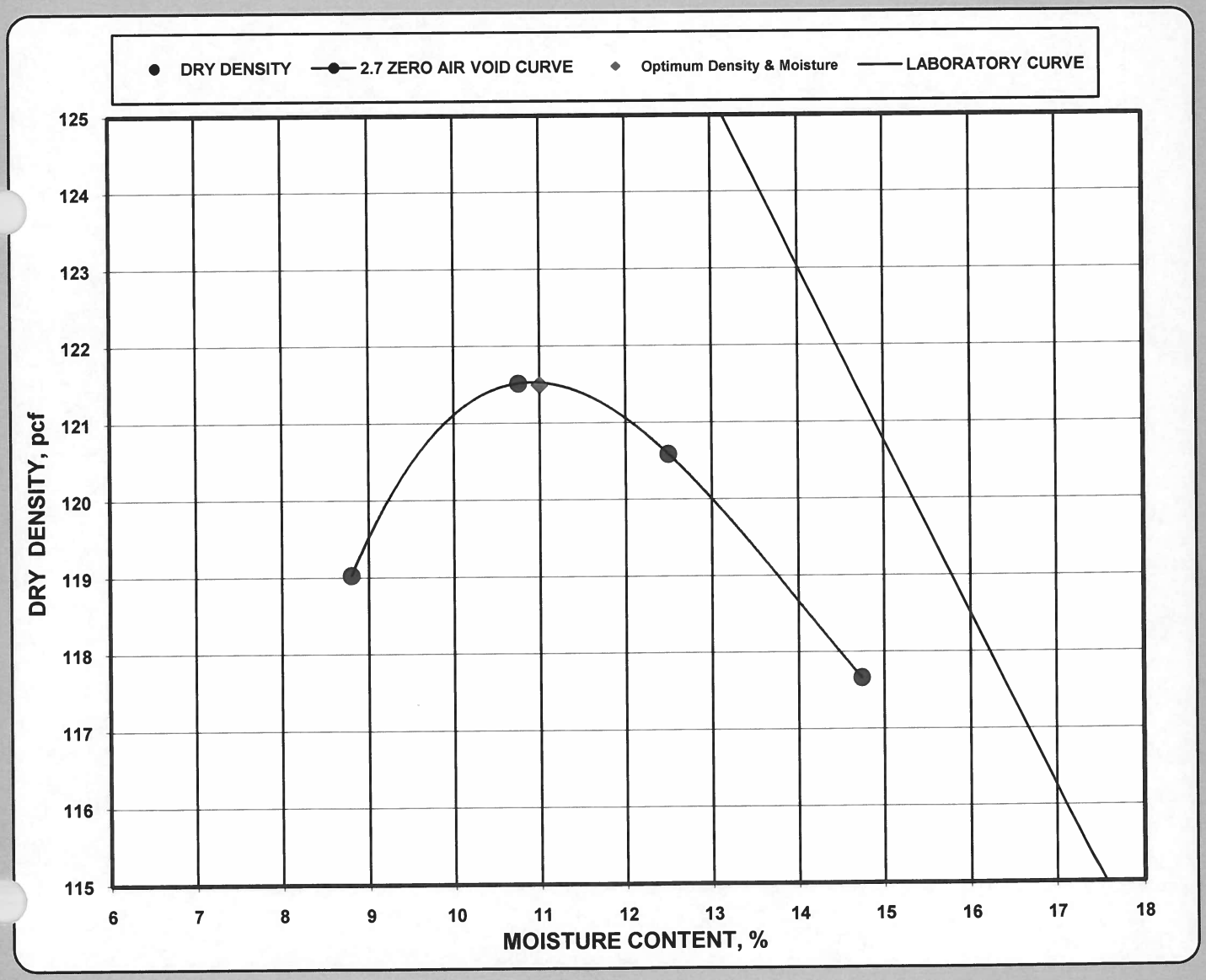
OPTIMUM MOISTURE, %
11.0

Placement Range: 5.2 - 11.2

ATTERBERG LIMITS

LIQUID LIMIT:	38
PLASTICITY INDEX:	25
% PASSING #200:	67

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA	CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084		
PROJECT LOCATION:	Many Farms, Arizona		
PROJECT NUMBER:	69095030		
MATERIAL SOURCE:	RB-23 @ 0-1.2m		
SAMPLE DESCRIPTION:	Lean Clay		
MATERIAL CLASSIFICATION:	CL		
TEST PROCEDURE:	ASTM D1557, Method A		
COMPACTION RAMMER:	Automatic		
DATE PERFORMED:	December 3, 2009		
LABORATORY TECHNICIAN:	RK		

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
124.0

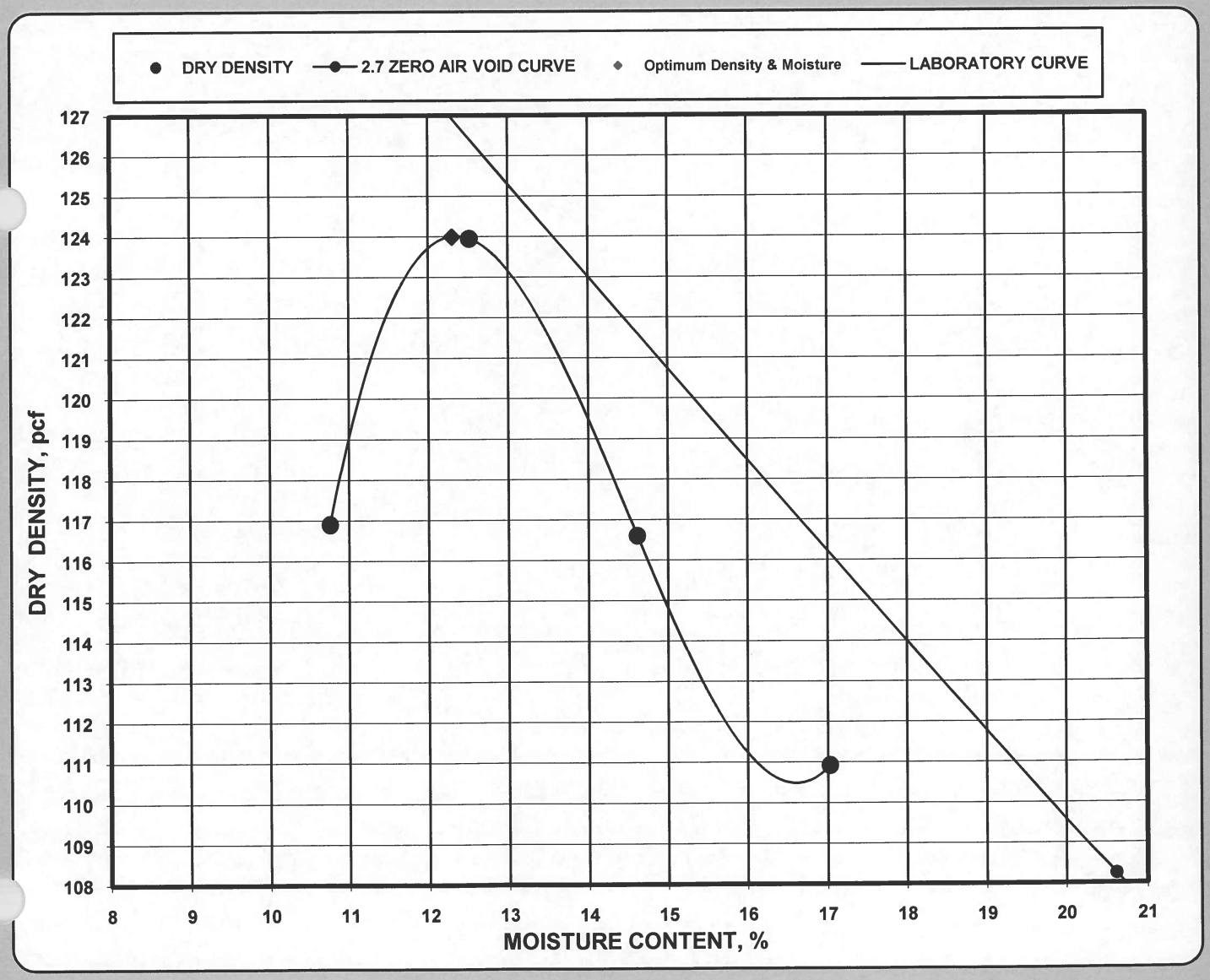
OPTIMUM MOISTURE, %
12.3

Placement Range: 9.3 - 15.3

ATTERBERG LIMITS

LIQUID LIMIT:	33
PLASTICITY INDEX:	21
% PASSING #200:	75

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-27 @ 0-0.9m
SAMPLE DESCRIPTION:	Clayey Sand
MATERIAL CLASSIFICATION:	SC
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	November 6, 2009
LABORATORY TECHNICIAN:	SC

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
127.8

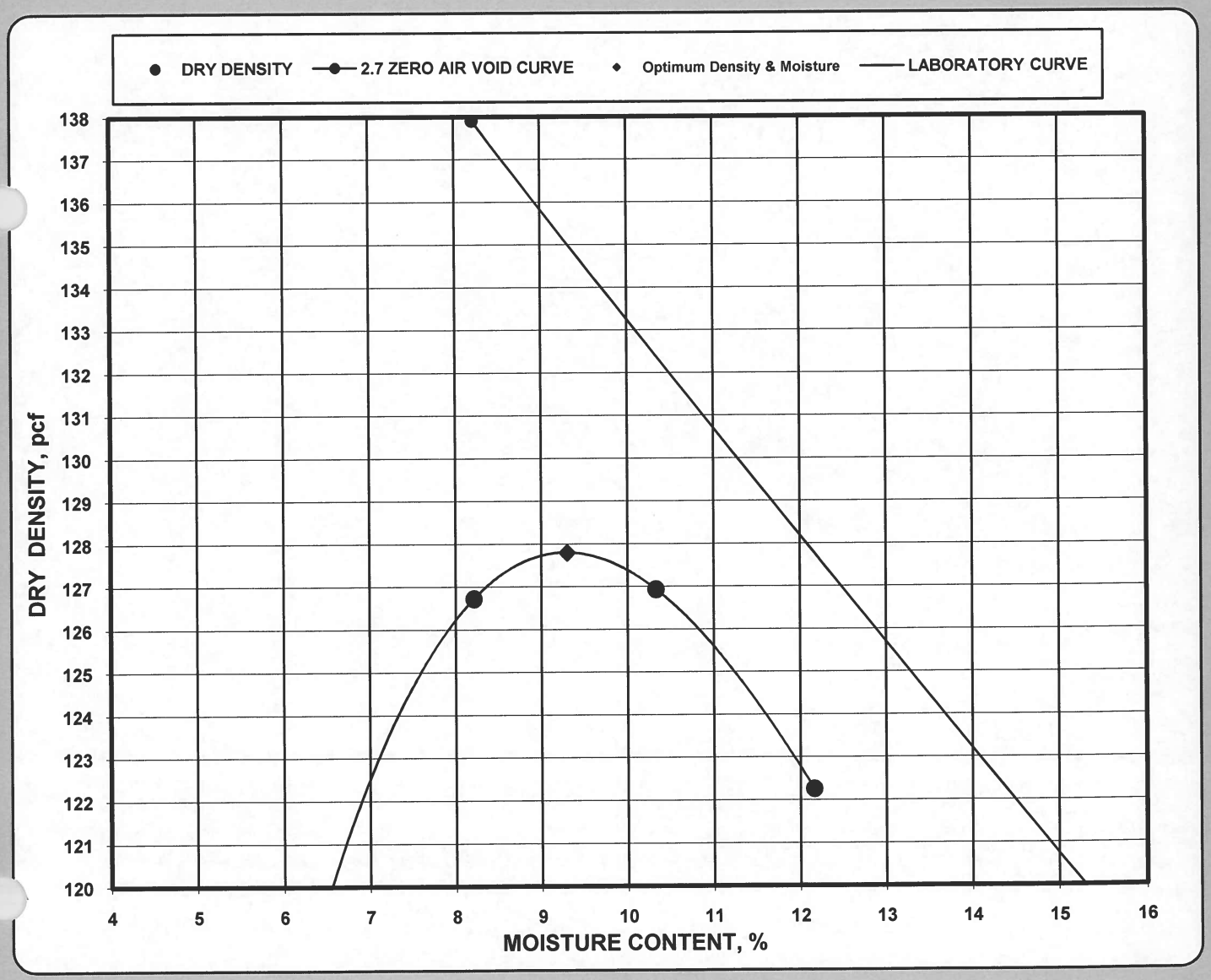
OPTIMUM MOISTURE, %
9.3

Placement Range: 6.3 - 12.3

ATTERBERG LIMITS

LIQUID LIMIT:	28
PLASTICITY INDEX:	16
% PASSING #200:	36

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-28 @ 0-0.2m
SAMPLE DESCRIPTION:	Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 4, 2009
LABORATORY TECHNICIAN:	KB

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
116.6

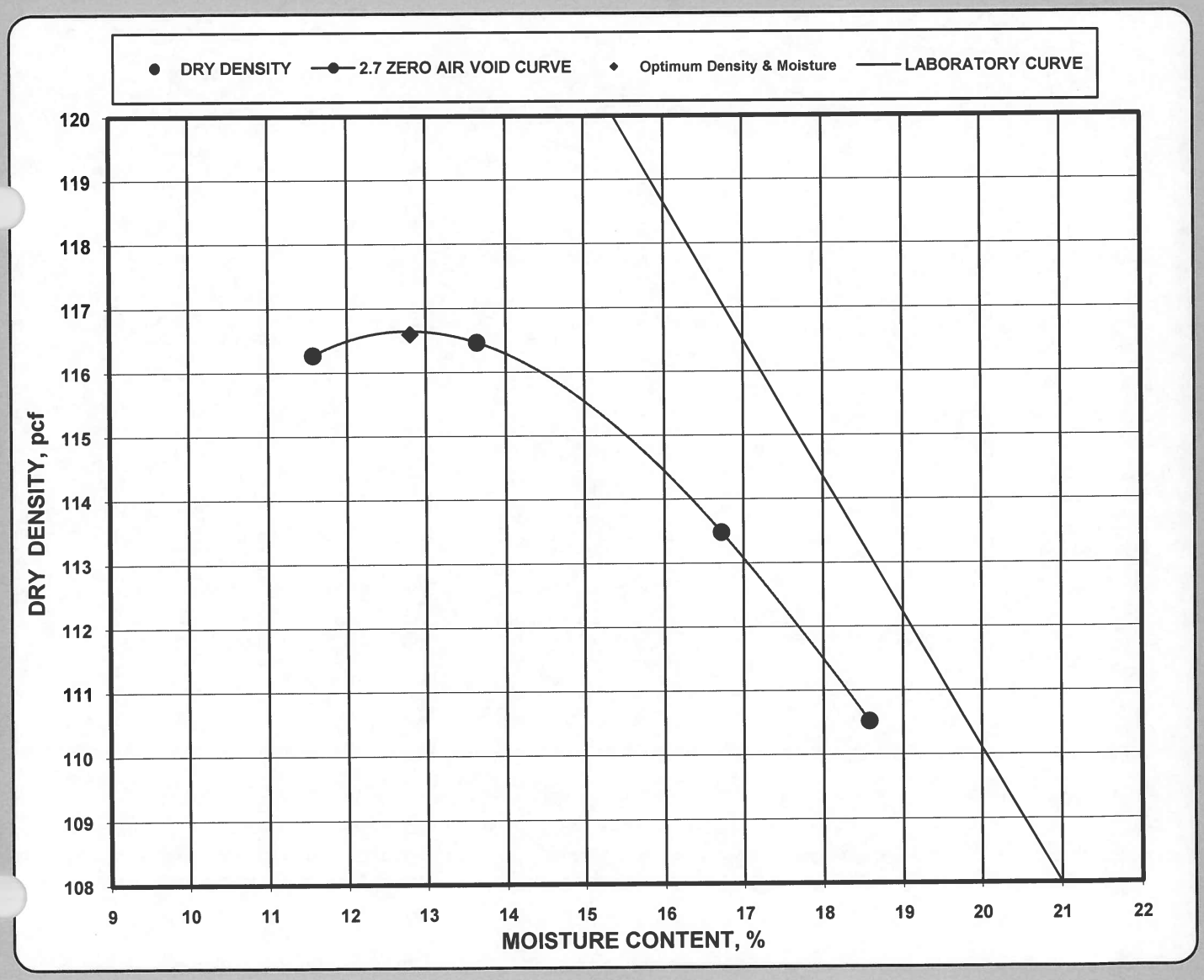
OPTIMUM MOISTURE, %
12.8

Placement Range: 9.8 - 15.8

ATTERBERG LIMITS

LIQUID LIMIT:	42
PLASTICITY INDEX:	26
% PASSING #200:	73

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-33 @ 0-1.2m
SAMPLE DESCRIPTION:	Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	November 8, 2009
LABORATORY TECHNICIAN:	SC

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
126.7

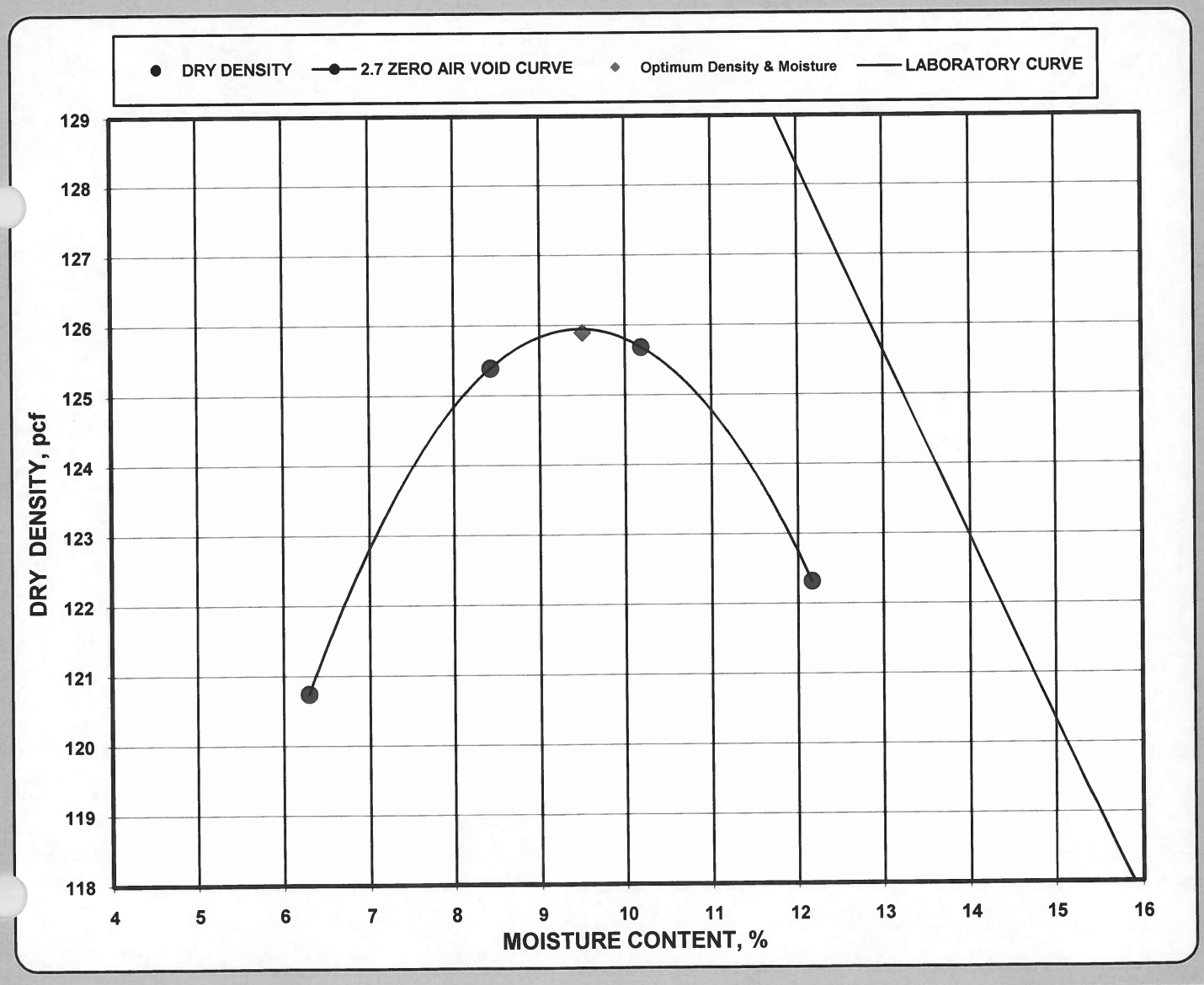
OPTIMUM MOISTURE, %
9.2

Placement Range: 6.2 - 12.2

ATTERBERG LIMITS

LIQUID LIMIT:	27
PLASTICITY INDEX:	17
% PASSING #200:	58

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-38 @ 0-1.2m
SAMPLE DESCRIPTION:	Clayey Sand
MATERIAL CLASSIFICATION:	SC
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	November 8, 2009
LABORATORY TECHNICIAN:	SC

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
127.5

OPTIMUM MOISTURE, %
8.9

Placement Range: 5.9 - 11.9

ATTERBERG LIMITS

LIQUID LIMIT:	27
PLASTICITY INDEX:	15
% PASSING #200:	30

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA	CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084		
PROJECT LOCATION:	Many Farms, Arizona		
PROJECT NUMBER:	69095030		
MATERIAL SOURCE:	RB-41 @ 0-1.2m		
SAMPLE DESCRIPTION:	Clayey Sand		
MATERIAL CLASSIFICATION:	SC		
TEST PROCEDURE:	ASTM D1557, Method A		
COMPACTION RAMMER:	Automatic		
DATE PERFORMED:	December 4, 2009		
LABORATORY TECHNICIAN:	KB		

