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GEOTECHNICAL SERVICES FOR PROJECT
DEVELOPMENT AND ENVIRONMENTAL STUDY
S.R. 39 EXTENSION FROM I-4 TO
KNIGHTS GRIFFIN ROAD
HILLSBOROUGH COUNTY, FLORIDA
F.P.N. 255099-1-31-01
STATE PROJECT NO. 10200-1508
PSI PROJECT NO. 775-95498

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December 21, 1999

Florida Department of Transportation
District VII
Professional Services Unit (MS 7-800)
11201 North McKinley Drive
Tampa, Florida 33612-6403

Attention: Mr. Brent Hamil

RE: Geotechnical Services For Project
Development and Environmental Study
S.R. 39 Extension from I-4 to
Knights Griffin Road
Hillsborough County, Florida
F.P.N. 255099-1-31-01
State Project No. 10200-1508
PSI Project No. 775-95498

Dear Mr. Hamil:

Professional Service Industries, Inc. (PSI), has completed the geotechnical portion of the Project Development and Environmental (PD&E) Study for the proposed S.R. 39 Extension in Hillsborough County, Florida. This study was performed in general accordance with PSI Proposal No. 109928.534 dated October 28, 1999.

This report presents the results of our preliminary evaluations for the roadway improvement areas based on our review of the published information and site reconnaissance.

PSI appreciates the opportunity of providing our services to the Florida Department of Transportation, District VII on this project. If you have questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

Sincerely,

Professional Service Industries, Inc.

Lucas Carlo
Staff Engineer

Kirk M. Eastman, P.E.
Project Engineer
Florida Registration No. 50733

Ching L. Kuo, Ph.D., P.E.
Chief Engineer
Florida Registration No. 36115

LC/KME/CLK/mjm: 95498go1

Attachments:
- Appendix A - Tables 1 through 5
- Appendix B - Sheets 1 through 8
- Appendix C - Gradation Curves
- Appendix D - LBR Test Curves

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1.0 INTRODUCTION

The Florida Department of Transportation is conducting a Project Development and Environmental (PD&E) Study for the proposed S.R. 39 extension from I-4 to Knights Griffin Road. The subject alignment extends from station 22+00 to 72+00 (C/L Construction) and is approximately 5.0 kilometers (km) in length. Improvements are also proposed for the Sam Allen Road, McGee Road and Joe McIntosh Road intersections along the alignment.

1.1 Project Information

This study is to support the design of the proposed S.R. 39 extension from I-4 to Knights Griffin Road in Hillsborough County, Florida. The project consists of improvements to approximately 5.0 km of the proposed S.R. 39 extension. The roadway program will generally consist of constructing a four-lane highway from the I-4/S.R. 39A interchange to the intersection of Knights Griffin Road and S.R. 39. The majority of the roadway improvements will match the existing grade of the existing pavement.

This PD&E Study report present herein is intended to be used to support the feasibility and design of the roadway extension.

1.2 Site Description

The proposed improvement project to S.R. 39 is located in Hillsborough County, Florida. Specifically, the roadway improvements are located within Township 28 South, Range 22 East, Sections 5, 8, 17 and 20 (see Sheet 1 in Appendix B of this report).

2.0 SCOPE OF SERVICES

2.1 Project Approach

Our services for this project consisted of providing preliminary geotechnical engineering services in general accordance with the District-Wide Geotechnical and Material Testing Contract and the Florida Department of Transportation (FDOT) "Soils and Foundations Manual". Our services consisted of reviewing the geotechnical data available, such as the construction drawings for the proposed roadway and any preliminary subsurface data available.

Our geotechnical study began with a review of all the available subsurface test data. These sources included the Hillsborough County Soil Survey and USGS Maps. After the review of the existing geotechnical data as outlined in the FDOT Soils and Foundations Manual, a recommended testing and field exploration program was developed.

After review and approval of the program by the FDOT District I/VII Geotechnical Engineer, we proceeded with the testing program. This testing program consisted of the following services:

1. Conducted a general visual reconnaissance of the project alignment.

2. Reviewed readily available published topographic and soils information. The published information was obtained from the "Plant City West, Florida" Quadrangle Map published by the USGS and the "Soil Survey of Hillsborough County, Florida" published by the USDA SCS.

3. Performed a preliminary roadway soil survey consisting of seventeen (17) auger borings to depths of 2.0 meters. The borings were performed along the roadway alignment. The borings were generally performed along the centerline of construction of the alignment at an interval of approximately every 100 to 300 meters.

4. Obtained soil samples for standard classification testing and laboratory testing.

5. Measured existing groundwater tables and estimated seasonal high groundwater tables.

6. Prepared an engineering report summarizing our study for the design and construction of the proposed roadway alignment.

2.2 Report Format

This report begins with a discussion of the field and laboratory programs followed by general subsurface conditions, engineering evaluations and recommendations, construction considerations, and report limitations. The laboratory test results are presented on Tables 2 through 4 and on Sheet 8. The preliminary estimated SHGWT levels are presented on Table 5. The grain size analyses curves are presented in Appendix C. The LBR curves are presented in Appendix D. The site vicinity maps, boring layout plans, soil profiles and the cross-section soil survey sheet are presented on Sheets 1 through 8 in Appendix B of this report.

3.0 SUBSURFACE EXPLORATION

3.1 Boring Locations and Utility Clearance

The proposed S.R. 39 centerline (C/L) construction was located by the project surveyor on 100 m intervals. All borings were referenced from this C/L Construction in the field for the report. All locations provided in the subject report are based on the C/L Construction.

3.2 Soil Borings

To evaluate the subsurface conditions along the proposed roadway alignment, hand auger borings were generally performed every 100 to 300 m along the centerline construction of the S.R. 39 extension. The auger borings were performed to depths of 2.0 m below existing grades. The hand auger borings were performed by manually twisting and advancing a bucket auger into the ground in 100 millimeter (mm) to 150 mm increments. As each soil type was revealed, representative samples were placed in air-tight jars and returned to the PSI Tampa office for review by a geotechnical engineer and confirmation of the field classification.

The boring locations are shown on the Boring Location Plan Sheets 3 through 6. In addition, the station and offset of each boring are labeled on the Soil Profile Sheet 7.

3.3 Bulk Sampling for Limerock Bearing Ratio (LBR) Tests

Bulk samples were retrieved for LBR testing at four (4) locations along the roadway alignment. The sample locations are shown on the Boring Location Plan Sheets 3 through 6 in Appendix B of this report. In general, the LBR samples were collected from depths of approximately 0.2 to 0.5 m below the existing grade. A listing of the sampling locations and LBR test results is provided in Table 4 in Appendix A of this report.

4.0 LABORATORY TESTING

4.1 Soil Classification Testing

Representative samples collected from the auger borings were visually reviewed by a geotechnical engineer to confirm the field classifications. The samples were then classified in general accordance with the AASHTO Soil Classification System in general accordance with the ASTM test designation D-3282, titled "Classification of Soils and Soils-Aggregate Mixtures for Highway Construction Purposes". The classification was based on visual observations with the results of

the laboratory testing used to confirm the visual classification. The laboratory classification consisted of grain-size analysis, Atterberg Limits, natural moisture and organic content tests and environmental corrosion tests. The tests were performed on selected samples believed to be representative of the materials encountered. Additionally, we performed LBR tests on soil samples obtained along the project alignment. A summary of the laboratory test results is provided on Tables 2, 3 and 4 and on Sheet 8 in the Appendix of this report.

4.1.1 Grain-Size Analysis

The grain-size analyses were conducted in general accordance with FDOT test designation Florida Manual (FM) 1-T088 (ASTM test designation D-422). The grain-size analysis test measures the percentage by weight of a dry soil sample passing a series of U.S. standard sieves, including the percentage passing the No. 200 Sieve. In this manner, the grain-size distribution of a soil is measured. The percentage by weight passing the No. 200 Sieve is the amount of silt and clay sized particles. The gradation of a soil, including the amount of silt and clay, affects its engineering properties, including permeability, consolidation rate, suitability as roadway subgrade, and suitability as general fill material.

4.1.2 Atterberg Limits

The liquid limit and the plastic limit tests ("Atterberg limits") were conducted in general accordance with FDOT test designation FM 1-T089 and FM 1-T090, respectively (ASTM test designation D-4318). Atterberg plastic limit and liquid limit tests measure the moisture content at which a fine-grained soil changes from a semi-solid to plastic state and from a plastic to a liquid state, respectively. The plasticity index is the difference between the liquid and plastic limits. The plasticity index is a rough indication of the tendency of a soil to absorb water on the particle surfaces. Some clays have a strong affinity for water, and tend to swell when wetted and shrink when dried. The larger the plasticity index, the greater the shrink-swell tendency.

4.1.3 Moisture and Organic Content Tests

Laboratory moisture content and organic content tests consist of the determination of the percentage of moisture and organic contents in selected samples in general accordance with FM 1-T265 and 1-T267 (ASTM D-2216 and D-2974). Briefly, natural moisture content was determined by weighing a sample of the selected material and then drying it in a warm oven. Care was taken to use a gentle heat so as not to destroy any organics. The sample was removed from the oven and reweighed. The difference of the two weights was the amount of moisture removed from the sample. The weight of the moisture divided by the weight of the dry soil sample is the percentage by weight of the moisture in the sample.

The dried soil samples were then heated in a small muffle furnace to 550 to 660 degrees Centigrade for six hours, thereby driving off all organic-type material, leaving only the soil minerals. The difference in weight prior to and after the burning is the weight of organics. The weight of the organics divided by the weight of the dried soil is the percentage of organics within a sample. Organic contents in excess of five (5) percent are considered detrimental.

4.1.4 Environmental Classification (Corrosion Tests)

Environmental corrosion tests were conducted in accordance with FDOT test designations FM 5-550, FM 5-551, FM 5-552 and FM 5-553. These tests were performed on recovered soil samples obtained from the roadway auger borings. Environmental corrosion tests measure parameters such as pH, resistivity, sulfate content and chloride content. Test results obtained are presented in Table 3.

4.1.5 Limerock Bearing Ratio (LBR)

LBR tests were performed in accordance with FDOT Standard FM 5-515 including a modified Proctor test. The LBR test is a measure of the bearing capacity of a soil. A summary of the LBR tests performed is shown on Table 4 in Appendix A, while the LBR curves and corresponding Proctor curves are shown in Appendix D.

4.2 Laboratory Test Results

Sheet 8 in Appendix B summarizes the laboratory testing program described above. The laboratory test results are shown on Tables 2, 3 and 4 in Appendix A and individual test results and grain size curves are provided in Appendix C.

5.0 GENERALIZED SUBSURFACE SOIL CONDITIONS

5.1 General Geology - Hillsborough County

The geology of Hillsborough County can briefly be described as surficial sands and clay, sandy clays and clayey sands overlying limestone.

In general, Hillsborough County is in the Floridian section of the Atlantic Coastal Plain. The notable physiographic features of the area are related to ancient seas, which once covered the region. Relict shorelines are evidenced by subtle linear escarpments, which have not been significantly altered by fluvial (river) processes in much of the area. Four ancient shorelines are preserved in Hillsborough County. The Pamlico, Talbot, Penholoway, and Wicomico shorelines stand at or near 7.6, 12.8, 21.3 and 30.5 meters above present mean sea level, respectively.

C. Wythe Cooke included the western and southern parts of the county in the Coastal Lowlands and the eastern part in the Central Highlands. The Coastal Lowlands are low, nearly level plains that lie next to the coast. The Central Highlands are the gently undulating to rolling areas in the eastern part of the county.

In the southwestern part of the county, Tampa Bay extends for a considerable distance inland. Its northern section is separated into Old Tampa Bay and Hillsborough Bay by a peninsula that extends southward from Tampa.

Large, nearly level plains, commonly called flatwoods, are in the western, southern, and northeastern parts of the county. These plains rise gradually from the coast to elevations of more than 30.5 meters in the eastern part of the county. Numerous intermittent ponds, swamps, and marshes and a few permanent lakes are in the flatwood areas. Many permanent lakes and intermittent ponds are in the northwestern and north-central parts of the county. Some of the larger lakes are Lake Thonotosassa, Lake Valrico, Mango Lake, Keystone Lake, and Lake Magdalene.

Along the coast, elevations in the county range from sea level to about 43.9 meters at a point about 5.5 km east of Plant City. Plant City is at an elevation of about 38 meters NGVD.

The surface drainage is toward Old Tampa Bay, Hillsborough Bay, and Tampa Bay. The principal streams are the Hillsborough, Alafia, and Little Manatee Rivers and Rocky, Sweetwater, Sixmile, and Bullfrog Creeks. Many ditches, canals and small bays extend inland from the coast for short distances.

Drainage is low on the flatwoods. Drainage provided by the slight depressions made up of swamps and sloughs and by the few large streams that pass through the areas. These depressions contain water during the wet season; during periods of low rainfall, these ponds may become dry. Portions of northwestern Hillsborough County is riddled with sinkholes. Many of the sinkhole lakes are in direct hydrologic contact with underlying limestone formations due to breaches in the clay aquitard. Consequently, water levels fluctuate in response to the potentiometric surface of the Floridan Aquifer.

Soil suitability for various uses is normally based on evaluations of properties within the soil alone. Interpretations in this soil survey are made to determine the effects these properties could have on use. Many geologic features that are not expressed within the soil can significantly affect the suitability of a site for a particular use. Individual sites should be evaluated by on-site examination and testing. In many cases, special planning, design, and construction techniques can be used to minimize geologic problems where they are identified and evaluated.

5.2 Hillsborough County Soil Survey

The "Soil Survey of Hillsborough County, Florida", published by the USDA SCS has been reviewed for the project vicinity. The soil survey map for the project vicinity is illustrated on Sheet 1 in the Appendix of this report. This soil survey map indicates that there are twelve (12) mapping units within the proposed project area. The map soil units are summarized in Table 1 in Appendix A.

5.3 USGS Quadrangle Map

The topographic survey map published by the United States Geological Survey (USGS) titled "Plant City West, Florida" dated 1975 was reviewed for ground surface features at the proposed project location. Based on this review, the natural ground surface elevation along the subject alignment varies from 32.0 to 33.5 meters National Geodetic Vertical Datum of 1929 (NGVD). A reproduction of the USGS topographic map for the project vicinity is presented on Sheet 2.

5.4 Soil Boring Results

Based upon the exploratory borings and results of the laboratory testing, the near surface soils along the project alignment have been grouped into three (3) strata. Each stratum group exhibits a range of engineering properties related to suitability for roadway construction as outlined by FDOT Standard Index 505. Sheet 8 is provided in Appendix B to show the general range of engineering properties measured in the laboratory for the various soil strata encountered during our preliminary investigation.

The results of the preliminary auger boring program for the S.R. 39 roadway extension are presented on Sheet 7 in the form of soil profiles, along with the profile legend and other pertinent information such as measured groundwater levels. Soil stratification is based on an examination of the recovered soil samples, the laboratory testing, and interpretation of field boring logs by a geotechnical engineer. The stratification lines represent the approximate boundaries between soil types of significantly different engineering properties. The actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation

may have been abbreviated or omitted for clarity. The profiles represent the conditions at the boring locations only and variations may occur among the borings.

In general, the auger borings performed along the S.R. 39 alignment encountered the following strata.

Stratum	Soil Description	AASHTO Soil Classification
1	Gray to Yellowish-Gray Slightly Silty Fine Sand	A-3
2	Gray to Dark Gray Silty Fine Sand	A-2-4
3	Muck	A-8

5.5 Groundwater

The groundwater table was encountered in approximately half of the borings performed and varied from 0.7 to 1.7 meters below existing grades at the tested locations.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds, and underdrains.

SHGWT depths were estimated along the roadway alignment from several of the auger borings performed. The results are presented in Table 5. These estimates are based on the soil stratigraphy, USDA information, ground surface topography, vegetation, and past experience.

6.0 ENGINEERING EVALUATIONS AND RECOMMENDATIONS

6.1 General

In general, the existing shallow subsurface soils encountered in the borings performed are capable of supporting the proposed construction of a typical pavement section after subgrade preparation in accordance with FDOT Standards. Buried organic soils, debris and unsuitable soils encountered during construction should be removed and replaced with clean compacted sandy soils when encountered at the surface or in open excavations. Similarly, plastic soils, if encountered during construction within the pavement section, should be removed and placed in areas not affecting pavement performance.

