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# GEOTECHNICAL REPORT
# FOR
# LANDFILL NO. 6 EXPANSION
# AREA A

OCTOBER, 1989
REV. 1

CHAMPION INTERNATIONAL CORPORATION
CANTON MILL
CANTON, NORTH CAROLINA

NORTH CAROLINA LICENSED SEAL 285 GEOLOGIST JAMES S. CHAMNESS

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SOLID WASTE BRANCH

PREPARED BY
SIRRINE ENVIRONMENTAL CONSULTANTS
GREENVILLE, SOUTH CAROLINA

SEC JOB NO. G-9083

James S. Chamness, P.G.
N.C. Registration No. 285

12-5-1989
Date

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# 1.0 INTRODUCTION AND SUMMARY

## 1.1 Overview

In March of 1989, Sirrine Environmental Consultants (SEC) was contracted by Champion International Corporation to provide engineering and geotechnical services for the development of construction specifications and a construction permit application for expansion of Champion's Canton Mill Landfill No. 6. A Solid Waste Permit was obtained for the 240 acre landfill site from the Solid and Hazardous Waste Management Branch of the North Carolina Department of Human Resources Division of Health Services in February of 1984. This facility is used for the disposal of ash, dewatered wastewater treatment sludges and spent lime mud.

The overall site development scheme, developed by Law Engineering and Testing Company for preparation of the Site Plan Application (1981-1982) divides the property into five large areas (A, B, C, D and E) designated for combined sludge and ash disposal. Lime waste is landfilled separately in smaller adjacent cells. Lime disposal operations have been completed or are in progress at several locations at the site. Disposal of sludge and ash is near completion in Area B. Soils have been excavated and retention dikes have been constructed for Area C and an adjacent disposal area. Undeveloped portions of the Landfill No. 6 site include Areas A, D and E, although borrow operations have resulted in significant excavation of Area D and a smaller portion of Area A.

Based on preliminary meetings during this project between SEC and Champion project personnel, Area A was selected as the next area to be developed at the site.

## 1.2 Report Scope

This report presents the results of geotechnical field investigations which were performed by Sirrine Environmental Consultants to support final design and construction of areas A, D and E at the Landfill No. 6 site. The results of all previous geotechnical investigations performed to date at this site have been compiled in the attached appendices. Final design engineering evaluations performed by SEC were restricted to Area A. The results of geotechnical engineering evaluations performed for the design of the Area A landfill are presented in this report. Landfill design details are not included. The landfill design details for development of Area A are contained in the Contract Documents also prepared for this project by Sirrine Environmental Consultants.

Groundwater occurrence and monitoring requirements for Area A were also re-evaluated during this study and are discussed in sections 3 and 5.

## 1.3 Survey and Elevation Datum

All elevations presented in this report are referenced in feet to the National Geodetic Vertical Datum (NGVD) formerly known as USC&GS Mean Sea Level Datum of 1929.

Locations and ground surface elevations of all subsurface explorations drilled under the supervision of SEC for this project were surveyed by Hampton Hintz and Associates of Fletcher, North Carolina during July and August, 1989. Locations and water surface elevations of springs flowing in Area A in July of 1989 were also surveyed and provided on the updated topographic plan of the site used as a base for Figure 1. The topographic base map was

"Drawing Under Seperate Cover"

photogrammetrically produced by Hampton, Hintz and Associates from aerial photos taken in October, 1987.

Locations and elevations of test borings and monitoring wells installed under the direction of Law Engineering and Testing Company (LETCo.) were transposed from drawings included in reports of their studies of this site.[7,8] Subsurface exploration and well locations contained in those reports were surveyed by Webb A. Morgan and Associates, P.A. or Hampton, Hintz and Associates.

## 1.4 Site Location and Topographic Setting

Champion International's Canton Mill Landfill No. 6 is located approximately two (2) miles northwest of the city of Canton in Haywood County, North Carolina. The 240-acre site is situated immediately north of the Pigeon River, within a broad valley between northeast-southwest trending mountain ridges of the Blue Ridge Mountains. Elevations at the landfill site range from approximately El.2600 to El.2800. The ridge formed by Chambers Mountain rises to El.4509, approximately 2 miles northwest of the site. Anderson Mountain forms the southern limit of this valley, with a summit elevation at El.3680, approximately 1.5 miles south of the site. The Pigeon River flows westerly at an elevation of approximately El.2400 along the southern margin of the landfill property. The site topography slopes steeply along the southern edge down to the Pigeon River over a distance ranging from 100 to 400 feet. Interstate I-40 borders the site on the north.

A site location plan is included in the geotechnical report prepared and submitted with the Solid Waste Permit Application for this site.[5,7] The site topography and property limits are shown on Figure 1, the Subsurface

Exploration Location Plan, included with this report. The approximate limits of Area A are also shown on this figure. Area A occupies a swale with a centerline approximately 2000 feet in length. The average width of Area A is 600 feet. This constitutes an area of approximately 27.5 acres. Elevations in Area A range from approximately El.2610 at the east end rising to approximately E1.2810 on the west.

Existing ground surface slopes are typically about 3 to 15 percent along the bottom of the draw and along the ridge tops in Area A. Hillside slopes in Area A range from approximately 25 to 50 percent.

## 1.5 Summary and Conclusions

The landfill design for the development of the cell at Area A of the Landfill No. 6 site has been updated to current, state of the art practice for land disposal of pulp and papermill solid wastes.

Key components of the landfill design include:

- a 60 ML synthetic HDPE liner installed on a compacted subgrade;
- a leachate collection and removal system;
- an oversized underdrain installed a minimum of four (4) feet below the synthetic liner. This underdrain is designed to divert the flow of existing springs. Sampling and analysis of the discharge from this system will provide a leak detection system;
- a network of groundwater monitoring wells surrounding the site.

This report was prepared to present the results of final design geotechnical investigations. Key findings of this study are summarized below.

- Topographic and hydrogeologic analysis indicate that the Landfill No. 6 site is situated in a local groundwater discharge area. This is generally considered to be favorable conditions for landfill siting.

- Bedrock will likely be encountered during excavation for construction in some areas of the site. It is recommended that a minimum thickness of two (2) feet compacted on-site soils be placed over exposed bedrock prior to liner installation.

- Laboratory permeability testing of representative subgrade soils from the site yielded compacted permeabilities ranging from $1.3 \times 10^{-4}$ to $2.7 \times 10^{-5}$ cm/sec. These samples were compacted to approximately 95 percent of standard Proctor maximum dry density.

- Residual soils and saprolite present at the site are suitable for the construction of required retention dikes. When these soils are properly placed in uniform lifts and compacted to recommended densities, embankment slopes of 2:1 (H:V) will provide an acceptable factor of safety. Drainage and foundation preparation for all embankments should be in accordance with previous recommendations.[7]

- Existing data indicate that the proposed design will provide the required four (4) foot minimum separation between the bottom elevation of solid waste and the seasonal high water table.

- The existing background well will require abandonment and relocation for construction. A new background well location is proposed as shown in Figure 1.

- Two (2) additional groundwater monitoring well locations are proposed immediately northwest of Area A. These locations appear to be upgradient from the site. They are recommended, however, due to the presence of domestic supply wells located further to the northwest.

- Construction monitoring should be performed to document that subsurface conditions are consistent with those encountered during preliminary and final design site investigations and to verify that materials and construction operations are in accordance with design recommendations and contract specifications.

## 2.0 SITE INVESTIGATIONS

### 2.1 Previous Studies

Geotechnical explorations and evaluations of this site were performed previously (1980-1982) by LETCo. as part of the conceptual site development study performed for preparation of the Solid Waste Permit Application. The results of these studies are contained in reports listed in section 6.0 of this report, entitled Selected References. This work included drilling and sampling 19 test borings (B-1 through B-19) and the installation of 13 permanent groundwater monitoring wells for the landfill development. Three of the original monitoring wells were abandoned and replaced during October of 1987 due to landfill construction activities.

Copies of all test boring logs contained in the LETCo. reports are included in Appendix C. Monitoring well construction records are presented in Appendix D. Geotechnical test results and slope stability analyses are included in Appendix F and Appendix G, respectively.

Locations of all existing monitoring wells and previous test boring locations are included on Figure 1.

### 2.2 SEC Investigations

The results of previous studies and other available hydrogeologic data were reviewed by SEC personnel while planning and performing this study. Detailed site reconnaissance was also performed by the Project Hydrogeologist and project field geologists during the course of this work.

### 2.2.1 Oversight and Logging

All subsurface investigations were continuously monitored by an experienced geologist provided by SEC who classified soils and constructed logs in the field. Continual observations were made while drilling to evaluate hydrogeologic conditions at the site. Soils were visually identified and classified in accordance with the Unified Soil Classification System and procedures described in ASTM D2487 and D2488.

### 2.2.2 Test Borings

Nineteen (19) test borings were drilled at the landfill site during June, 1989. All test borings conducted during this investigation were drilled in areas A, D and E. The test borings were drilled with 3-1/4 inch I.D. hollow stem augers to enable representative soil sampling with a split spoon sampler. All boring procedures were in accordance with applicable ASTM standards.

Split spoon samples were obtained at five (5) foot intervals in all borings. The Standard Penetration Test was conducted while driving the split spoon sampler in accordance with ASTM D-1586. The Standard Penetration Test consists of driving a standard split spoon sampler (1-3/8 in. I.D., 2 in. O.D.) 18 inches into the undisturbed soils with a 140 lb hammer free falling for 30 inches. The N-value is defined as the number of the blows required to drive the sampler 6 to 18 inches into undisturbed soil. The N-value is used as a measure of the relative density or consistency of the soil. All Standard Penetration Tests conducted in this field program were made with a 140 lb Mobile safety drive hammer.