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
114.6

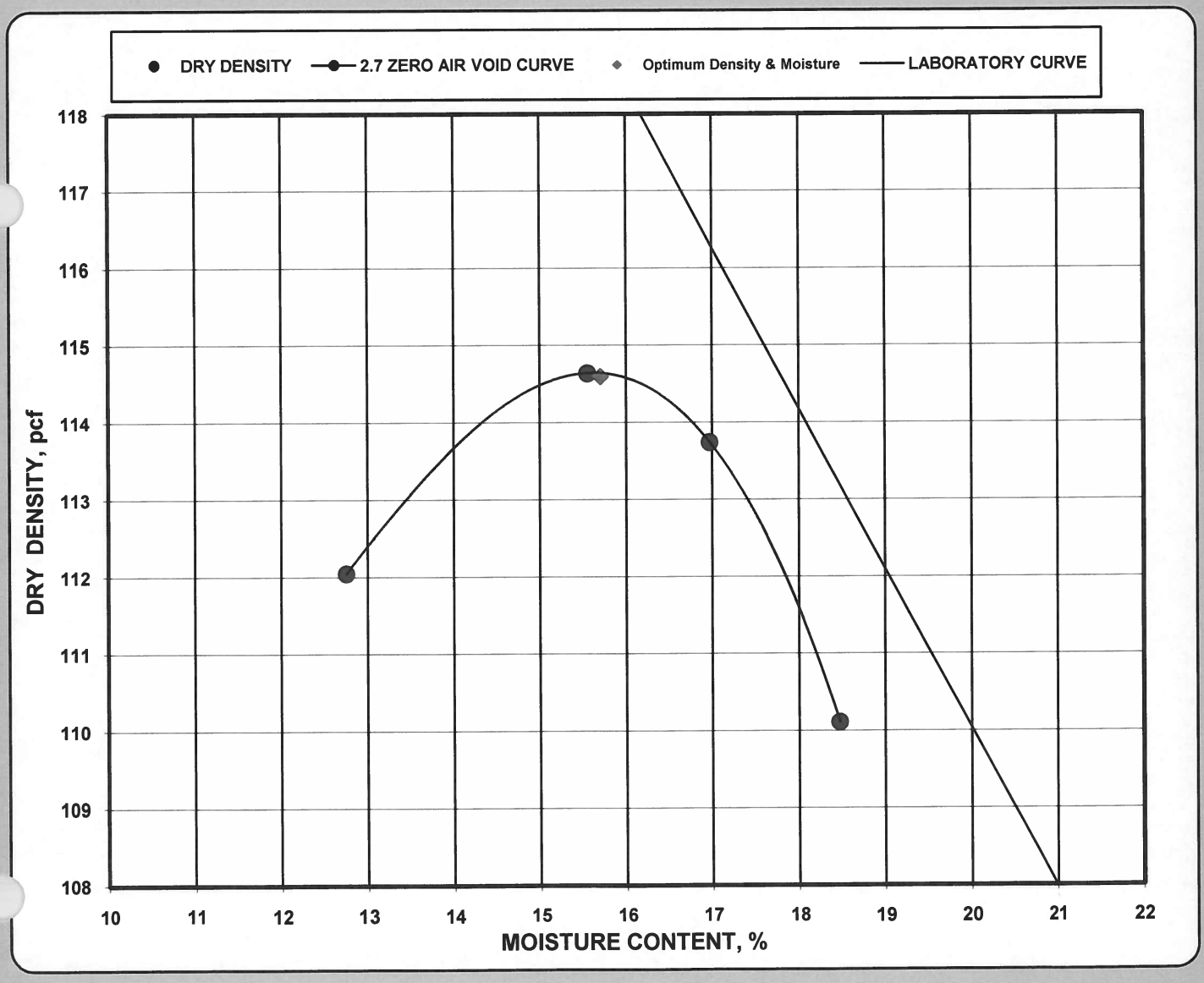
OPTIMUM MOISTURE, %
15.7

Placement Range: 12.7 - 18.7

ATTERBERG LIMITS

LIQUID LIMIT:	42
PLASTICITY INDEX:	27
% PASSING #200:	61

Reviewed By:



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA	CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084		
PROJECT LOCATION:	Many Farms, Arizona		
PROJECT NUMBER:	69095030		
MATERIAL SOURCE:	RB-45 @ 0-1.2m		
SAMPLE DESCRIPTION:	Clayey Sand		
MATERIAL CLASSIFICATION:	SC		
TEST PROCEDURE:	ASTM D1557, Method A		
COMPACTION RAMMER:	Automatic		
DATE PERFORMED:	October 29, 2009		
LABORATORY TECHNICIAN:	SC		

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
122.6

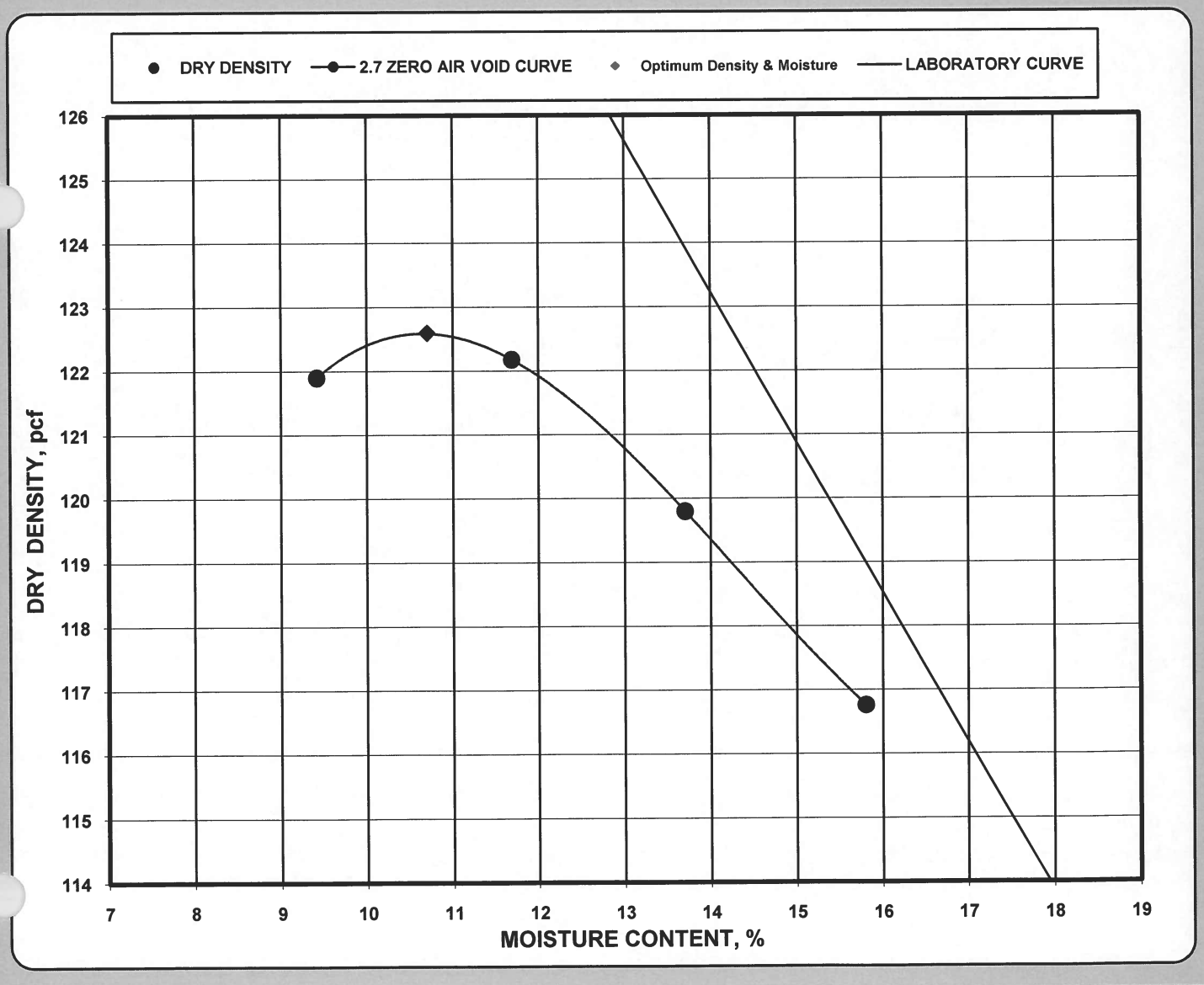
OPTIMUM MOISTURE, %
10.7

Placement Range: 7.7 - 13.7

ATTERBERG LIMITS

LIQUID LIMIT:	37
PLASTICITY INDEX:	23
% PASSING #200:	44

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-50 @ 0-1.2m
SAMPLE DESCRIPTION:	Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	October 30, 2009
LABORATORY TECHNICIAN:	SC

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
121.3

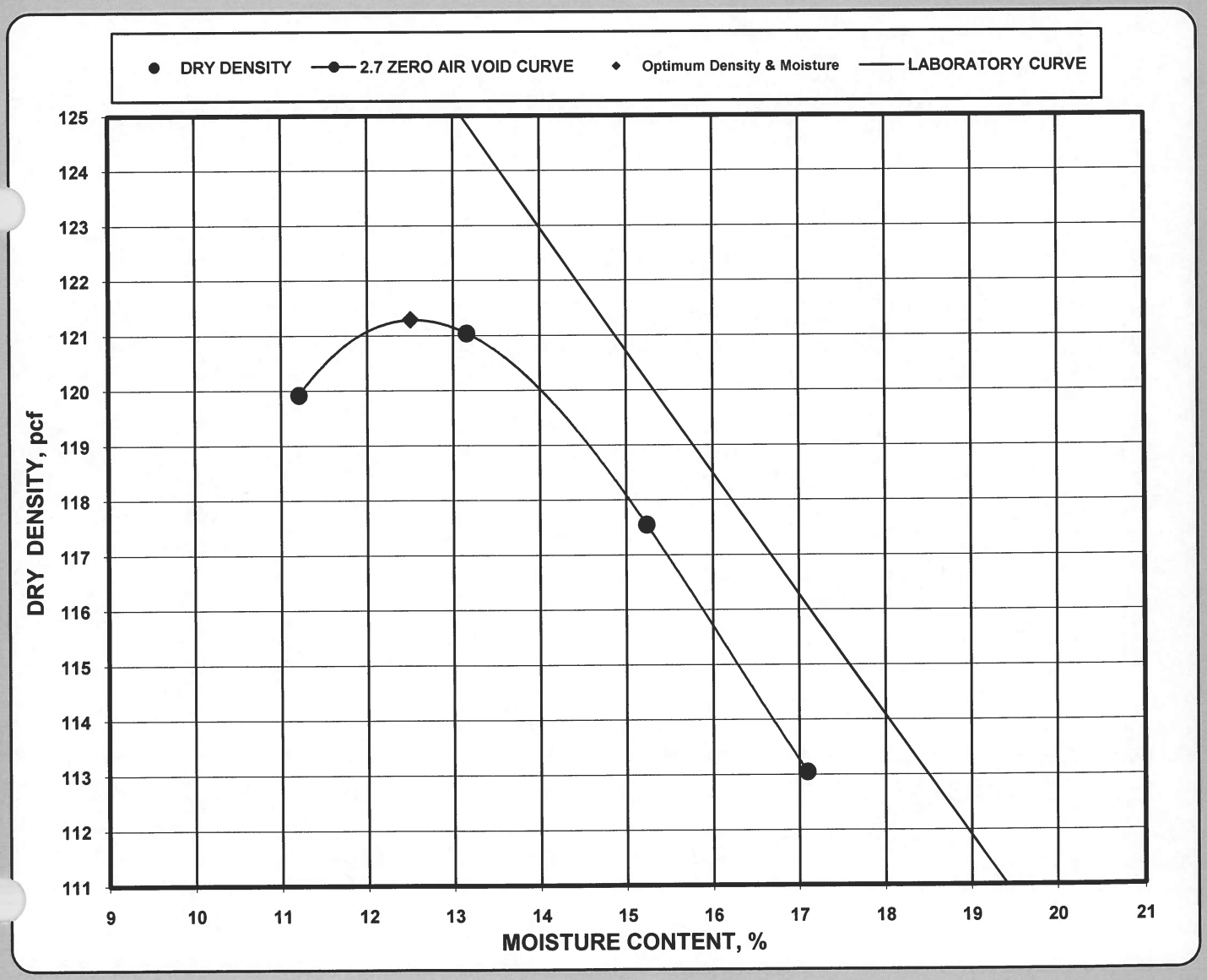
OPTIMUM MOISTURE, %
12.5

Placement Range: 9.5 - 15.5

ATTERBERG LIMITS

LIQUID LIMIT:	33
PLASTICITY INDEX:	20
% PASSING #200:	67

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-75 @ 0-1.2m
SAMPLE DESCRIPTION:	Clayey Sand
MATERIAL CLASSIFICATION:	SC
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	October 30, 2009
LABORATORY TECHNICIAN:	SC

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
129.8

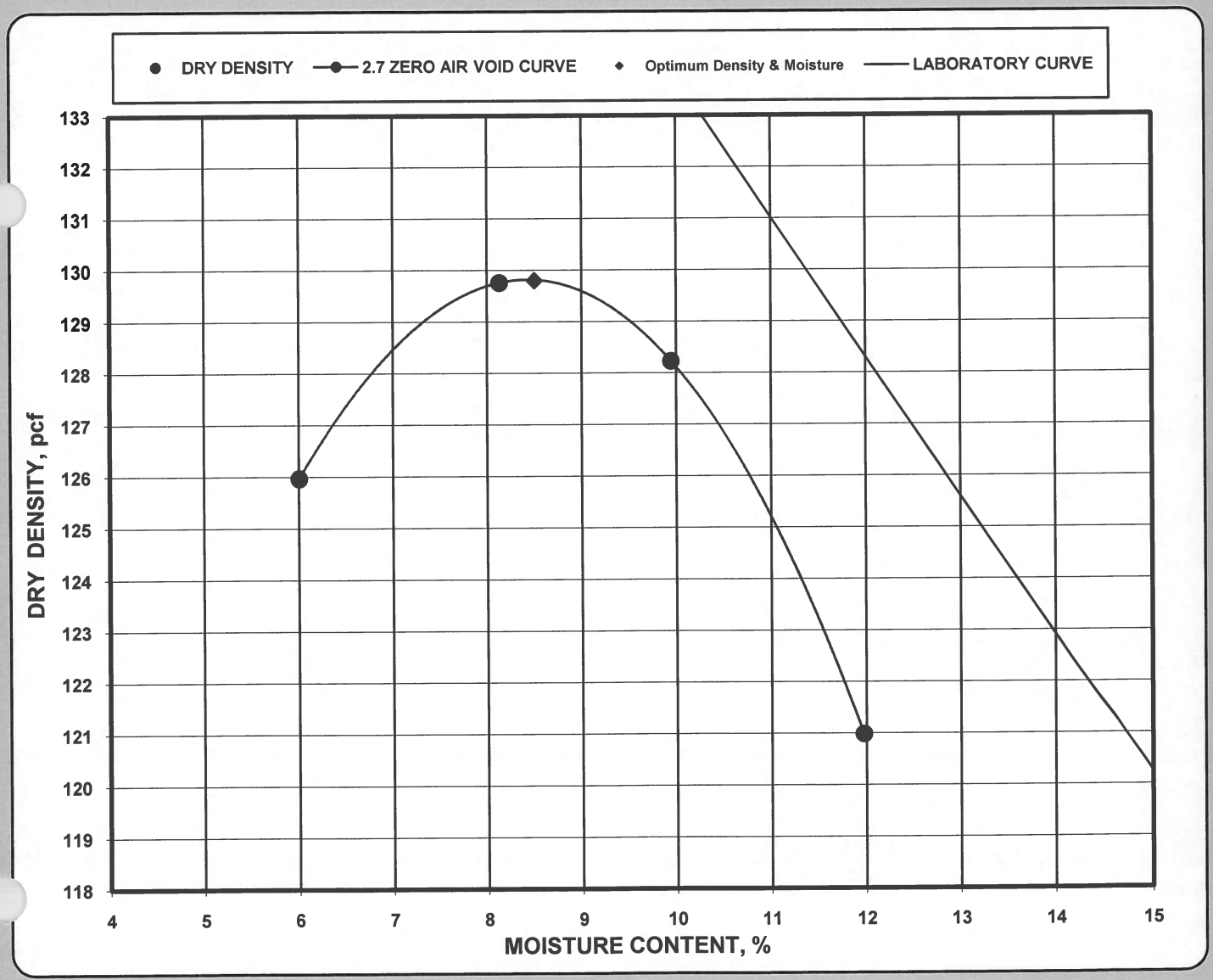
OPTIMUM MOISTURE, %
8.5

Placement Range: 5.5 - 11.5

ATTERBERG LIMITS

LIQUID LIMIT:	23
PLASTICITY INDEX:	11
% PASSING #200:	39

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-82 @ 0-1.2m
SAMPLE DESCRIPTION:	Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	October 31, 2009
LABORATORY TECHNICIAN:	SC

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
126.7

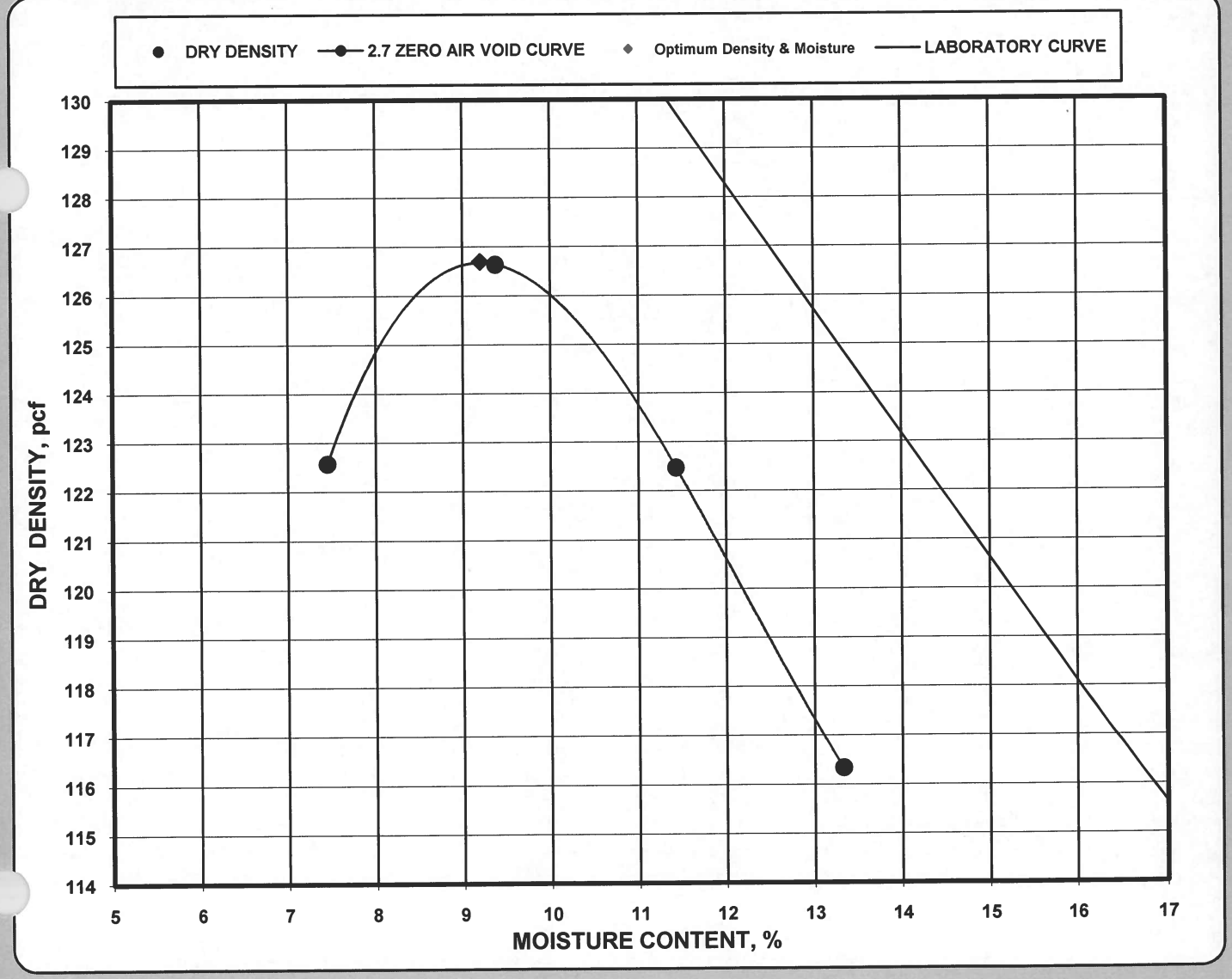
OPTIMUM MOISTURE, %
9.2

Placement Range: 6.2 - 12.2

ATTERBERG LIMITS

LIQUID LIMIT:	22
PLASTICITY INDEX:	8
% PASSING #200:	53

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-92 @ 0-1.2m
SAMPLE DESCRIPTION:	Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	November 8, 2009
LABORATORY TECHNICIAN:	SC