The removal of topsoil, near-surface clayey soils (if encountered during construction) and surficial organic soils should be accomplished in accordance with the FDOT Standard Specifications for Road and Bridge Construction and Index 500. Site preparation should consist of normal clearing and grubbing followed by compaction of subgrade soils. Backfill should consist of materials conforming with FDOT Index 505 and compacted in general accordance with the FDOT Standard Specifications for Road and Bridge Construction. Materials directly beneath the base should be "SELECT" materials.

Organic soils (organic contents of 18 to 57 percent) were encountered at two (2) locations along the alignment at depth intervals between 0.0 to 0.46 meters below existing grade. The delineation of the vertical and lateral extent of these suspect areas was not performed in this PD&E phase and should be performed in the future stages of the project.

6.2 Pavement Design Considerations

Four (4) LBR tests were performed on near surface soils obtained at various locations along the roadway alignment. The LBR tests yielded values ranging from 30 to 42 percent. The FDOT 90 percentile method yielded a design LBR value of 30 percent. We recommend a design LBR value of 30 percent be used for the existing project soils for use in pavement design.

Groundwater levels along the proposed roadway alignment were encountered at depths of approximately 0.7 to 1.7 meters below existing grades at approximately half of the boring locations. The seasonal high water table data is provided in Table 5 in Appendix A. The minimum separation between the bottom of the base and the estimated SHGWT levels shall be designed in accordance with the FDOT Drainage Manual and other related FDOT and FHWA guidelines. However, if more significant cuts on the order of 1 meter or greater are proposed, the choice of base material would depend upon the relationship of final roadway improvement grades and the bottom of the base to the estimated SHGWT levels. Coquina shell base materials are more resistant to wet conditions than limerock and the separation can be somewhat reduced. Crushed concrete is also less sensitive to moisture than limerock, but should be treated in the same fashion. An asphaltic concrete base may also be used in areas of high groundwater.

6.3 Groundwater Control

Depending upon groundwater levels at the time of construction, some form of dewatering may be required to achieve the required compaction. Groundwater can normally be controlled in shallow excavations with pumps and sumps. During subgrade soil preparation any plastic soils below design grade could become disturbed by construction activities. If this becomes the case, the contractor may be directed by the owners representative to remove the disturbed or pumping soils to a depth of 300 to 460 mm below design grade and backfill the area with structural fill. In such situations, FDOT Indexes 500 and 505 should be followed closely.

6.4 General Roadway Construction Recommendations

Site preparation and roadway construction should be done in accordance with the latest FDOT Standard Specifications for Road and Bridge Construction and Roadway and Traffic Design Standards. Temporary excavation side slopes should also be shored in accordance with OSHA requirements.

6.5 On-Site Soil Suitability

In general, the majority of the fine sands (A-3/Stratum 1) can be moved and used for grading purposes, site levelling, general engineering fill, structural fill and backfill in other areas, provided the fill is free of organic materials, clay, debris or any other material deemed unsuitable for construction. All fill should be placed in accordance with recommendations provided in this report. Silty fine sand soils (A-2-4/Stratum 2) may be used as embankment soils as described in FDOT Index 505. However, this material is likely to retain excess moisture and be difficult to dry and compact. It should be used in the embankment above the water level existing at the time of construction. The muck (A-8) encountered shall be overexcavated within the proposed embankment limits. This material may be used in the embankment construction as outlined in FDOT Index 505.

7.0 ENVIRONMENTAL CLASSIFICATION

Corrosion tests were performed on four (4) random samples from the roadway auger borings. Test results obtained are presented in Table 3, Appendix A. Based on the FDOT's "Structures Design Guidelines, Section 7.2, Topic No. 625-020-150b", the roadway subsurface environment has been classified as slightly to extremely aggressive for both steel and concrete. Resistivity and pH values varied from 6,500 to 37,000 ohm-cm and from 5.3 to 6.6, respectively. Sulfate and chloride values varied from 20 to 125 ppm and from 15 to 45 ppm, respectively.

8.0 REPORT LIMITATIONS

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This company is not responsible for the conclusions, opinions or recommendations made by others based on these data.

The analyses and recommendations submitted in this report are based upon the anticipated location and type of construction and the data obtained from the soil borings performed at the locations indicated and does not reflect any variations which may occur among these borings. If any variations become evident during the course of construction, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. When final design plans and specifications are available, a general review by our office should be completed to check that the assumptions made in preparation of this report are correct and that earthwork recommendations are properly interpreted and implemented.

The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.

APPENDIX A

TABLE 1
SUMMARY OF USDA SOIL SURVEY
S.R. 39 EXTENSION FROM I-4
TO KNIGHTS GRIFFIN ROAD
HILLSBOROUGH COUNTY, FLORIDA
F.P.N. 255099-1-31-01
S.P.N. 10200-1508
PSI PROJECT NO. 775-95498

USDA Symbol and Soil Name	Classification				Seasonal High Water Table			Risk of Corrosion	
	Depth (m)	AASHTO Group	USCS Group	Permeability (m/day)	Depth (m)	Kind	Month	Uncoated Steel	Concrete
Basinger, Holopaw and Samsula Soils (5)	0 - 0.2 0.2 - 0.7 0.7 - 1.1 1.1 - 2.0	A-3 A-3, A-2-4 A-3, A-2-4 A-3, A-2-4	SP SP, SP-SM SP, SP-SM SP, SP-SM	3.6 - 12.2 3.6 - 12.2 3.6 - 12.2 3.6 - 12.2	+0.6 - 0.3	Apparent	Jun - Feb	High	Moderate
Candler (7)	0 - 0.2 0.2 - 1.8 1.8 - 2.0	A-3 A-3 A-3, A-2-4	SP, SP-SM SP, SP-SM SP-SM	3.6 - 12.2 3.6 - 12.2 3.6 - 12.2	>1.8	-	-	Low	High
Fort Meade (18)	0-0.7 0.7-2.0	A-2-4 A-2-4	SM SM	3.6-12.2 3.6-12.2	>1.8	-	-	Low	High
Lake (25)	0-2.0	A-3, A-2-4	SP-SM	>3.6	>1.8	-	-	Low	High
Malabar (27)	0 - 0.3 0.3 - 0.8 0.8 - 1.3 1.3 - 1.7 1.7 - 2.0	A-3 A-3, A-2-4 A-3 A-2, A-4, A-6 A-3, A-2-4	SP, SP-SM SP, SP-SM SP, SP-SM SC, SM-SC, SM SP-SM, SM	3.6 - 12.2 3.6 - 12.2 3.6 - 12.2 <0.1 3.6 - 12.2	0 - 0.3	Apparent	Jun - Nov	High	Low
Myakka (29)	0 - 0.6 0.6 - 0.8 0.8 - 2.0	A-3 A-3, A-2-4 A-3	SP, SP-SM SM, SP-SM SP, SP-SM	3.6 - 12.2 0.4 - 3.6 3.6 - 12.2	0 - 0.3	Apparent	Jun - Nov	High	High
Orlando (35)	0-0.5 0.5-2.0	A-3 A-2-4 A-3, A-2-4	SP, SP-SM SP, SP-SM	3.6-12.2 3.6-12.2	>1.8	-	-	Low	High
St. Johns (46)	0-0.3 0.3-0.7 0.7-1.2 1.2-2.0	A-3 A-3 A-3, A-2-4 A-3	SP, SP-SM SP, SP-SM SP-SM, SM SP, SP-SM	3.6-12.2 3.6-12.2 0.12-1.2 3.6-12.2	0-0.3	Apparent	Jun-Apr	High	High
Seffner (47)	0-0.3 0.3-0.5 0.5-2.0	A-3, A-2-4 A-3, A-2-4 A-3, A-2-4	SP-SM, SP SP-SM, SP SP-SM, SP	3.6-12.2 3.6-12.2 3.6-12.2	0.5-1.1	Apparent	Jun-Nov	Low	Moderate
Smyrna (52)	0-0.3 0.3-0.5 0.5-2.0	A-3, A-2-4 A-3, A-2-4 A-3	SP, SP-SM SM, SP-SM SP, SP-SM	3.6-12.2 0.36-3.6 3.6-12.2	0-0.3	Apparent	Jul-Oct	High	High
Tavares (53)	0 - 0.2 0.2 - 2.0	A-3 A-3	SP, SP-SM SP, SP-SM	>3.6 >3.6	1.1 - 1.8	Apparent	Jun - Dec	Low	High
Zolfo (61)	0-0.08 0.08-1.5 1.5-2.0	A-3, A-2-4 A-3, A-2-4 A-3, A-2-4	SP-SM SP-SM, SM SP-SM, SM	3.6-12.2 3.6-12.2 0.36-1.2	0.6-1.1	Apparent	Jun-Nov	Low	Moderate

TABLE 2
SUMMARY OF LABORATORY TEST RESULTS
S.R. 39 EXTENSION FROM I-4
TO KNIGHTS GRIFFIN ROAD
HILLSBOROUGH COUNTY, FLORIDA
F.P.N. 255099-1-31-01
S.P.N. 10200-1508
PSI PROJECT NO. 775-95498
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Station Number and Offset (Meters) C/L Construction	Sample Depth (Meters)	Natural Moisture Content (%)	Organic Content (%)	Sieve Analysis (%)					Atterberg Limits (%)		AASHTO Group	Stratum Number
				#10	#40	#60	#100	#200	LL	PI		
24+00, C/L	0.0-0.76	206	57	100	54	39	29	24	-	-	A-8	3
33+00, C/L	0.15-0.61	71	18	100	95	80	52	33	-	-	A-8	3
35+00, C/L	0.15-0.30	-	-	100	96	76	35	6	-	-	A-3	1
36+00, C/L	0.46-1.37	-	-	100	96	75	34	7	-	-	A-3	1
39+00, C/L	1.07-1.22	-	-	100	97	74	26	5	-	-	A-3	1
48+00, C/L	0.00-0.76	10	4	100	97	80	37	9	-	-	A-3	1
51+00, C/L	0.76-0.91	-	-	100	98	82	41	12	-	-	A-2-4	2
53+00, C/L	0.0-1.22	-	-	100	97	81	41	11	-	-	A-2-4	2
56+00, C/L	1.52-1.67	26	-	100	99	84	46	20	NP	NP	A-2-4	2
62+00, C/L	1.22-1.98	18	-	100	98	83	50	20	NP	NP	A-2-4	2
65+00, C/L	0.46-0.61	-	-	89	85	67	36	11	-	-	A-2-4	2
67+00, C/L	0.76-1.67	-	-	100	96	76	43	16	-	-	A-2-4	2
70+00, C/L	1.67-1.83	17	-	100	97	82	52	24	22	6	A-2-4	2

TABLE 3
SUMMARY OF CORROSION TEST RESULTS
S.R. 39 EXTENSION FROM I-4
TO KNIGHTS GRIFFIN ROAD
HILLSBOROUGH COUNTY, FLORIDA
F.P.N. 255099-1-31-01
S.P.N. 10200-1508
PSI PROJECT NO. 775-95498

Station and Offset (Meters) C/L Construction	Sample Depth (Meters)	Stratum Number	AASHTO	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	Environmental Classification	
								Steel	Concrete
30+00	0.30-0.46	1	A-3	5.1*	37,000	20	15	Extremely Aggressive	Moderately Aggressive
42+00	0.30-0.46	1	A-3	5.8*	14,000	69	15	Extremely Aggressive	Moderately Aggressive
59+00	0.00-0.76	1	A-3	5.3*	24,000	35	15	Extremely Aggressive	Moderately Aggressive
67+00	0.30-0.91	1	A-3	6.6*	6,500	125	45	Moderately Aggressive	Moderately Aggressive

* Governing Factor for Environmental Classification other than Slightly Aggressive

TABLE 4
SUMMARY OF LIMEROCK BEARING RATIO TEST RESULTS
S.R. 39 EXTENSION FROM I-4
TO KNIGHTS GRIFFIN ROAD
HILLSBOROUGH COUNTY, FLORIDA
F.P.N. 255099-1-31-01
S.P.N. 10200-1508
PSI PROJECT NO. 775-95498
PAGE 1 OF 1

Sample Number	Sample Location		AASHTO Classification	Stratum Number	Optimum Moisture Content (%)	Maximum Dry Unit Weight (kN/m^3)	LBR Value (%)
	Station Number	Offset[1]					
1	30+00	C/L	A-3	1	12	17.9	39
2	39+00	C/L	A-3	1	10	18.3	42
3	59+00	C/L	A-3	1	14	17.9	32
4	70+00	C/L	A-3	1	10	18.4	30

(1) Offset was measured from the Centerline of Construction in meters.

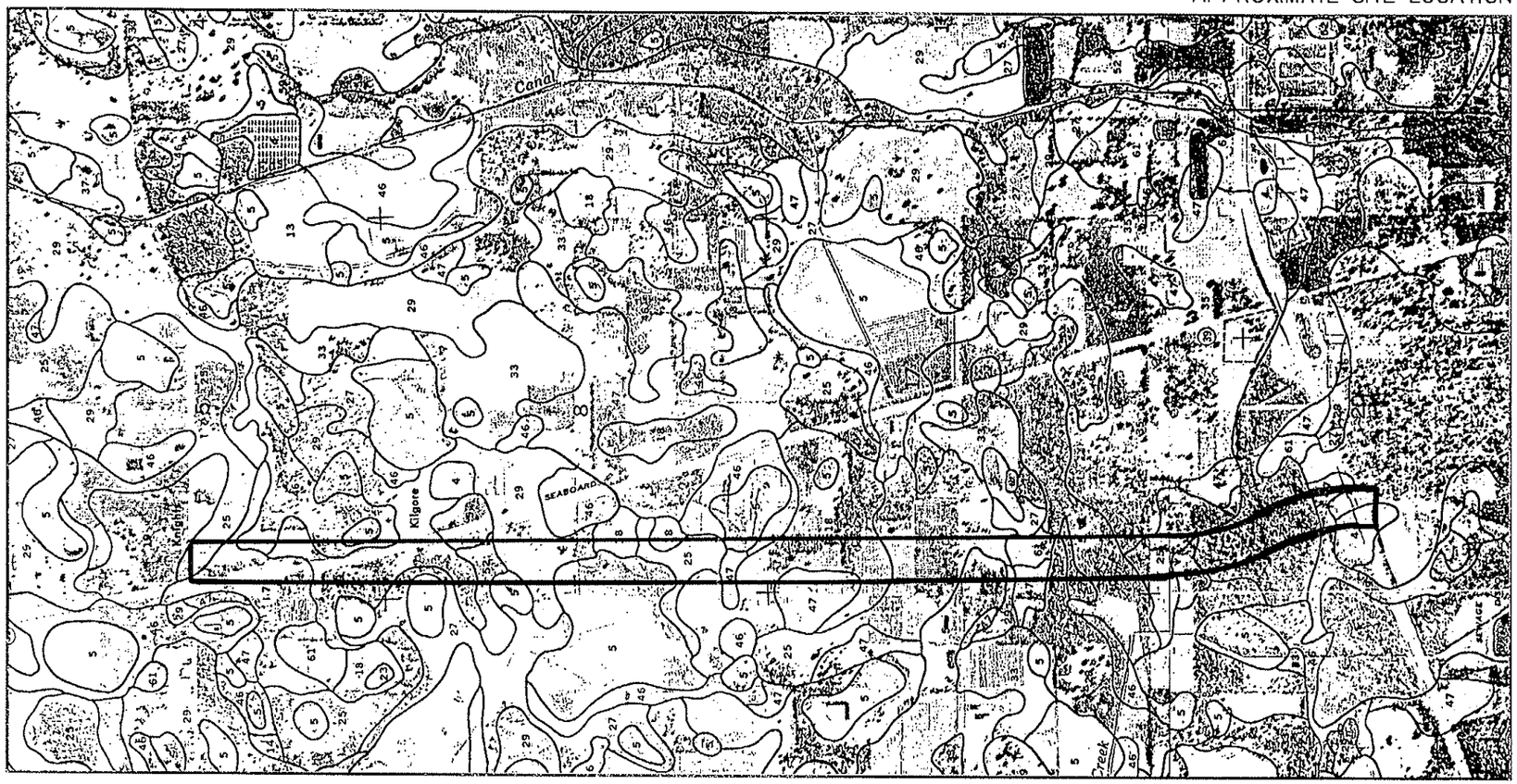
TABLE 5
ESTIMATED SEASONAL HIGH GROUNDWATER TABLES
S.R. 39 EXTENSION FROM I-4
TO KNIGHTS GRIFFIN ROAD
F.P.N. 255099-1-31-01
S.P.N. 10200-1508
PSI PROJECT NO. 775-95498
PAGE 1 OF 1