SEC test boring logs are included as Appendix A. Test boring locations are shown on Figure 1. All test borings drilled for this study at the direction of SEC are designated by 100 series (ex. B101, B102....B119).

### 2.2.3 Auger Probes

In addition to the test borings described above, solid stem flight augers were used to investigate the available overburden thickness present at the site and to make observations regarding groundwater occurrence. Forty-six (46) auger probes were drilled in areas A, D and E. The small diameter solid flight augers (4.25 inch O.D.) were drilled to refusal or selected depths ranging from 4.5 to 50.0 feet below ground surface. The drilling operations were observed by a field geologist who classified soils based on cuttings brought to the surface by the auger. Bulk samples of cuttings were collected from selected intervals off the auger flights for geotechnical soils analyses. This information is recorded on the Test Probe Summary Reports included in Appendix B. Water level measurements were made at each location approximately 24 hours after removing the augers from the ground.

All test borings and auger probe holes were backfilled with bentonite chips and cuttings, tamped in place incrementally upon completion. Bentonite chips were placed into the borehole to an elevation at least five (5) feet above the proposed cut elevation and hydrated prior to backfilling with cuttings.

Auger probe locations are included in Figure 1.

Test borings and auger probes drilled during June 1989, were performed by a driller provided by Froehling & Robertson, Inc. of Charlotte, North Carolina.

### 2.2.4 Laboratory Soils Testing

Geotechnical soils analyses were performed on representative soil samples collected during this study to supplement soil classifications made in the field and to determine geotechnical parameters necessary for final landfill design. The majority of samples tested for this study were collected from Area A.

The laboratory testing program included three (3) controlled gradient permeability tests of remolded (compacted) samples, thirteen (13) washed sieve analyses, eleven (11) determination of atterberg limits, fifteen (15) natural moisture content analyses, five (5) standard proctor compaction tests (5) and consolidated undrained triaxial compression tests of two (2) remolded samples. These tests were performed by Froehling & Robertson, Inc. of Charlotte, North Carolina.

In addition to the tests described above, geotechnical soil testing was performed on selected samples from all areas of the Landfill No. 6 site by LETCo. during previous investigations. These tests included two (2) sieve analyses and one (1) consolidated undrained triaxial compression test of samples collected from Area A.

All available geotechnical soil test results of samples collected from the Landfill No. 6 site are compiled in Appendix F. Descriptions of laboratory test procedures are also provided.

## 3.0 SUBSURFACE CONDITIONS

### 3.1 Soils

Four (4) predominant soil types were observed in subsurface explorations performed within Area A. These soil types are also characteristic of the entire Landfill No. 6 site. In order of their typical occurrence from ground surface to depth these units are classified as:

- topsoil
- alluvium
- residual soil
- saprolite

The general properties and inherent variations of these soil units as observed in test borings and auger probes drilled within Area A are discussed below.

Topsoil: Topsoil was generally absent or only one (1) to three (3) inches in thickness within Area A. Topsoil generally consisted of a thin rooty mat of humic soil with a rather abrupt transition to the underlying residual soil.

Alluvium: Alluvial soils, eroded by surface water from the hillsides, flank the small creek which occupies the lower portion of the draw in Area A. One boring (B3) was drilled in this area during previous investigations by LETCo. where approximate 4.5 feet of alluvium was penetrated. Alluvium at B3 was described as medium stiff, micaceous brown silt with some sand and a minor fraction of gravel.*

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*Soil descriptions are in accordance with the Unified Soil Classification System and terminology described in ASTM D-2487 and D-2488. These terms are also defined at the bottom of SEC Test Boring Reports included in Appendix A.

Borings drilled through alluvial soils in other areas of the Landfill No. 6 site indicate that these deposits are highly variable including organic soils (OL/OH), silty clay (CL), sandy silt (ML), and poorly graded sand (SP) with varying amounts of silt and clay. The alluvial sediments are generally soft to medium stiff or very loose to loose, and compressible. These deposits may contain significant quantities of organic debris. Eight (8) borings drilled through alluvium at the Landfill No. 6 site indicate that an average thickness of approximately 6 to 6.5 feet may be anticipated for these deposits.[7]

Colluvial soils, soils which may have sloughed off the hillsides above, may be intermixed with the alluvium. Colluvium was encountered near the base of the hillsides in some of the borings drilled in other areas of the Landfill No. 6 site. Colluvium would also be generally looser than underlying residual soils or saprolite with organic debris potentially intermixed. Colluvium was not encountered in any of the subsurface explorations performed in Area A.

Residual Soil and Saprolite: Most of the overburden overlying the bedrock at the Landfill No. 6 site consists of soils formed by in-place weathering of the underlying rock. These soils can be divided into two types, residual soil and saprolite. The distinguishing factor between these two soil types is that saprolite retains the original fabric and structure of the parent bedrock. Residual soils, which are the product of a higher degree of weathering, and generally overly the saprolite, do not. The residual soil thickness observed in Area A was typically less than five (5) feet however 10.5 feet of residuum was encountered at B105.

No consistent difference in soil gradation was observed between samples of residual soils and saprolite collected from the Landfill No. 6 Site. Variations in soil gradation appear to be more a function of variations in the lithology of the parent bedrock than to the degree of weathering or to depth below ground surface. This is due to the

highly micaceous nature of much of the parent bedrock. The sand content of the saprolite, however, frequently was observed to increase rather abruptly with depth immediately above bedrock material which resulted in refusal to the augers.

The residual soils and saprolite consisted predominantly of dense to very dense, interlayered silty sand (SM), and poorly graded sand (SP) with some silt. Layers of silt (ML) with some sand were also encountered. Most of the residual soils and saprolite are very micaceous. Samples were typically estimated to contain 20 to 40 percent mica with percentages up to 60% estimated for many samples. As a result of the high percentage of mica, these soils will be particularly susceptible to erosion and sensitive to moisture content during compaction.

The total thickness of soils present at the site is highly variable, however, areas of shallow soil cover are generally associated with irregularities in topography. Auger refusals may be generally interpreted as the top of relatively coherent bedrock. Seams and layers of competent rock should be anticipated within the saprolite however. The relative spacing of auger probes and test borings was determined in the field as the work progressed to identify areas of shallow rock which may require drilling and blasting for removal. Areas which are anticipated to require some rock removal for landfill construction are delineated on SEC Drawing Number G-9083-2, included with the Contract Documents for Area A.

Surveyed ground surface and refusal elevations of all subsurface explorations are summarized on Table 1. Detailed soil descriptions are included on the logs contained in the Appendices to this report.

**TABLE 1**
**SUMMARY OF EXPLORATION ELEVATION DATA**
**LANDFILL No. 6 SITE**
**CHAMPION INTERNATIONAL CORPORATION**
**CANTON MILL**

| EXPLORATION NUMBER | LANDFILL SITE AREA (1) | GROUND SURFACE (2) ELEVATION | GROUNDWATER (3) DEPTH | GROUNDWATER (3) ELEVATION | GROUNDWATER (3) DATE | REFUSAL (5) DEPTH | REFUSAL (5) ELEVATION | BOTTOM OF EXPLORATION DEPTH | BOTTOM OF EXPLORATION ELEVATION |
|---|---|---|---|---|---|---|---|---|---|
| AP1 | A | 2720.53 | NE | - | 6/20-26/89 | - | - | 35.0 | 2685.53 |
| AP2 | A | 2717.33 | NE | - | 6/20-26/89 | - | - | 30.0 | 2687.33 |
| AP3 | A | 2705.54 | NE | - | 6/20-26/89 | - | - | 30.0 | 2675.54 |
| AP4 | A | 2674.96 | NE | - | 6/20-26/89 | 32.0 | 2642.96 | 32.0 | 2642.96 |
| AP5 | A | 2690.27 | NE | - | 6/20-26/89 | - | - | 30.0 | 2660.27 |
| AP6 | A | 2706.69 | NE | - | 6/20-26/89 | - | - | 30.0 | 2676.69 |
| AP7 | A | 2701.93 | NE | - | 6/20-26/89 | - | - | 30.0 | 2671.93 |
| AP8 | A | 2691.40 | NE | - | 6/20-26/89 | 27.0 | 2664.40 | 27.0 | 2664.40 |
| AP9 | A | 2689.29 | NE | - | 6/20-26/89 | 9.0 | 2680.29 | 9.0 | 2680.29 |
| AP10 | A | 2682.25 | NE | - | 6/20-26/89 | - | - | 30.0 | 2652.25 |
| AP11 | A | 2683.61 | NE | - | 6/20-26/89 | 8.0 | 2675.61 | 8.0 | 2675.61 |
| AP12 | A | 2683.64 | NE | - | 6/20-26/89 | 17.5 | 2666.14 | 17.5 | 2666.14 |
| AP13 | A | 2681.58 | NE | - | 6/20-26/89 | 25.0 | 2656.58 | 25.0 | 2656.58 |
| AP14 | A | 2725.82 | NE | - | 6/20-26/89 | 43.5 | 2682.32 | 43.5 | 2682.32 |
| AP15 | A | 2755.53 | NE | - | 6/20-26/89 | - | - | 30.0 | 2725.53 |
| AP16 | A | 2729.32 | NE | - | 6/20-26/89 | - | - | 30.0 | 2699.32 |
| AP17 | A | 2747.66 | NE | - | 6/20-26/89 | - | - | 30.5 | 2717.16 |
| AP18 | A | 2668.07 | NE | - | 6/20-26/89 | - | - | 30.0 | 2638.07 |
| AP19 | A | 2648.31 | NE | - | 6/20-26/89 | 17.0 | 2631.31 | 17.0 | 2631.31 |
| AP20 | A | 2644.22 | NE | - | 6/20-26/89 | 20.2 | 2624.02 | 20.2 | 2624.02 |

