



**PRELIMINARY REPORT OF
SUBSURFACE EXPLORATION**

**CANSLER PROPERTY
CATAWBA COUNTY
ECONOMIC DEVELOPMENT CORPORATION
CATAWBA COUNTY, NORTH CAROLINA**

Prepared For:

CATAWBA COUNTY ECONOMIC DEVELOPMENT CORPORATION

Mr. Scott Millar
Post Office Box 389
Newton, North Carolina 28658

Prepared By:

FROEHLING & ROBERTSON, INC.

1310 Lowndes Hill Road
Greenville, South Carolina 29607
Telephone: (864) 271-2840
Facsimile: (864) 271-8124

F&R File No. B70-131A

**August 16, 2000
(Revised October 13, 2000)**



FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

1310 LOWNDES HILL ROAD • GREENVILLE, SC 29607
PHONE: (864) 271-2840 • FAX: (864) 271-8124

August 16, 2000

(Revised October 13, 2000)

Mr. Scott Millar
Catawba County Economic Development Corporation
Post Office Box 389
Newton, North Carolina 28658

Reference: Report of Preliminary Subsurface Exploration
Cansler Property
Catawba County Economic Development Corporation
F&R Project No. B70-131A

Dear Mr. Millar:

Froehling and Robertson, Inc. (F&R) performed a preliminary subsurface exploration of a site, referred to as the "Cansler Property", for the Catawba County Economic Development Corporation. The subject site is located at the intersection of Startown Road and West Maiden Road in Catawba County, North Carolina. The total land area of the subject property is approximately 80 acres. We understand that the Catawba County Economic Development Corporation has subdivided the subject site into nine (9) individual parcels for sale. Development of the individual lots will be at the discretion of the new owners.

This preliminary report contains a brief description of the project information provided to us, general site and subsurface conditions revealed during our field exploration, and our preliminary recommendations for site planning and development. We recommend subsurface explorations be performed within the nine (9) parcels (including Lot 2) once development plans are complete and the proposed use of each of the tracts are known.

There are important limitations to all geotechnical studies. Some of these limitations are discussed in the information prepared by The Association of Engineering Firms Practicing in the Geosciences (ASFE) which is included in Appendix 1. We ask that you please review this information and advise us should you have any questions.

HEADQUARTERS: 3015 DUMBARTON ROAD • BOX 27524 • RICHMOND, VA 23261-7524
TELEPHONE: (804) 264-2701 • FAX: (804) 264-1202

BRANCHES: ASHEVILLE, NC • ATLANTA, GA • BALTIMORE, MD • CHARLOTTE, NC
CHESAPEAKE, VA • CROZET, VA • FAYETTEVILLE, NC • FREDERICKSBURG, VA
GREENVILLE, SC • RALEIGH, NC • ROANOKE, VA • STERLING, VA



We have enclosed herewith one (1) original and one (1) copy of our report for your use. We are available to discuss with you any questions you may have regarding the site, our findings, or our preliminary recommendations. We appreciate the opportunity to serve as your geotechnical consultant and look forward to our continued association. If you need further information, or if we can provide additional service, please do not hesitate to contact us.

Sincerely yours,

FROEHLING & ROBERTSON, INC.

William F. Edelen, Jr., P.E.
Senior Geotechnical Engineer
Registered NC 11058

This Document Originally Issued and Sealed By:
K.G. Kope, Jr., P.E.,
North Carolina Registration No. 5581,
On August 16, 2000.

This Media Shall Not Be Considered A Certified Document.



TABLE OF CONTENTS

	<u>PAGE</u>
1. PURPOSE AND SCOPE OF SUBSURFACE EXPLORATION	1
1.1 Purpose of Study	1
1.2 Scope of Subsurface Exploration.....	2
2. SITE AND SUBSURFACE CONDITIONS	3
2.1 Site Description	3
2.2 Physiographic Province and Area Geology	4
2.3 Site Topography	5
2.4 Subsurface Conditions	5
2.5 Groundwater Conditions.....	7
3. PRELIMINARY DESIGN CONSIDERATIONS.....	8
4. EVALUATION AND PRELIMINARY RECOMMENDATIONS	9
4.1 Background.....	9
4.2 General Evaluation.....	9
4.3 Preliminary Foundation Design Considerations.....	10
4.4 Site Preparation	11
4.5 Settlement.....	12
4.6 Excavations	12
4.7 Groundwater Control	13
5. LIMITATIONS.....	13