Approximate Station and Offset C/L Construction (Meters)	Measured Groundwater Table	Preliminary Estimated Seasonal High Groundwater Table
	Depth (Meters)	Depth (Meters)
30+00, C/L	GNE	1.8-2.0
39+00, C/L	1.63	0.76-0.91
45+00, C/L	GNE	0.91-1.10
51+00, C/L	GNE	0.46-0.61
56+00, C/L	1.52	0.76-0.91
59+00, C/L	0.81	0.61-0.76
65+00, C/L	GNE	1.22-1.37
70+00, C/L	GNE	1.07-1.22

GNE Groundwater table not encountered within the depth of the boring performed

APPENDIX B

— APPROXIMATE SITE LOCATION



REFERENCE: USDA SCS, "SOIL SURVEY OF HILLSBOROUGH COUNTY, FLORIDA"

TOWNSHIP:	28 SOUTH	ISSUED:	1989
RANGE:	22 EAST	PHOTO:	1982
SECTION:	5, 8, 17 AND 20	SCALE:	1 : 24,000

USDA VICINITY MAP

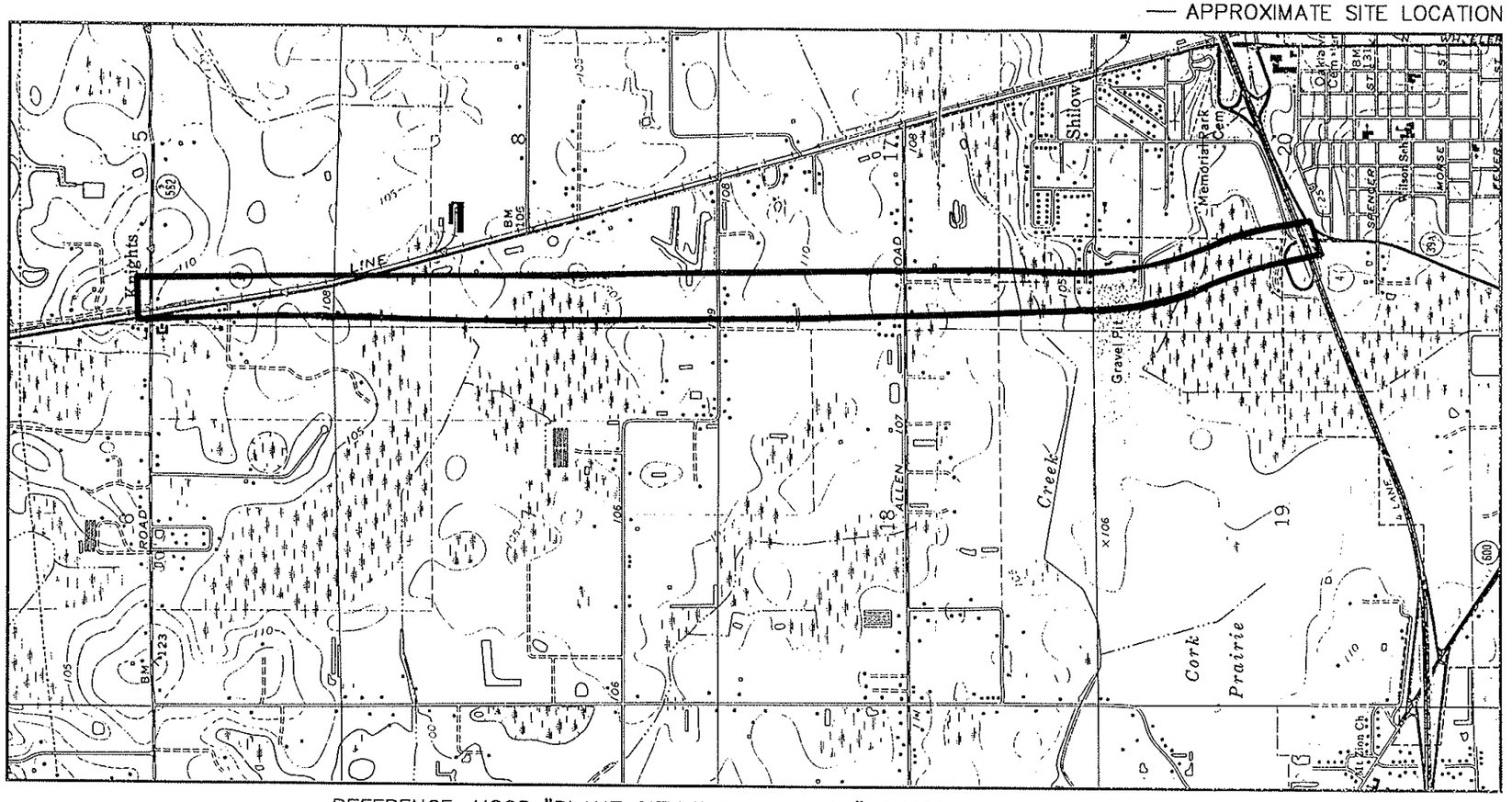
DRAWN	KDQ
CHECKED	LC
APPROVED	CLK
SCALE	NOTED

USDA & USGS VICINITY MAPS
S.R. 39 EXTENSION
FROM I-4 TO KNIGHTS GRIFFEN ROAD
HILLSBOROUGH COUNTY, FLORIDA

psi ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

DATE	PROJ. NO.	SHEET
DEC 99	775-95498	SHEET 1

— APPROXIMATE SITE LOCATION



REFERENCE: USGS "PLANT CITY WEST, FLORIDA" QUADRANGLE MAP

TOWNSHIP:	28 SOUTH	ISSUED:	1975
RANGE:	22 EAST	PHOTOREVISED:	–
SECTION:	5, 8, 17 AND 20	SCALE:	1 : 24,000

USGS VICINITY MAP

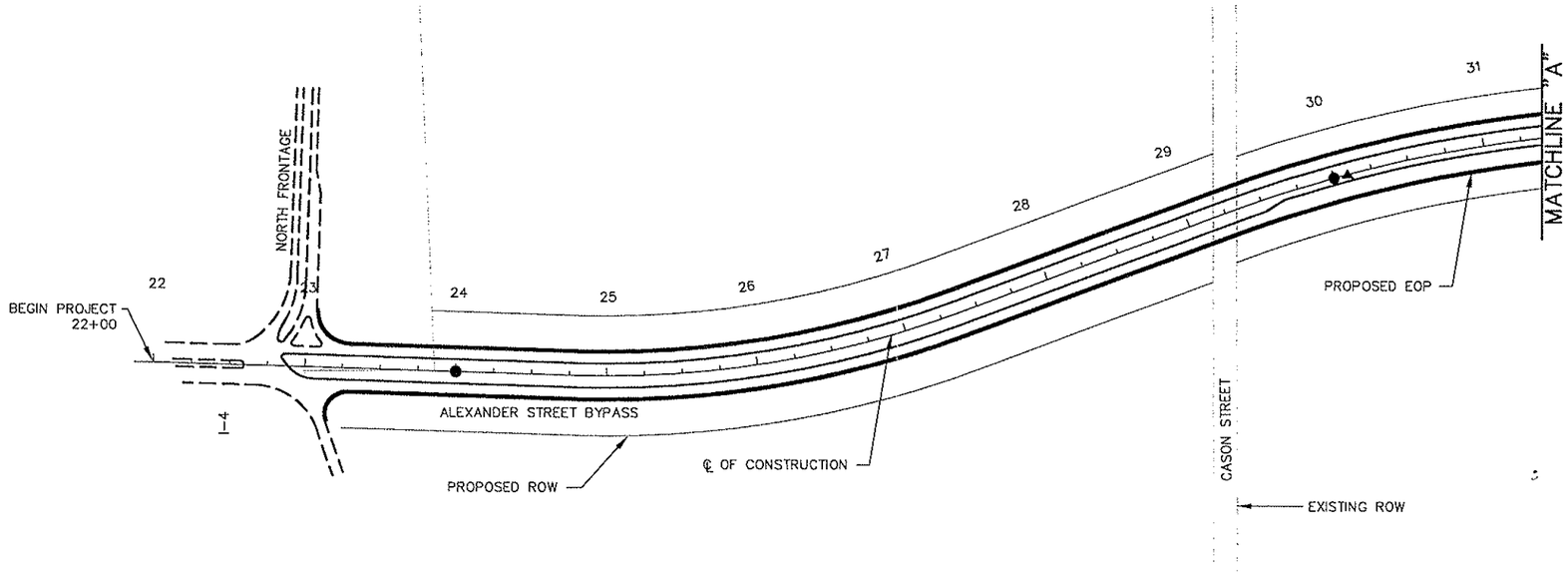
DRAWN	KDQ
CHECKED	LC
APPROVED	CLK
SCALE	NOTED

USDA & USGS VICINITY MAPS
S.R. 39 EXTENSION
FROM I-4 TO KNIGHTS GRIFFEN ROAD
HILLSBOROUGH COUNTY, FLORIDA

psi ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

DATE	PROJ. NO.	SHEET
DEC 99	775-95498	SHEET 2

FINANCIAL PROJECT ID.	PROJECT NO.	FISCAL YEAR	SHEET NO.
255099-1-31-01	10200-1508		



LEGEND

- ● APPROXIMATE HAND AUGER BORING LOCATION
- ▲ APPROXIMATE LBR SAMPLE LOCATION

BORING LOCATION PLAN

0 40.0
PLAN SCALE

LOCATION	
TOWNSHIP:	28 S
RANGE:	22 E
SECTION:	5, 8, 17 AND 20

REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY	KDQ	12/99
CHECKED BY			CHECKED BY	LC	12/99

SUPERVISED BY: CHING L. KUO, PhD., P.E.

PSI ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

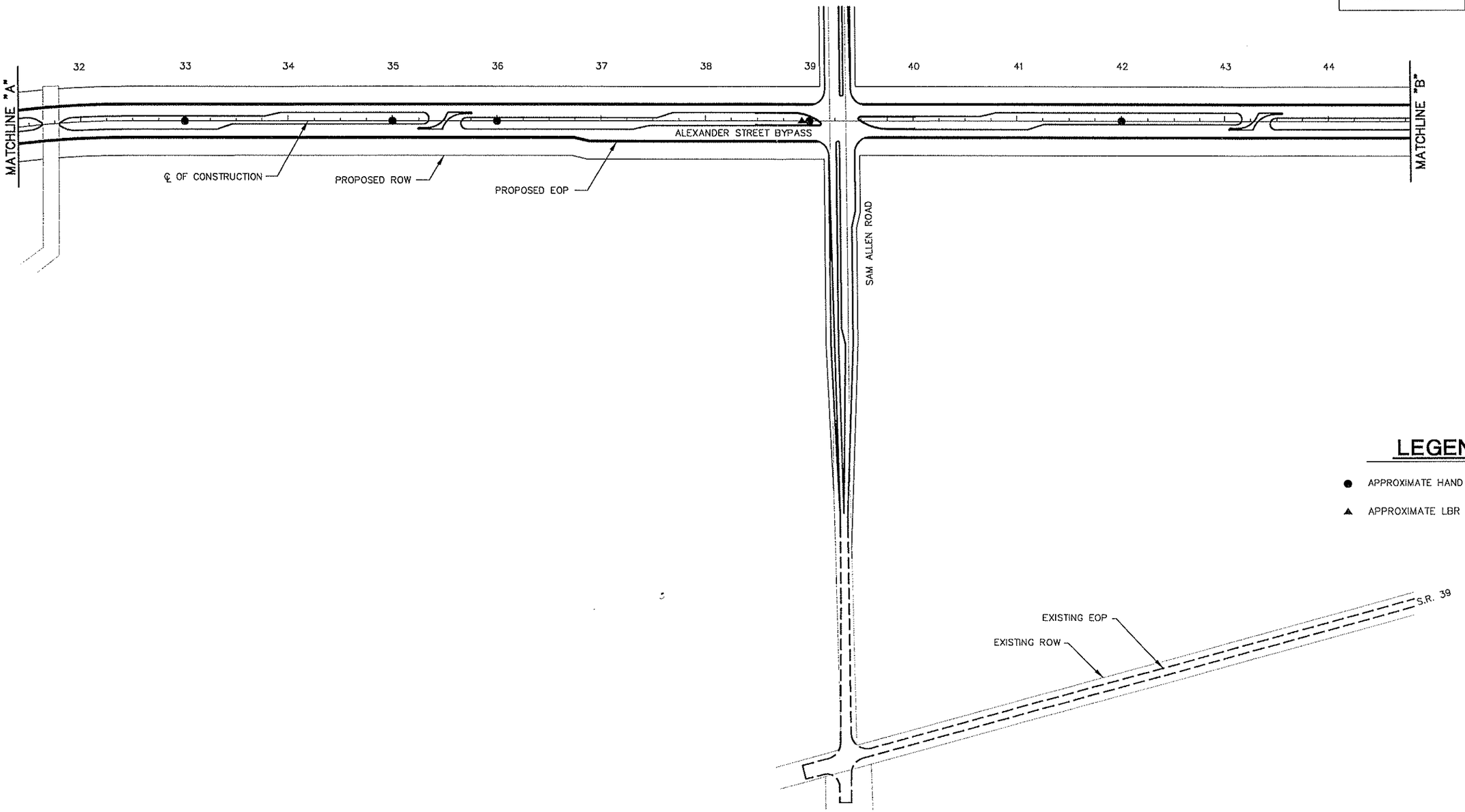
ROAD NO.	COUNTY	PROJECT NO.
S.R. 39	HILLSBOROUGH	10200-1508

FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:

SHEET TITLE: ROADWAY SOILS SURVEY
DRAWING NO.
PROJECT NAME: S.R. 39 EXTENSION FROM I-4 TO KNIGHTS GRIFFEN ROAD
INDEX NO.

PSI PROJECT No. 775-95498
SHEET 3

FINANCIAL PROJECT ID.	PROJECT NO.	FISCAL YEAR	SHEET NO.
255099-1-31-01	10200-1508		



LEGEND

- ● APPROXIMATE HAND AUGER BORING LOCATION
- ▲ APPROXIMATE LBR SAMPLE LOCATION

BORING LOCATION PLAN

0 40.0

PLAN SCALE

LOCATION	
TOWNSHIP:	28 S
RANGE:	22 E
SECTION:	5, 8, 17 AND 20

REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY	KDQ	12/99
CHECKED BY			CHECKED BY	LC	12/99

SUPERVISED BY: CHING L. KUO, PhD., P.E.

PSI ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

ROAD NO.	COUNTY	PROJECT NO.
S.R. 39	HILLSBOROUGH	10200-1508

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

SHEET TITLE: ROADWAY SOILS SURVEY

DRAWING NO.

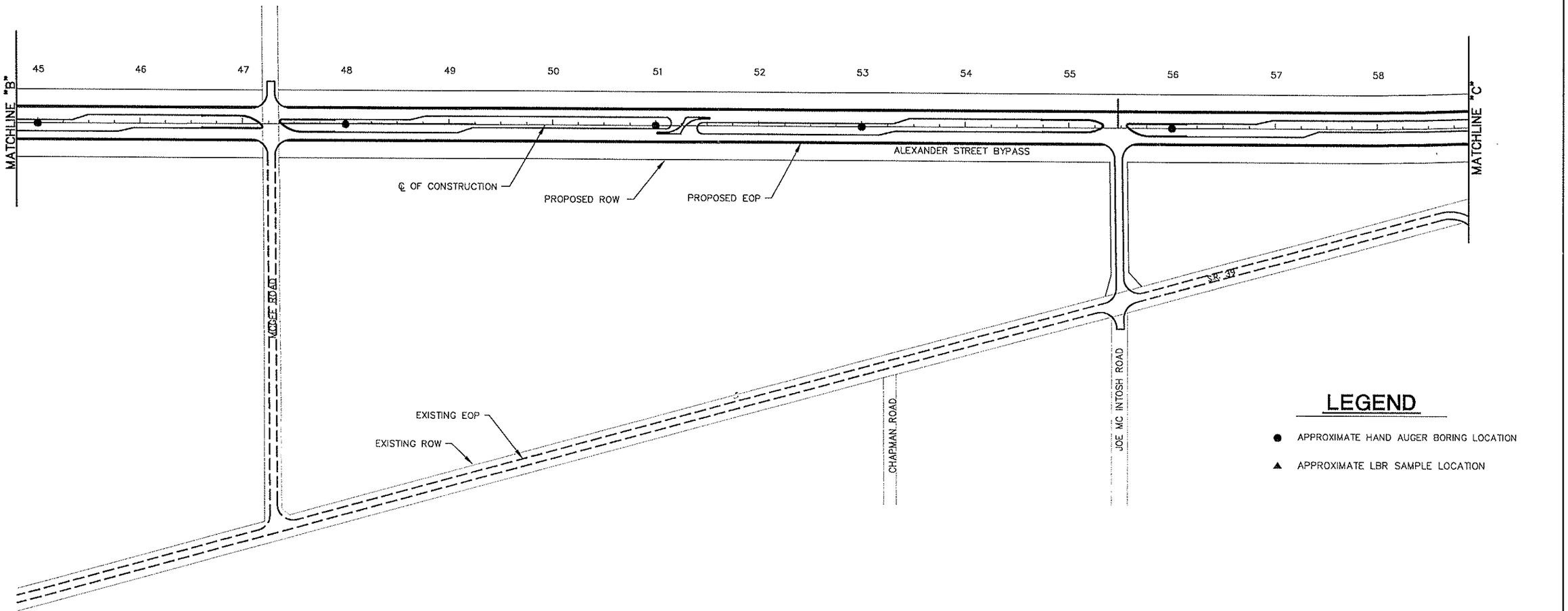
PROJECT NAME: S.R. 39 EXTENSION FROM I-4 TO KNIGHTS GRIFFEN ROAD

INDEX NO.