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|---|---|---|---|---|---|---|---|---|---|
| | | | DEPTH | ELEVATION | DATE | DEPTH | ELEVATION | DEPTH | ELEVATION |
| AP21 | A | 2651.08 | NE | - | 6/20-26/89 | 28.0 | 2623.08 | 28.0 | 2623.08 |
| AP22 | D | 2779.22 | NE | - | 6/20-26/89 | 43.5 | 2735.72 | 43.5 | 2735.72 |
| AP23 | D | 2784.71 | NE | - | 6/20-26/89 | 33.0 | 2751.71 | 33.0 | 2751.71 |
| AP24 | D | 2774.68 | NE | - | 6/20-26/89 | 38.0 | 2736.68 | 38.0 | 2736.68 |
| AP25 | D | 2757.92 | NE | - | 6/20-26/89 | 32.0 | 2725.92 | 32.0 | 2725.92 |
| AP26 | D | 2786.91 | NE | - | 6/20-26/89 | - | - | 20.0 | 2766.91 |
| AP27 | D | 2747.26 | NE | - | 6/20-26/89 | - | - | 40.0 | 2707.26 |
| AP28 | D | 2716.94 | NE | - | 6/20-26/89 | 43.0 | 2673.94 | 43.0 | 2673.94 |
| AP29 | D | 2675.33 | NE | - | 6/20-26/89 | - | - | 15.0 | 2660.33 |
| AP30 | D | 2692.09 | NE | - | 6/20-26/89 | - | - | 25.0 | 2667.09 |
| AP31 | D | 2694.71 | NE | - | 6/20-26/89 | - | - | 30.0 | 2664.71 |
| AP32 | D | 2681.26 | NE | - | 6/20-26/89 | 38.0 | 2643.26 | 38.0 | 2643.26 |
| AP33 | D | 2687.81 | NE | - | 6/20-26/89 | 48.4 | 2639.41 | 48.4 | 2639.41 |
| AP34 | D | 2699.86 | NE | - | 6/20-26/89 | 33.0 | 2666.86 | 33.0 | 2666.86 |
| AP35 | D | 2651.54 | NE | - | 6/20-26/89 | - | - | 45.0 | 2606.54 |
| AP36 | D | 2633.81 | NE | - | 6/20-26/89 | - | - | 18.5 | 2615.31 |
| AP37 | D | 2648.69 | NE | - | 6/20-26/89 | - | - | 25.5 | 2623.19 |
| AP38 | D | 2653.28 | NE | - | 6/20-26/89 | - | - | 25.0 | 2628.28 |
| AP39 | D | 2673.35 | NE | - | 6/20-26/89 | 4.5 | 2668.85 | 4.5 | 2668.85 |
| AP40 | EAST OF E | 2675.14 | NE | - | 6/20-26/89 | - | - | 50.0 | 2625.14 |

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|---|---|---|---|---|---|---|---|---|---|
| | | | DEPTH | ELEVATION | DATE | DEPTH | ELEVATION | DEPTH | ELEVATION |
| AP41 | E | 2690.67 | NE | - | 6/20-26/89 | - | - | 40.0 | 2650.67 |
| AP42 | E | 2721.56 | NE | - | 6/20-26/89 | 27.3 | 2694.26 | 27.3 | 2694.26 |
| AP43 | E | 2735.69 | NE | - | 6/20-26/89 | 38.7 | 2696.99 | 38.7 | 2696.99 |
| AP44 | E | 2689.80 | NE | - | 6/20-26/89 | 20.0 | 2669.80 | 20.0 | 2669.80 |
| AP45 | E | 2725.07 | NE | - | 6/20-26/89 | - | - | 40.0 | 2685.07 |
| AP46 | D | 2721.54 | NE | - | 6/20-26/89 | 29.1 | 2692.44 | 29.1 | 2692.44 |
| B101 | A | 2685.40 | NE | - | 7/5 | - | - | 36.5 | 2648.90 |
| B102 | A | 2721.69 | NE | - | 6/22 | - | - | 30.5 | 2691.19 |
| B103 | A | 2734.16 | NE | - | 6/22 | - | - | 29.0 | 2705.16 |
| B104 | A | 2746.52 | NE | - | 6/21 | - | - | 31.0 | 2715.52 |
| B105 | A | 2770.62 | NE | - | 6/21 | - | - | 31.0 | 2739.62 |
| B106 | D | 2752.08 | NE | - | 6/29 | 21.5 | 2730.58 | 21.5 | 2730.58 |
| B107 | D | 2752.59 | NE | - | 6/30 | - | - | 26.9 | 2725.69 |
| B108 | D | 2677.07 | NE | - | 7/5 | 28.1 | 2648.97 | 28.1 | 2648.97 |
| B109 | D | 2648.41 | NE | - | 7/5 | - | - | 27.0 | 2621.41 |
| B110 | A | 2722.34 | NE | - | 6/21 | - | - | 32.0 | 2690.34 |
| B111 | A | 2684.55 | NE | - | 6/22 | - | - | 10.2 | 2674.35 |
| B112 | D | 2640.78 | NE | - | 7/10 | - | - | 22.0 | 2618.78 |
| B113 | D | 2677.52 | NE | - | 7/8 | - | - | 50.0 | 2627.52 |
| B114 | D | 2632.26 | NE | - | 7/8 | - | - | 31.5 | 2600.76 |

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|---|---|---|---|---|---|---|---|---|---|
| | | | DEPTH | ELEVATION | DATE | DEPTH | ELEVATION | DEPTH | ELEVATION |
| B115 | D | 2595.97 | 3.5 | 2592.47 | 7/7 | 15.0 | 2580.97 | 15.0 | 2580.97 |
| B116 | E | 2766.74 | NE | - | 7/12 | 36.5 | 2730.24 | 36.5 | 2730.24 |
| B117 | E | 2699.37 | NE | - | 7/11 | - | - | 32.0 | 2667.37 |
| B118 | E | 2693.44 | NE | - | 7/12 | 33.3 | 2660.14 | 33.3 | 2660.14 |
| B119 | EAST OF E | 2668.20 | 43.2 | 2625.00 | 7/12 | 49.9 | 2618.30 | 49.9 | 2618.30 |
| B1 | E | 2640.00 | 7.2 | 2632.80 | 3/11/89 | | | 15.0 | 2625.00 |
| B2 | E | 2754.00 | NE | - | 4/24/81 | 50.0 | 2704.00 | 50.0 | 2704.00 |
| B3 | A | 2626.00 | 5.0 | 2621.00 | 4/22/80 | - | - | 19.0 | 2607.00 |
| B4 | D | 2734.50 | NE | - | 4/24/80 | - | - | 49.0 | 2685.50 |
| B5 | B | 2709.50 | NE | - | 4/22/80 | 47.5 | 2662.00 | 47.5 | 2662.00 |
| B6 | C | 2663.00 | 18.5 | 2644.50 | 4/23/80 | - | - | 25.0 | 2638.00 |
| B7 | B | 2565.00 | 9.0 | 2556.00 | 3/11/81 | - | - | 15.0 | 2550.00 |
| B8 | D | 2646.50 | NE | - | 4/25/80 | 26.5 | 2620.00 | 26.5 | 2620.00 |
| B9 | EAST OF A | 2591.00 | 6.4 | 2584.60 | 3/11/81 | 14.5 | 2576.50 | 14.5 | 2576.50 |
| B10 | EAST OF B | 2651.50 | 66.6 | 2584.90 | 1/11/81 | 71.0 | 2580.50 | 71.0 | 2580.50 |
| B11 | A | 2665.00 | 11.2 | 2653.80 | 3/11/81 | - | - | 20.0 | 2645.00 |
| B12 | A | 2736.00 | NE | - | 12/5/80 | 37.5 | 2698.50 | 37.5 | 2698.50 |
| B13 | A | 2699.50 | NE | - | 11/25/80 | 7.3 | 2692.20 | 7.3 | 2692.20 |
| B14 | D | 2695.50 | 16.0 | 2679.50 | 3/11/81 | 18.0 | 2677.50 | 18.0 | 2677.50 |
| B15 | SOUTH OF C | 2566.00 | 9.1 | 2556.90 | 3/11/81 | - | - | 15.0 | 2551.00 |

TABLE 1
SUMMARY OF EXPLORATION ELEVATION DATA
LANDFILL No. 6 SITE
CHAMPION INTERNATIONAL CORPORATION
CANTON MILL

| EXPLORATION NUMBER | LANDFILL SITE AREA (1) | GROUND SURFACE (2) ELEVATION | GROUNDWATER (3) | | | REFUSAL (5) | | BOTTOM OF EXPLORATION | |
|---|---|---|---|---|---|---|---|---|---|
| | | | DEPTH | ELEVATION | DATE | DEPTH | ELEVATION | DEPTH | ELEVATION |
| B16 | D | 2607.00 | 1.9 | 2605.10 | 3/11/81 | - | - | 15.0 | 2592.00 |
| B17 | E | 2702.00 | 12.2 | 2689.80 | 3/11/81 | - | - | 20.0 | 2682.00 |
| B18 | D | 2707.00 | 72.0 | 2635.00 | 11/20/80 | - | - | 73.9 | 2633.10 |
| B19 | D | 2536.00 | 8.4 | 2527.60 | 3/11/81 | 15.0 | 2521.00 | 15.0 | 2521.00 |

NOTES:
1. Refers to overall development areas as shown on LETCo Figure 10 (Conceptual Site Development Plan), Feb., 1982.
2. Surveyed ground surface elevation at time of exploration, referenced to the National Geodetic Vertical Datum (NGVD).
3. Ground water observation at completion of exploration.
4. Auger probes (designated AP) were generally left open for a minimum of 24 hours for ground water observation.
5. Possible elevation of the top of coherent bedrock which may require drilling and blasting for removal.
6. All depths are referenced to ground surface at time of exploration.