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
126.5

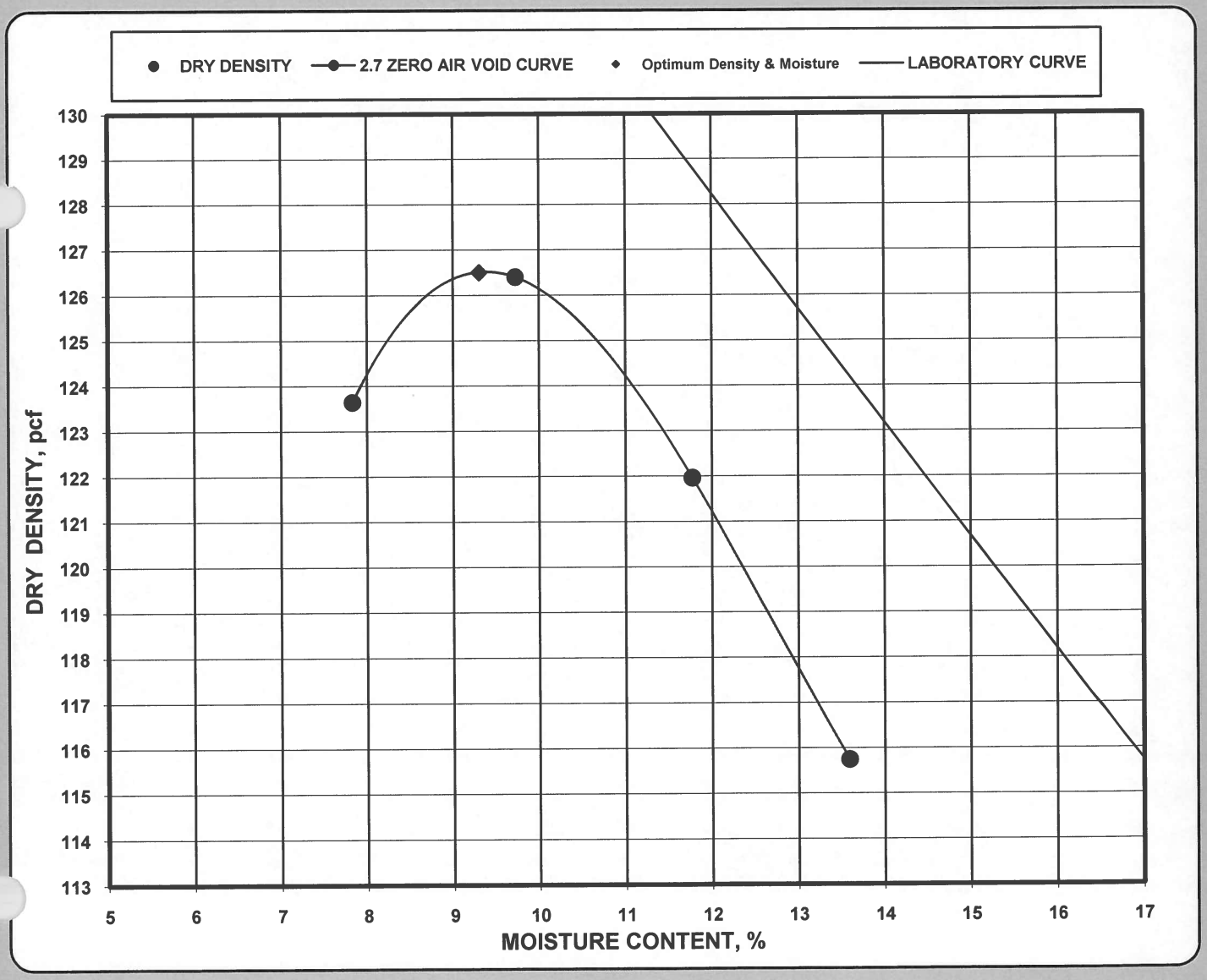
OPTIMUM MOISTURE, %
9.3

Placement Range: 6.3 - 12.3

ATTERBERG LIMITS

LIQUID LIMIT:	24
PLASTICITY INDEX:	12
% PASSING #200:	53

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA	CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084		
PROJECT LOCATION:	Many Farms, Arizona		
PROJECT NUMBER:	69095030		
MATERIAL SOURCE:	RB-99 @ 0-1.2m		
SAMPLE DESCRIPTION:	Clayey Silty Sand		
MATERIAL CLASSIFICATION:	SC-SM		
TEST PROCEDURE:	ASTM D1557, Method A		
COMPACTION RAMMER:	Automatic		
DATE PERFORMED:	November 8, 2009		
LABORATORY TECHNICIAN:	SC		

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
124.3

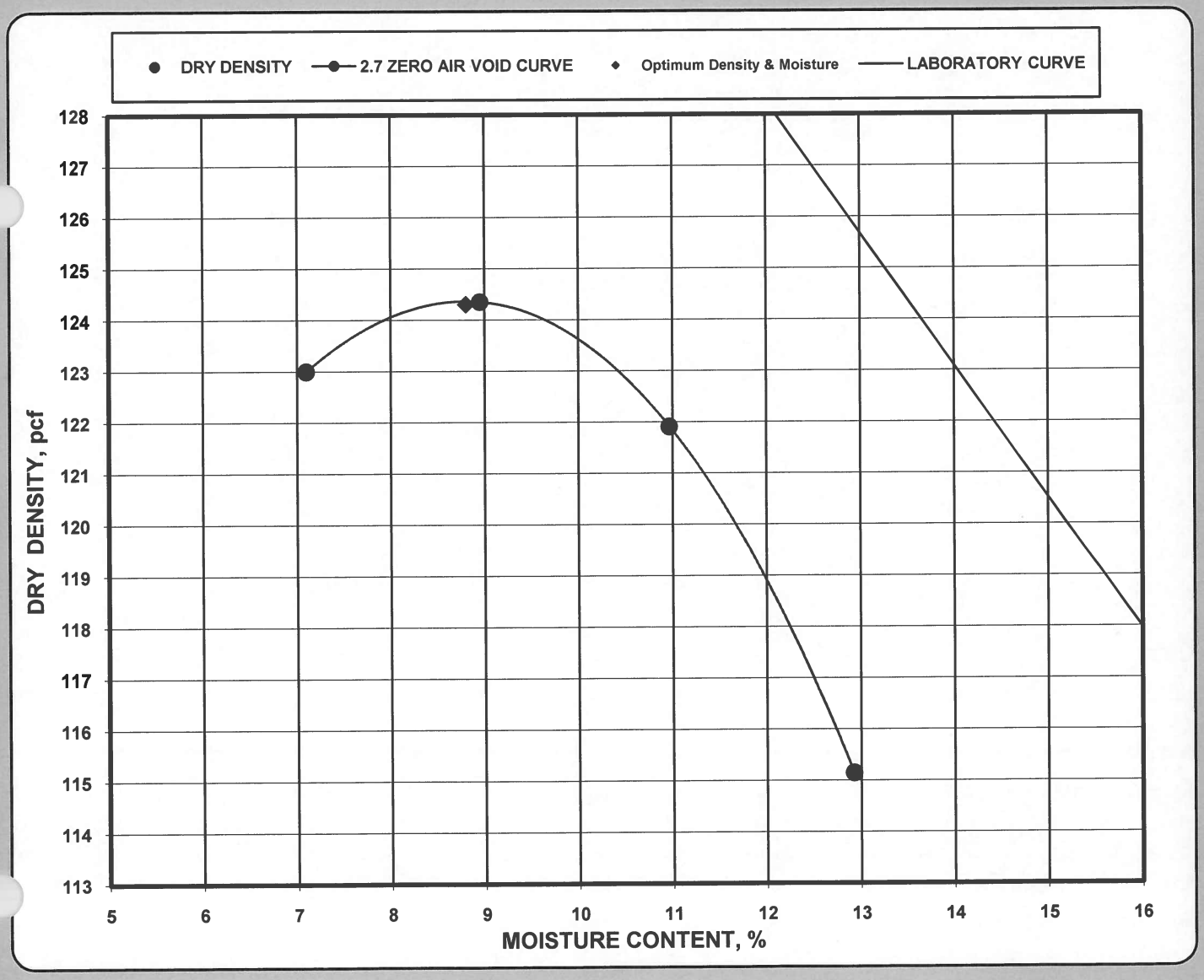
OPTIMUM MOISTURE, %
8.8

Placement Range: 5.8 - 11.8

ATTERBERG LIMITS

LIQUID LIMIT:	19
PLASTICITY INDEX:	4
% PASSING #200:	33

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-107 @ 0-1.2m
SAMPLE DESCRIPTION:	Clayey Silt
MATERIAL CLASSIFICATION:	ML
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	November 8, 2009
LABORATORY TECHNICIAN:	SC

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
135.4

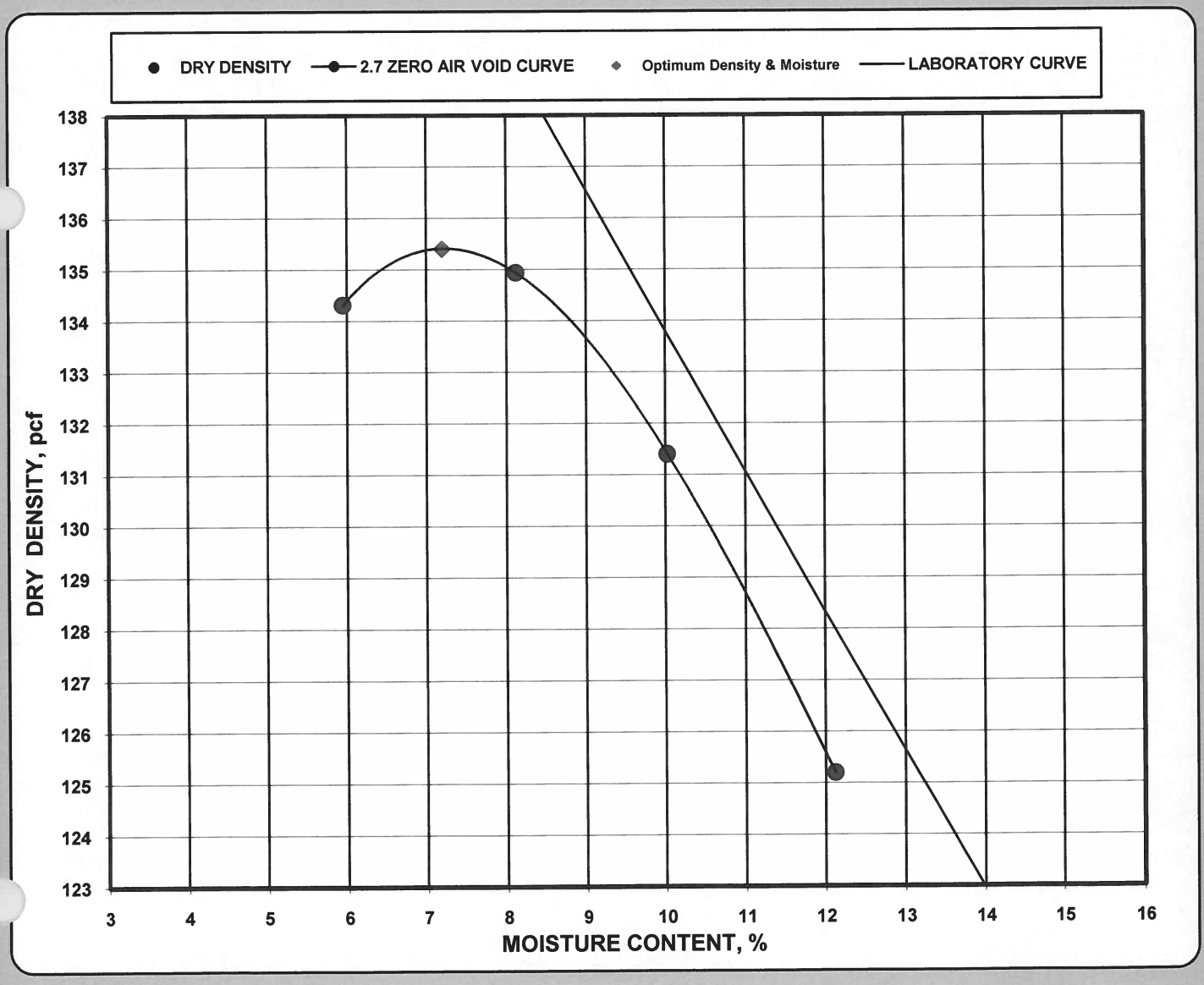
OPTIMUM MOISTURE, %
7.2

Placement Range: 4.2 - 10.2

ATTERBERG LIMITS

LIQUID LIMIT:	18
PLASTICITY INDEX:	3
% PASSING #200:	88

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA	CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	Indian Route 8084		
PROJECT LOCATION:	Many Farms, Arizona		
PROJECT NUMBER:	69095030		
MATERIAL SOURCE:	RB-117 @ 0-1.2m		
SAMPLE DESCRIPTION:	Clayey Sand to Sandy Clay		
MATERIAL CLASSIFICATION:	SC-CL		
TEST PROCEDURE:	ASTM D1557, Method A		
COMPACTION RAMMER:	Automatic		
DATE PERFORMED:	November 9, 2009		
LABORATORY TECHNICIAN:	SC		

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
125.8

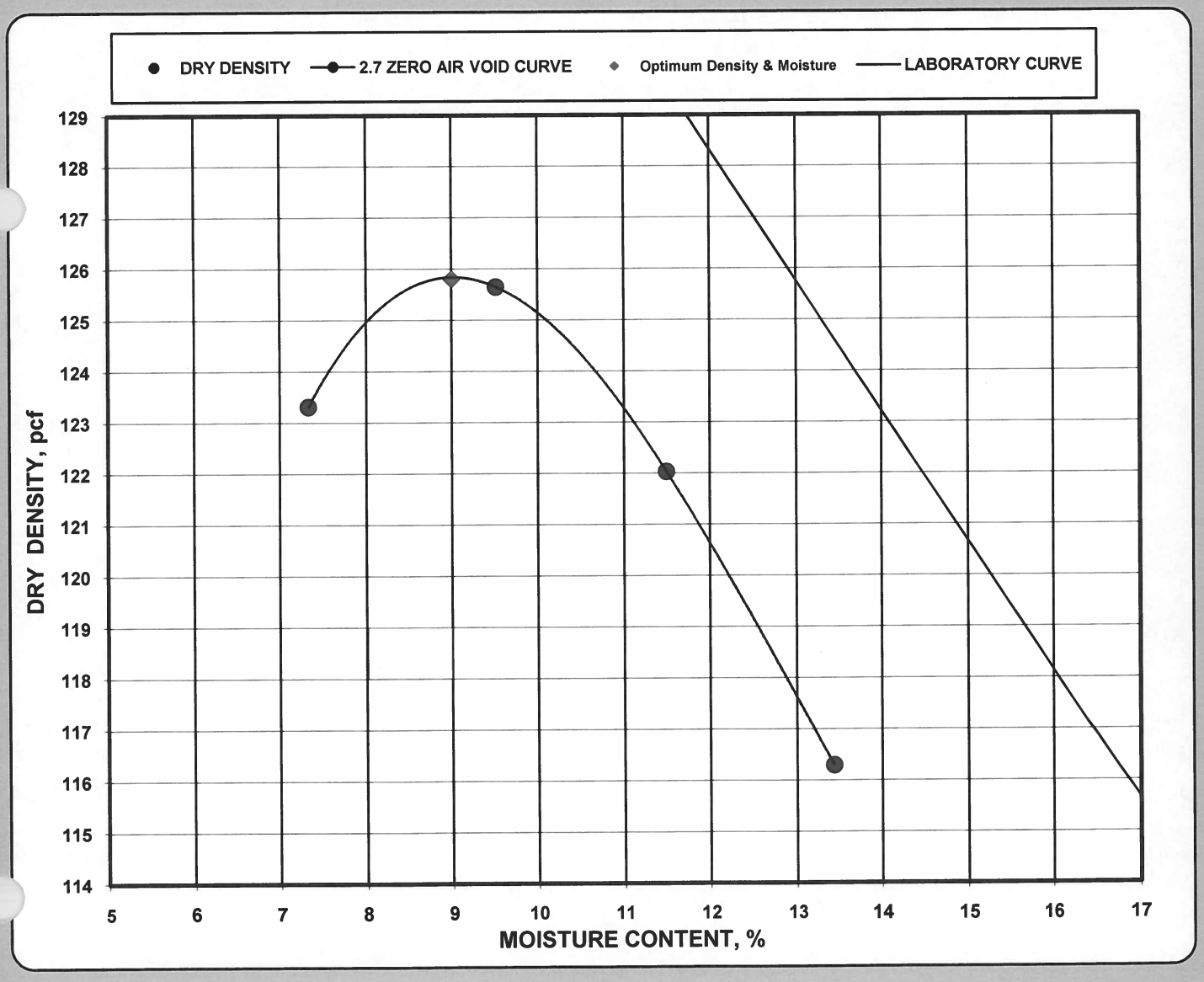
OPTIMUM MOISTURE, %
9.0

Placement Range: 6.0 - 12.0

ATTERBERG LIMITS

LIQUID LIMIT:	22
PLASTICITY INDEX:	9
% PASSING #200:	50

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	Indian Route 8084
PROJECT LOCATION:	Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-124 @ 0-1.2m
SAMPLE DESCRIPTION:	Clayey Sand
MATERIAL CLASSIFICATION:	SC
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	November 9, 2009
LABORATORY TECHNICIAN:	SC

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
125.0

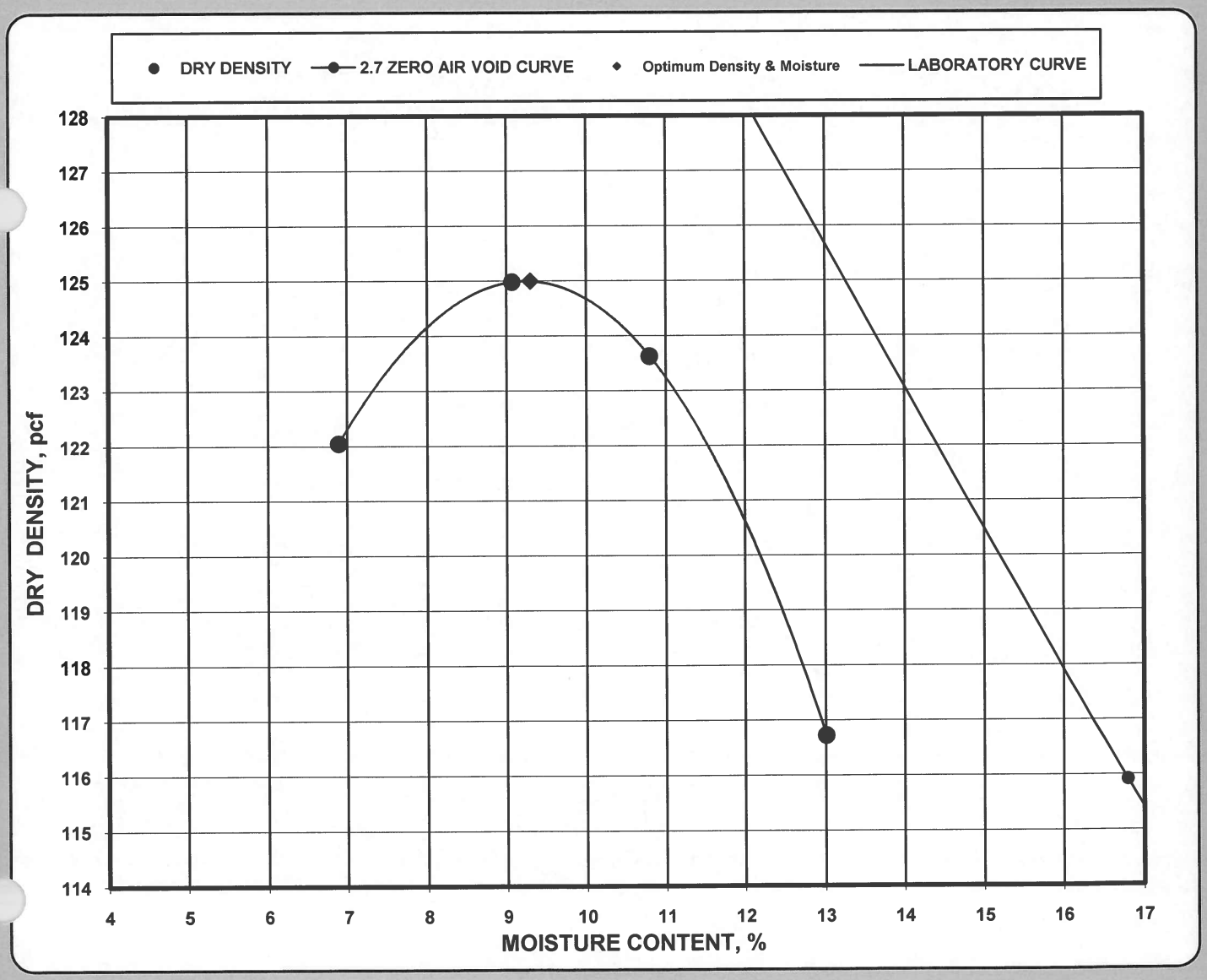
OPTIMUM MOISTURE, %
9.3

Placement Range: 6.3 - 12.3

ATTERBERG LIMITS

LIQUID LIMIT:	28
PLASTICITY INDEX:	17
% PASSING #200:	22

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-5 @ 0-1.2m
SAMPLE DESCRIPTION:	Fat Clay
MATERIAL CLASSIFICATION:	CH
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 3, 2009
LABORATORY TECHNICIAN:	RK