PSI PROJECT No. 775-95498

SHEET 4

FINANCIAL PROJECT ID.	PROJECT NO.	FISCAL YEAR	SHEET NO.
255099-1-31-01	10200-1508		



LEGEND

- ● APPROXIMATE HAND AUGER BORING LOCATION
- ▲ APPROXIMATE LBR SAMPLE LOCATION

BORING LOCATION PLAN

0 40.0

PLAN SCALE

LOCATION	
TOWNSHIP:	28 S
RANGE:	22 E
SECTION:	5, 8, 17 AND 20

REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY	KDQ	12/99
CHECKED BY			CHECKED BY	LC	12/99

SUPERVISED BY: CHING L. KUO, PhD., P.E.

PSI ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

ROAD NO.	COUNTY	PROJECT NO.
S.R. 39	HILLSBOROUGH	10200-1508

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

SHEET TITLE: ROADWAY SOILS SURVEY

DRAWING NO.

PROJECT NAME: S.R. 39 EXTENSION FROM I-4 TO KNIGHTS GRIFFEN ROAD

INDEX NO.

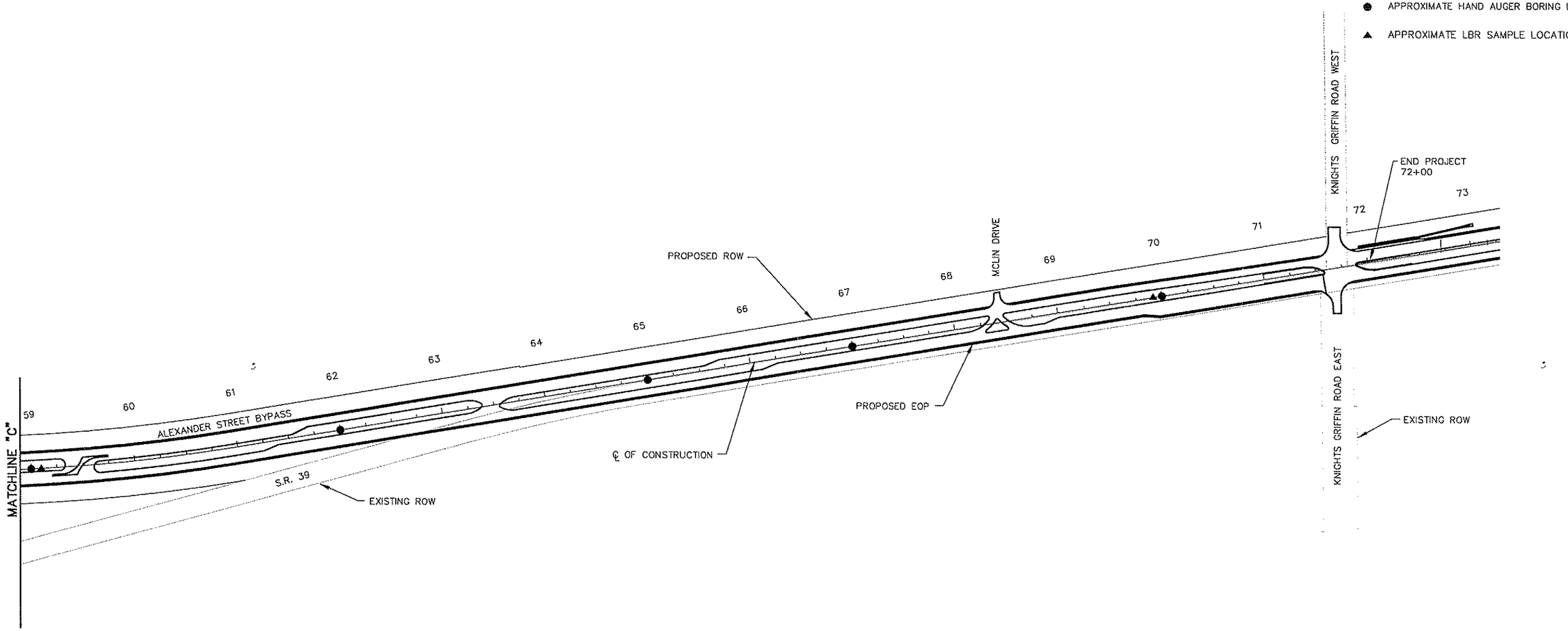
PSI PROJECT No. 775-95498

SHEET 5

FINANCIAL PROJECT ID.	PROJECT NO.	FISCAL YEAR	SHEET NO.
255099-1-31-01	10200--1500		

LEGEND

- ● APPROXIMATE HAND AUGER BORING LOCATION
- ▲ APPROXIMATE LBR SAMPLE LOCATION



BORING LOCATION PLAN

0 40.0

PLAN SCALE

LOCATION	
TOWNSHIP:	28 S
RANGE:	22 E
SECTION:	5, 8, 17 AND 20

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY	KDQ	12/99
CHECKED BY			CHECKED BY	LC	12/99

SUPERVISED BY: CHING L. KUO, PhD., P.E.

PSI ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

ROAD NO.	COUNTY	PROJECT NO.
S.R. 39	HILLSBOROUGH	10200-1508

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

SHEET TITLE: ROADWAY SOILS SURVEY

DRAWING NO.

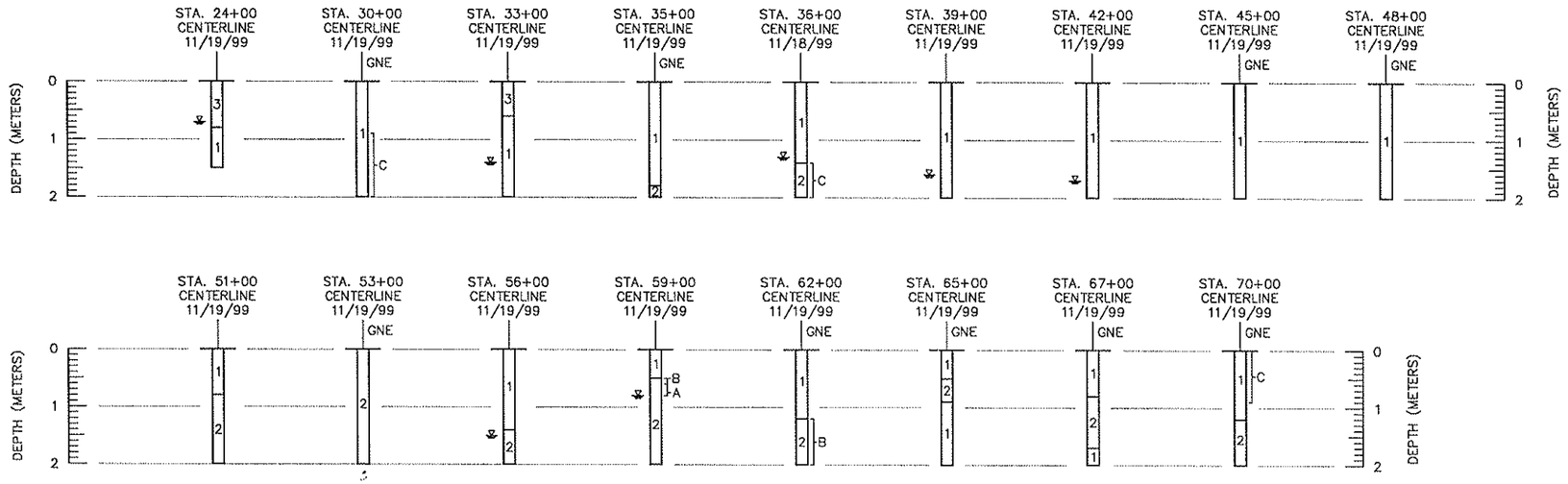
PROJECT NAME: S.R. 39 EXTENSION FROM I-4 TO KNIGHTS GRIFFEN ROAD

INDEX NO.

PSI PROJECT No. 775-95498

SHEET 6

FINANCIAL PROJECT ID.	PROJECT NO.	FISCAL YEAR	SHEET NO.
255099-1-31-01	10200-1508		



0 1.0

VERTICAL SCALE
HORIZONTAL N.T.S.

SOIL PROFILES

LEGEND

1. GRAY TO YELLOWISH-GRAY SLIGHTLY SILTY FINE SAND (A-3)
2. GRAY TO DARK GRAY SILTY FINE SAND (A-2-4)
3. MUCK (A-8)

A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

GROUNDWATER LEVEL

GNE GROUNDWATER LEVEL NOT ENCOUNTERED

A WITH TRACE ORGANICS

B WITH CLAY LENSES

C WITH LIMEROCK FRAGMENTS

REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY	KDQ	12/99
CHECKED BY			CHECKED BY	LC	12/99

SUPERVISED BY: CHING L. KUO, PhD., P.E.

PSI ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

ROAD NO.	COUNTY	PROJECT NO.
S.R. 39	HILLSBOROUGH	10200-1508

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

SHEET TITLE: ROADWAY SOILS SURVEY

DRAWING NO.

PROJECT NAME: S.R. 39 EXTENSION FROM I-4 TO KNIGHTS GRIFFEN ROAD

INDEX NO.

PSI PROJECT No. 775-95498
SHEET 7

FINANCIAL PROJ. ID.	STATE PROJ. NO.	SHEET NO.
255099-1-31-01	10200-1508	

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIAL AND RESEARCH

DATE OF SURVEY: NOVEMBER 1999
SURVEY MADE BY: PSI
SUBMITTED BY: CHING L. KUO, P.E., PhD.

DISTRICT: VII
ROAD No.: S.R. 39
COUNTY: HILLSBOROUGH

PROJECT No. 10200-1508

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STA. 22+00

SURVEY ENDS STA. 72+00

		ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS % PASS						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	LBR VALUE (%)	No. OF TESTS	% ORGANIC	No. OF TESTS	MOISTURE CONTENT	No. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY OHM-CM	CHLORIDES PPM	SULFATE PPM	pH
1	30-42	1	4	1	10	4	100	96-97	74-80	26-37	5-9	--	------	------	A-3	GRAY TO YELLOWISH-GRAY SLIGHTLY SILTY FINE SAND	4	6,500-37,000	15-45	20-125	5.0-6.6
2	------	--	------	3	17-25	7	89-100	85-99	67-84	36-52	11-24	3	NP-22	NP-6	A-2-4	GRAY TO DARK GRAY SILTY FINE SAND	--	------	------	------	------
3	------	2	18-57	2	71-206	2	100	54-95	39-80	29-52	24-33	--	------	------	A-8	MUCK	--	------	------	------	------

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY.

GWT GROUNDWATER TABLE ENCOUNTERED

GNE GROUNDWATER TABLE NOT ENCOUNTERED

A INDICATES WITH TRACE ORGANICS.

B INDICATES WITH CLAY LENSES.

C INDICATES WITH LIMEROCK FRAGMENTS.

NOTES:

1. THE MATERIAL FROM STRATUM NUMBER 1 (A-3) APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH INDEX 505.
2. THE MATERIAL FROM STRATUM NUMBER 2 APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH INDEX 505. HOWEVER, THIS MATERIAL IS LIKELY TO RETAIN EXCESS MOISTURE AND BE DIFFICULT TO DRY AND COMPACT. IT SHOULD BE USED IN THE EMBANKMENT ABOVE THE WATER LEVEL EXISTING AT THE TIME OF CONSTRUCTION.
3. THE MATERIAL FROM STRATUM NUMBER 3 IS MUCK (A-8) MATERIAL AND SHALL BE REMOVED IN ACCORDANCE WITH INDEX 500. THIS MATERIAL MAY BE USED IN EMBANKMENT CONSTRUCTION AS OUTLINED IN FDOT INDEX 505.

REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE
DESIGNED BY		
DRAWN BY	KDQ	12/99
CHECKED BY	LC	12/99

SUPERVISED BY: CHING L. KUO, P.E., PhD.

PSI ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

ROAD NO.	COUNTY	PROJECT NO.
S.R. 39	HILLSBOROUGH	10200-1508

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

ROADWAY SOILS SURVEY

S.R. 39 EXTENSION FROM I-4 TO KNIGHTS GRIFFEN ROAD

PSI PROJECT No. 775-95498

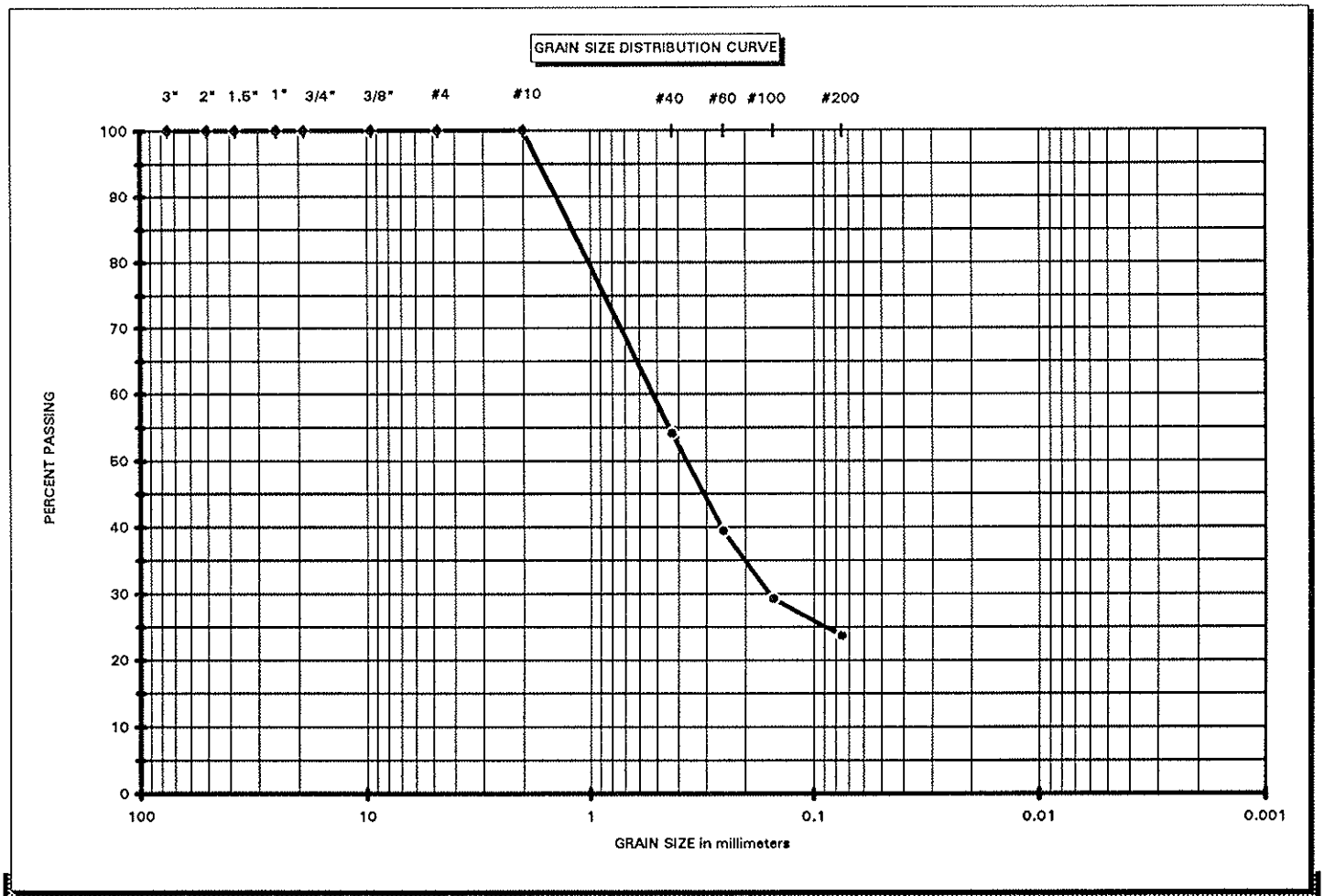
APPENDIX C

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 24+00 **OFFSET:** C/L **DEPTH (m):** 0.00 - 0.76