## 3.2 Bedrock

The bedrock underlying the Landfill No. 6 site has been mapped by the North Carolina Geologic Geological Survey as part of the Ashe Metamorphic Suite[14]. On a regional scale this unit consists of interlayered, metasedimentary rocks; predominantly mica schists, schistose gneiss and metagraywacke. Rock observed in exposures in the vicinity of the site consist of brown to gray, medium to coarse grained, Quartz-Biotite-Muscovite Gneiss and Schistose Gneiss. Jointing appears to occur predominantly along the characteristically wavy-irregular foliation. Foliation joints observed were not generally continuous across relatively small exposures and were typically coated with iron and magnesium oxides. The foliation and foliation joints were typically near vertical to steeply dipping, generally dipping 75° or steeper southeasterly, towards the Pigeon River. Occasional joints dipping steeply towards the northwest were noted. The predominant strike of the foliation and foliation joints observed was roughly parallel to the Pigeon River (AZ 45° to AZ 80°), but ranged from Azimuth 15° to 145°. This information is consistent with local regional trends.[14]

The boundary between coherent bedrock and the overlying soils is typically a transitional one. The thickness and nature of this transition zone may be highly variable. This zone generally includes saprolite and relatively coherent blocks of rock.

## 3.3 Groundwater Occurrence

In the valleys of the Blue Ridge Mountains such as at the Location of the Landfill No. 6 site, as well as in the adjacent Piedmont, groundwater occurs in both the overburden soils (residual soil and saprolite) and in fracture systems within the underlying bedrock. The residual soil and saprolite are generally porous, but have relatively low permeabilities. Groundwater within the crystalline bedrock is primarily

contained within secondary fractures such as joints, faults and shear zones, or fractures along foliation or bedding planes. The saprolite and bedrock are generally hydraulically connected. Due to the relatively high porosity of the residual soil and saprolite, these materials have a relatively high capacity for groundwater storage as compared to the underlying bedrock. As a result, the residual soil/saprolite aquifer functions as a local reservoir which slowly releases groundwater from storage to the fractures in the underlying rock. The transition zone at the saprolite/bedrock interface is often a relatively significant zone of groundwater flow.

Topography and geologic structure are dominant factors controlling the occurrence, movement, and discharge of groundwater in this area. In general, topographically higher areas are recharge areas and valley bottoms are discharge areas. Surface water and groundwater are closely interrelated, particularly during low-flow periods (generally late summer and early fall). During low-flow periods, stream flow, such as that of the creek present at Area A, is generally sustained by groundwater moving laterally through the saprolite and bedrock and discharging as springs. Observations made while drilling in Area A after several days of heavy rainfall suggest that much of the recharge to the bedrock aquifer (and perhaps the saprolite aquifer) beneath the site occurs along the flanks of Chambers Mountain to the northwest (overburden soils remained relatively dry at shallow depths even after several days of heavy rains). Based upon elevations of springs, groundwater levels, bedrock structure, and fracture trace analysis, the overall groundwater flow direction in the bedrock aquifer beneath the site appears to be to the south and southeast, towards the Pigeon River. This information indicates that the Landfill No. 6 site is situated in a local discharge area which is generally favorable for landfill construction.

Records of groundwater level measurements made from 1983 to the present in monitoring wells at the Landfill No. 6 site were evaluated as part of this study. The previous "Report of Groundwater Monitoring Study"[8] was also reviewed. Water-level

observations were made approximately 24 hours after completion of all test borings and auger probes drilled for this project. Water-level observations were made through PVC pipe left temporarily in boreholes overnight to facilitate stabilized water-level measurement. Available monitoring well construction records are included in Appendix D. Hydrographs of groundwater level fluctuations are contained in Appendix E. Groundwater level observations made while drilling are noted on test boring and auger probe reports included in the appendices to this report. Observations made in boreholes are summarized on Table 1 included in Section 3.2.

A generalized potentiometric map of the water table aquifer at the site is included in the previous "Report of Groundwater Monitoring Study".[8] The potentiometric surface shown on this map appears to be representative of groundwater occurrence and flow directions within the uppermost portion of the bedrock aquifer as well as the residual soil/saprolite system. This information is consistent with more recent groundwater observations.

The depths to groundwater at the Landfill No. 6 site are related to topography. Depths to groundwater beneath the prominent ridges are generally in excess of 50 to 100 feet below the existing ground surface. Groundwater was generally 25 to 35 feet on the hillsides. In the bottom of the draws, groundwater is typically encountered less than 10 feet below the surface.[8] Groundwater was not encountered in any of the subsurface explorations drilled within Area A for this study during the summer of 1989. Many of these explorations extended 10 to 25 feet below the proposed cut grade.

An inspection of the hydrographs included in Appendix E reveals groundwater level fluctuations ranging from 2.6 feet (MW-3A and MW-12) to approximately 23 feet (MW-1) based upon measurements made in 9 monitoring wells located on the Landfill No. 6 property. The average fluctuation, however is approximately 6 feet. The

magnitude of groundwater level fluctuations is strongly dependent upon the topographic location of the well, the proximity to discharge or recharge areas, and the aquifer material screened. The highest fluctuations were observed in the deepest wells screened in the bedrock aquifer or in the saprolite/bedrock transition zone. The bedrock aquifer may be partially confined beneath the site and therefore more susceptible to large fluctuations in potentiometric level. The largest fluctuations were observed at MW-1 (22.7 feet) and MW-9 (11 feet). Both of these wells are situated at or near ridge tops and are screened in the bedrock aquifer. Fluctuations observed in wells installed in the bedrock aquifer located adjacent to local discharge features such as creeks (MW-2, MW-3A, MW-8) showed significantly smaller scale fluctuations (2.6 to 6.6 feet).

## 4.0 ENGINEERING EVALUATIONS AND RECOMMENDATIONS

This section of the report presents general recommendations applicable to overall site preparation and grading, embankment construction, and subsurface drainage control in the project area. Recommendations contained herein are supplementary to those included in the "Revised Report of Geotechnical Exploration and Evaluation and Conceptual Site Development Recommendations".[7] Based on a review of information contained in the previous report and evaluation of the results of additional geotechnical testing performed for this study, we generally concur with foundation preparation and embankment construction recommendations presented in that report.[7]

Design details for the development of Area A of the Champion Landfill No. 6 are presented in the Contract Documents for this project dated November, 1989. A primary element in the proposed design is the utilization of a liner system which includes the following components listed from the ground surface up:

- prepared subgrade
- 60 MIL textured HDPE liner
- HDPE drainage net
- 4 oz. geotextile fabric (non-woven)

The actual materials used for construction should be approved by the Engineer to assure that the strength and drainage characteristics of all components conform to design assumptions.

### 4.1 Subgrade Preparation

General subgrade preparation for the HDPE liner installation should include the following:

- Strip all organic materials and unsuitable soils including topsoil, alluvium and colluvium and any other detrimental materials from the surface. This will generally require excavation to a minimum depth of one (1) foot below existing grade.

- Scarify the upper six(6) inches of the subgrade and remove any remaining roots, angular or sharp rocks larger than three quarter (3/4) inches in diameter, or any other angular or sharp debris or material from the upper four (4) inches of the subgrade.

- Adjust the subgrade moisture content to 0 to 4 percent above the optimum moisture content.

- Compact the subgrade using a minimum of three passes of compaction equipment to a density equivalent to at least 95 percent of the maximum dry density as determined by the standard Proctor compaction test (ASTM D-698). Compaction equipment should be approved by the Engineer.

- Where filling is required to bring the subgrade up to the design elevation, on-site soils may be placed in maximum lift thicknesses of nine (9) inches, measured prior to compaction. On-site soils suitable for the subgrade include residual soils and saprolite. Topsoil, alluvium and colluvial soils should not be used.

- Where bedrock is encountered or removed during excavation, a minimum of two (2) feet of properly compacted soils should be placed over the bedrock prior to liner installation.

- The subgrade should have no sudden sharp or abrupt changes in grade.

- The liner should be installed as soon as possible after subgrade preparation. In any event, the earthwork contractor should protect the subgrade from desiccation, flooding and freezing. Protection, if required, may consist of a thin plastic protective cover (or other material as approved by the engineer) installed over the completed subgrade until such time as the placement of the geomembrane liner begins. Subgrades found to have desiccation cracks greater than 1/2 inch in width or depth, or which exhibit swelling, heaving or other similar conditions should be replaced or reworked to remove these defects.