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
111.6

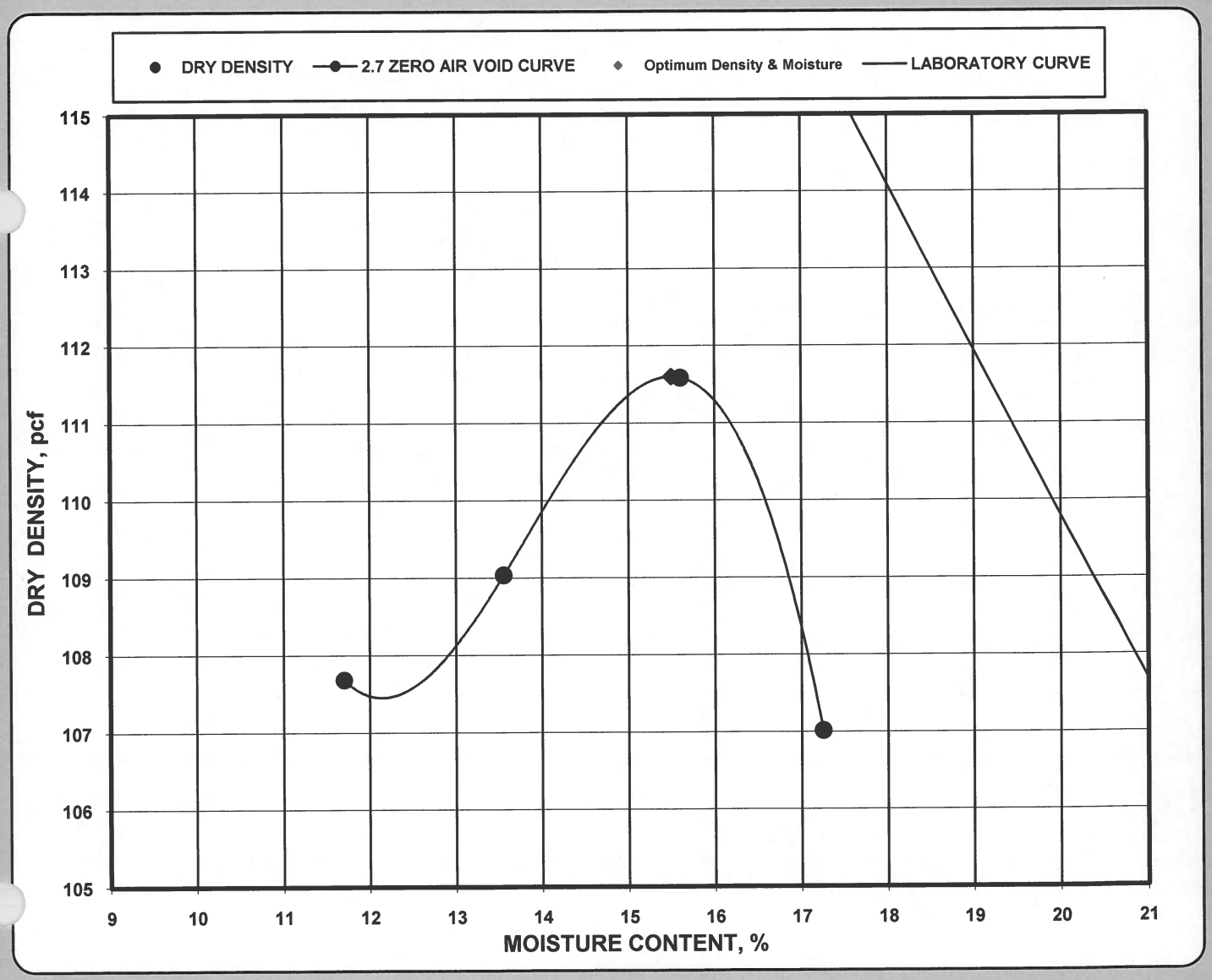
OPTIMUM MOISTURE, %
15.5

Placement Range: 12.5 - 18.5

REMOLDED SWELL,%

15.6

Reviewed By:



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-13 @ 0-0.9m
SAMPLE DESCRIPTION:	Sandy Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 3, 2009
LABORATORY TECHNICIAN:	RK

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
114.9

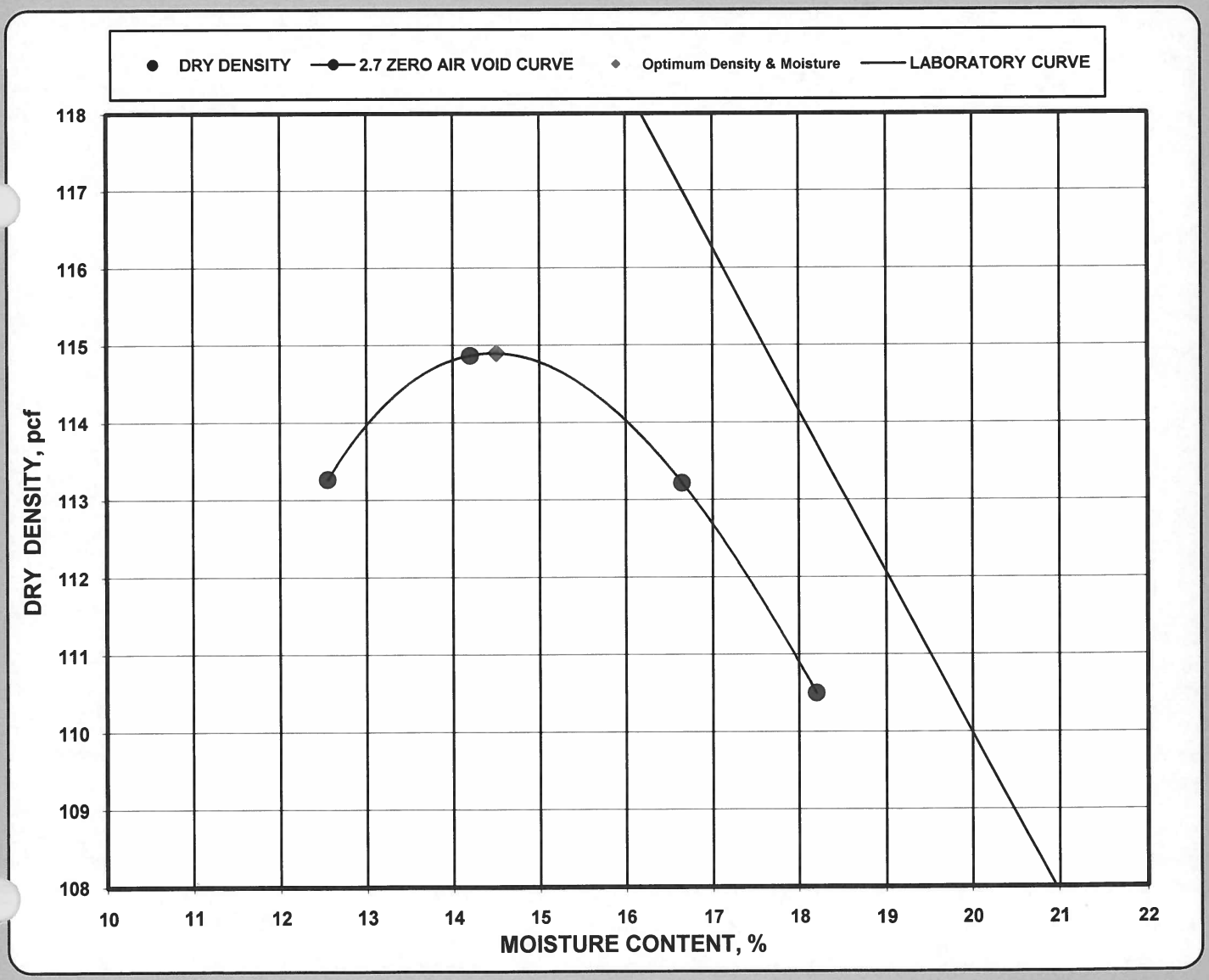
OPTIMUM MOISTURE, %
14.5

Placement Range: 11.5 - 17.5

REMOLDED SWELL,%

8.6

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-20 @ 0-0.3m
SAMPLE DESCRIPTION:	Fat Clay
MATERIAL CLASSIFICATION:	CH
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 3, 2009
LABORATORY TECHNICIAN:	RK

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
111.5

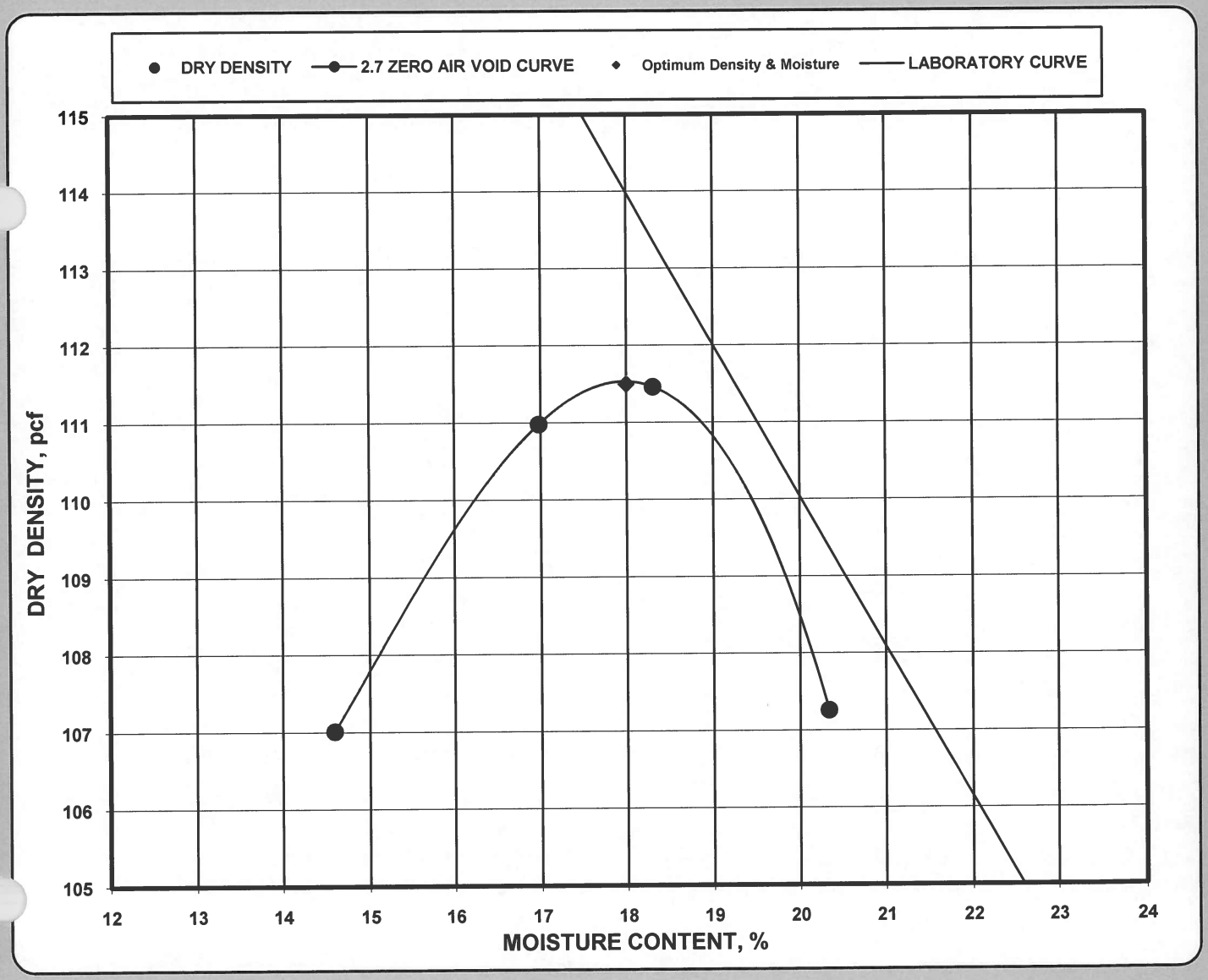
OPTIMUM MOISTURE, %
18.0

Placement Range: 15.0 - 21.0

REMOLDED SWELL,%

16.0

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-23 @ 0-1.2m
SAMPLE DESCRIPTION:	Lean Clay with Sand
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 3, 2009
LABORATORY TECHNICIAN:	RK

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
124.0

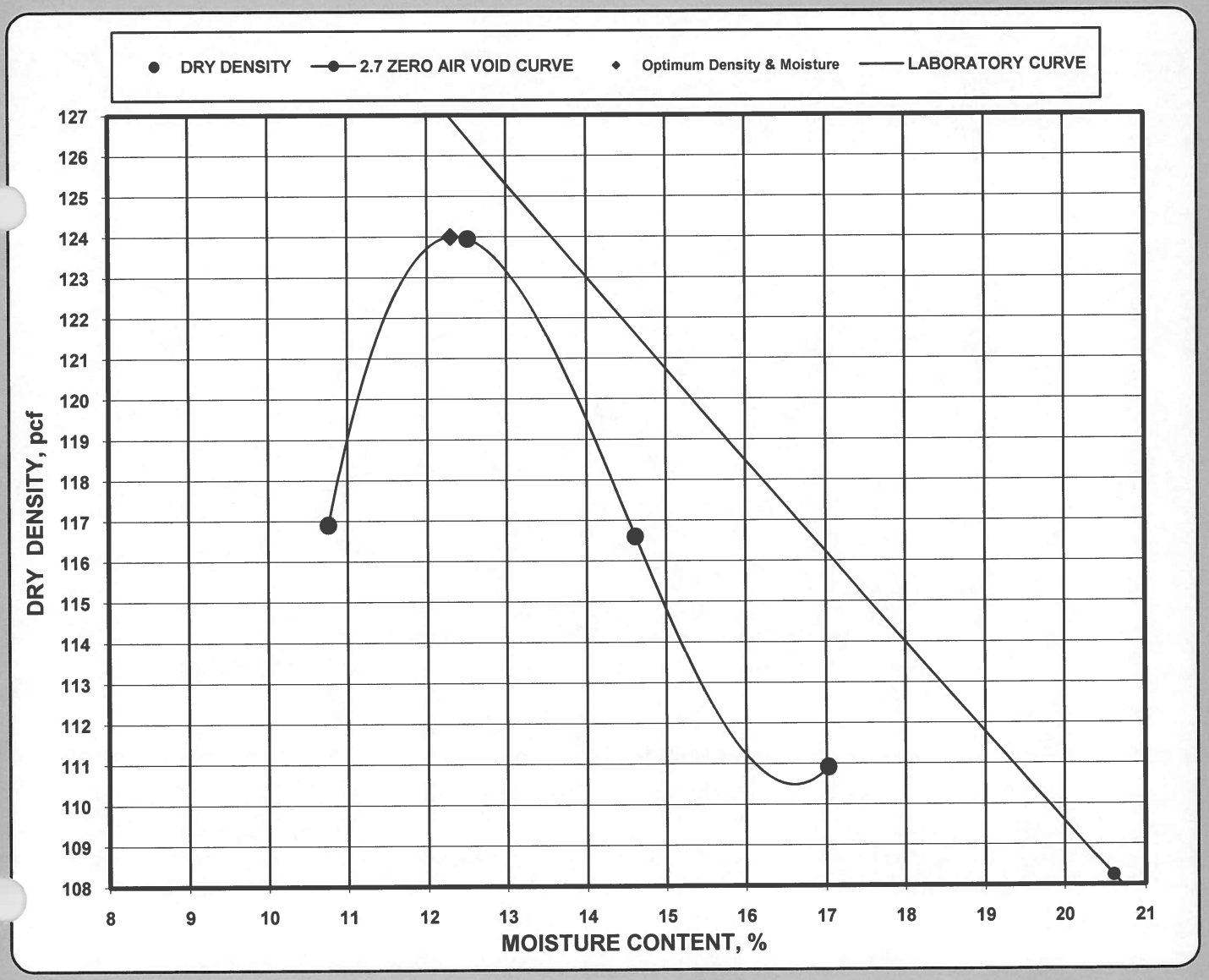
OPTIMUM MOISTURE, %
12.3

Placement Range: 9.3 - 15.3

REMOLDED SWELL,%

5.8

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-28 @ 0-0.2m
SAMPLE DESCRIPTION:	Lean Clay with Sand
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 4, 2009
LABORATORY TECHNICIAN:	KB

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
116.6

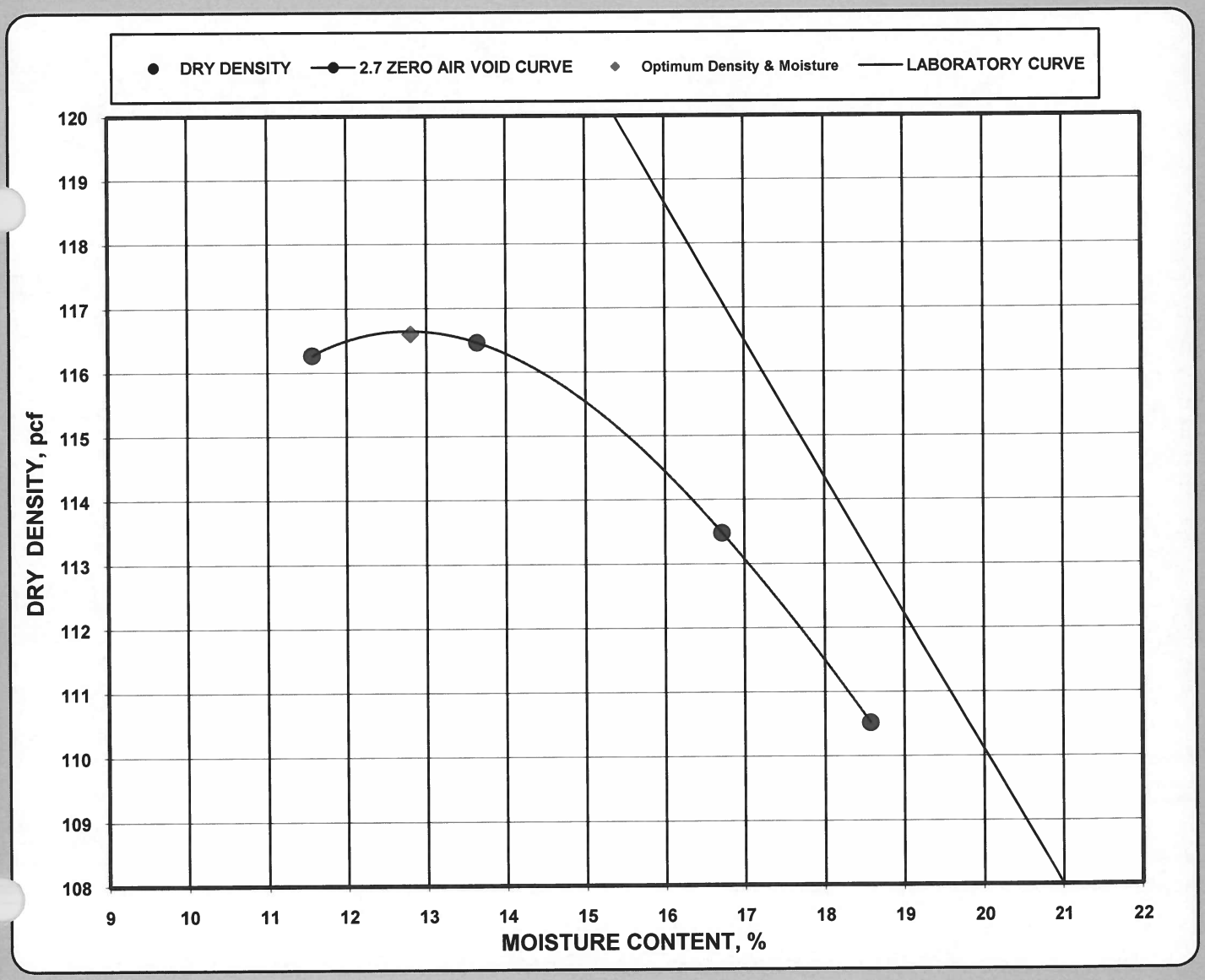
OPTIMUM MOISTURE, %
12.8

Placement Range: 9.8 - 15.8

REMOLDED SWELL,%

17.3

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA	CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	BIA, Indian Route 8084		
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona		
PROJECT NUMBER:	69095030		
MATERIAL SOURCE:	RB-41 @ 0-1.2m		
SAMPLE DESCRIPTION:	Sandy Lean Clay		
MATERIAL CLASSIFICATION:	CL		
TEST PROCEDURE:	ASTM D1557, Method A		
COMPACTION RAMMER:	Automatic		
DATE PERFORMED:	December 4, 2009		
LABORATORY TECHNICIAN:	KB		

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
114.6

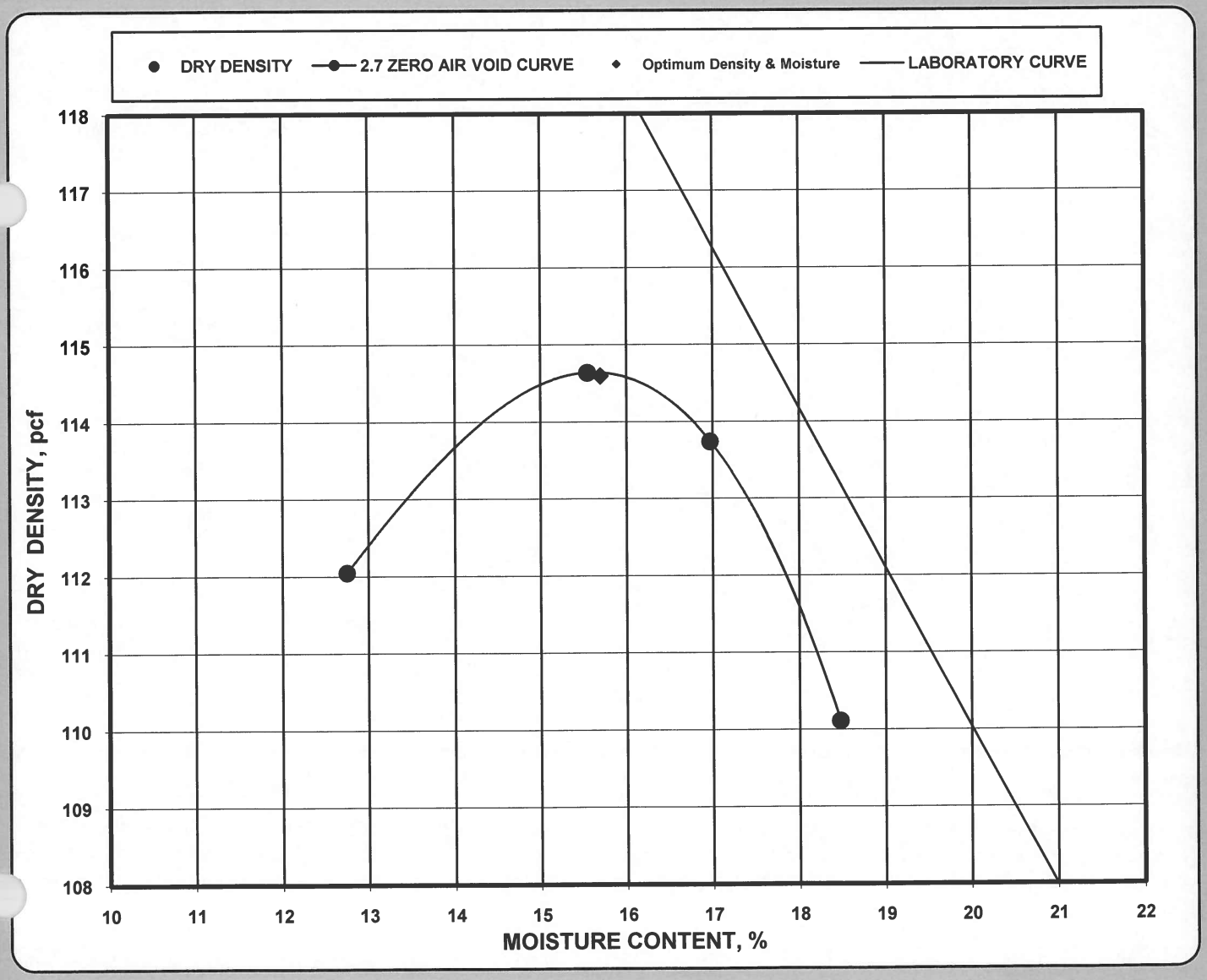
OPTIMUM MOISTURE, %
15.7

Placement Range: 12.7 - 18.7

REMOLDED SWELL, %

10.7

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-52 @ 0-1.2m
SAMPLE DESCRIPTION:	Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 8, 2009
LABORATORY TECHNICIAN:	RK