APPENDICES

APPENDIX 1	ASFE Pamphlet
APPENDIX 2	Boring Location Plan
APPENDIX 3	Boring Logs



1.2 Scope of Subsurface Exploration

Our subsurface exploration program consisted of performing five (5) widely-spaced Standard Penetration Test (SPT) borings. The boring locations are illustrated on Figure 1, "Boring Location Plan", attached hereto as Appendix 2. F&R did not survey the boring locations, estimate material quantities, prepare plans and specifications, nor perform laboratory analysis of the in-situ soils or potential borrow soils. These services were beyond our approved scope of work. The property lines of the parcels were not staked prior to our exploration.

F&R selected the number, location, and termination depths of the borings. Lot 2 was sold prior to our exploration; and we were directed not to perform any of the proposed borings within the general area of Lot 2. F&R personnel located the borings in the field using standard taping procedures and by estimating right angles from existing site features as control points. Therefore, the actual locations are approximate in nature and should not be considered precise. We advanced the borings with our truck-mounted drill rig using hollow stem, continuous flight auger drilling techniques in general accordance with ASTM D 6151 procedures. We advanced the five (5) borings to the suggested termination depths of 20 feet below grade.

Moss Marlow Building Company provided to F&R an e-mail version of the "General Development Plan" depicting the site, the proposed layout of the nine (9) parcels, and the proposed alignment of Cansler Circle. With the exception of Lot 2, which was sold prior to our exploration, we performed the five (5) widely-spaced borings (B-1 through B-5) throughout the 80-acre site.

We located B-1 near the proposed alignment of Cansler Circle, close to the intersection of Cansler Circle with Startown Road. We located B-2 within that area on the "General Development Plan" labeled as Lot 7; B-3 within that area labeled as Lot 9; B-4 within that area labeled as Lot 8; and B-5 within that area labeled as Lot 1. We did not perform borings within the general areas of Lot 2, Lot 3, Lot 4, Lot 5, and Lot 6.



*Cansler Property
Intersection of Startown Road and Maiden Road
Catawba County, North Carolina*

*Page -3-
August 16, 2000
(Revised October 13, 2000)
F&R File No. B70-131A*

F&R performed Standard Penetration Tests (SPTs) at intervals of five feet, or less, to evaluate the strength and relative density of the soils encountered. In conjunction with the penetration testing, F&R recovered split-spoon samples at each of the boring locations for soil classification purposes. We performed split-spoon sampling in general accordance with ASTM D 1586 and returned the samples to our laboratory for visual classification in general accordance with the Unified Soil Classification System (USCS), in conjunction with ASTM D 2488. Unless otherwise notified, we will discard the samples within 90 days of sampling.

With regards to the Standard Penetration Testing, the N-Value represents the number of blows required to drive a split-spoon sampler 12 inches with a 140-pound hammer falling from a height of 30 inches. The sampler is driven three successive, 6-inch increments. The first 6-inch increment is referred to as the "seating blow", and the second and third increment blow count values [blows per foot (bpf)] are added to obtain the Standard Penetration Resistance value commonly known as "N". When properly evaluated, the N-Value provides an index for estimating soil strength, relative density, and foundation support characteristics.

The Boring Logs in Appendix 3 should be reviewed for a detailed description of the subsurface materials and horizontal stratifications encountered at each boring location. We have assumed uniform variation in the soil properties between borings; however, transitions between strata may differ in the field both horizontally and vertically.

2. SITE AND SUBSURFACE CONDITIONS

2.1 Site Description

F&R performed a preliminary subsurface exploration of the "Cansler Property" located at the intersection of Startown Road and Maiden Road in Catawba County, North Carolina. The subject site is approximately 80 acres in size; and is being subdivided into nine (9) individual



parcels for sale by the Catawba County Economic Development Corporation. We understand that Lot 2 has been sold. Development of the individual parcels will be at the discretion of the new owners.

The proposed property is located within the northeastern quadrant of the intersection of Startown Road and West Maiden Road. The "Cansler" residence is currently located along the northern side of West Maiden Road; and the remainder of the property is undeveloped. The property is currently grass covered and sparsely wooded in localized areas throughout the site.