## 4.2 Dike Geometry and Stability

Retention dike stability analyses were performed by Geo-Systems Design & Testing, Inc. of West Columbia, South Carolina. This included evaluation of the existing retention dike which forms the eastern ends of Area A, and evaluation of the proposed dike along the northern margin of Area A, parallel to Interstate I-40. Strength parameters for the fill and foundation soils were developed from data contained in the previous geotechnical report prepared by LETCo.[7] and from the results of recent triaxial shear tests conducted on remolded samples collected during our exploration of Area A. Laboratory test data utilized for these analyses are contained in Appendix F.

Strength properties of the sludge and sludge/ash mixture (4:1) were based upon recent tests performed by Geo-Systems Design & Testing, Inc. on samples of these materials collected by SEC personnel at the Canton Mill. These data were comparable to data available in current literature on similar waste materials.[1,4]

The results of these analyses indicate satisfactory stability for 2:1 (H:V) slopes on required perimeter retention dikes. These slopes should result in a factor of safety generally greater than 2.1 using the modified Bishop sliding circle method of analysis. A minimum factor of safety of 1.5 is considered acceptable. Lateral sheet drainage to facilitate dewatering of the waste materials as a result of consolidation is recommended, however, at least every fifteen (15) feet of height within the waste pile. This may consist of laterally continuous layers of more permeable materials or geotextile drains. Drainage along the interior dike slopes is also recommended.

In the event that the owner might elect to construct interior retention dikes of available on site soils, slope stability analyses were also performed utilizing a worst case 120 foot high embankment to evaluate potential slope configurations. These analyses are based on the geotechnical test results included in Appendix F. On site soils considered acceptable for embankment construction are restricted to residual soil and saprolite as characterized in this report. Analyses were performed on various degrees of slope inclination and reinforcement to determine optimal dike sections. The results indicate that a non-reinforced 1.5:1 (H:V) slope should provide a factor of safety against failure of 1.30 (for a 120 foot high embankment). A 1.75:1 (H:V) slope should provide a factor of safety of 1.45. A comparable factor of safety (approximately 1.45) can be attained by reinforcing a 120 foot high embankment with 1.5:1 (H:V) side slopes with 20 layers of geogrid (evenly spaced) or by reducing the maximum embankment height to 90 feet (1.5:1 side slopes).

Material specifications and related literature provided by Gundle indicate that utilization of a textured geomembrane beneath interior retention dikes will provide a stable foundation for interior embankments. Specifications of all geosynthetics utilized for construction should be reviewed by a qualified Engineer prior to construction.

The results of recent geotechnical testing performed on waste materials and slope stability analyses are contained in Appendix G.

## 4.3 Underdrain

A drainage system will be required beneath the synthetic membrane liner to intercept and control the flow from springs present in the bottom of the draw at Area A. A typical cross section of the recommended underdrain design is included in the Contract Documents for this project. The drainage system design consists of a coarse grained, durable aggregate (ASTM D 448, size 57 or equivalent) completely surrounded by a six (6) inch thick layer of fine-grained filter aggregate (ASTM C33 fine aggregate or equivalent). A 4 oz. geotextile fabric should completely surround the coarse aggregate to segregate the filter and drainage media. A 12-inch perforated HDPE pipe will be installed within the coarse aggregate to provide the principal conduit for flow. At least 12-inches of coarse aggregate should envelope the pipe.

The 12-inch HDPE pipe will provide substantial excess flow capacity for anticipated flow. A flow of approximately 10 gpm was measured at the culvert discharge of the creek in Area A in late July of 1989 after a period of heavy rainfall. With a minimum pipe slope of approximately 0.06 ft/100 ft, Manning's formula yields a hydraulic capacity in excess of 5,000 gpm for the 12 inch HDPE pipe.

As an additional factor of saftey, a minimum required cross sectional area sufficient to handle twice the measured stream flow was computed using Darcy's Law. This computation is as follows:

$A_c$ = minimum cross sectional area of aggregate drain

$A_d$ = design cross sectional area

= 2 ($A_c$)

q = spring flow

= 10 gpm (0.022 cfs)

i = minimum slope of drain

= .06 ft/ft

K = design permeability of coarse grained aggregate

= 0.0328 to 0.328 ft/sec (1 to 10 cm/sec)

Using Darcy's Law to relate these terms:

$A_c = q/(ki)$

= 0.022 cfs/(0.0328 ft/sec) (0.06 ft/ft)

$A_c = 11.18\ ft^2$

Therefore:

$A_d = 2\ (11.18\ ft^2) = 22.4\ ft^2$

Based on the equations above, the minimum recommended sectional dimensions for the coarse grained drainage coarse are 2 feet thick and 8 feet wide.

Actual dimensions of the underdrain system will be determined in the field to conform with the prepared subgrade. The drainage system should be separated from the HDPE liner by a minimum thickness of at least four (4) feet of on-site soils (saprolite or residual soil) placed in nine (9) inch thick lifts (measured prior to compaction) compacted to 95 percent of the standard Proctor maximum dry density. The typical separation between the pipe and the liner will be much greater than 4 feet.

The underdrain should at a minimum be extended laterally five (5) feet beyond all springs identified in the field at the time of construction. The approximate lateral extent of the underdrain system is shown on drawing number G-9083-2 of the Contract Documents. The underdrain system will terminate at a junction box which will be constructed at the east end of Area A. This structure will route the underdrain flow into the existing 36 inch pipe through the embankment to the Bowen Branch creek.

## 4.4 Construction Quality Control

Quality control monitoring for construction should be performed to verify that subsurface conditions agree with those encountered in the field investigation used for design and to document that construction and materials are in accordance with design specifications. Conditions encountered during construction which differ from those anticipated should be reported and the design re-evaluated.

Construction monitoring should include inspection of foundation bearing surfaces and monitoring of placement and compaction of soils for the general liner foundation, underdrain installation, and embankment construction. Destructive and non-destructive testing of all liner seams will also be required as described in the Contract Documents prepared for this work.

## 5.0 EVALUATION OF MONITORING WELL NETWORK

### 5.1 Existing Wells

Monitoring well construction records taken from previous reports[8,10] are compiled in Appendix D. The locations and construction details of monitoring wells in proximity to Area A were evaluated in conjunction with the additional hydrogeologic data collected for this study. Monitoring wells immediately surrounding Area A are MW-1, MW-2 and MW-3A. the locations of these wells and other existing monitoring wells at the Champion Landfill No. 6 site are shown on Figure 1.

The primary components of groundwater flow from Area A appear to be easterly in the residual soil, sapprolite and the upper portion of the bedrock. Flow in the deeper bedrock aquifer beneath the site is anticipated to be generally southerly as discussed in section 3.3 of this report.

MW-1 is the existing background well for the entire Landfill No. 6 site. Existing hydrogeologic information indicates that this well is located in the best available background area at the site. MW-1 monitors the uppermost portion of the water table aquifer at this location. MW-2 and MW-3A are shallow water table wells constructed in the lower portion of the saprolite and upper portion of the bedrock respectively. Due to the difference in elevation between the proposed bottom of the landfill in Area A and the water table elevations at MW-2 and MW-3A, these wells should provide adequate detection monitoring for easterly components of groundwater flow from the landfill at Area A.

Several additional landfill cells are being developed immediately south of Area A. Monitoring well MW-4, MW-5A, MW-6, MW-7A, MW-8 and MW-12 provide detection monitoring of groundwater flowing southerly towards the Pigeon River.

## 5.2 Recommendations

The existing back ground well, MW-1, will require replacement for the development of Area A. The new background well location will be approximately 170 feet northwest of MW-1, 40 feet south of the northern property line. This will provide a permanent background location which should not require further relocation for future development.

Two additional monitoring well locations for Area A are proposed. These locations are along the northwest margin of the Area A cell, about half way between the northernmost limit of waste disposal and the Champion Paper property line. The additional wells are proposed as an added precaution only, due to the presence of domestic wells located northwest of the site, north of Interstate I-40. Existing hydrogeologic data indicates that these wells will be upgradient of the landfill site. Information reviewed at the Asheville office of the North Carolina Department of Environment in July, 1989, indicates that local domestic water wells are generally completed in the bedrock aquifer to depths typically 100 to 400 feet below ground surface. SEC recommends that monitoring wells installed at the proposed locations should be completed within a significantly fractured zone in the upper portion of the bedrock aquifer.

The locations of all new proposed monitoring wells are included on Figure 1. Based on existing information, proposed elevations for the bottom of each well are indicated. Actual well completion depths should be determined by a qualified hydrogeologist in the field at the time of drilling. It is anticipated that all of the proposed new wells will be bedrock wells. A typical bedrock monitoring well construction detail recommended for these installations is included as Figure 2. We recommend that bedrock should be cored for well installation to facilitate more detailed evaluation of the bedrock aquifer. The locations of existing water supply

wells present in the vicinity of the Landfill No. 6 Site are also included on Figure 1. These locations were transposed from a figure included in reference 3. Domestic well locations were determined by a door-to-door survey performed by Hampton Hintz and Associates during June of 1983.