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
121.2

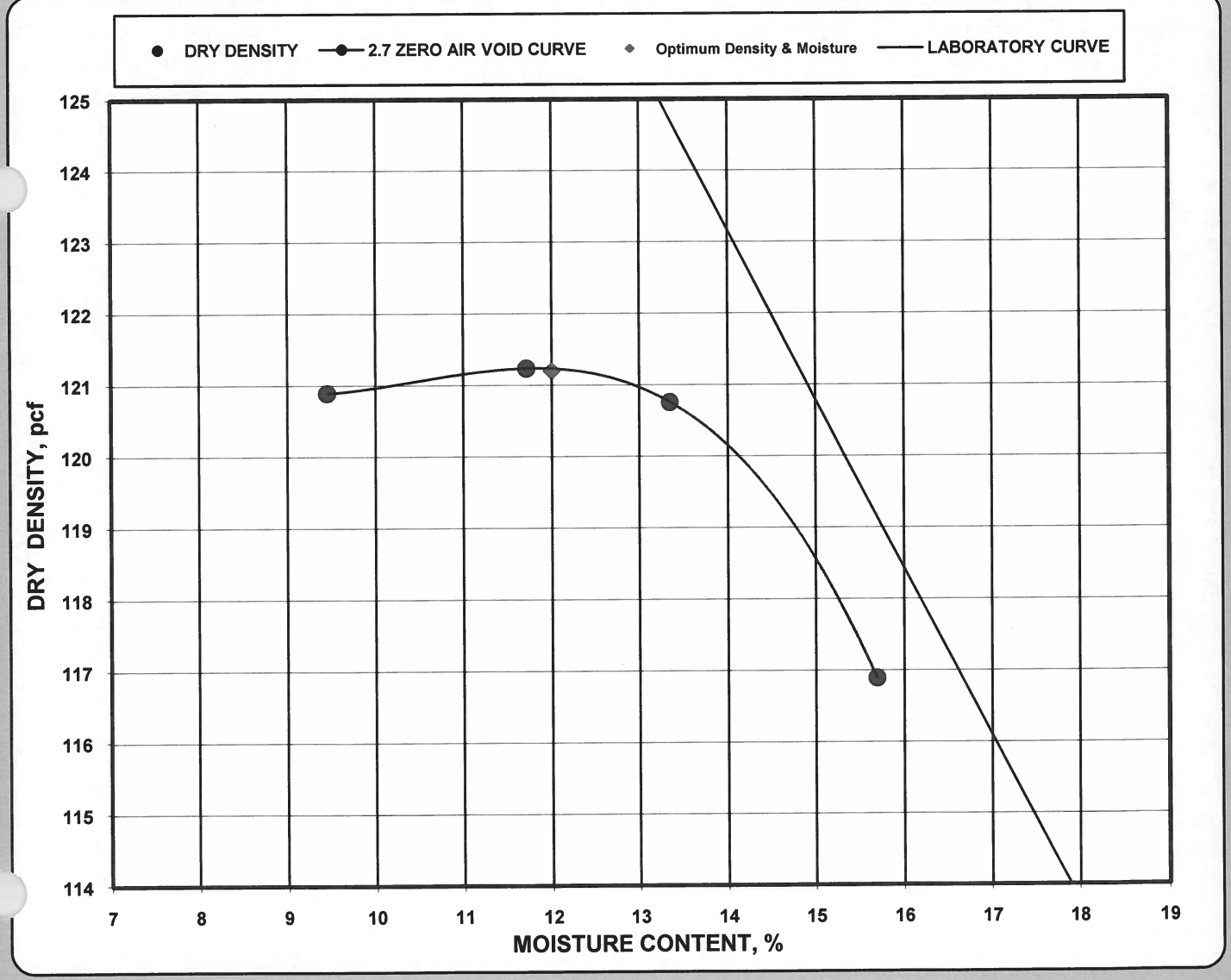
OPTIMUM MOISTURE, %
12.0

Placement Range: 9.0 - 15.0

REMOLDED SWELL, %

8.8

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-67 @ 0-1.2m
SAMPLE DESCRIPTION:	Sandy Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 8, 2009
LABORATORY TECHNICIAN:	RK

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
122.2

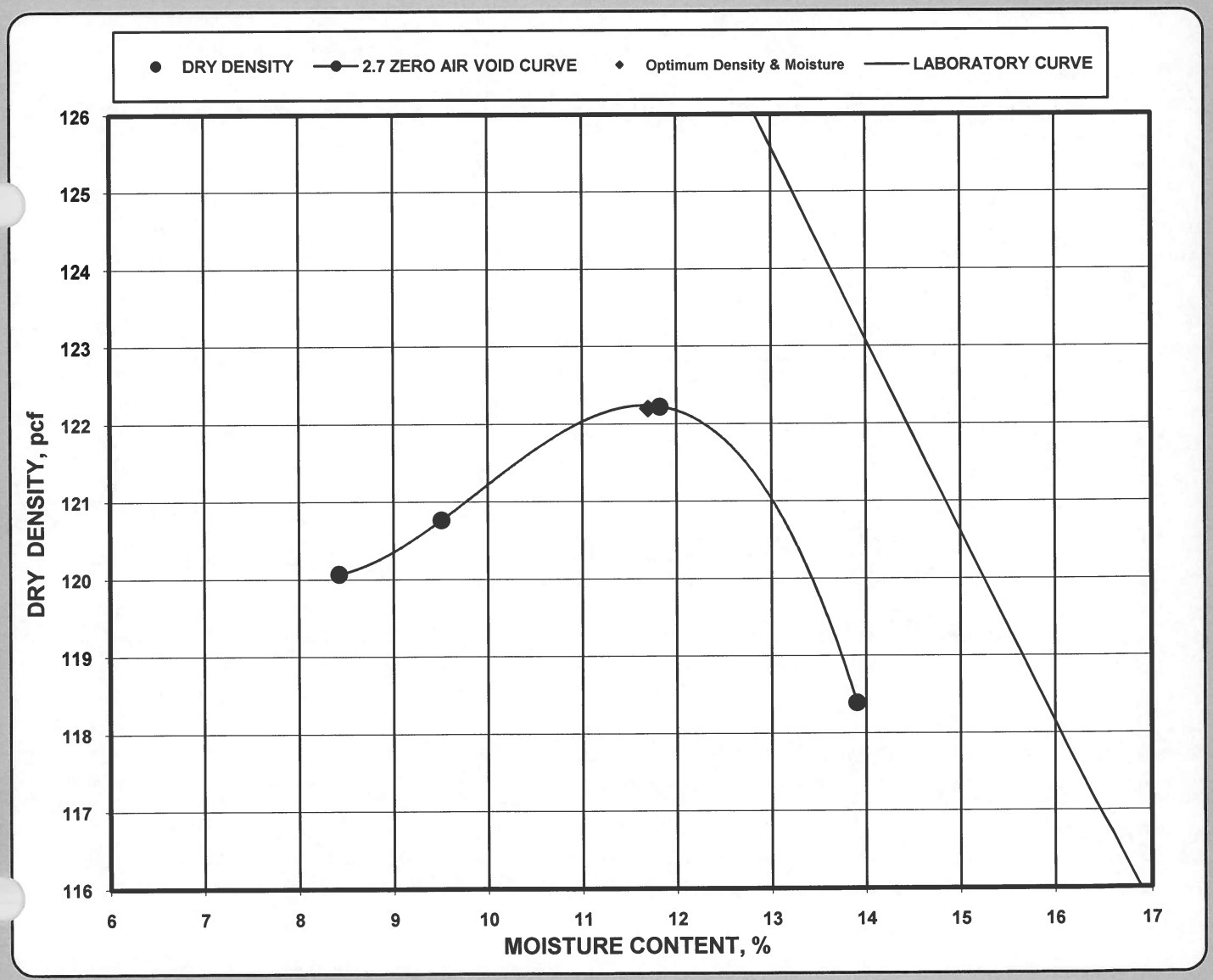
OPTIMUM MOISTURE, %
11.7

Placement Range: 8.7 - 14.7

REMOLDED SWELL, %

6.1

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-79 @ 0-0.9m
SAMPLE DESCRIPTION:	Sandy Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 8, 2009
LABORATORY TECHNICIAN:	KB

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
125.3

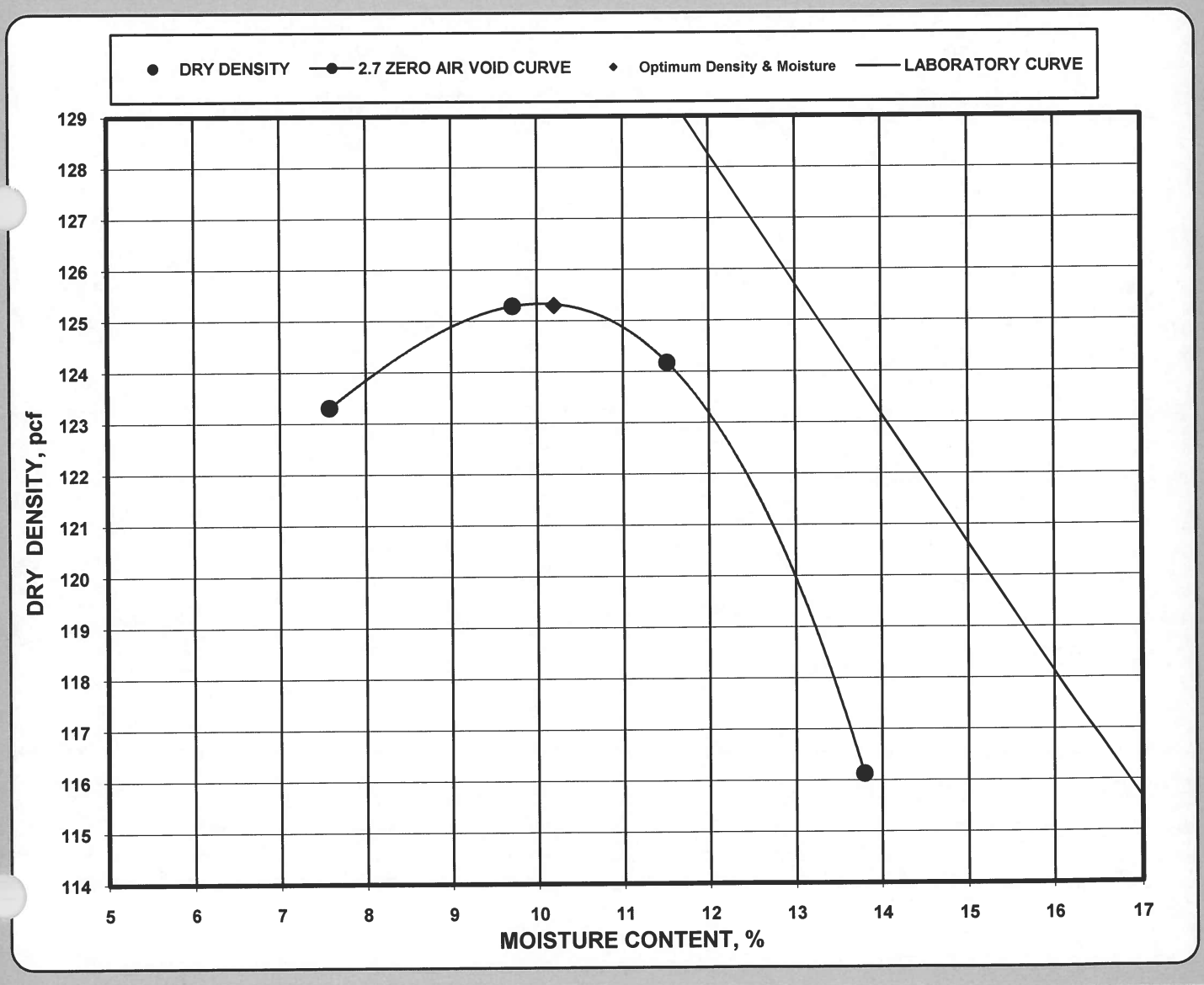
OPTIMUM MOISTURE, %
10.2

Placement Range: 7.2 - 13.2

REMOLDED SWELL, %

2.1

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
CURVE NO.:	DATE: 01/05/10
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-90 @ 0-1.2m
SAMPLE DESCRIPTION:	Sandy Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 8, 2009
LABORATORY TECHNICIAN:	KB

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
130.2

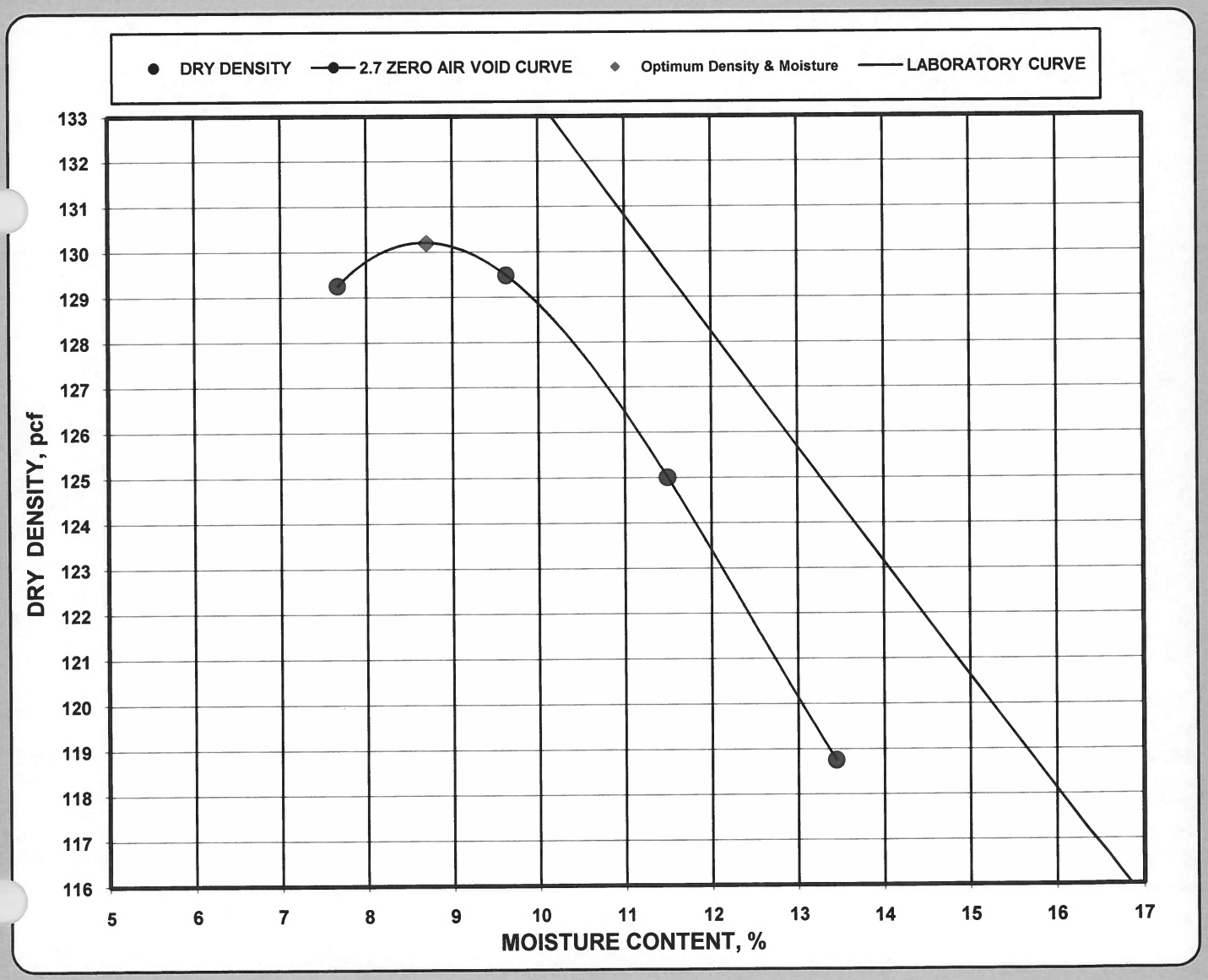
OPTIMUM MOISTURE, %
8.7

Placement Range: 5.7 - 11.7

REMOLDED SWELL, %

6.2

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

Terracon

#4A CR 3499
Flora Vista, New Mexico 87415
(505)334-2900 FAX (505)334-9703

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-115 @ 0-1.2m
SAMPLE DESCRIPTION:	Sandy Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 8, 2009
LABORATORY TECHNICIAN:	KB

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
120.9

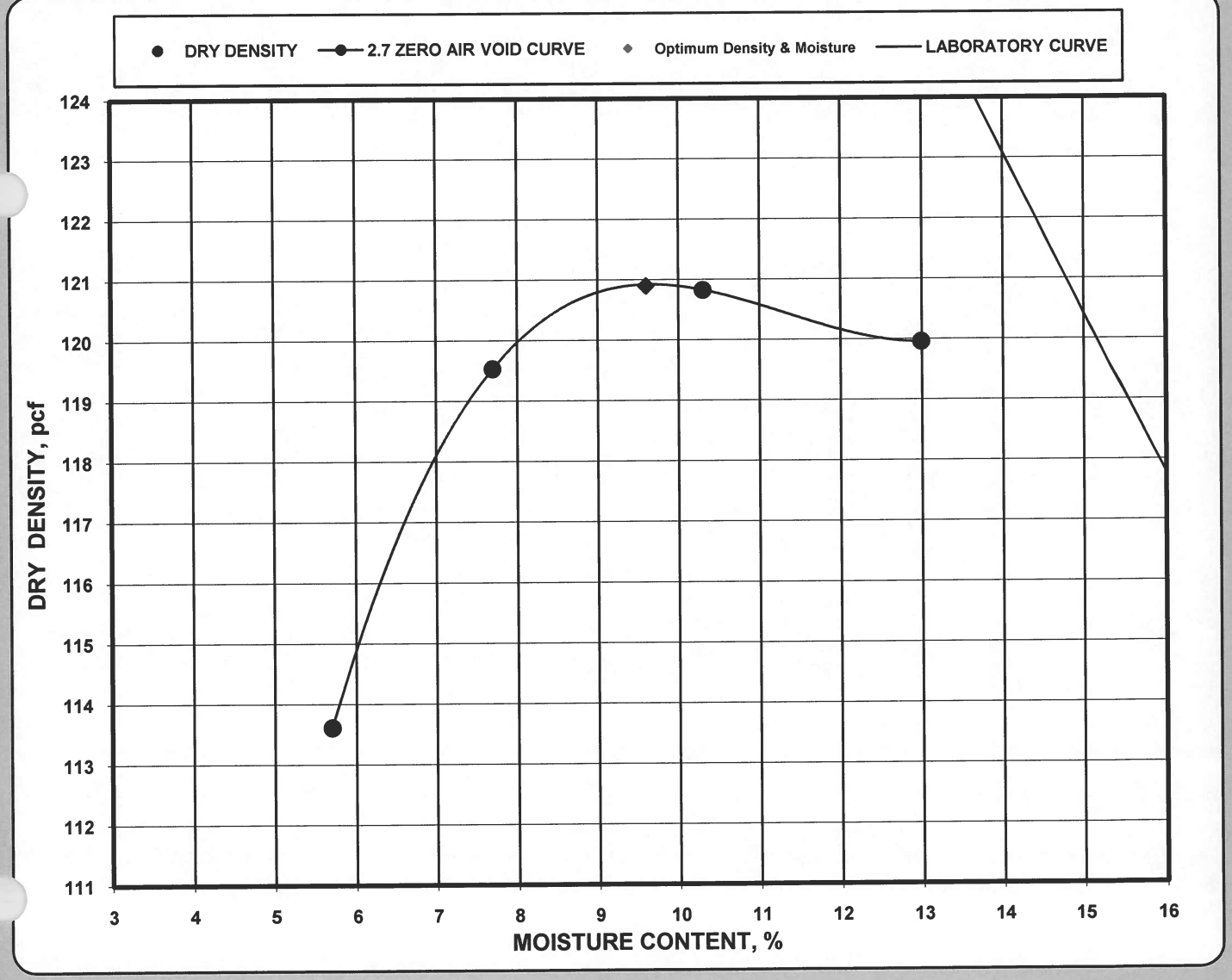
OPTIMUM MOISTURE, %
9.6

Placement Range: 6.6 - 12.6

REMOLDED SWELL, %

3.8

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

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LABORATORY COMPACTION CHARACTERISTICS OF SOIL

CLIENT NAME:	BIA
PROJECT NAME:	BIA, Indian Route 8084
PROJECT LOCATION:	Many Farms toward Tsaile Many Farms, Arizona
PROJECT NUMBER:	69095030
MATERIAL SOURCE:	RB-121 @ 0-1.2m
SAMPLE DESCRIPTION:	Sandy Lean Clay
MATERIAL CLASSIFICATION:	CL
TEST PROCEDURE:	ASTM D1557, Method A
COMPACTION RAMMER:	Automatic
DATE PERFORMED:	December 8, 2009
LABORATORY TECHNICIAN:	RK