2.2 Physiographic Province and Area Geology

The project site is located within the Western Portion of the Piedmont Physiographic Province, an area underlain by ancient igneous and metamorphic rock with occasional, deeply incised, and broad river valleys, underlain by alluvial materials. The soils encountered at this site are the residual product of the in-place chemical weathering of the underlying bedrock (commonly referred to as residuum).

The topography of the Piedmont Plateau consists of well-rounded hills and long-rolling ridges with a northeast-southwest trend. This rolling topography is the result of streams flowing across and acting on rocks of unequal hardness. The typical residual soil profile within the region consists of fine-grained soils (clays/silts) near the surface, where soil weathering is more advanced, underlain by more coarse-grained soils (sandy silts/silty sands).

The boundary between soil and rock is not sharply defined. This transitional zone, termed "weathered rock", is normally found overlying the parent bedrock. Weathering is facilitated by fractures, joints, and by the presence of less resistant rock types. Consequently, the profile of the weathered rock and hard rock is quite irregular and erratic, even over short horizontal distances. Lenses and boulders of hard rock and zones of partially weathered rock are often encountered within the soil mantle, well above the general bedrock level.



2.3 Site Topography

The topography of the site is highest within the southwestern portion, near the intersection of Startown Road and West Maiden Road. The topography slopes steeply downward toward the north-northeast. The maximum elevation relief across the subject property appears to be approximately 100 feet. We observed drainage patterns across the site at the time of our subsurface exploration; however, we did not observe standing water or free-flowing water within these areas. Additionally, we did not observe rock outcrops on the site.

2.4 Subsurface Conditions

The exploratory activities revealed that the general subsurface conditions encountered at the five widely-spaced boring locations consist of a mantle of organic laden soils underlain by residual soils. At the five locations we explored, the organic laden material varied in thickness from approximately 2 to 6 inches. However, the thickness of the organic matter may be even greater in areas that were previously farmed or used for agricultural purposes.

The residual soils are the result of the in-situ chemical and mechanical weathering of the underlying bedrock. A typical soil profile would include fine-grained soils (clays/silts) near the surface that become coarser grained (sandy) with depth, and eventually transition into either soft or hard weathered rock. The transitional soils usually retain the relic structure of the parent rock. Their consistency is typically very hard or very dense; but generally they can be penetrated by power auger. The thickness of the soil profile can vary locally due to varying conditions in sediment and rock type, jointing patterns, surface topography, erosion, groundwater, etc. Additionally, it is common to encounter boulders, ledges, or seams of weathered rock within the residual soil profile.



*Cansler Property
Intersection of Startown Road and Maiden Road
Catawba County, North Carolina*

*Page -6-
August 16, 2000
(Revised October 13, 2000)
F&R File No. B70-131A*

The Boring Logs (Appendix 3) describe the subsurface materials and horizontal zones encountered at each boring location. The lines designating interfaces between various strata represent approximate boundaries; transitions between various strata may differ in the field both horizontally and vertically. We assumed uniform variation in the soil properties between borings.

Due to the economically limited number of borings and their wide spacing, areas of unsuitable subgrade bearing materials may be revealed once site grading activities commence within the individual parcels. Therefore, we recommend subsurface explorations be performed within each of the remaining, unsold (8) parcels, and Lot 2, once the grading plans are complete and the specific use of each parcel is known. Such exploration and evaluation will help to establish whether areas of unsuitable subgrade materials (not encountered during our field exploration) may exist and may extend laterally and vertically unknown distances. Additionally, laboratory testing may be required to help identify the location of unsuitable soils during construction operations.

In general, the subsurface profile—within the area explored—was very consistent. We classified the residual soils as silty SANDS, sandy SILTS, and sandy lean CLAYS. These soils have USCS designations of: SM (silty SAND), ML (sandy SILT), and CL (sandy lean CLAY). The sand particles would be described as fine to coarse; and the moisture content ranged from dry to slightly moist. The relative density of the sands ranged from loose (N-Value = 9 bpf) to medium dense (N-Value = 28 bpf). The consistency of the silts and clays ranged from medium stiff (N-Value = 6 bpf) to very stiff (N-Value = 24 bpf).