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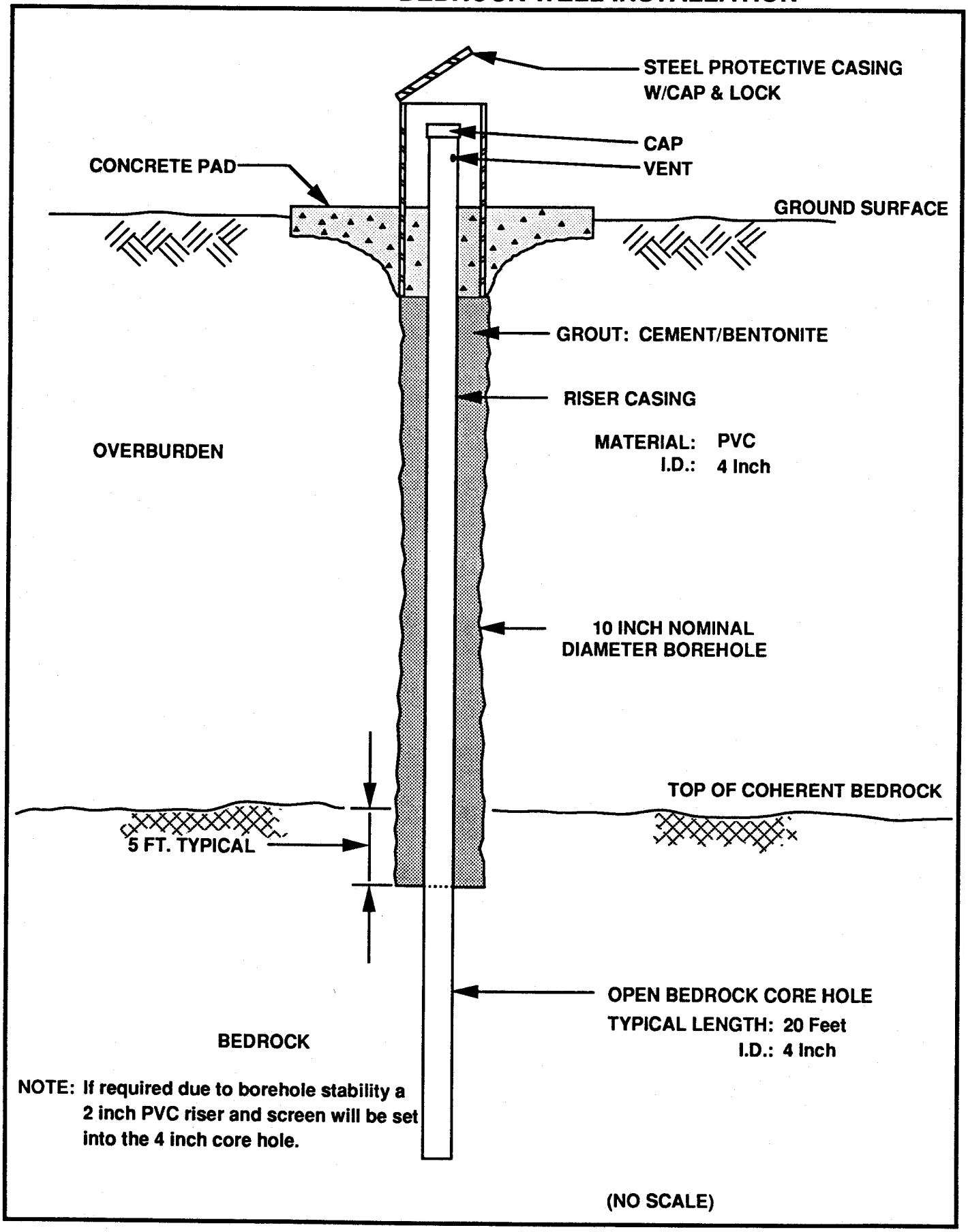
# FIGURE 2
# MONITORING WELL DETAIL
# BEDROCK WELL INSTALLATION



## 6.0 SELECTED REFERENCES


1. Atwell, James S., Wallar, Stanley E., and Wardell, Richard E., 1977, "Geotechnical Aspects of Papermill Sludge Disposal in Proceedings of the Conference on Geotechnical Practice for Disposal of Solid Waste Materials - ASCE", 9 pages.

2. Cedegren, Harry R., 1989, "Seepage, Drainage and Flow Nets", 465 pages.

4. Charlie, Wayne A., 1977, "Pulp and Papermill Solid Waste Disposal - A Review in Proceedings of the Conference on Geotechnical Practice for Disposal of Solid Waste Materials - ASCE", 8 pages.

5. Champion International Corporation, March 1983, "Solid Waste Permit Application - Sanitary Landfill Site Six".

6. Cherry, John A., and Freeze, Allan R., 1979, "Groundwater", 604 pages.

7. LETCo., February 1982, "Revised Report of Geotechnical Exploration and Evaluation and Conceptual Site Development and Recommendations, Landfill No. 6 - Champion Papers".

8. LETCo., January 1983, "Report of Groundwater Monitoring Study, Landfill No. 6 - Champion Papers".

9. LETCo., May 1986, "Bid Documents and Specifications for Preparation of Area C - Landfill No. 6".

10. LETCo., December 1987, "Monitoring Well Installation Details, Champion International - Canton Landfills".

11. North Carolina Department of Human Resources - Health Services Division, March 1984, "Solid Waste Permit for Champion Papers Landfill No. 6".

12. North Carolina Department of Human Resources - Health Services Division, August 1988, "North Carolina Solid Waste Management Regulations".

13. North Carolina Department of Environment - Health and Natural Resources Division of Environmental Management, August 1989, "Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina".

14. Merschat, Carl E., and Wiener, Leonard S., 1988, "Geology of the Sandymush and Canton Quadrangles, North Carolina: North Carolina Geological Survey Bulletin 90", 66 pages with maps.

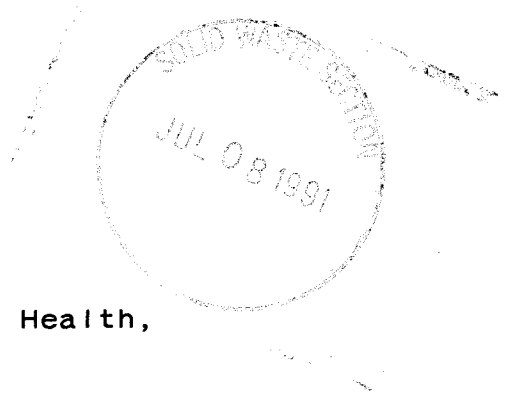
15. U.S. Geological Survey, 1979, "7.5 Minute Topographic Map of the Canton Quadrangle, North Carolina", at a scale of 1:24,000.

16. U.S. Geological Survey, 1978, "7.5 Minute Topographic Map of the Clyde Quadrangle, North Carolina", at a scale of 1:24000.

Canton Mill
Box C-10
Canton, North Carolina 28716

**Champion**
Champion International Corporation

July 5, 1991




Ms. Sherri Hoyt
Environmental Engineer
Division of Solid Waste Management
North Carolina Department of Environment, Health,
and Natural Resources
401 Oberlin Road
Raleigh, North Carolina 27605

RE: Revised Construction Drawings, 6/14/91
Canton Mill Landfill No. 6, Area A
Amendment to Permit No. 44-06

Dear Ms. Hoyt:

Please find enclosed revised construction drawings in triplicate, dated June 14, 1991, for the proposed expansion of Champion's Landfill No. 6, Area A. As we discussed on June 3, these revised drawings incorporate three minor changes to improve the overall design of the cell. Each modification is highlighted on the drawings as indicated below.

The first modification, highlighted in green, lowers the elevation of the west end of Cell I to increase cell capacity and improve operation by creating a more level cell for easier operation. The resulting changes in elevation are indicated on drawings G9083-2, G9083-4, G9083-5, and G9083-7.

The second modification, highlighted in yellow, raises the elevation of the northeast corner of Cell IV to increase capacity. This change is indicated on drawings G9083-2, G9083-3, G9083-5, and G9083-7.

The third modification, highlighted in blue, adds a new 12-inch steel stormwater pipe jacked and bored through the east end of the Cell IV embankment. In the original design, the stormwater pipe was to be pushed through the existing 36-inch pipe for the underdrain. By separating the stormwater and underdrain pipes, construction and operation will be simplified. The addition of the new

pipe and the headwall concrete detail are highlighted on drawing G9083-2. The removal of the stormwater line from the junction box is shown on drawing G9083-6, Detail 10.

We are also submitting today the Erosion Control Plan, one set of revised construction drawings, and the required permit fee to Mr. Richard Phillips, Land Quality Section - Asheville Office, for approval.

Please contact me at (704) 646-2645 if you have any questions regarding this information.

Sincerely,

Liz Dickson

Liz Dickson
Process Engineer

Enclosures

Copy: (without enclosures)

Mr. J. Ross Kilpatrick
Vice President - Operations Manager
Champion International Corporation
Canton Mill
P.O. Box C-10
Canton, North Carolina 28716

Mr. James Coffey
Head, Permitting Branch
Division of Solid Waste Management
North Carolina Department of Environment, Health, and Natural Resources
P.O. Box 27687
Raleigh, North Carolina 27611-7687

Mr. James E. Patterson
Waste Management Specialist
Western Regional Office
North Carolina Department of Environment, Health, and Natural Resources
59 Woodfin Place
Asheville, North Carolina 28802

# Appendices

## APPENDIX A

## SEC TEST BORING LOGS

Soil descriptions noted on the logs are based on visual / manual soil identification techniques conducted in the field by a trained geologist. Soils were classified in accordance with the Unified Soil Classification System and procedures described in ASTM D-2487 and D-2488.