SOIL DESCRIPTION: A-8

% NATURAL MOISTURE CONTENT : 206%

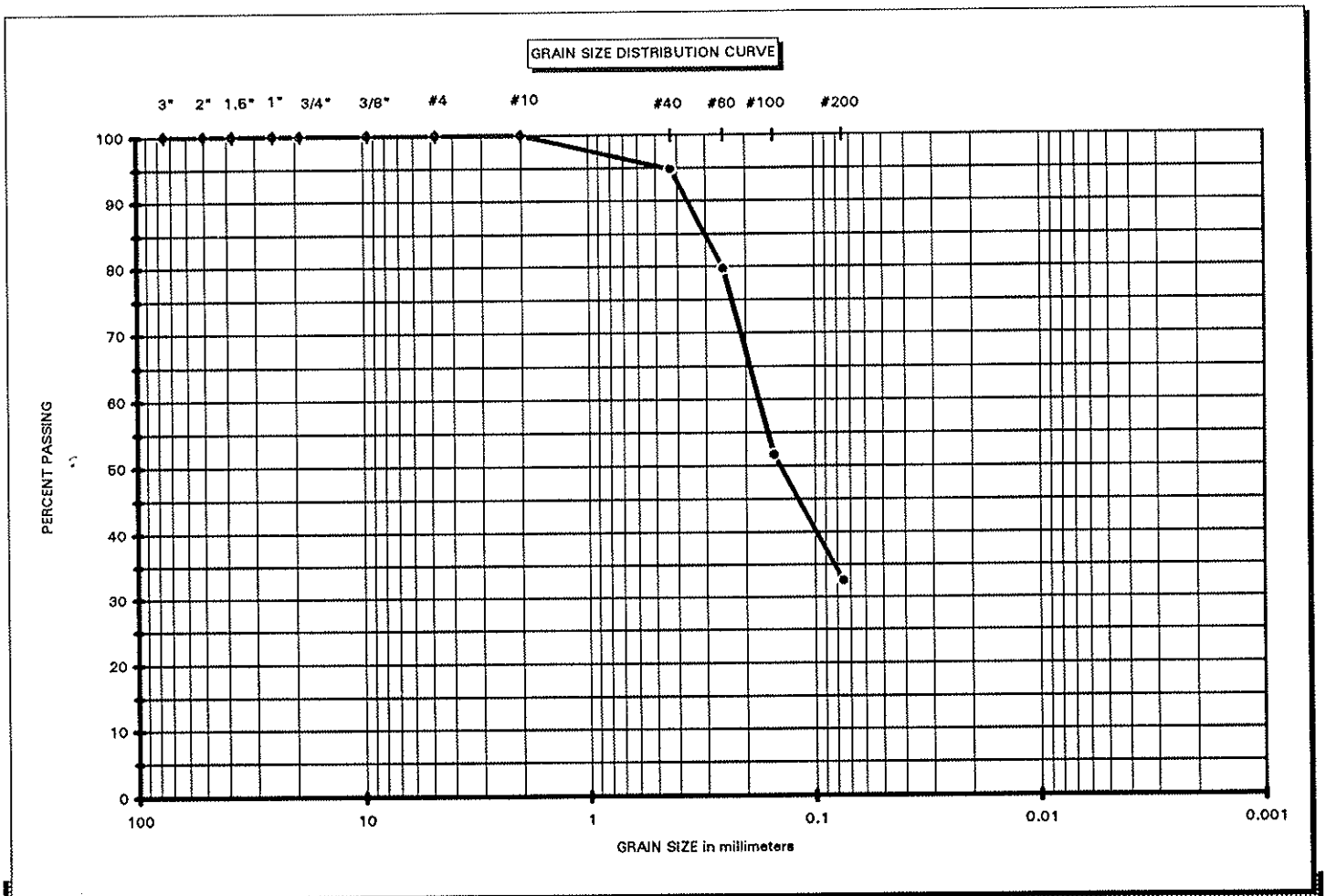
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 33+00 **OFFSET:** C/L **DEPTH (m):** 0.15 - 0.61

SOIL DESCRIPTION: A-8

% NATURAL MOISTURE CONTENT : 71%

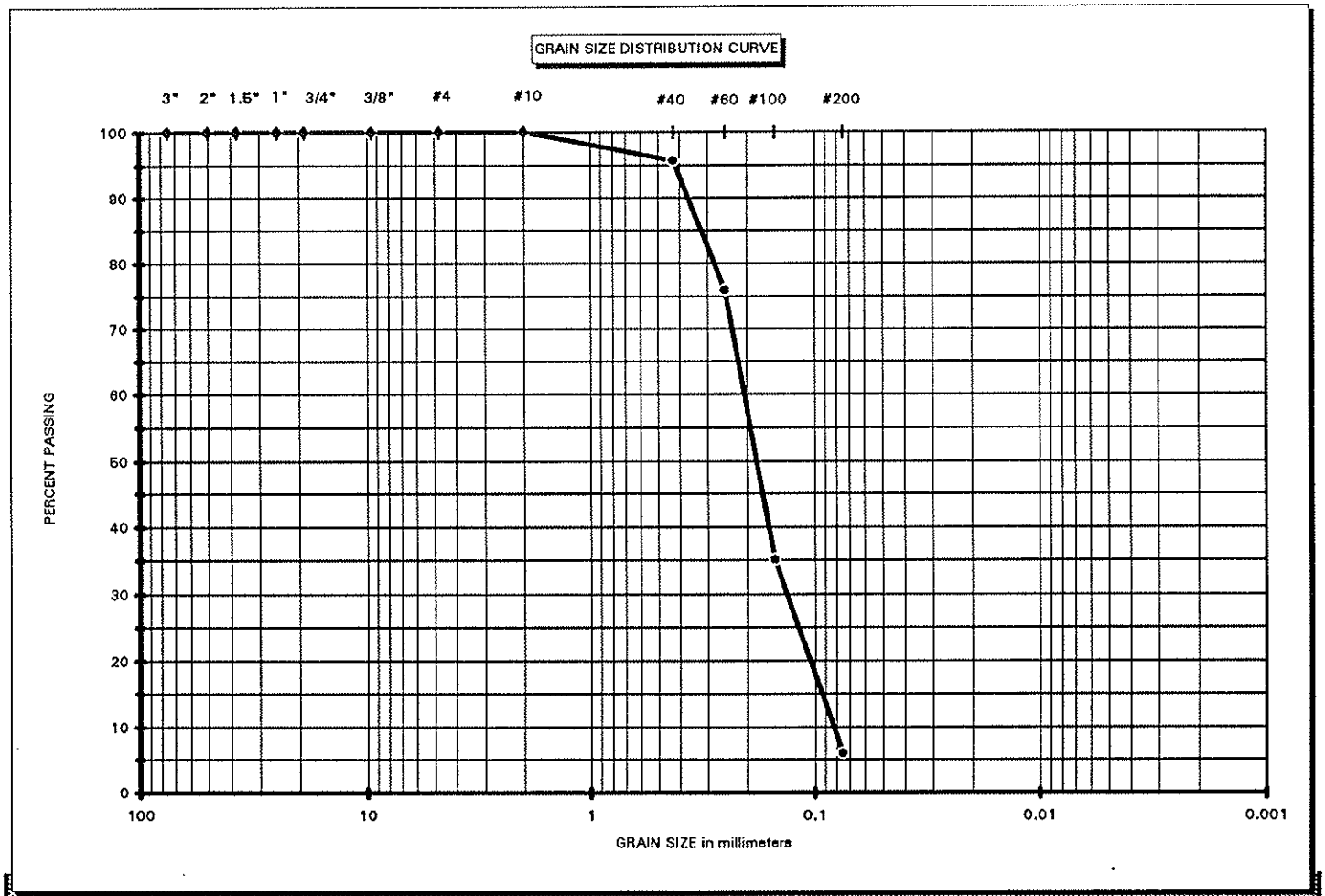
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 35+00 **OFFSET:** C/L **DEPTH (m):** 0.15 - 0.30

SOIL DESCRIPTION: A-3

% NATURAL MOISTURE CONTENT : N/A

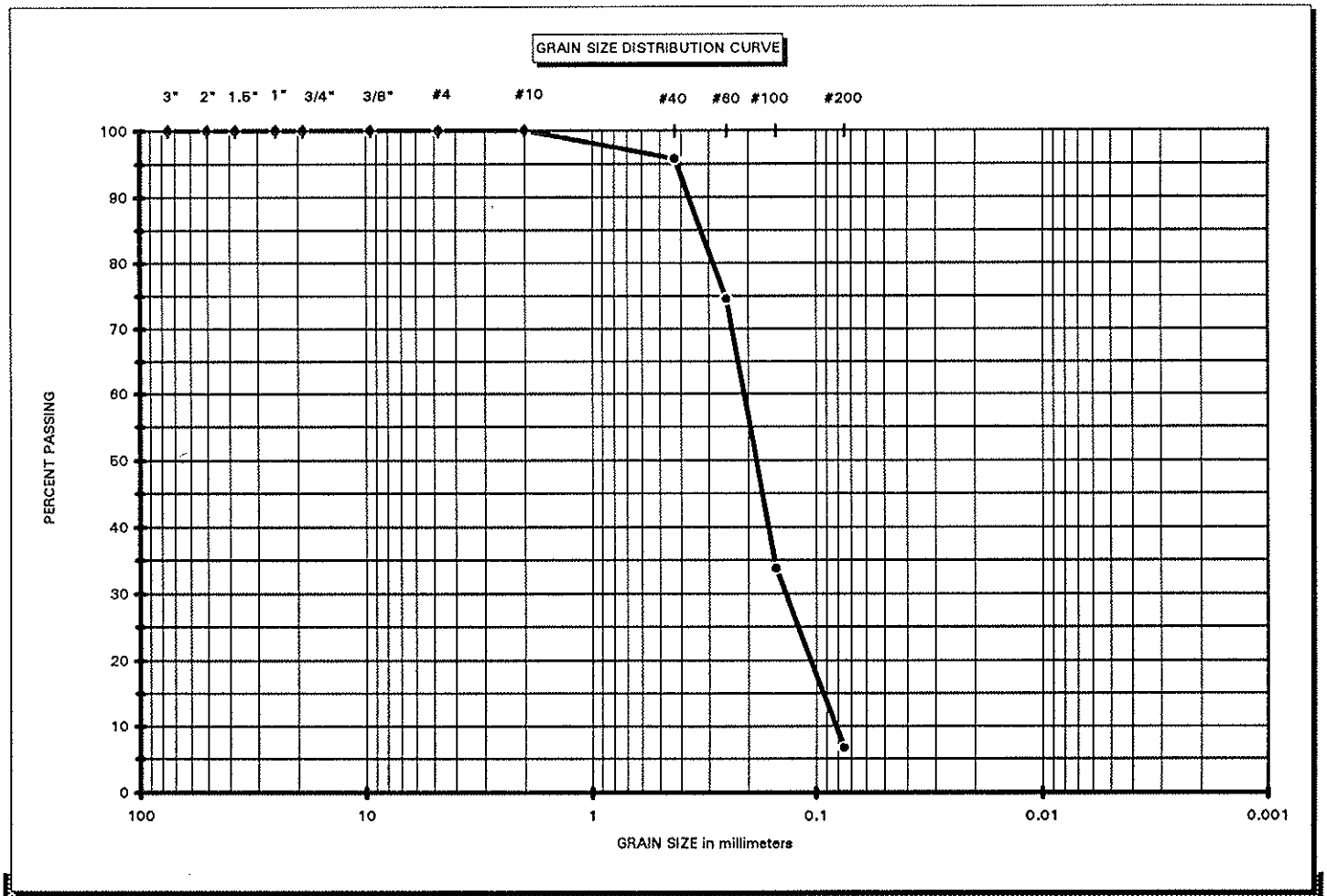
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 36+00 **OFFSET:** C/L **DEPTH (m):** 0.46 - 1.37

SOIL DESCRIPTION: A-3

% NATURAL MOISTURE CONTENT : N/A

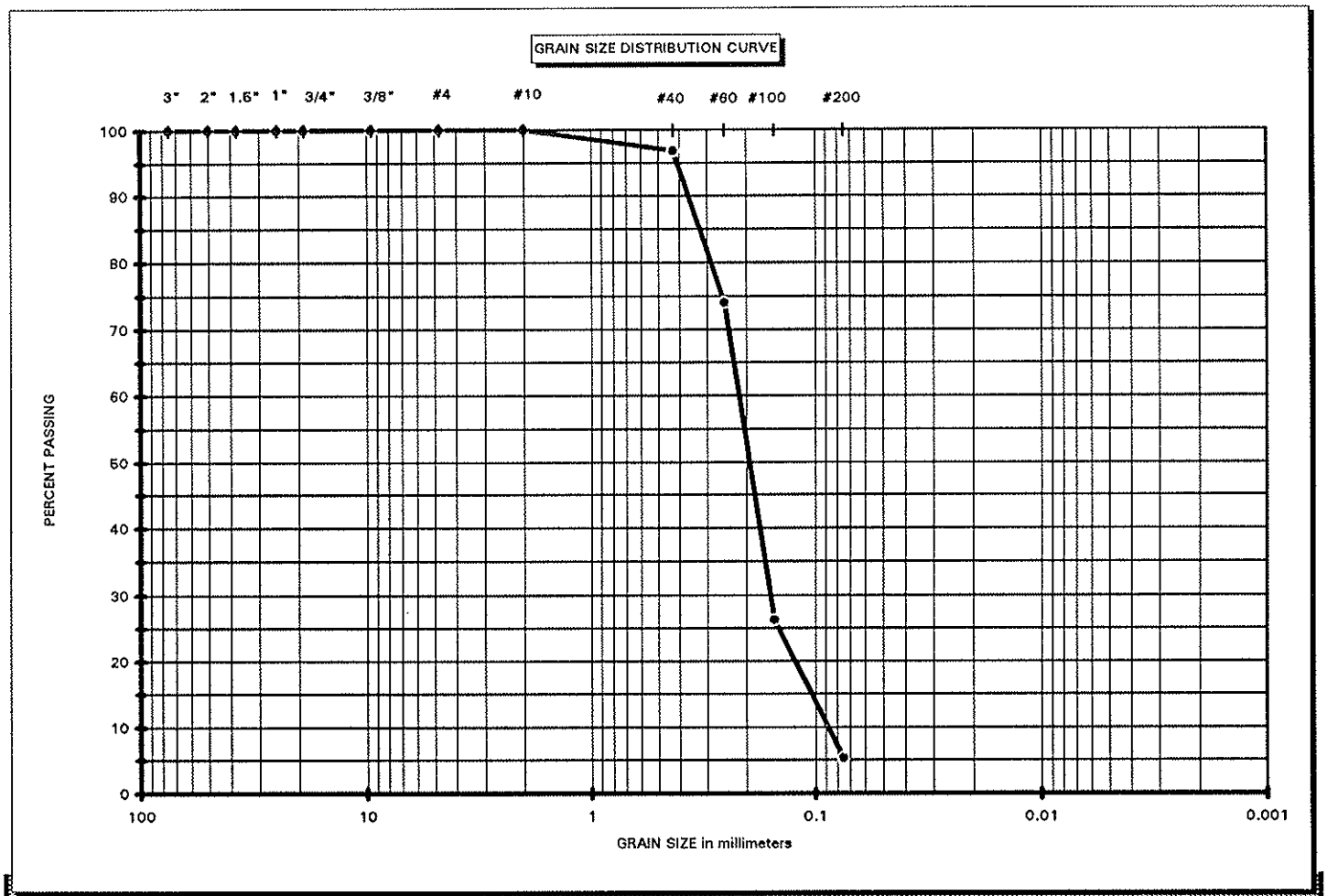
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 39+00 **OFFSET:** C/L **DEPTH (m):** 1.07 - 1.22