At the time of drilling, the organic laden material we observed consisted mainly of meadow grass and rootlets. The thickness of the organic laden soil was approximately 2 to 6 inches. However, the thickness and characteristics of the organic matter may differ greatly within those areas of the site that we did not explore, specifically, the wooded portions of the property or within those areas of the site that were previously farmed.



We did not encounter split-spoon or auger refusal at the five locations sampled. Auger refusal is a designation applied to material that cannot be further penetrated by power auger and is indicative of very hard or very dense material, such as boulders or lenses of bedrock or the upper surface of continuous bedrock. Core drilling is required to determine the character and continuity of auger refusal material. Split-spoon refusal is a designation applied to material that exists near the suggested boring termination depth that cannot be further penetrated by the split-barrel sampler during standard penetration testing.

Additionally, we did not encounter material hard enough to be classified as Soft or Hard Weathered Rock. The North Carolina Building Codes defines Soft and Hard Weathered Rock as follows:

- • • • **Soft Weathered Rock** - Broken or partially weathered rock with Standard Penetration resistance (ASTM D1586) between 50 blows per six inches and 50 blows per one inch.
- • • • **Hard Weathered Rock** - Broken or partially weathered rock of sufficient hardness to refuse sampling tools: normally has Standard Penetration resistance (ASTM D1586) in excess of 50 blows per one inch.

2.5 Groundwater Conditions

F&R personnel took water level readings at the soil boring locations at the time of drilling, and we did not observe water within the boreholes. If subsurface water is encountered during construction, F&R should be notified immediately so that our preliminary geotechnical recommendations may be re-evaluated if necessary. We backfilled the borings immediately after drilling using the soil cuttings from each borehole.



Groundwater levels tend to fluctuate with seasonal and climatic changes, as well as with some types of construction operations. Generally, the highest groundwater levels occur in late winter and early spring; and the lowest levels in late summer and late fall. Depending on the final grading plan and the proposed cut/fill depths across the site, groundwater may be encountered within the lower-lying areas, particularly within the north-northeastern portion of the property. Modification of the existing topography may change the characteristics, depth, and flow of subsurface water.

3. PRELIMINARY DESIGN CONSIDERATIONS

Moss Marlow Building Company provided to F&R an e-mail version of the "General Development Plan" depicting the 80-acre parcel and the proposed layout of the nine (9) parcels and the proposed alignment of Cansler Circle. We modified the "General Development Plan" to illustrate the five (5) boring locations. We included this modified version within Appendix 2 of this report and labeled the drawing, Figure 1, "Boring Location Plan".

We understand the 80-acre parcel of property is being subdivided by the Catawba County Economic Development Corporation into nine lots for individual sale and development. Grading information and structural details regarding the proposed use of the nine parcels have not been provided to F&R. One lot, Lot 2, was sold prior to our exploration and was not included in our scope of services.

Based on the results of our site visit and our review of the topographic information provided, it appears that a significant amount of fill material will need to be placed within a majority of the proposed construction areas. Therefore, we recommend that F&R evaluate potential borrow material to be used as fill and that F&R's geotechnical engineering personnel monitor site grading operations.



We based our preliminary geotechnical recommendations on the limited information that was available to F&R at the time this report was prepared, the results of our field exploration, our engineering analysis, and our experience with similar projects. Once the grading plans and the structural details regarding the remaining, eight unsold parcels are known, F&R requests the opportunity to review the preliminary recommendations presented herein so that we might suggest which additional services will help establish the subsurface conditions and characteristics within the proposed areas of construction and provide site-specific geotechnical recommendations. Lot 2 was sold prior to our exploration; and it is understood that this parcel was not included in our scope of services, and subsequently our geotechnical recommendations do not encompass this parcel. If requested, we would be glad to perform a geotechnical exploration within the area of Lot 2 and provide site-specific geotechnical recommendations.

4. EVALUATION AND PRELIMINARY RECOMMENDATIONS

4.1 Background

Without more specific information regarding the intended use of the remaining, unsold (8) parcels—and information regarding site layout, structural details, and final grade elevations—the following recommendations are preliminary in nature. We offer these preliminary recommendations and guidelines to assist in site planning and as an overall evaluation of the general subsurface conditions.