Symbols

Abrupt strata change or bottom of exploration: _____

Inferred or gradational strata change: _____ _____ _____ _____ _____

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# TEST BORING REPORT

**BORING NO. B101**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: A Area
ELEVATION: 2685.40
DATE START: 6/28
DATE FINISH: 6/28
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S | |
| 7/5 | 168 | NE | 35.0 | 36.5 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lbs. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>4<br>5<br>3 | S1 | 0.0<br>--<br>2.0 | **Silty Sand (SM)**<br>Reddish - brown, moist, mostly fine sand, some silt, saprolite in bottom 10 inches of sample<br>1.2<br>**- RESIDUAL SOIL -** |
| 5.0 | | 64 | S2 | 5.0<br>5.5 | **Silty Sand (SM)**<br>Mottled, reddish - brown, moist, mostly fine sand, some silt, visible relict fabric<br>**- SAPROLITE (GNEISS) -** |
| 10.0 | | 27<br>53 | S3 | 10.0<br>11.0 | **Poorly Graded Sand (SP)**<br>Reddish - brown, dry, mostly fine sand, little medium sand, good relict fabric. |
| 15.0 | | 27<br>31<br>39<br>35 | S4 | 15.0<br>--<br>17.0 | **Poorly Graded Sand (SP)**<br>Reddish - brown, dry, mostly fine sand, little medium sand, good relict fabric.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B101

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# TEST BORING REPORT

BORING NO. B101

PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20 | | 15<br>26<br>35<br>26 | S5 | 20.0<br>--<br>22.0 | **Poorly Graded Sand (SP)**<br>Light reddish - brown, dry, mostly fine sand, trace silt, moderate relict foliation. |
| 25.0 | | 9<br>40<br>50 | S6 | 25.0<br>--<br>26.5 | **Poorly Graded Sand (SP)**<br>Light reddish - brown, dry, mostly fine sand, some medium sand, trace silt, good relict fabric.<br>**- SAPROLITE (GNEISS) -** |
| 30.0 | | 19<br>33<br>50 | S7 | 30.0<br>--<br>31.5 | **Silty Sand (SM)**<br>White to light gray, dry, mostly fine sand, some silt, predominantly quartzo - feldspathic.<br>**- SAPROLITE (GNEISS) -** |
| 35.0 | | 36<br>41<br>50 | S8 | 35.0<br>--<br>36.5 | **Poorly Graded Sand (SP)**<br>White, dry, mostly fine sand, some silt, few muscovite (medium grained), interlaminated with gray - brown, mostly fine sand, trace silt.<br>**- SAPROLITE (GNEISS) -**<br>**BOTTOM OF EXPLORAITON AT 36.5 FEET** |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B101

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B102**

PROJECT: LANDFILL NO. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING AND ROBERTSON, INC.
EQUIPMENT USED: CME 55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: A Area
ELEVATION: 2721.69
DATE START: 6/22/89
DATE FINISH: 6/22/89
DRILLER: BOB MAXWELL
PREPARED BY: C. BUDINGER

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S | |
| 6/22 | 5 | NE | 30.0 | 30.5 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lb. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>3<br>2<br>3 | S1 | 0.0<br>--<br>2.0 | **SILTY SAND (SM)**<br>Orange-brown, dry, mostly fine to medium sand, little silt, trace clay, micaceous (approximately 30% fine mica flakes).<br><br>**- RESIDUAL SOIL -** |
| 5.0 | | 13<br>29<br>50/5 in. | S2 | 5.0<br>--<br>6.4 | 5.5<br>**SANDY SILT (ML)**<br>Reddish-purple to grayish-white, moist, mostly silt, some fine to coarse sand, trace clay, micaceous, near vertical banding (foliation), (10-20% fine mica flakes).<br><br>**- SAPROLITE (SCHISTOSE GNEISS) -** |
| 10.0 | | 12<br>38<br>37<br>33 | S3 | 10.0<br>--<br>12.0 | **SILTY SAND (SM)**<br>Reddish-brown, moist, mostly fine to coarse sand, little silt, trace clay, trace fine gravel.<br><br>**- SAPROLITE (GNEISS) -** |
| 15.0 | | 27<br>54<br>50/3 in. | S4 | 15.0<br>--<br>16.3 | **SILT WITH SAND (ML)**<br>Reddish-brown, moist, mostly silt, little to some fine to coarse sand, trace clay and gravel. Steeply dipping banding.<br><br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B102

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B102
PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 50/5 in. | S5 | 20.0 - 20.5 | **SILT WITH SAND (ML)** Reddish-brown, moist, mostly silt, little fine to medium sand, trace coarse sand, trace clay, micaceous (30-40% mica). **- SAPROLITE (GNEISS) -** |
| 25.0 | | 34 / 56 | S6 | 25.0 - 26.0 | **SILT WITH SAND (ML)** White to gray, moist, mostly silt, little fine and coarse sand, little clay, micaceous, (approx. 20-30% medium to coarse grained mica flakes); strongly banded, steeply dipping, foliation. **- SAPROLITE (GNEISS) -** |
| 30.0 | | 50/6 in. | S7 | 30.0 - 30.5 | **SILT WITH SAND (ML)** Reddish brown, moist, mostly silt, little fine to medium sand, micaceous, (20-30% medium grained mica). **- SAPROLITE (GNEISS) -** |
| 35.0 | | | | | **BOTTOM OF EXPLORATION 30.5 FT.** |
| 40.0 | | | | | **NOTE:** Auger continued to penetrate fairly easily although at times drilling was difficult at constant 500 psi down-pressure. |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. | |
|---|---|
| WD | WHILE DRILLING |
| NE | NOT ENCOUNTERED |
| UR | NOT READ |

BORING NO. B102

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B103**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: A Area
ELEVATION: 2734.16
DATE START: 6/22
DATE FINISH: 6/22
DRILLER: B. Maxwell
PREPARED BY: C. Budinger

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S. | |
| 6/22 | 5 | NE | 28.5 | 29.0 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lb. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 1 | S1 | 0.0 | **Silt With Sand (ML)** |
| | | 1 | | -- | Brown, moist, mostly silt, little fine sand and coarse gravel, few medium to coarse sand, trace clay. Occasional roots and detritus, with approximately 10 % very fine mica flakes (muscovite). |
| | | 2 | | | **- RESIDUAL SOIL -** |
| | | 4 | | 2.0 | |
| 5.0 | | 6 | S2 | 5.0 | **Sandy Silt With Gravel (ML)** |
| | | 9 | | -- | Reddish - brown, moist, some silt, some medium to coarse sand, little coarse gravel, trace clay, 10-15% fine to medium grained mica (muscovite). |
| | | 10 | | | **Note:** Occasional very coarse gravel fragment. |
| | | 12 | | 7.0 | **- RESIDUAL SOIL -** |
| 10.0 | | 14 | S3 | 10.0 | 10.5 |
| | | 40 | | -- | **Sandy Silt (ML)** |
| | | 33 | | | Reddish - brown, moist, mostly silt, some fine to medium sand, few coarse sand, trace clay. |
| | | 64 | | 12.0 | **- SAPROLITE (GNEISS) -** |
| 15.0 | | 25 | S4 | 15.0 | **Silty Sand (SM)** |
| | | 56 | | -- | Reddish - brown, moist, mostly fine to medium sand, some silt, few clay, trace coarse sand, micaceous (30-40% very fine to fine grained mica). |
| | | 50 | | 16.3 | **- SAPROLITE (GNEISS ) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY | BLOWS/FT. | CONSISTENCY |
|---|---|---|---|
| 0 - 4 | VERY LOOSE | 0 - 2 | VERY SOFT |
| 5 - 10 | LOOSE | 3 - 4 | SOFT |
| 11 - 30 | MEDIUM DENSE | 5 - 8 | MEDIUM STIFF |
| 31 - 50 | DENSE | 9 - 15 | STIFF |
| 51+ | VERY DENSE | 16 - 30 | VERY STIFF |
| | | 31+ | HARD |

| SAMPLE ID. | | COMPONENT % | |
|---|---|---|---|
| S | SPLIT SPOON | MOSTLY | 50 - 100% |
| T | TUBE | SOME | 30 - 45% |
| U | UNDISTURBED PISTON | LITTLE | 15 - 25% |
| G | GRAB SAMPLE | FEW | 5 - 10% |
| X | OTHER | TRACE | <5% |
| NR | NO RECOVERY | | |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B103

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B104**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: A Area
ELEVATION: 2746.52
DATE START: 6/21
DATE FINISH: 6/21
DRILLER: B. Maxwell
PREPARED BY: C. Budinger