CURVE NO.: DATE: 01/05/10

TEST RESULTS

MAXIMUM DRY DENSITY, pcf
123.3

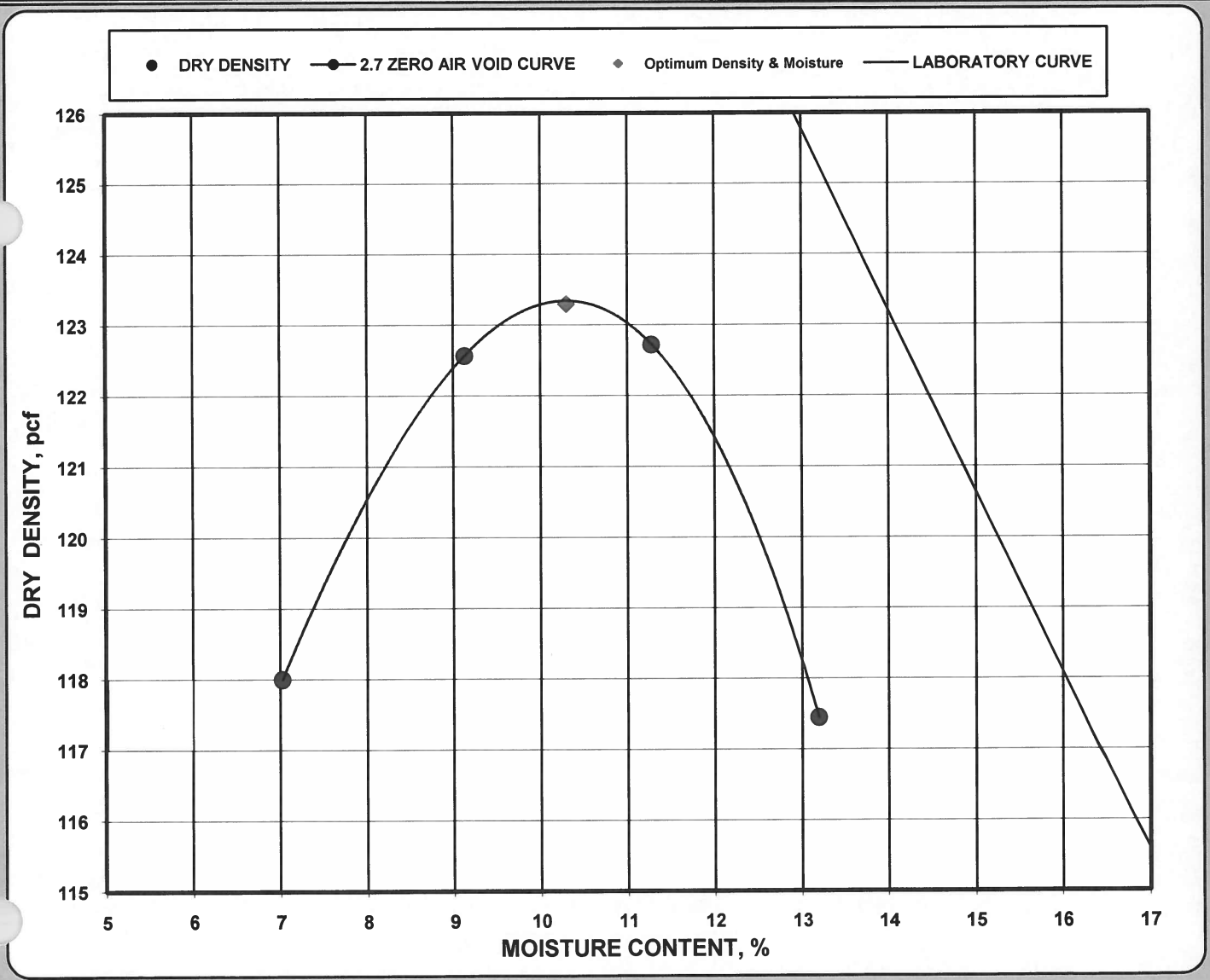
OPTIMUM MOISTURE, %
10.3

Placement Range: 7.3 - 13.3

REMOLDED SWELL, %

0.7

Reviewed By: Brian E. Clough, CET (CS Manager)



*NP Denotes test procedure not performed

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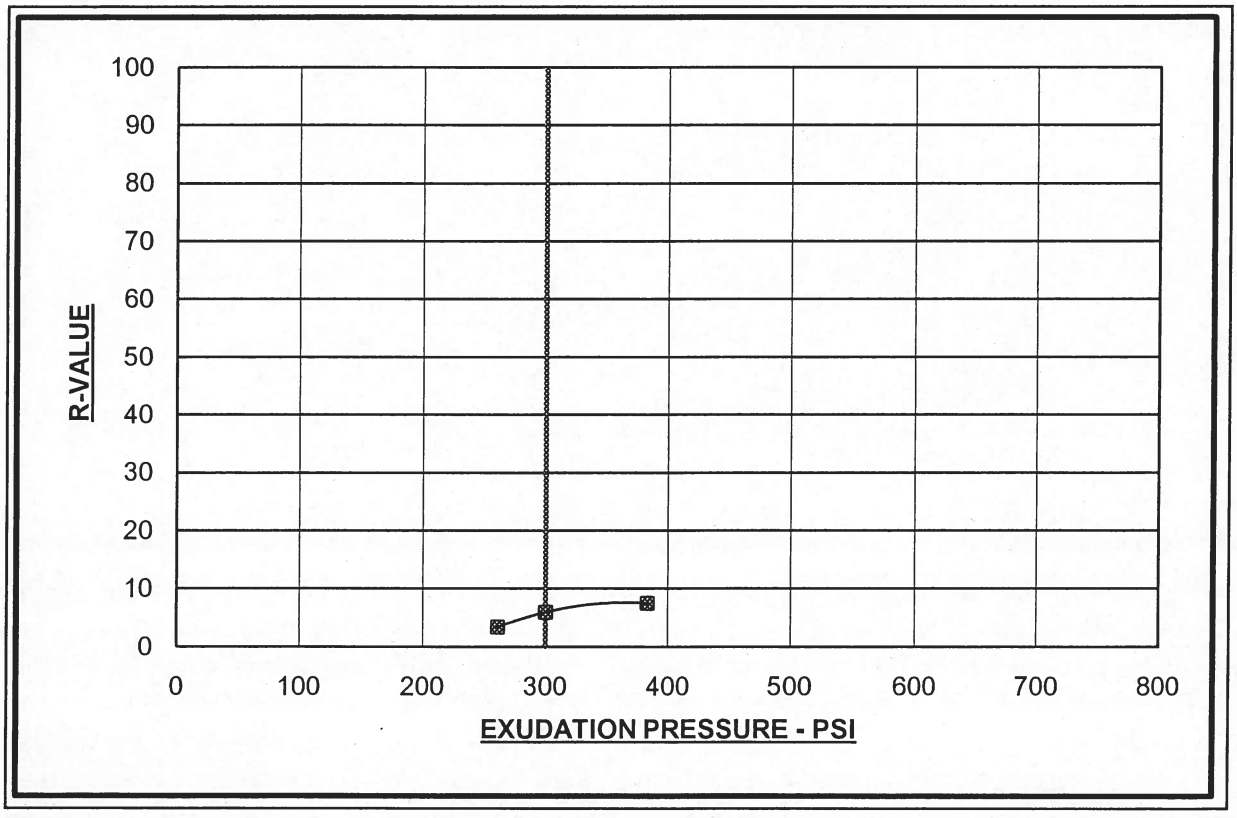
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	04-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-1 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	80	110	150
DENSITY (PCF)	107.6	108.1	110.3
MOISTURE CONTENT (%)	20.1	18.0	17.3
EXPANSION PRESSURE (PSI)	-0.03	0.09	0.34
HORIZONTAL PRESSURE @ 160 PSI	149	136	129
SAMPLE HEIGHT (INCHES)	2.60	2.50	2.45
EXUDATION PRESSURE (PSI)	260.9	299.9	383.1
CORRECTED R-VALUE	3.4	6.0	7.5
UNCORRECTED R-VALUE	3.2	6.0	7.5

R-VALUE @ 300 PSI EXUDATION PRESSURE = 6



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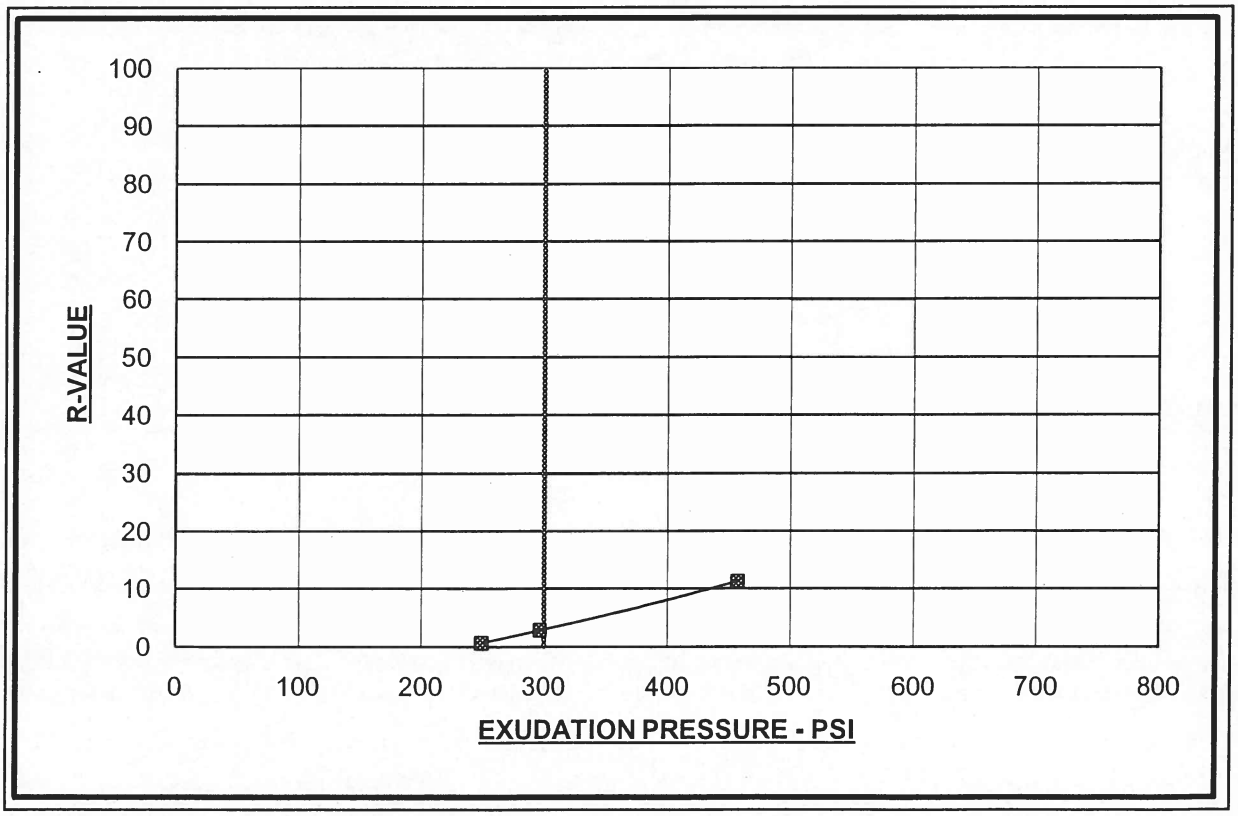
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	04-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-11 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	50	70	140
DENSITY (PCF)	95.4	105.6	116.3
MOISTURE CONTENT (%)	30.2	21.6	12.6
EXPANSION PRESSURE (PSI)	0.06	0.43	0.90
HORIZONTAL PRESSURE @ 160 PSI	158	152	132
SAMPLE HEIGHT (INCHES)	2.50	2.50	2.50
EXUDATION PRESSURE (PSI)	249.4	296.7	457.0
CORRECTED R-VALUE	0.7	2.8	11.3
UNCORRECTED R-VALUE	0.7	2.8	11.3

R-VALUE @ 300 PSI EXUDATION PRESSURE = 3



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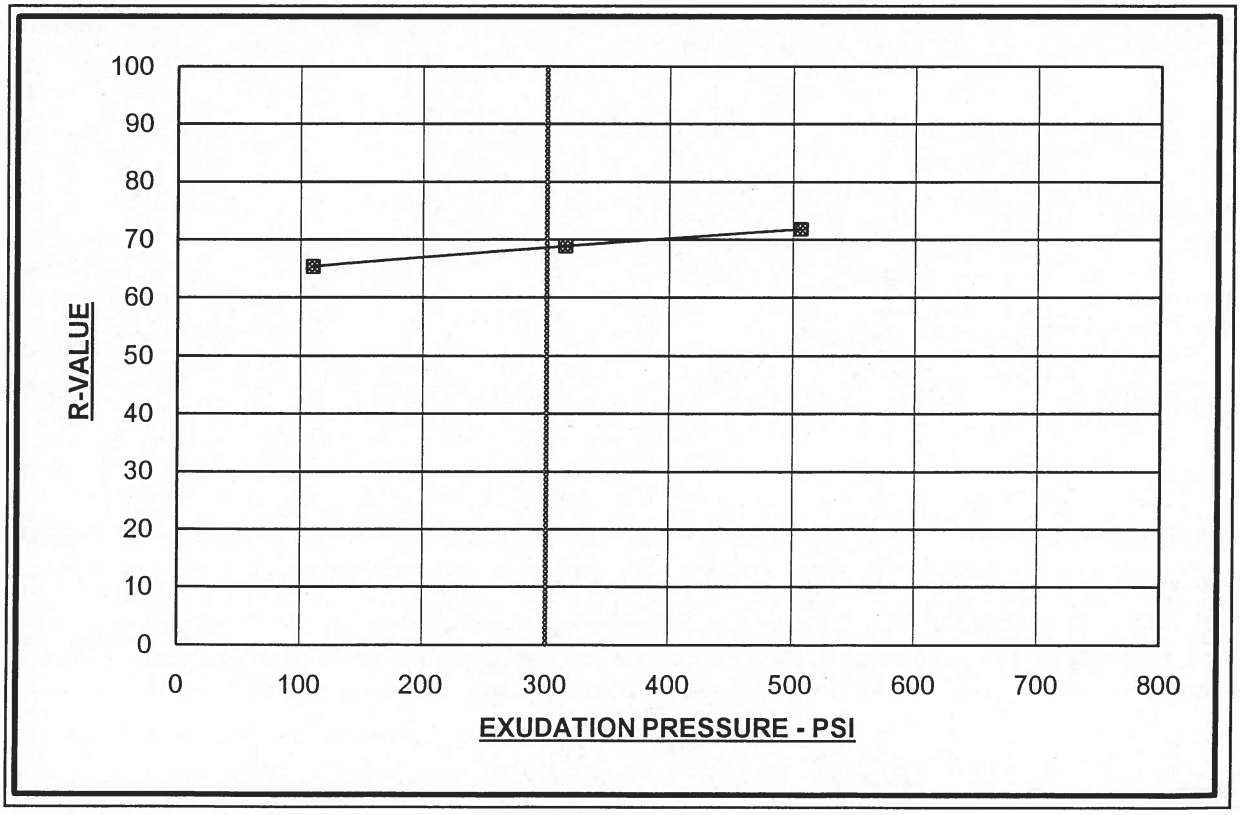
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	11-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-18 @ 0-0.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	190	200	250
DENSITY (PCF)	118.6	118.7	119.5
MOISTURE CONTENT (%)	12.2	11.0	9.9
EXPANSION PRESSURE (PSI)	-0.22	-0.16	0.00
HORIZONTAL PRESSURE @ 160 PSI	34	32	29
SAMPLE HEIGHT (INCHES)	2.40	2.55	2.55
EXUDATION PRESSURE (PSI)	110.2	315.0	506.8
CORRECTED R-VALUE	65.4	68.9	71.8
UNCORRECTED R-VALUE	68.1	68.9	71.8

R-VALUE @ 300 PSI EXUDATION PRESSURE = **69**



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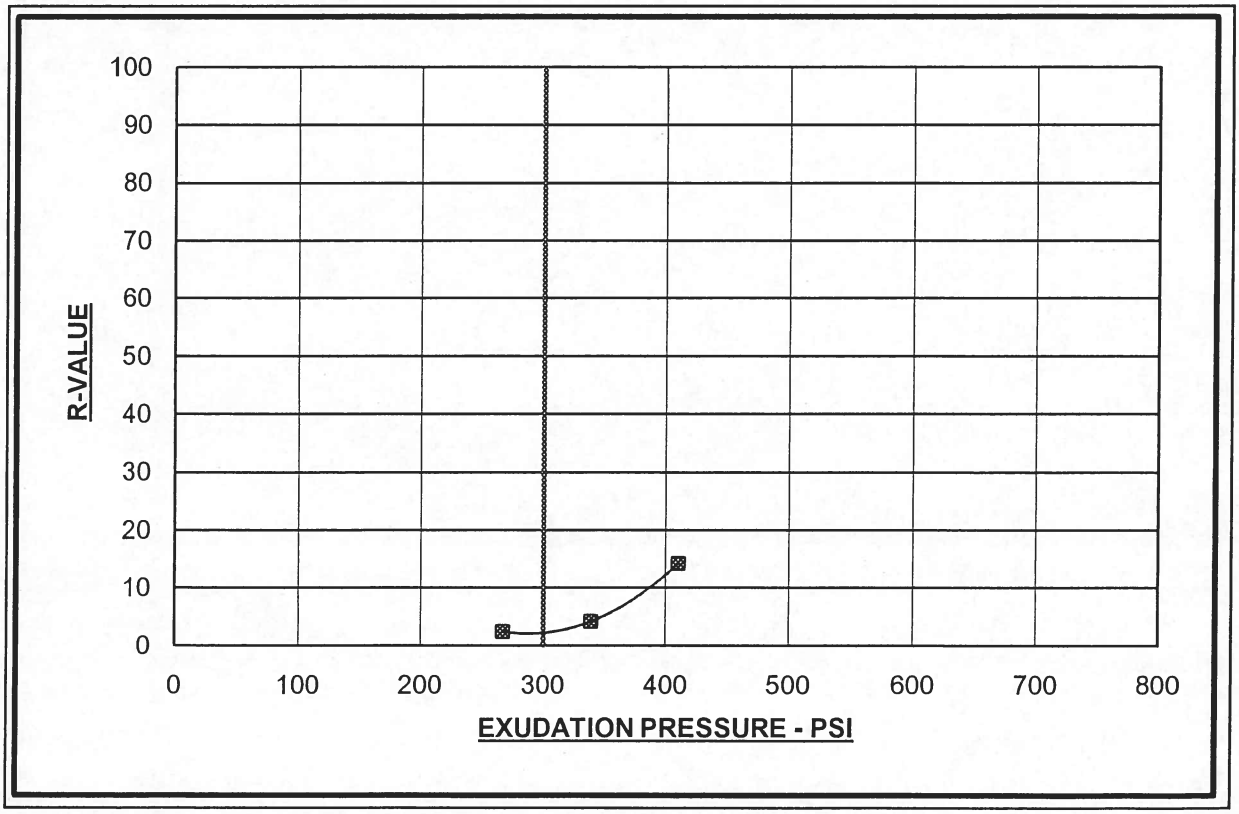
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	04-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-22 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	60	80	100
DENSITY (PCF)	106.1	111.5	116.4
MOISTURE CONTENT (%)	20.2	19.1	17.6
EXPANSION PRESSURE (PSI)	0.22	0.47	0.47
HORIZONTAL PRESSURE @ 160 PSI	152	148	126
SAMPLE HEIGHT (INCHES)	2.50	2.50	2.40
EXUDATION PRESSURE (PSI)	266.9	338.9	410.1
CORRECTED R-VALUE	2.4	4.2	14.3
UNCORRECTED R-VALUE	2.4	4.2	14.8