4.2 General Evaluation

In general, a majority of the residual silty SANDS (SM), sandy SILTS (ML), and sandy lean CLAYS (CL) encountered during our subsurface exploration appear suitable for use as subgrade bearing material or structural fill for the proposed structurally loaded areas: building, pavements, and drive areas. The mantle of organic laden soils (which varies in thickness across the site) is not suitable for use as subgrade bearing material or structural fill. Organic laden material



should be excavated and removed from within structurally loaded areas. Organic laden material may be placed within landscaped areas.

Depending on construction operations and/or environmental conditions during site construction, areas of unsuitable subgrade bearing materials may be revealed at locations not explored during our field activities. In addition, due to the economically limited number of borings, deleterious materials may be present within the proposed construction areas and may extend laterally and vertically unknown distances. Furthermore, changes in the subsurface conditions may exist over relatively short distances.

If encountered during grading, debris pits and/or unsuitable subgrade bearing soils—such as moderately to highly plastic soils [elastic silts (MH) or fat clays (CH)]—may require excavation, removal, moisture conditioning, or drying (discing or scarification). We recommend that site-specific subsurface explorations be performed once development plans are complete and the proposed development and the proposed use of the remaining, unsold eight tracts are known.

4.3 Preliminary Foundation Design Considerations

The net allowable bearing capacity of the in-situ soils or newly placed structural fill will, in part, be a function of the final grading plan (or cut/fill depths) of each of the individual parcels, the loading of the proposed structures, and the foundation bottom elevations. As a general guideline for development purposes, we would recommend a minimal allowable design soil bearing pressure of 2,500 pounds per square foot be used for the design of shallow continuous footings bearing in the existing undisturbed, residual soils (N-Value ≥ 9 bpf) within the areas we explored. The allowable design soil bearing pressure of newly-placed structural fill will be dependent on the characteristics of the soils placed, the degree of compaction achieved by the contractor during placement, the depth of the fill placed, the anticipated structural loads, and the foundation design.



4.4 Site Preparation

Initially, the construction areas of each individual parcel should be stripped and removed of all organic laden soil and deleterious material, if present. If tree stumps, rootmat, or organic soils are encountered during site preparation and foundation construction, such material should be removed from within the construction areas and disposed of in suitable areas. Depressions or low areas, resulting from stump removal, should be backfilled with approved soil and compacted in compliance with the recommendations provided by F&R.

After the site has been stripped, the exposed subgrade of all cut sections, or areas to receive fill, should be evaluated by our geotechnical engineer to establish the presence of suitable materials and confirm their consistency with the subsurface characteristics encountered during our field exploration. We recommend performing a proofroll evaluation of the proposed building and pavement areas under the direction of our geotechnical engineer before fill placement or after achieving final grades in cut areas.

Proofroll the exposed subgrade with a loaded tandem-axle dump truck or similar rubber-tired equipment with a minimum load of 25 tons. Perform at least four passes (two passes perpendicular to the others) across the exposed areas. The proofroll evaluation will help to identify isolated areas of low strength soils that may require undercutting, removal, or conditioning. Additionally, the proofroll evaluation will help densify the exposed subgrade before placement of structural fill.

If areas rut, deflect, or pump during proofrolling, undercut to suitable soils as directed by F&R and backfill with approved fill as outlined herein. The exposed subgrade should be well drained to minimize the accumulation of precipitation. If the exposed subgrade soils are not as anticipated, or become excessively wet, consult our geotechnical engineer for guidance. If construction occurs during inclement or wet weather, repeat the proofroll evaluation with at least



one pass in each direction immediately before placing fill material.

4.5 Settlement

Our approved scope of service did not include laboratory testing to determine the consolidation characteristics of the in-situ soils or potential, off-site borrow soils. Furthermore, we were not provided information regarding the proposed or final grades nor the anticipated use of the remaining, unsold (8) parcels. Therefore, we are unable to provide recommendations regarding anticipated or estimated settlement levels.

Settlement and consolidation will be contingent upon structural loads, foundation design, final foundation bottom elevations, and the characteristics of the soils beneath the foundations. Variations in the fill depths and consistency of the fill soils will also contribute to some differential settlements of foundations. The magnitude and rate of settlement will be a function of the height of any newly placed fill material, the compaction effort achieved during grading, and the magnitude of new building loads.