SOIL DESCRIPTION: A-3

% NATURAL MOISTURE CONTENT : N/A

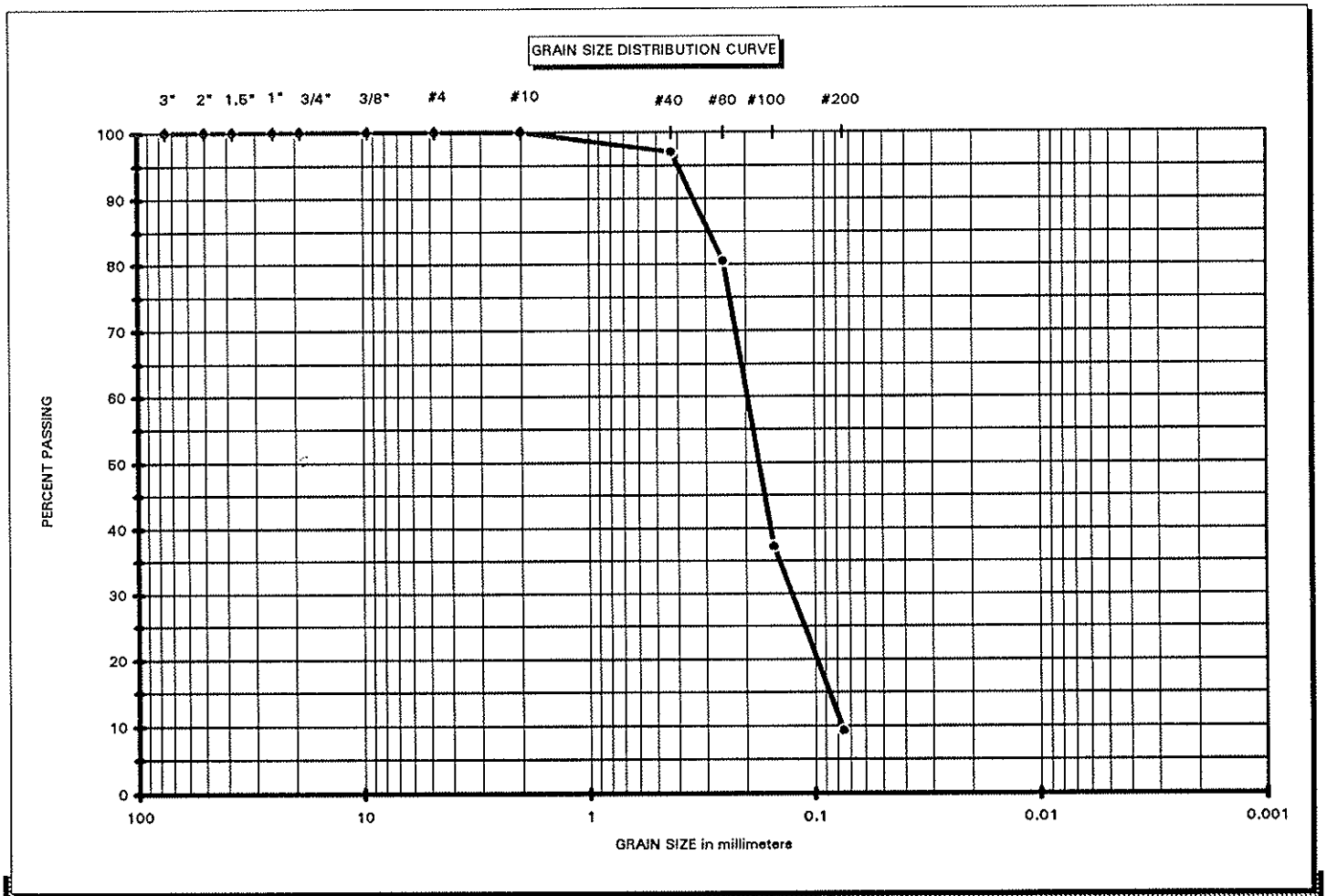
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA. INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 48+00 **OFFSET:** C/L **DEPTH (m):** 0.00 - 0.76

SOIL DESCRIPTION: A-3

% NATURAL MOISTURE CONTENT : 10%

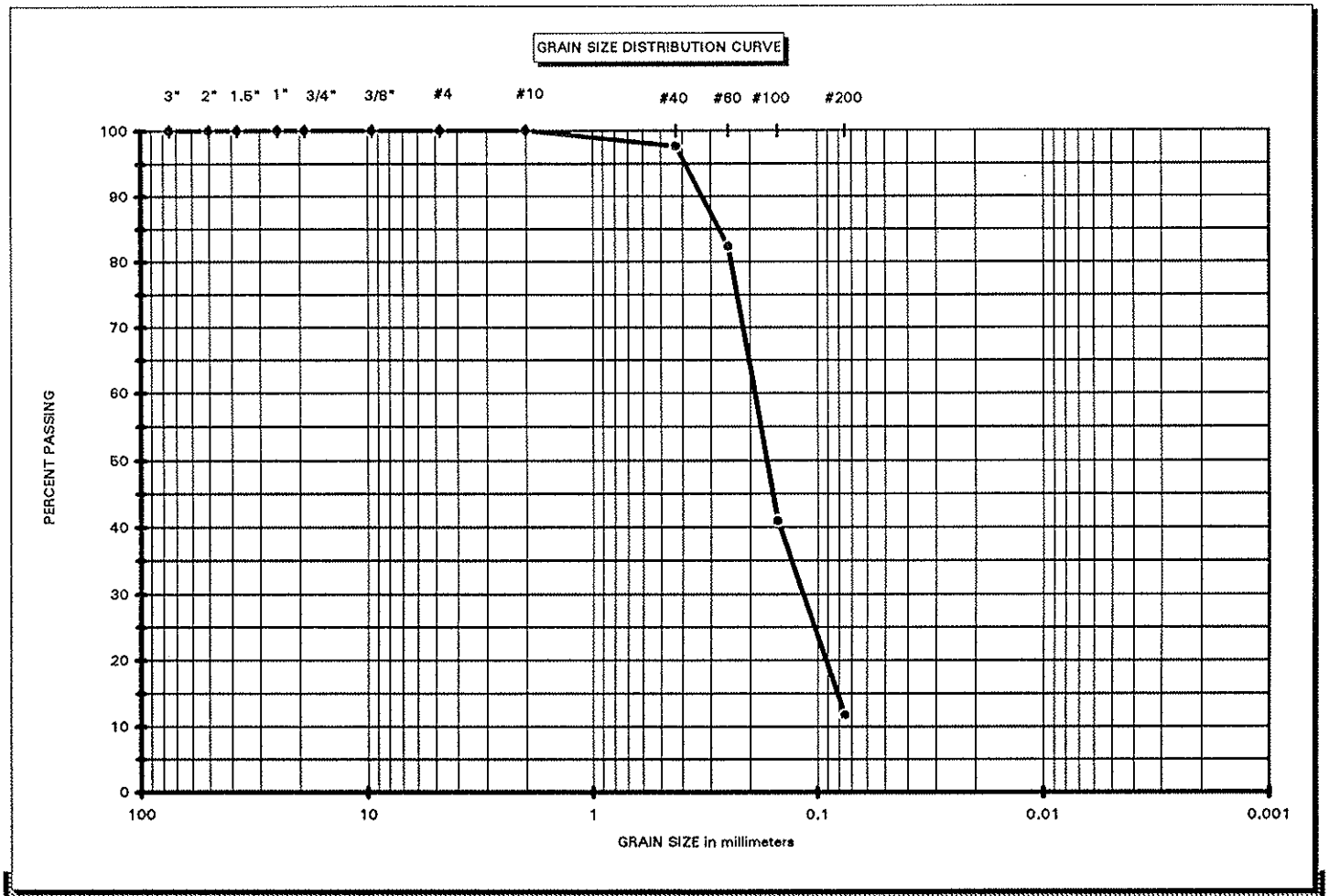
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 51+00 **OFFSET:** C/L **DEPTH (m):** 0.76 - 0.91

SOIL DESCRIPTION: A-2-4

% NATURAL MOISTURE CONTENT : N/A

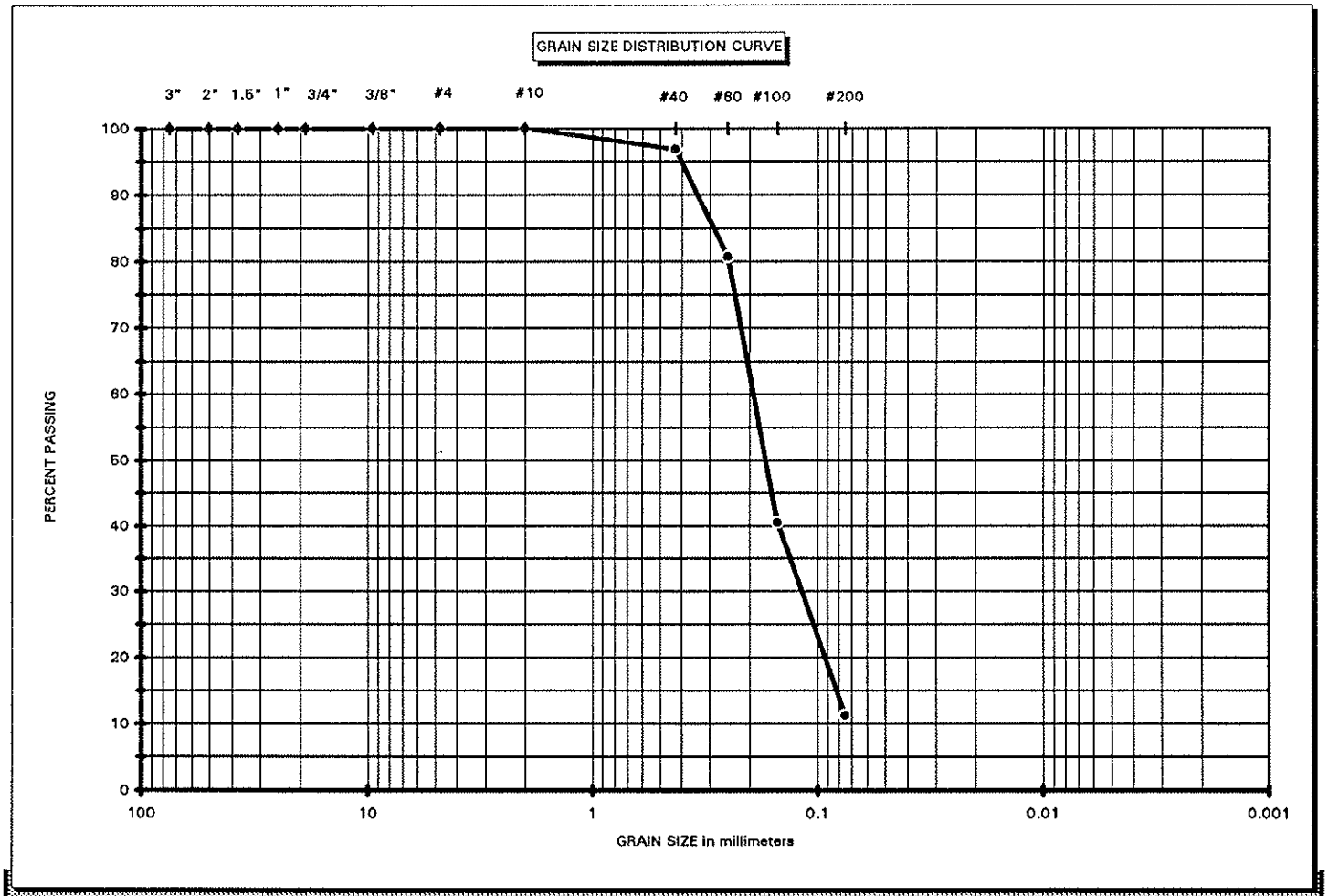
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 53+00 **OFFSET:** C/L **DEPTH (m):** 0.00 - 1.22

SOIL DESCRIPTION: A-2-4

% NATURAL MOISTURE CONTENT : N/A

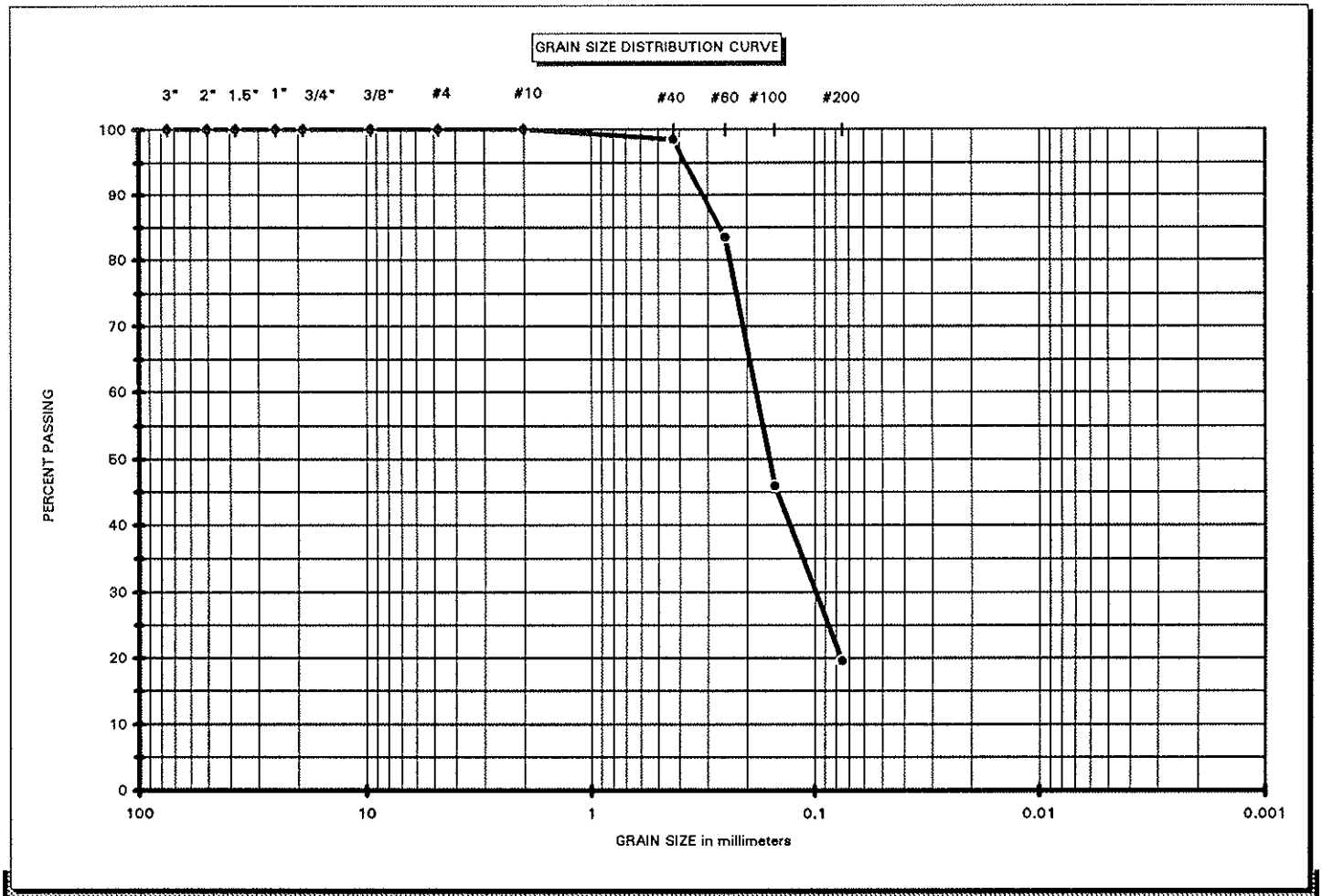
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 56+00 **OFFSET:** C/L **DEPTH (m):** 1.52 - 1.67