R-VALUE @ 300 PSI EXUDATION PRESSURE = 3



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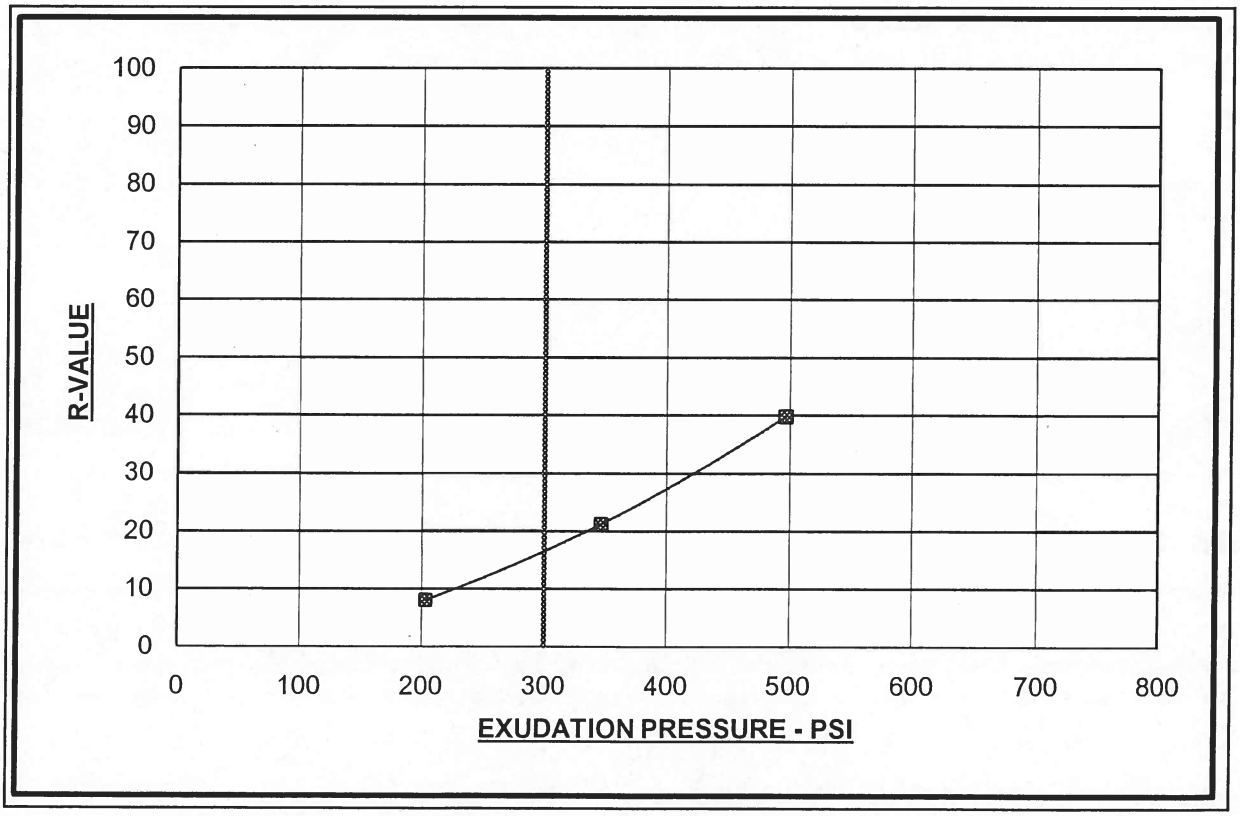
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	11-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-27 @ 0-0.9m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	190	210	350
DENSITY (PCF)	120.8	122.7	124.4
MOISTURE CONTENT (%)	12.8	11.9	10.8
EXPANSION PRESSURE (PSI)	-0.19	-0.03	0.50
HORIZONTAL PRESSURE @ 160 PSI	133	114	82
SAMPLE HEIGHT (INCHES)	2.65	2.40	2.40
EXUDATION PRESSURE (PSI)	203.3	346.1	496.8
CORRECTED R-VALUE	8.1	21.2	39.8
UNCORRECTED R-VALUE	7.6	22.1	41.4

R-VALUE @ 300 PSI EXUDATION PRESSURE = 17



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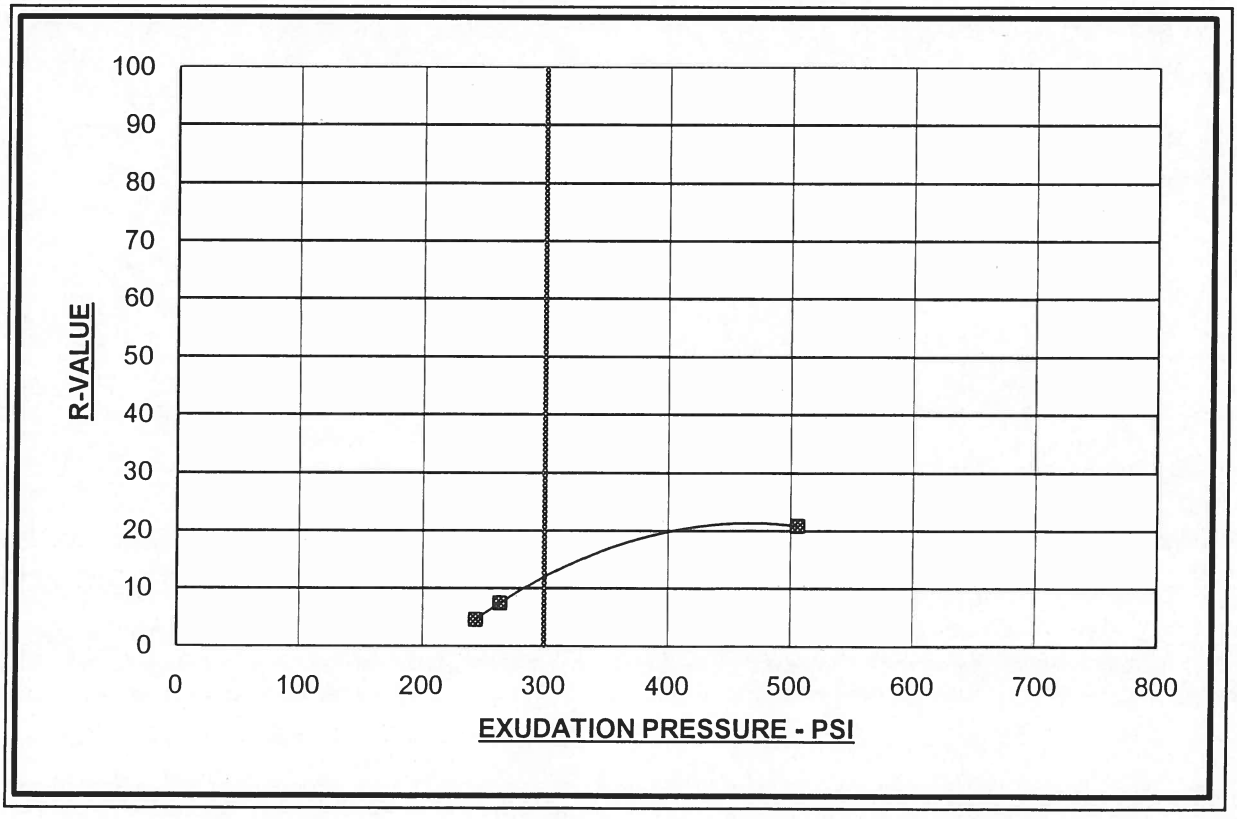
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	13-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-33 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	70	100	250
DENSITY (PCF)	112.6	115.2	120.3
MOISTURE CONTENT (%)	15.5	14.3	12.2
EXPANSION PRESSURE (PSI)	-0.12	-0.12	0.34
HORIZONTAL PRESSURE @ 160 PSI	146	140	118
SAMPLE HEIGHT (INCHES)	2.45	2.45	2.50
EXUDATION PRESSURE (PSI)	243.8	263.7	505.6
CORRECTED R-VALUE	4.6	7.5	20.8
UNCORRECTED R-VALUE	4.6	7.5	20.8

R-VALUE @ 300 PSI EXUDATION PRESSURE = 9



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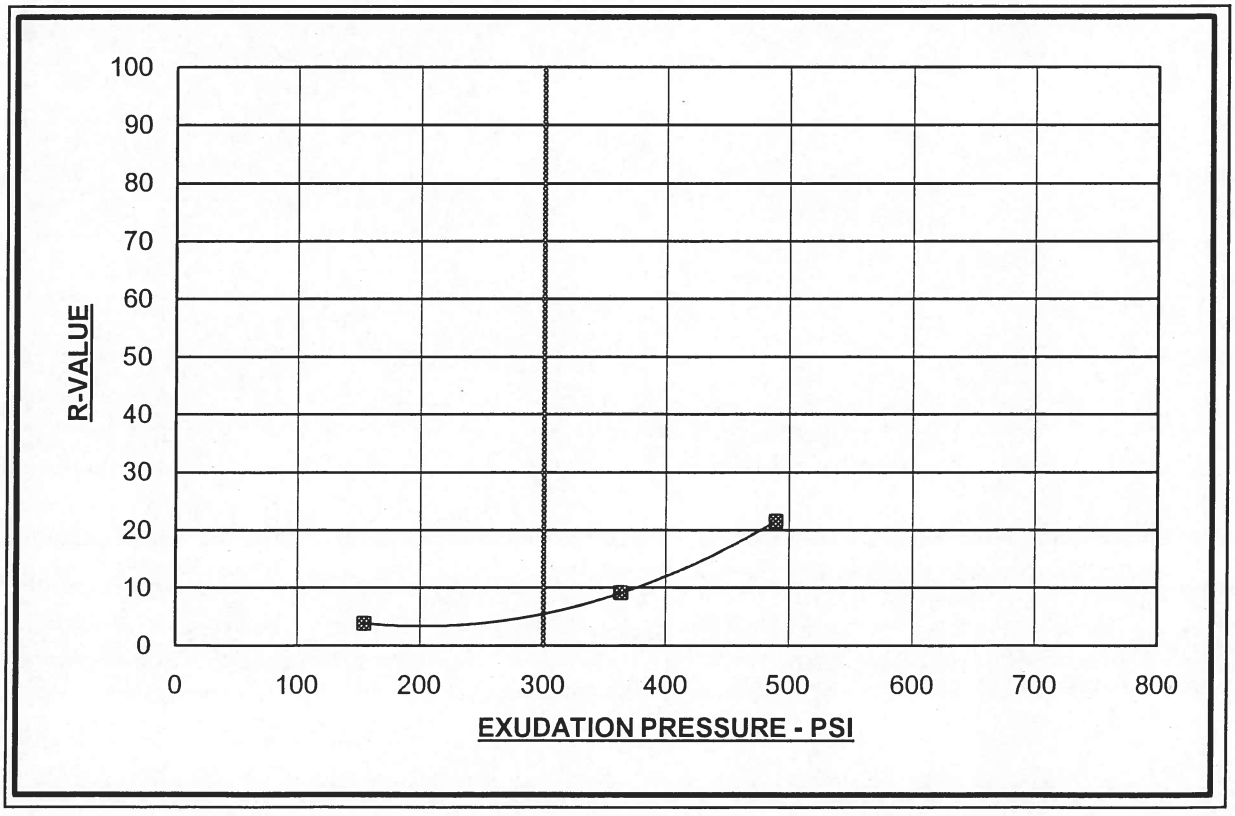
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	13-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-38 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	60	150	210
DENSITY (PCF)	117.4	121.7	123.6
MOISTURE CONTENT (%)	14.6	12.2	11.1
EXPANSION PRESSURE (PSI)	-0.28	-0.12	-0.09
HORIZONTAL PRESSURE @ 160 PSI	150	138	114
SAMPLE HEIGHT (INCHES)	2.45	2.45	2.40
EXUDATION PRESSURE (PSI)	154.7	363.6	489.3
CORRECTED R-VALUE	3.8	9.1	21.6
UNCORRECTED R-VALUE	3.8	9.1	22.5

R-VALUE @ 300 PSI EXUDATION PRESSURE = 8



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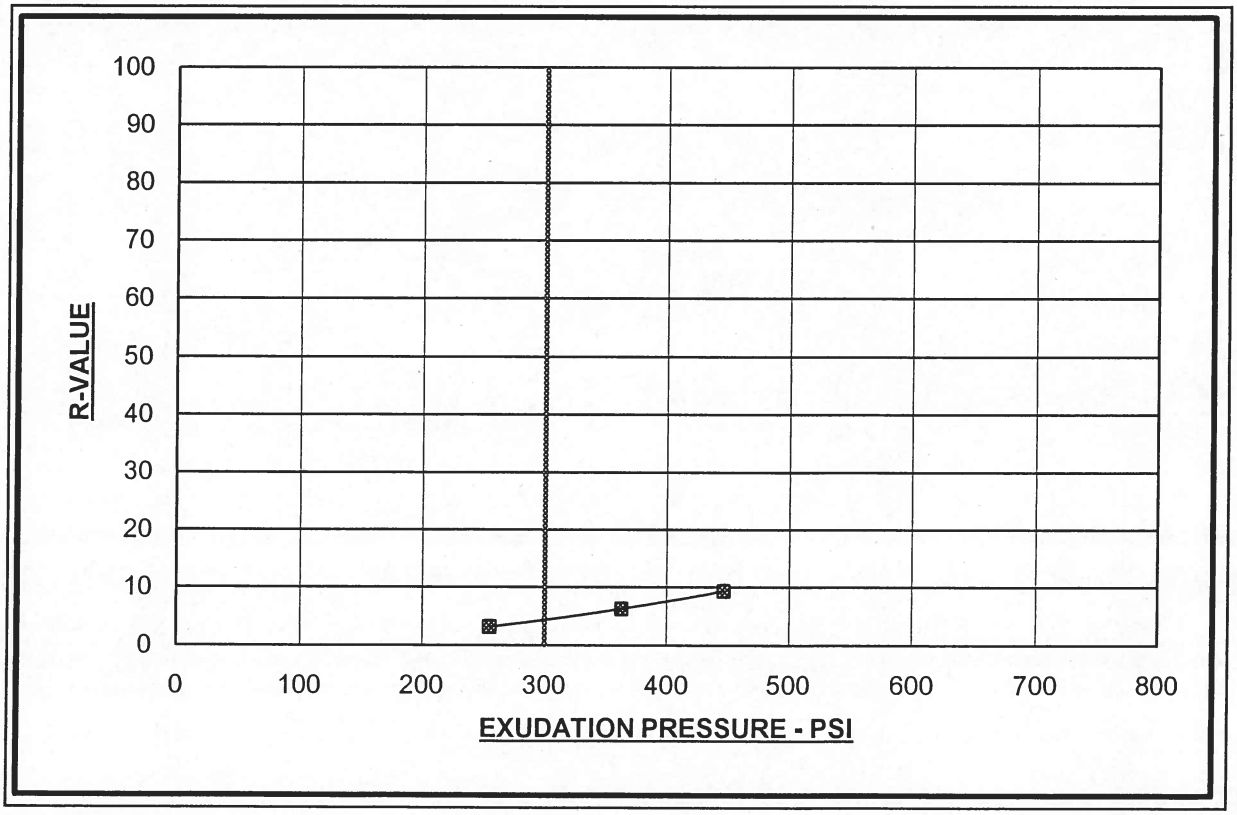
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	07-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-45 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	60	80	100
DENSITY (PCF)	105.9	106.7	108.6
MOISTURE CONTENT (%)	20.8	19.5	18.4
EXPANSION PRESSURE (PSI)	0.19	0.28	0.40
HORIZONTAL PRESSURE @ 160 PSI	148	139	135
SAMPLE HEIGHT (INCHES)	2.45	2.50	2.50
EXUDATION PRESSURE (PSI)	255.0	363.2	446.7
CORRECTED R-VALUE	3.2	6.3	9.4
UNCORRECTED R-VALUE	3.2	6.3	9.4

R-VALUE @ 300 PSI EXUDATION PRESSURE = 4



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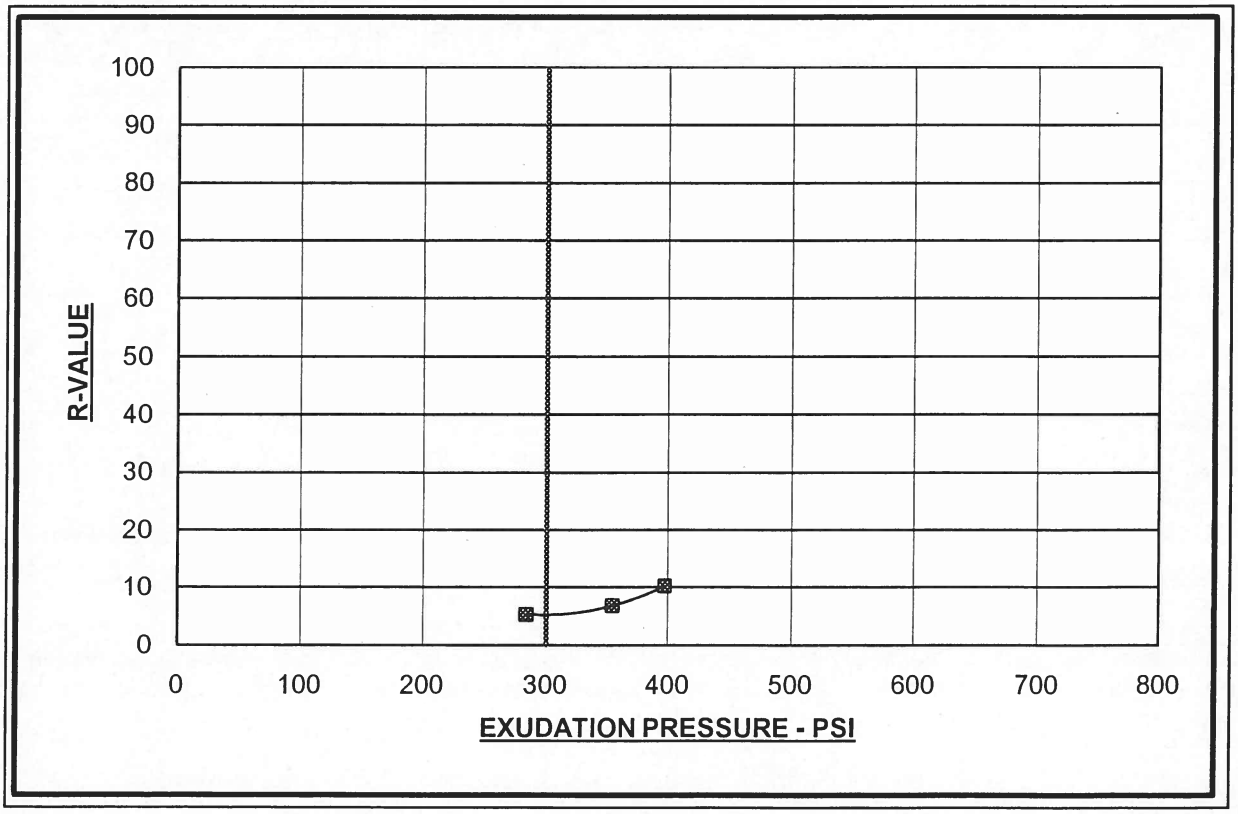
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	Nov-07-09
PROJECT:	MANY FARMS		
LOCATION:	B-50 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	90	120	140
DENSITY (PCF)	110.3	115.3	112.8
MOISTURE CONTENT (%)	18.8	17.7	17.0
EXPANSION PRESSURE (PSI)	0.25	0.34	0.68
HORIZONTAL PRESSURE @ 160 PSI	143	140	134
SAMPLE HEIGHT (INCHES)	2.50	2.40	2.45
EXUDATION PRESSURE (PSI)	284.0	354.4	397.4
CORRECTED R-VALUE	5.3	6.8	10.2
UNCORRECTED R-VALUE	5.3	7.1	10.2

R-VALUE @ 300 PSI EXUDATION PRESSURE = 6



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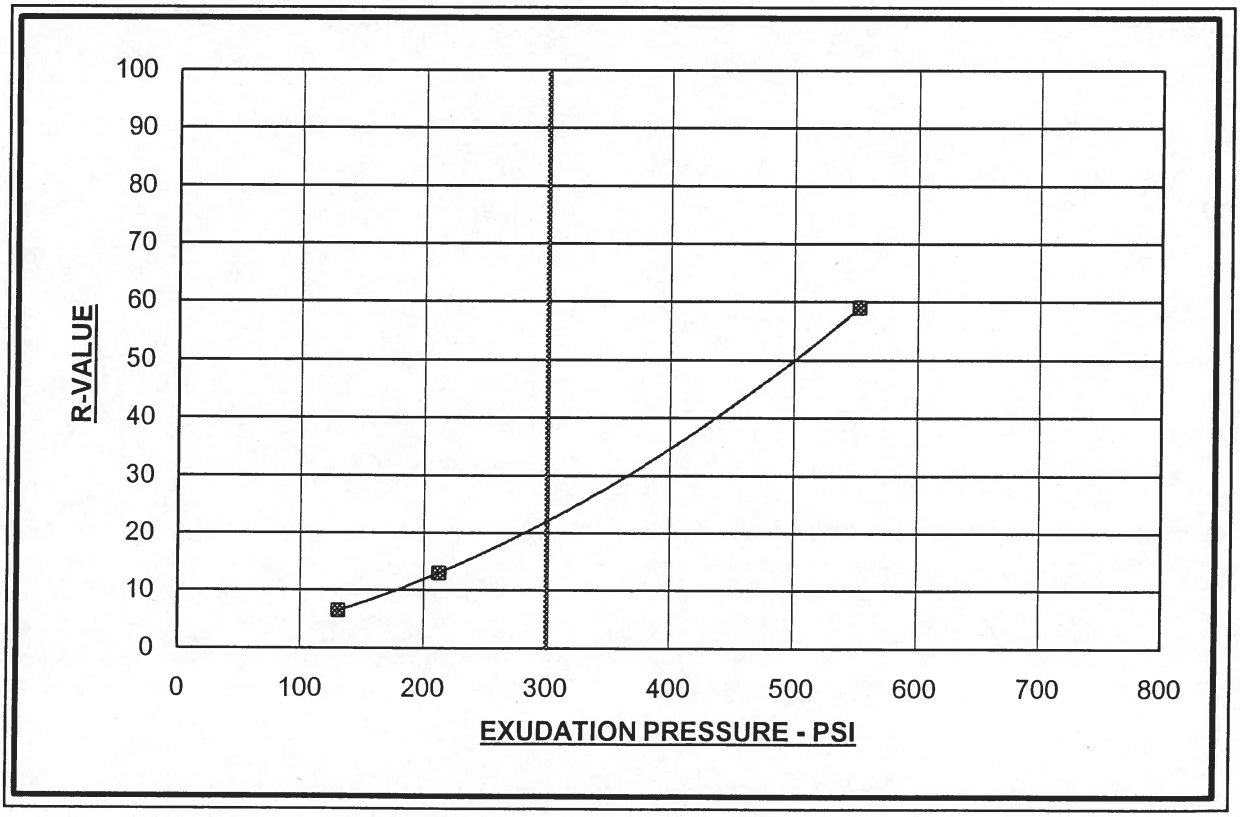
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	06-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-75 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	70	140	250
DENSITY (PCF)	120.4	123.8	129.4
MOISTURE CONTENT (%)	12.4	11.1	9.2
EXPANSION PRESSURE (PSI)	-0.25	-0.09	0.12
HORIZONTAL PRESSURE @ 160 PSI	143	128	52
SAMPLE HEIGHT (INCHES)	2.50	2.45	2.40
EXUDATION PRESSURE (PSI)	130.9	212.0	552.9
CORRECTED R-VALUE	6.5	13.1	59.0
UNCORRECTED R-VALUE	6.5	13.1	61.5