4.6 Excavations

Based on our experience with soils within this geographic area and our knowledge of the property, we anticipate that grading activities may reveal areas of weathered rock at varying depths across the site. Such material may be encountered during construction of foundations, underground utilities, or elevator shafts. Depending on the degree of weathering, conventional earth moving equipment may be able to remove such weathered material, if encountered. However, we recommend the contract documents include contingency costs for ripping or blasting in the event material of a hard or dense characteristic is encountered. If blasting is required, please notify F&R so that we may provide guidelines for blasting activities relative to adjacent structures. Please keep in mind the level and location of rock, whether in boulders or massive form, vary erratically within the region this site is located.



4.7 Groundwater Control

Data obtained during our field exploration indicates that subsurface moisture conditions ranged from dry to slightly moist at the time of drilling. We did not observe subsurface water within the boreholes at the time of boring. Depending on the season in which construction activities commence and weather conditions, groundwater may be encountered during site preparation and earthwork operations. Ground water levels in this area tend to fluctuate with seasonal and climatic changes.

5. LIMITATIONS

This report has been prepared in accordance with generally accepted geotechnical engineering practices for the exclusive use of Moss Marlow Building Company and/or its assignees specifically for this project. No other warranty, expressed or implied, is made. Our evaluations and preliminary recommendations are based on the data obtained our subsurface exploration program and our experience with soils in this geographic area.

Our approved scope of work did not include an environmental assessment or wetlands study of the site. Consequently, this report does not contain information regarding the presence or absence of toxic or hazardous wastes nor the possible existence of wetland parameters as defined by the U. S. Army Corps of Engineers.

The evaluations and preliminary recommendations do not reflect variations in subsurface conditions that may exist between boring locations or in unexplored portions of the site. Should such variations become apparent during construction, the general recommendations contained within this report will not be considered valid unless F&R is given the opportunity to review such variations and revise or modify our recommendations accordingly. No changes may be made to the general recommendations contained herein without the written consent of F&R.



*Cansler Property
Intersection of Startown Road and Maiden Road
Catawba County, North Carolina*

*Page -14-
August 16, 2000
(Revised October 13, 2000)
F&R File No. B70-131A*

We recommend that this report, in its entirety, be made available to prospective buyers, contractors, and subcontractors for informational purposes and discussion. We intend that the information presented within this report be interpreted only within the context of the report as a whole. No portion of this report should be separated from the rest of the information presented herein. No single portion of this report shall be considered valid unless it is presented with and as an integral part of the entire report.

APPENDICES

BORING LOG



F&R ENGINEERING & ROBERTSON, INC.
 CIVIL ENGINEERS - LAND SURVEYORS - GEOTECHNICAL ENGINEERS
 1000 W. 10th Street, Suite 100
 Winston-Salem, NC 27103
 PHONE: 703.444.1111 FAX: 703.444.1112

Report No.: **B70-131A**

Date: **August 9, 2000**

Client: Catawba County Economic Development Corporation		Project: Candler Property		Project Location: Catawba County, North Carolina		
Boring No.: B-1 (1 of 1)		Total Depth: 20.0'	Elev: 907 ±	Boring Location: See Figure 1, "Boring Location Plan"		
Type of Boring: HSA		Started: 7/26/00	Completed: 7/26/00	Driller: R. Childers		
Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	*Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	N Value (blows/ft) 5 10 20 30 50 60
906.8	0.3	ORGANIC LADEN SOIL <i>(Approximately 3 inches thick)</i>	4-4-5	0.0	9	
905.5	1.5	RESIDUAL: Loose, slightly moist, reddish brown, silty fine SAND (SM) with trace organics	5-7-7	1.5	14	
		Medium dense, dry, yellowish red, silty fine SAND (SM)	5-7-10	3.0		
				3.5		
				5.0	17	
				6.0		
				7.5	17	
898.5	8.5	Very stiff, slightly moist, reddish yellow, fine sandy lean CLAY (CL) with intrusions of red silt	5-7-9	8.5	16	
				10.0		
893.5	13.5	Stiff, mottled reddish yellow and pale yellow, SILT (ML) with fine sand	4-4-5	13.5	9	
				15.0		
888.5	18.5	Medium stiff, slightly moist, brownish yellow with very dark brown stains, SILT (ML) with little clay	2-3-3	18.5	6	
887.0	20.0	BORING TERMINATED		20.0		

F&R-SPE-1100-3-10-11-A-GEL-ENG-GRT-10-1-000

*Number of blows required for a 140-pound hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18" in three 6-inch increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.