SOIL DESCRIPTION: A-2-4

% NATURAL MOISTURE CONTENT : 26%

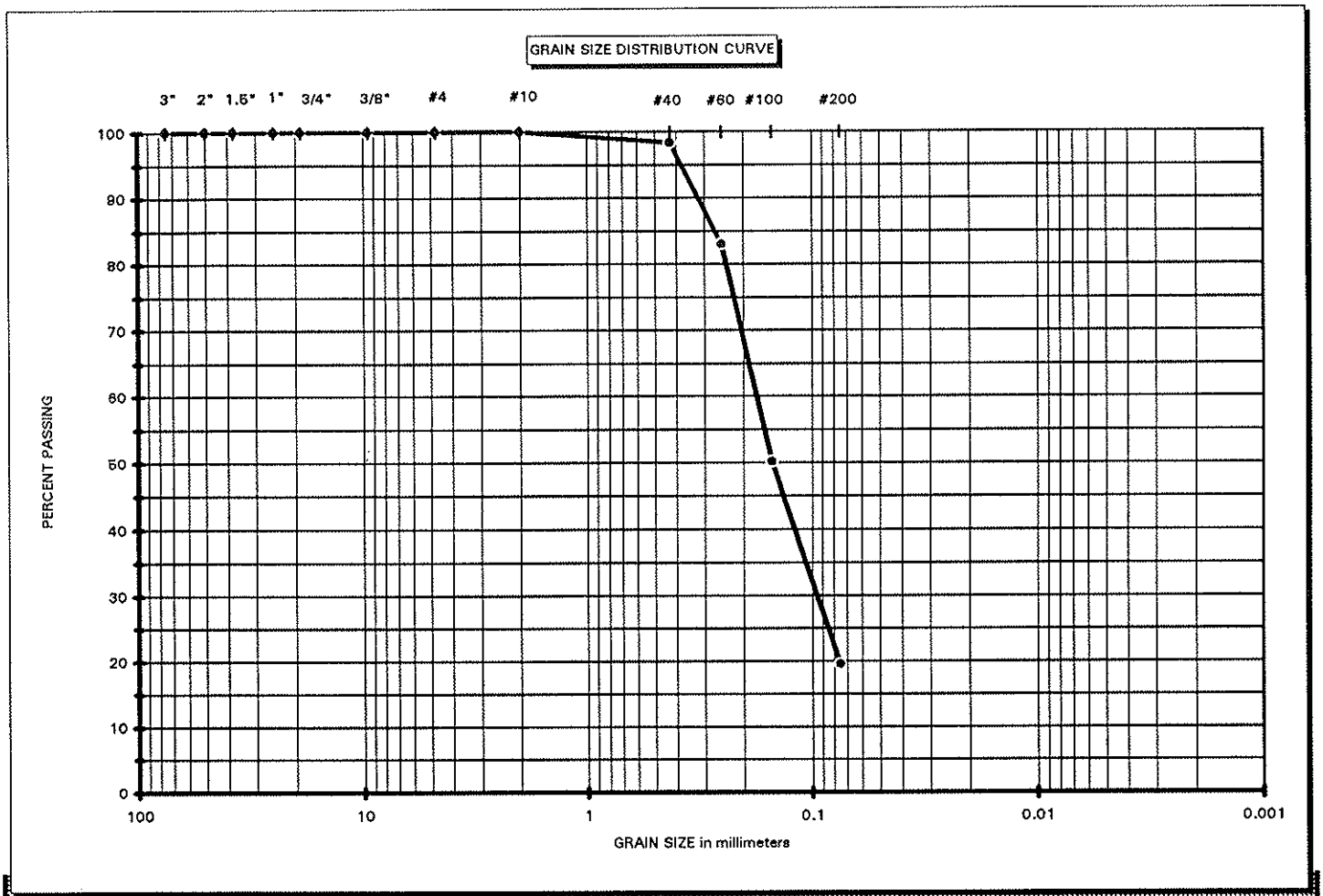
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	NP
PLASTIC LIMIT	NP
PLASTIC INDEX	NP

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 62+00 **OFFSET:** C/L **DEPTH (m):** 1.22 - 1.98

SOIL DESCRIPTION: A-2-4

% NATURAL MOISTURE CONTENT : 18%

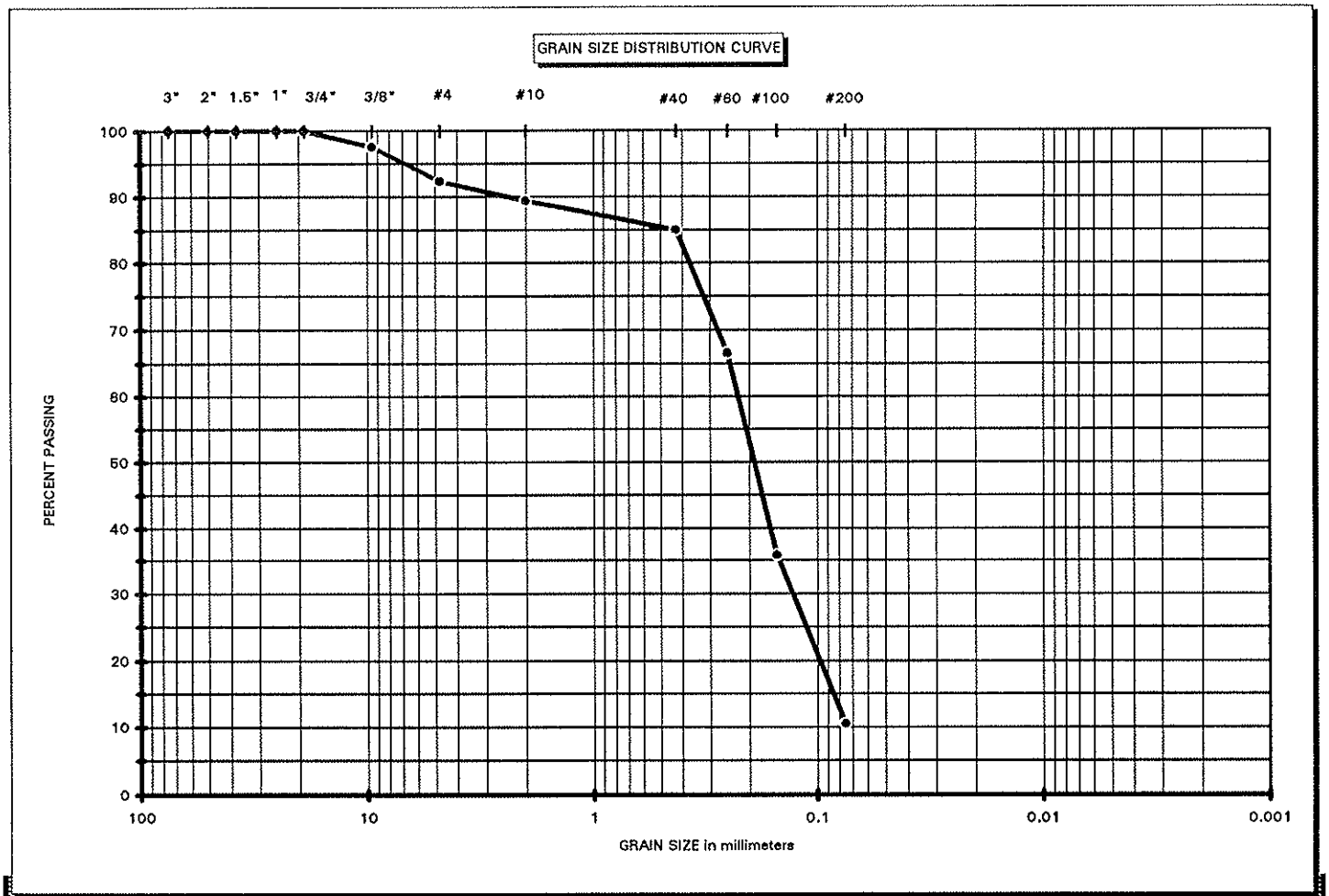
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	NP
PLASTIC LIMIT	NP
PLASTIC INDEX	NP

TIERRA. INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 65+00 **OFFSET:** C/L **DEPTH (m):** 0.46 - 0.61

SOIL DESCRIPTION: A-2-4

% NATURAL MOISTURE CONTENT : N/A

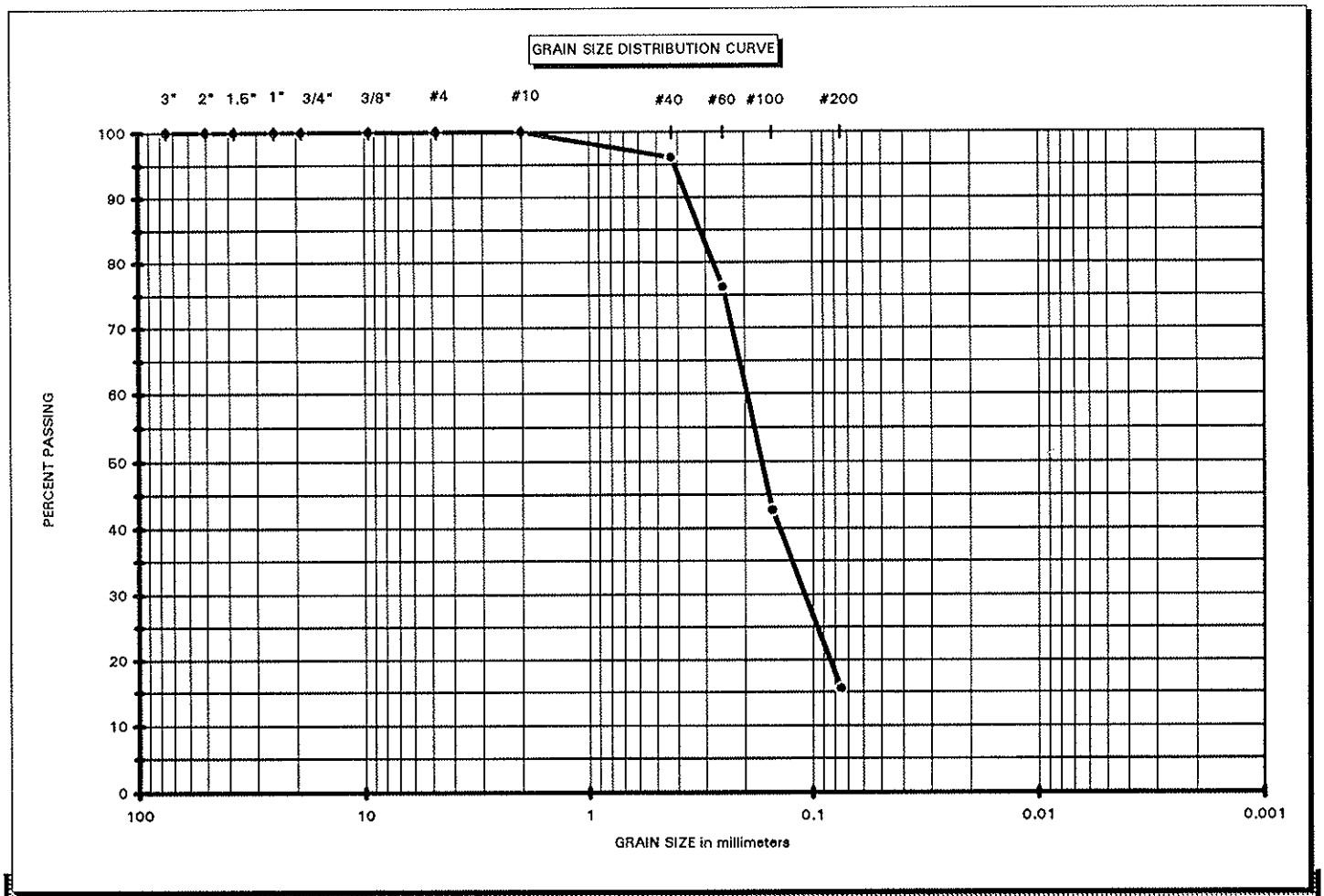
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA. INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 67+00 **OFFSET:** C/L **DEPTH (m):** 0.76 - 1.67

SOIL DESCRIPTION: A-2-4

% NATURAL MOISTURE CONTENT : N/A

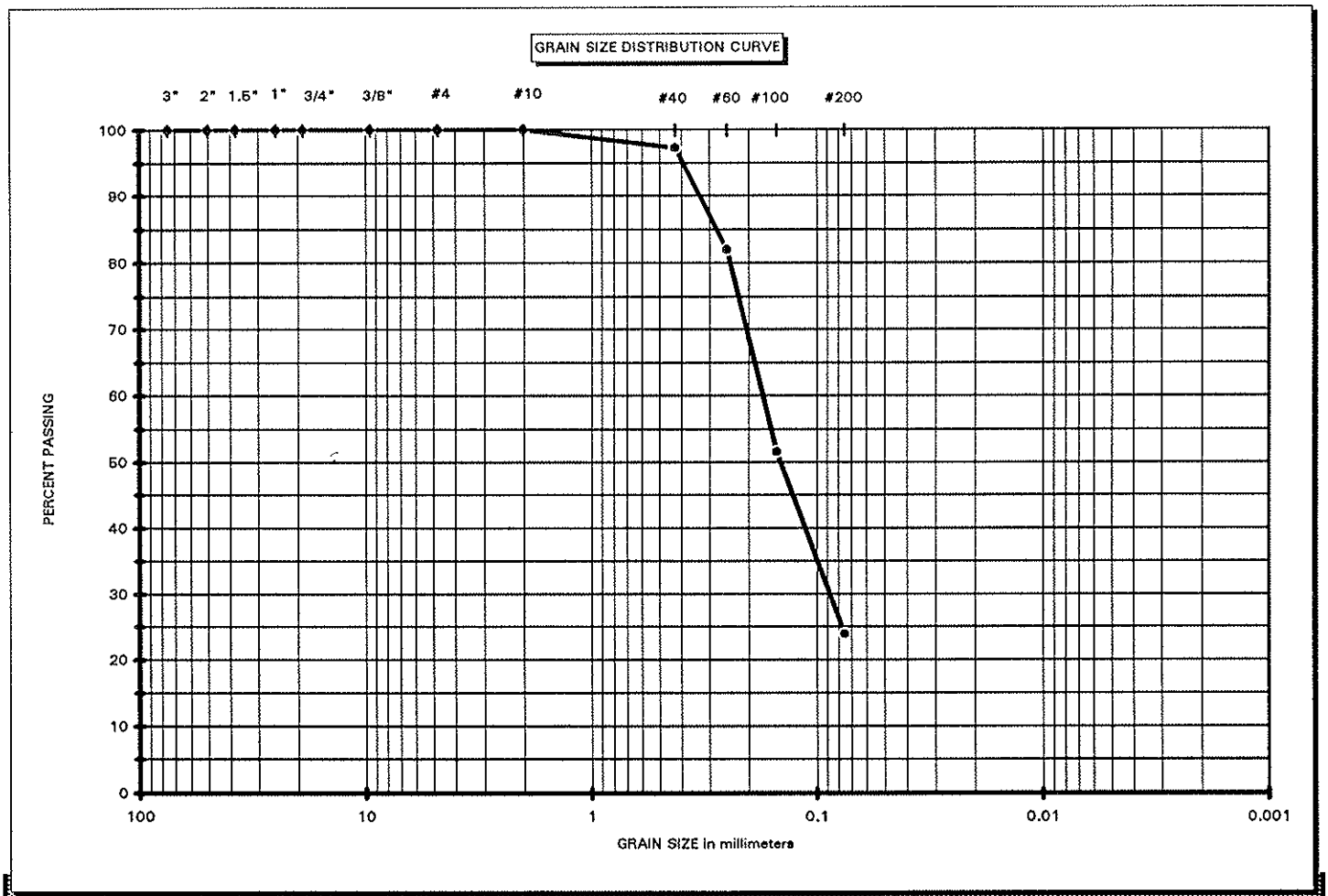
ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

TIERRA, INC.

GRAIN SIZE DATA SHEET

PROJECT NAME: SR 39 Extension **DATE:** 12/3/1999

PROJECT #: 6113-99-085



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	Cu = D60 / D10
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

STATION #: 70+00 **OFFSET:** C/L **DEPTH (m):** 1.67 - 1.83

SOIL DESCRIPTION: A-2-4

% NATURAL MOISTURE CONTENT : 17%

ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	22
PLASTIC LIMIT	16
PLASTIC INDEX	6

APPENDIX D

TIERRA, INC.