R-VALUE @ 300 PSI EXUDATION PRESSURE = 25



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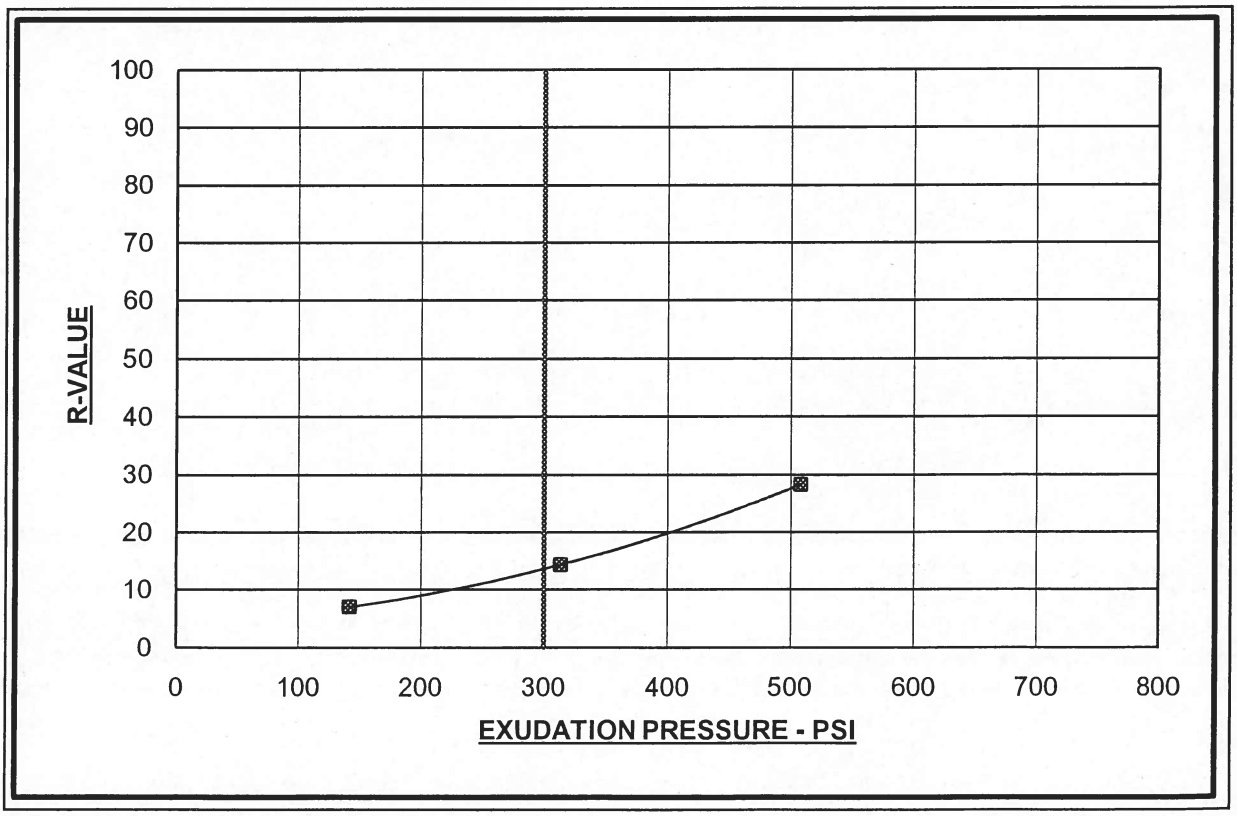
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	13-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-82 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	90	190	350
DENSITY (PCF)	114.1	116.8	118.3
MOISTURE CONTENT (%)	15.0	12.9	12.0
EXPANSION PRESSURE (PSI)	-0.19	-0.12	0.00
HORIZONTAL PRESSURE @ 160 PSI	138	120	92
SAMPLE HEIGHT (INCHES)	2.55	2.55	2.50
EXUDATION PRESSURE (PSI)	141.2	313.4	508.0
CORRECTED R-VALUE	7.0	14.4	28.3
UNCORRECTED R-VALUE	7.0	14.4	28.3

R-VALUE @ 300 PSI EXUDATION PRESSURE = 14



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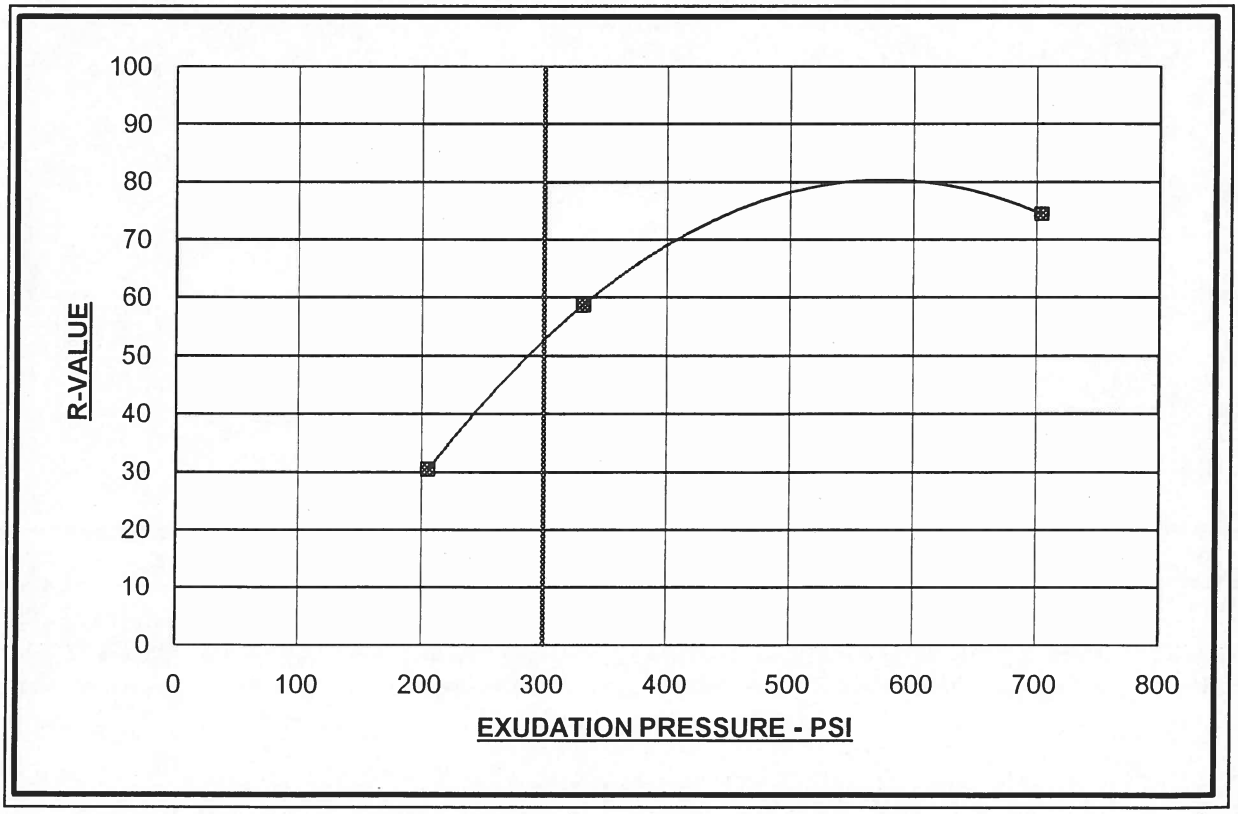
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	14-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-99 @ 0-1.2m		
TERRACON NO.	69065030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	350	350	350
DENSITY (PCF)	119.9	120.5	124.6
MOISTURE CONTENT (%)	11.6	10.3	9.5
EXPANSION PRESSURE (PSI)	-0.25	-0.25	0.16
HORIZONTAL PRESSURE @ 160 PSI	84	47	29
SAMPLE HEIGHT (INCHES)	2.55	2.50	2.45
EXUDATION PRESSURE (PSI)	205.3	332.1	703.7
CORRECTED R-VALUE	30.5	58.8	74.5
UNCORRECTED R-VALUE	30.5	58.8	74.5

R-VALUE @ 300 PSI EXUDATION PRESSURE = 52



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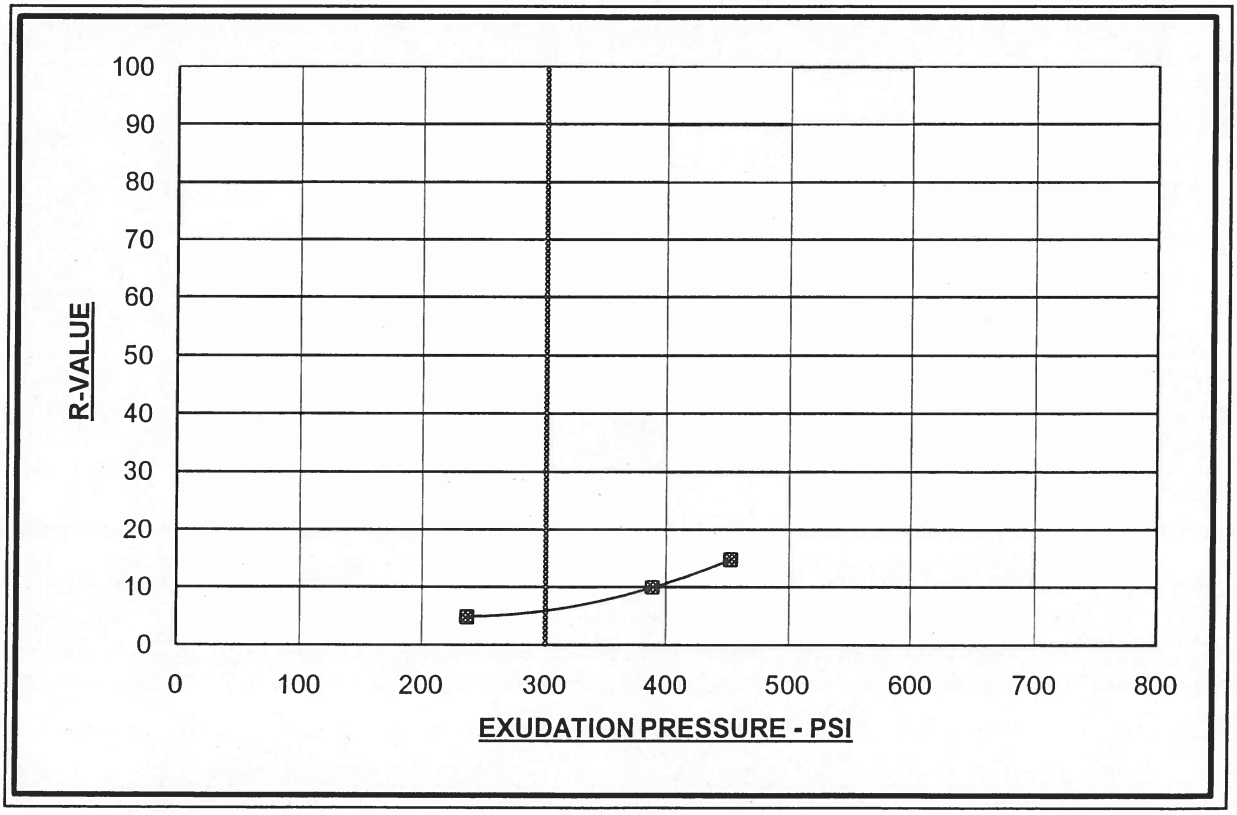
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	17-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-107 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	90	130	230
DENSITY (PCF)	125.7	126.4	128.8
MOISTURE CONTENT (%)	12.6	11.4	11.0
EXPANSION PRESSURE (PSI)	-0.16	0.03	0.16
HORIZONTAL PRESSURE @ 160 PSI	148	136	127
SAMPLE HEIGHT (INCHES)	2.50	2.40	2.45
EXUDATION PRESSURE (PSI)	236.7	389.0	452.7
CORRECTED R-VALUE	4.9	10.0	14.8
UNCORRECTED R-VALUE	4.9	10.4	14.8

R-VALUE @ 300 PSI EXUDATION PRESSURE = 7



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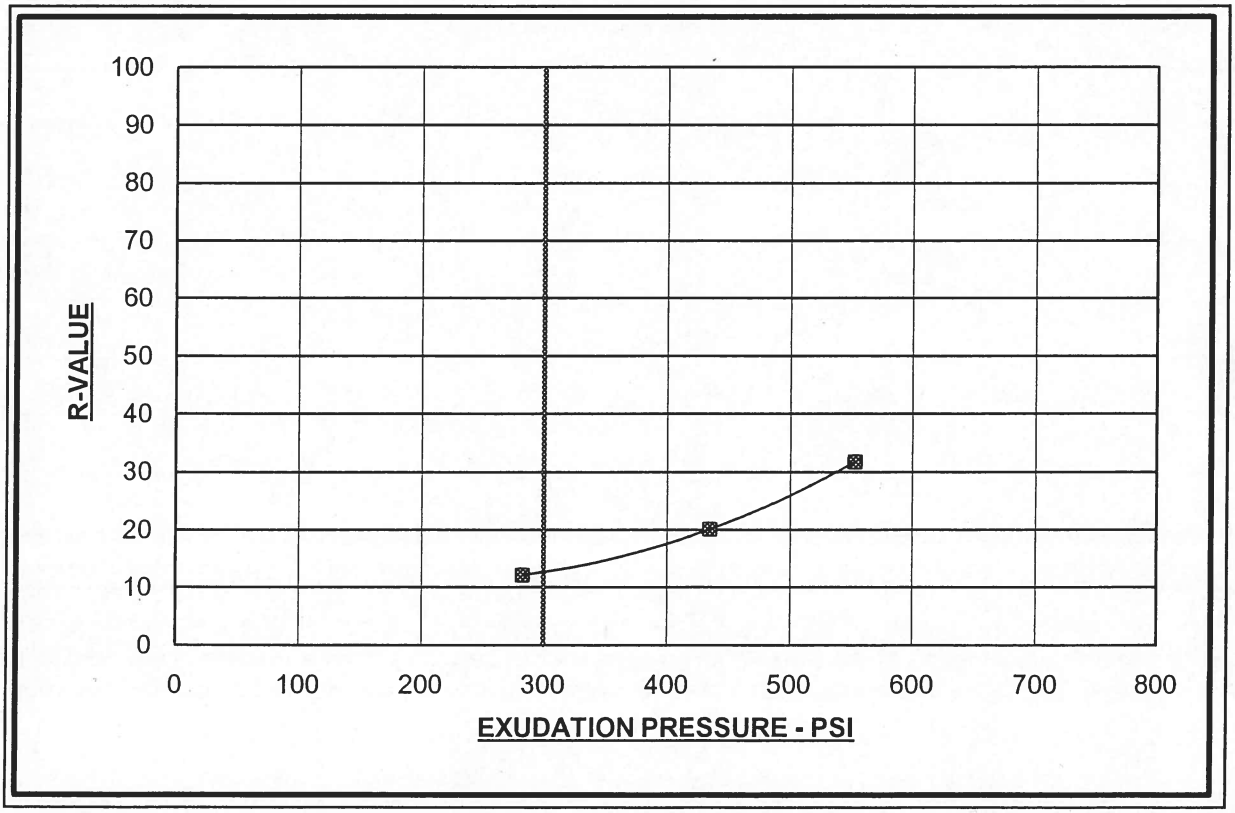
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	17-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-117 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	160	300	350
DENSITY (PCF)	116.6	119.0	122.7
MOISTURE CONTENT (%)	13.2	12.0	11.1
EXPANSION PRESSURE (PSI)	0.00	0.03	0.19
HORIZONTAL PRESSURE @ 160 PSI	129	114	93
SAMPLE HEIGHT (INCHES)	2.60	2.55	2.50
EXUDATION PRESSURE (PSI)	282.8	435.2	552.9
CORRECTED R-VALUE	12.2	20.1	31.8
UNCORRECTED R-VALUE	11.7	20.1	31.8

R-VALUE @ 300 PSI EXUDATION PRESSURE = 13



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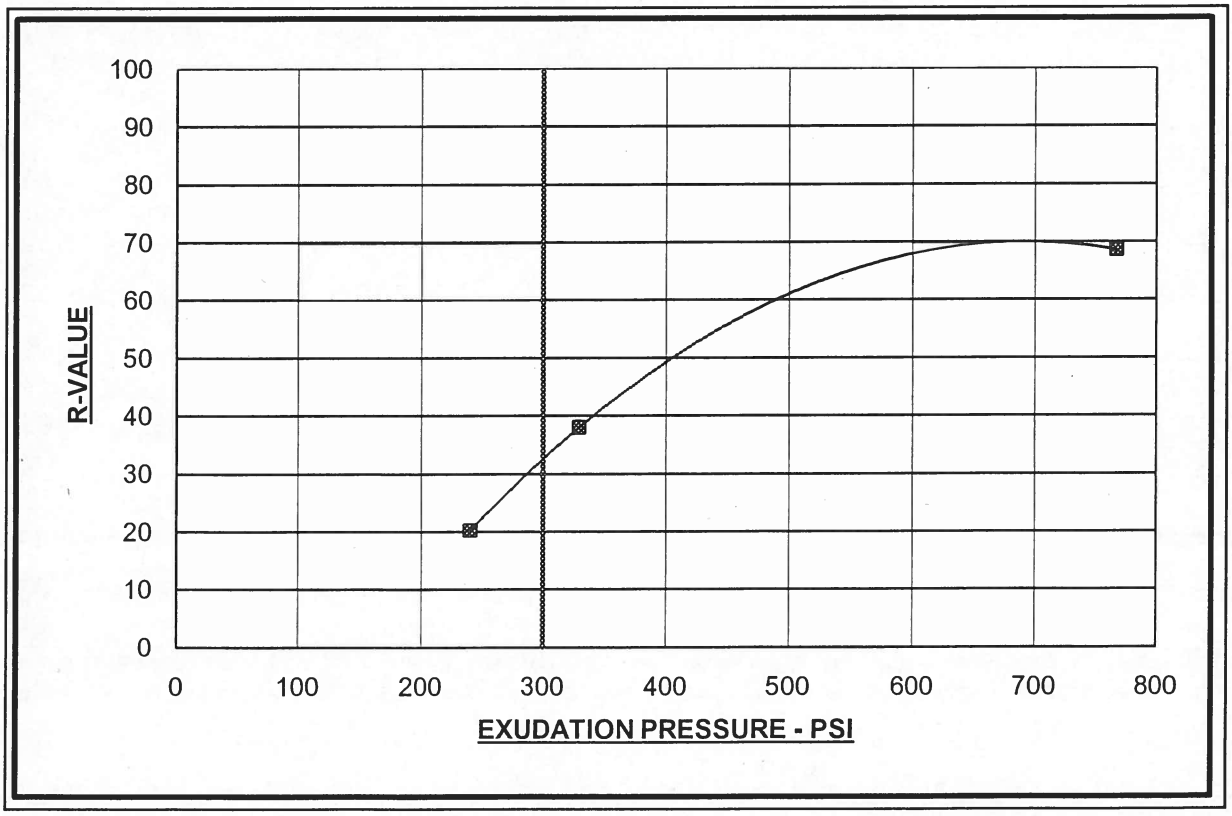
RESISTANCE R-VALUE & EXPANSION PRESSURE OF COMPACTED SOIL ASTM D2844

CLIENT:	BIA	**DATE OF TEST:**	11-Nov-09
PROJECT:	MANY FARMS		
LOCATION:	RB-124 @ 0-1.2m		
TERRACON NO.	69095030	**CLASSIFICATION:**	Not Performed

SAMPLE DATA TEST RESULTS

TEST SPECIMEN NO.	1	2	3
COMPACTION PRESSURE (PSI)	180	260	320
DENSITY (PCF)	117.0	119.5	118.0
MOISTURE CONTENT (%)	12.8	11.8	10.7
EXPANSION PRESSURE (PSI)	-0.19	-0.25	-0.03
HORIZONTAL PRESSURE @ 160 PSI	106	73	34
SAMPLE HEIGHT (INCHES)	2.50	2.45	2.50
EXUDATION PRESSURE (PSI)	240.3	329.4	766.1
CORRECTED R-VALUE	20.3	38.0	68.6
UNCORRECTED R-VALUE	20.3	38.0	68.6

R-VALUE @ 300 PSI EXUDATION PRESSURE = 32



Corrosion Test Results

Sample	Depth (meters)	Minimum Lab Resistivity (Ohm/cm)	pH	Sulfate-S (ppm)	Chloride (ppm)
RB-2	0-1.2	1038	7.80	19.5	123
RB-10	0-0.5	438	8.68	*see note	66.2
RB-21	0-1.2	327	8.17	426	53.0
RB-26	0-1.2	720	7.29	273	145
RB-34	0-1.2	1482	7.59	6.4	52.1
RB-39	0-1.2	2675	8.06	*see note	31.8
RB-44	0-1.2	424	7.67	508	36.5
RB-49	0-1.2	1083	7.27	258	77.8
RB-67	0-1.2	804	8.21	107	179
RB-76	0-1.2	1681	7.61	40.9	26.5
RB-91	0-1.2	2717	7.24	4.8	26.9
RB-100	0-1.2	2792	7.73	12.6	30.4
RB-108	0-1.2	1540	7.97	133	97
RB-116	0-1.2	1869	7.43	16.9	56.3
RB-123	0-1.2	1987	7.40	2.9	31.1

Note: These samples contained a large quantity of silt which interferes with turbidimetric determination of sulfate. In order to determine sulfate gravimetric analysis must be performed which is more time consuming and more expensive.