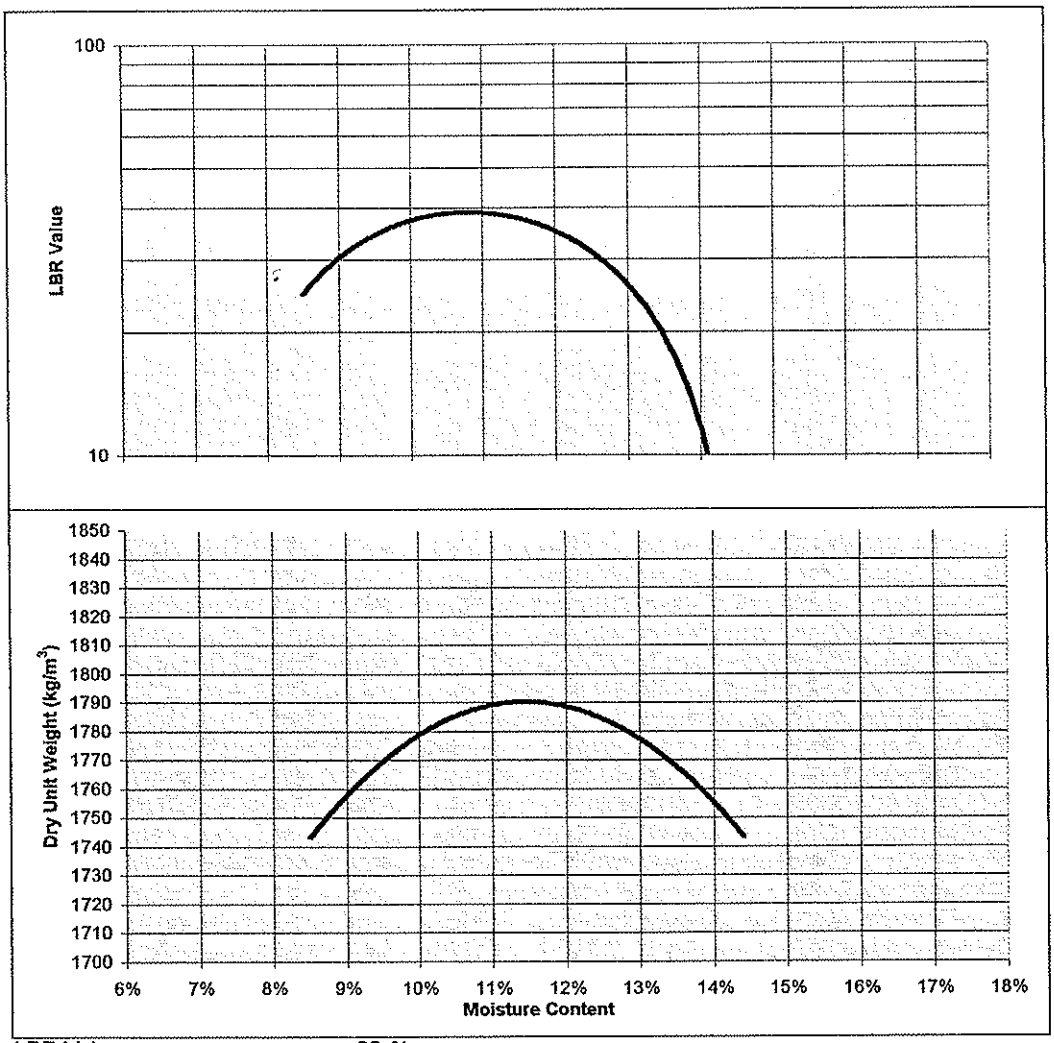
RESULTS OF LABORATORY TESTING

Tested For: MR. LUCAS CARLO
PSI, INC.
5801 BENJAMIN CENTER DR., STE 112
TAMPA FL 33634

Project: SR 39 EXTENSION

Project No. 6113-99-085
Date: 12/03/1999 Report No. LBR #1

LBR & MOISTURE-DENSITY RELATIONSHIP



LBR Value	39 %		
Maximum Density	1790 kg/m3	Description:	BROWN SLIGHTLY SILTY
Optimum Moisture	12 %	FINE SAND	
Test Method:	FSTM FM 5-515		
Sampled by:	TIERRA INC	Sample Location:	STATION 30+00

cc:

Respectfully Submitted,
Tierra, Inc.

TIERRA, INC.

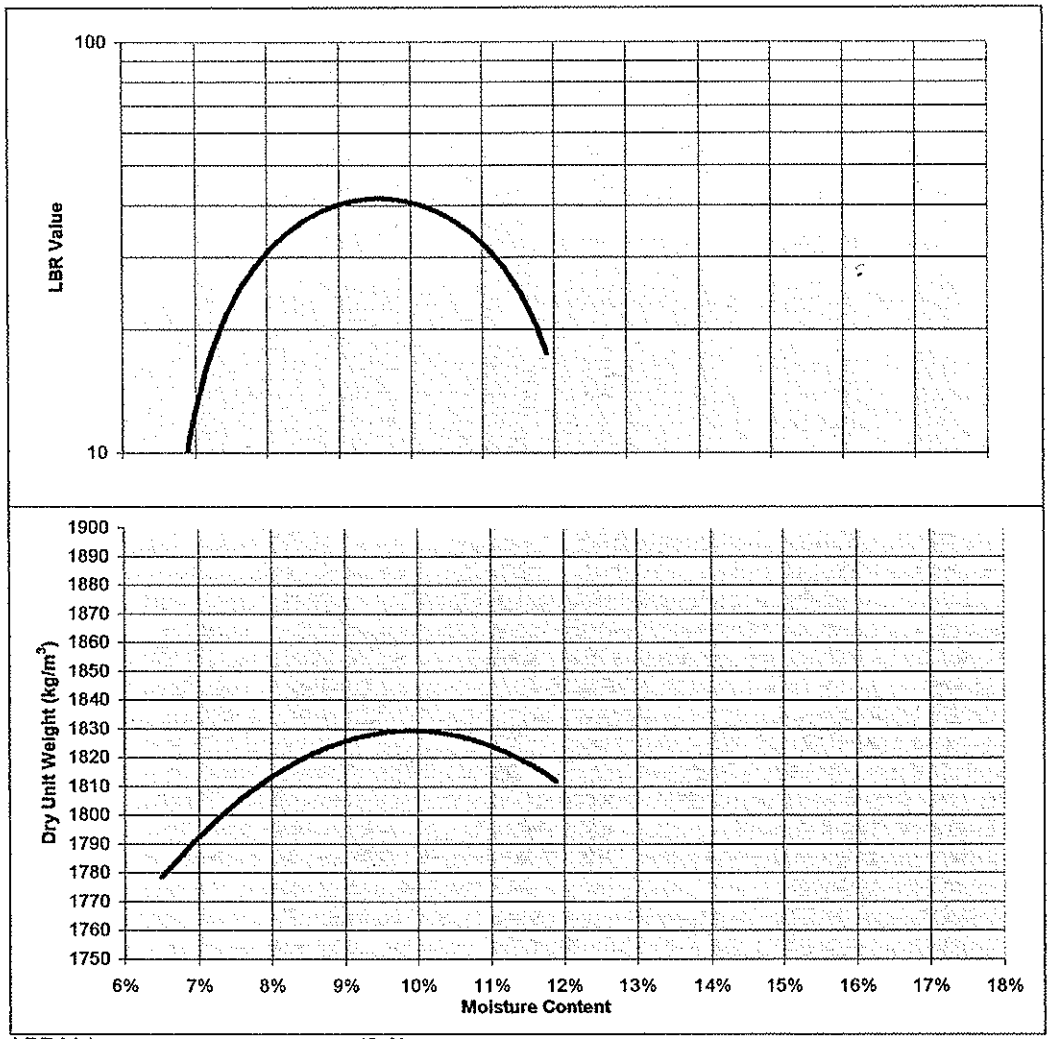
RESULTS OF LABORATORY TESTING

Tested For: MR. LUCAS CARLO
PSI, INC.
5801 BENJAMIN CENTER DR., STE 112
TAMPA FL 33634

Project: SR 39 EXTENSION

Project No. 6113-99-085
Date: 12/03/1999 Report No. LBR #2

LBR & MOISTURE-DENSITY RELATIONSHIP



LBR Value	42 %		
Maximum Density	1830 kg/m3	Description:	LT BROWN SLIGHTLY SILTY
Optimum Moisture	10 %	FINE SAND	
Test Method:	FSTM FM 5-515		
Sampled by:	TIERRA INC	Sample Location:	STATION 39+00

cc:

Respectfully Submitted,
Tierra, Inc.

TIERRA, INC.

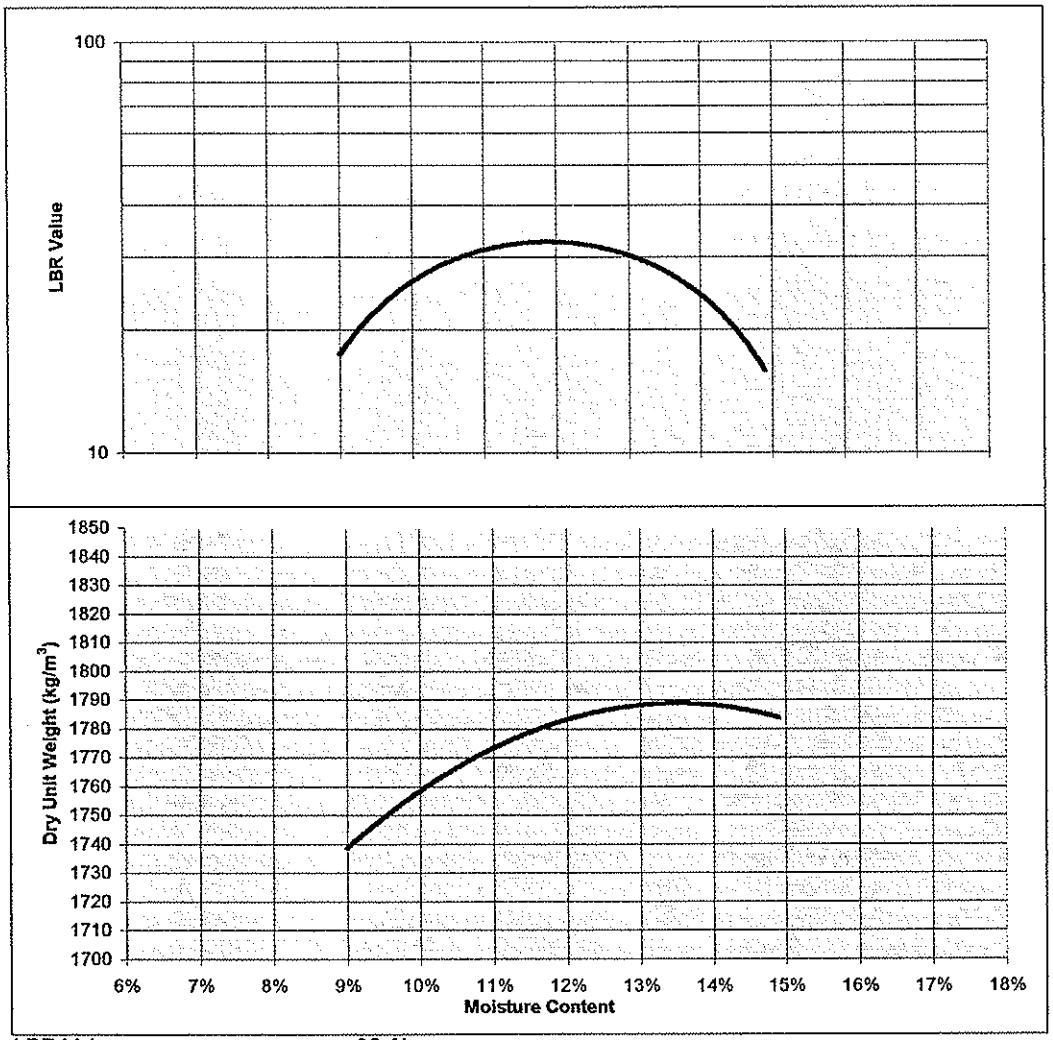
RESULTS OF LABORATORY TESTING

Tested For: MR. LUCAS CARLO
PSI, INC.
5801 BENJAMIN CENTER DR., STE 112
TAMPA FL 33634

Project: SR 39 EXTENSION

Project No. 6113-99-085
Date: 12/03/1999 Report No. LBR #3

LBR & MOISTURE-DENSITY RELATIONSHIP



LBR Value	32 %		
Maximum Density	1790 kg/m3	Description:	GRAY SLIGHTLY SILTY
Optimum Moisture	14 %		FINE SAND W/LIMEROCK
Test Method:	FSTM FM 5-515		
Sampled by:	TIERRA INC	Sample Location:	STATION 59+00

cc:

Respectfully Submitted,
Tierra, Inc.

TIERRA, INC.

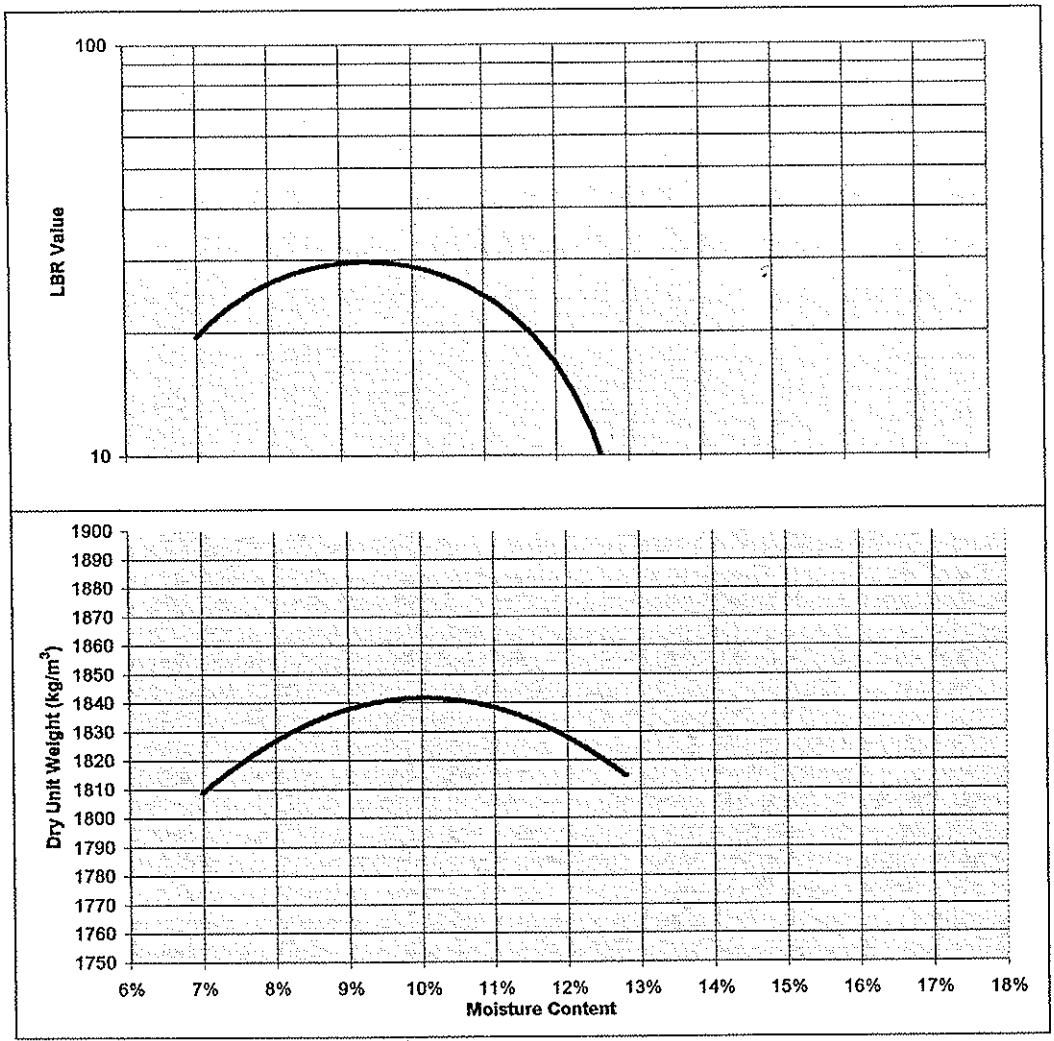
RESULTS OF LABORATORY TESTING

Tested For: MR. LUCAS CARLO
PSI, INC.
5801 BENJAMIN CENTER DR., STE 112
TAMPA FL 33634

Project: SR 39 EXTENSION

Project No. 6113-99-085
Date: 12/03/1999 Report No. LBR #4

LBR & MOISTURE-DENSITY RELATIONSHIP



LBR Value	30 %		
Maximum Density	1840 kg/m3	Description:	LT BROWN SLIGHTLY
Optimum Moisture	10 %		SILTY FINE SAND
Test Method:	FSTM FM 5-515		
Sampled by:	TIERRA INC	Sample Location:	STATION 70+00

cc:

Respectfully Submitted,
Tierra, Inc.