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S. | |
| 6/21 | 12 | NE | 30.0 | 31.0 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lb. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>4<br>10<br>15 | S1 | 0.0<br>--<br>2.0 | **Silt (ML)**<br>Reddish - brown, moist, mostly silt, few sand, trace clay, 15-20% mica.<br>1.5 **- RESIDUAL SOIL -** |
| | | | | | **Sandy Silt (ML)**<br>Reddish - brown, moist, mostly silt, some fine to coarse sand, trace clay, micaceous (20-30% fine mica).<br>**- SAPROLITE (GNEISS) -** |
| 5.0 | | 5<br>7<br>12<br>13 | S2 | 5.0<br>--<br>7.0 | 5.5<br>**Silt With Sand (ML)**<br>Pale orange, moist, mostly silt, little fine sand, trace clay, 10-25% mica. Appears like intact crystalline rock - but severly weathered.<br>6.5 **Sandy Silt (SM)**<br>Pale orange - red, moist, mostly silt, some fine sand, trace clay, 10-15% mica. |
| 10.0 | | 7<br>20<br>26<br>34 | S3 | 10.0<br>--<br>12.0 | **Silty Sand (SM)**<br>Brownish - orange, moist, mostly fine to coarse sand, little to some silt, trace clay, 15-25% biotite and muscovite. Coarser grained sand appears as dark crystals (garnet).<br>**- SAPROLITE (GNEISS) -** |
| 15.0 | | 8<br>9<br>9<br>11 | S4 | 15.0<br>--<br>17.0 | **Silty Sand (SM)**<br>Greenish - brown, dry, mostly fine to coarse sand, little silt, trace clay, micaceous (25-35% fine mica flakes).<br>16.0 **Silt With Sand (ML)**<br>Reddish - brown, moist, mostly silt, little fine sand, few medium to coarse sand, trace clay, micaceous (35-45% mica flakes).<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B104
PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 11<br>11<br>36<br>54 | S5 | 20.0<br>–<br>22.0 | **Silt With Sand (ML)**<br>Reddish - brown, moist, mostly silt, little fine sand, few medium to coarse sand, trace clay, 35-45% mica flakes.<br>**- SAPROLITE (GNEISS) -**<br>Alternating hard and soft layers |
| 25.0 | | 45<br>55/5 in. | S6 | 25.0<br>25.9 | 25.5 **Silt With Sand (ML)** |
| | | | | | **Silty Sand (SM)**<br>Dark brownish - purple, moist, mostly fine to medium sand, little silt, few coarse sand, few fine gravel, trace clay, 10-20% very fine mica.<br>**- SAPROLITE (GNEISS)-** |
| 30.0 | | 30<br>54 | S7 | 30.0<br>31.0 | 30.0 **Silt With Gravel (ML)**<br>Brown to brownish purple, moist, mostly silt, little to some fine and medium gravel, trace clay, micaceous (20-30% fine to medium mica flakes).<br>**- SAPROLITE (GNEISS) -** |
| 35.0 | | | | | **BOTTOM OF EXPLORATION AT 31.0 FEET.**<br>**Note:** Constant 500 psi down pressure on augers except where noted. |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B104

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B105**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 6/21 | 12 | NE | 30.0 | 31.0 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lb. | |
| HAMMER FALL | | 30 in. | |

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: A Area
ELEVATION: 2770.62
DATE START: 6/21
DATE FINISH: 6/21
DRILLER: B. Maxwell
PREPARED BY: C. Budinger

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>2<br>4<br>6 | S1 | 0.0<br>--<br>2.0 | **Silt (ML)**<br>Reddish-brown, moist, mostly silt, few fine sand, few clay, micaceous, (approximately 25-20% fine mica flakes).<br>**- RESIDUAL SOIL -** |
| 5.0 | | 5<br>7<br>6<br>7 | S2 | 5.0<br>--<br>7.0 | **Silty Sand (SM)**<br>Reddish brown, dry, mostly fine sand, little silt, trace clay, micaceous, (30-40% muscovite and biotite).<br>**- SAPROLITE (SCHIST) -** |
| 10.0 | | 14<br>20<br>26<br>27 | S3 | 10.0<br>--<br>12.0 | **Silty Sand (SM)**<br>Reddish - brown, dry, mostly fine sand, little silt, trace clay, micaceous, (20-25% fine mica and biotite flakes), foliated.<br>**- SAPROLITE (GNEISS) -** |
| 15.0 | | 10<br>27<br>36<br>49 | S4 | 15.0<br>--<br>17.0 | **Silty Sand (SM)**<br>Reddish - brown, dry, mostly fine sand, little silt, trace clay, micaceous, (20-25% fine mica and biotite flakes), foliated. |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

**SIRRINE**
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B105
PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20 | | 28<br>44<br>63<br>55/3 in. | S5 | 20.0<br>--<br>22.0 | **Poorly Graded Sand (SP)**<br>Reddish - brown, dry, fine sand, little silt, trace clay, 30-40% fine mica, trace fine gravel; crumbles.<br><br>**- SAPROLITE (SCHISTOSE GNEISS) -** |
| 25.0 | | 17<br>18<br>28<br>55/5 in. | S6 | 25.0<br>--<br>27.0 | **Poorly Graded Sand (SP)**<br>Increasing mica (50-60%); less sand, grading coarser, 4 zones in S6:<br>1) mostly greenish - gray fine grained mica (foliated)<br>2) reddish - brown / yellow, quartz band, dipping near vertically<br>3) same, separated by thin horizontal fine grained biotite layer<br>4) coarse, dark colored, weathered schist, sandy layer (50-60% sand with 40-50% mica). |
| 30.0 | | 24<br>70/5 in. | S7 | 30.0<br>--<br>31.0 | **Silt With Sand (ML)**<br>Brown and multicolored, dry, mostly silt, little to some fine sand, trace clay, trace fine gravel (qtz), micaceous (40-60% mica and biotite) |
| 35.0 | | | | | **BOTTOM OF EXCAVATION AT 31.0 FEET.** |
| 40.0 | | | | | **Notes:**<br>1. Constant down pressure of 500 psi, except where noted.<br>2. Bulk samples collected from 0 to 15 feet and 15 to 30 feet. These samples were labeled B105A and B105B respectively. |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B105

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B106**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 6/29 | 0.1 | NE | 21.5 | 21.5 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S. | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lbs. | |
| HAMMER FALL | | 30 in. | |

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: D Area
ELEVATION: 2752.08
DATE START: 6/29
DATE FINISH: 6/29
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>3<br>4<br>6 | S1 | 0.0<br>--<br>2.0 | **Poorly Graded Sand (SP)**<br>Light reddish - brown, moist, mostly medium sand, some fine sand, trace silt, good relict fabric.<br>**- SAPROLITE (MUSCOVITE GNEISS) -** |
| 5.0 | | 45<br>50/1 in. | S2 | 5.0<br>5.6 | **Poorly Graded Sand With Silt (SP-SM)**<br>Light reddish - brown, dry, mostly fine sand, little silt, trace medium sand, relict foliation.<br>**- SAPROLITE (MUSCOVITE GNEISS) -**<br>Increase in penetration rate at 7.0 feet. |
| 10.0 | | 40<br>47<br>44<br>40 | S3 | 10.0<br>--<br>11.0 | **Poorly Graded Sand (SP)**<br>Light reddish - brown, dry, mostly fine sand, little medium sand, trace silt, 10% muscovite, good relict foliation. |
| 15.0 | | 12<br>23<br>47<br>34 | S4 | 15.0<br>--<br>17.0 | **Poorly Graded Sand (SP)**<br>Light reddish - brown, dry, mostly fine sand, little medium sand, trace silt, 10% muscovite, poor relict foliation.<br>**- SAPROLITE (MUSCOVITE GNEISS) -**<br>Drop in penetration rate at 19.0 feet. |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B106

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B106



| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 50/3 in. | S5 | | **Poorly Graded Sand (SP)** |
| | | | | | White, dry, mostly medium sand, highly weathered quartzo - feldspathic vein. - SAPROLITE (GNEISS) - |
| | | | | | AUGER REFUSAL AT 21.5 FEET. |
| 25.0 | | | | | |
| 30.0 | | | | | |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B106

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B107**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPROATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

| JOB NO: | G-9083 |
|---|---|
| PAGE NO: | 1 OF 2 |
| LOCATION: | D Area |
| ELEVATION: | 2752.59 |
| DATE START: | 6/29 |
| DATE FINISH: | 6/29 |
| DRILLER: | B. Maxwell |
| PREPARED BY: | M. Sheehan |

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S. |
| 6/30 | 16.25 | NE | 25.0 | 26.9 | SIZE ID | 3 1/4 in. | 1 3/8 in. |
| | | | | | HAMMER WT | | 140 lbs. |
| | | | | | HAMMER FALL | | 30 in. |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>4<br>4<br>5 | S1 | 0.0<br>--<br>2.0 | **Silt (ML)**<br>Reddish - brown, moist, mostly silt, some clay, trace fine sand.<br>**- RESIDUAL SOIL -** |
| 5.0 | | 7<br>9<br>12<br>13 | S2 | 5.0<br>--<br>7.0 | **Silty Sand (SM)**<br>Banded, maroon and light brown, moist, mostly fine sand, some silt, relict gneiss fabric.<br>**- SAPROLITE (GNEISS) -** |
| 10.0 | | 8<br>11<br>26<br>30 | S3 | 10.0<br>--<br>12.0 | **Silty Sand (SM)**<br>Reddish - brown, moist, mostly fine sand, some silt, little muscovite, relict schistose - gneissic fabric. |
| 15.0 | | 12<br>16<br>19<br>27 | S4 | 15.0<br>--<br>17.0 | **Silty Sand (SM)**<br>Reddish - brown, moist, mostly fine sand, some silt, little muscovite, relict schistose - gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B107

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B107
PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 16<br>17<br>22<br>28 | S5 | 20.0<br>--<br>22.0 | **Poorly Graded Sand (SP)**<br>Maroon and light gray, moist, mostly fine sand, trace silt, steeply dipping relict foliation.<br>**- SAPROLITE (MUSCOVITE GNEISS) -** |
| 25.0 | | 24<br>32<br>42<br>55/5 in. | S6 | 25.0<br>--<br>26.9 | **Poorly Graded Sand (SP)**<br>Maroon and light brownish - gray, moist, mostly fine sand, trace silt, 5% muscovite, steeply dipping relict foliation.<br>**- SAPROLITE (GNEISS) -**<br>**BOTTOM OF EXPLORAITON AT 26.9 FEET.** |
| 30.0 | | | | | |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B107

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B108**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: D Area
ELEVATION: 2677.07
DATE START: 6/30
DATE FINISH: 6/30
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 7/5 | 121 | NE | 28.1 | 28.1 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S. | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lbs. | |
| HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2 | S1 | 0.0 | **Well Graded sand (SW)** |
| | | 3 | | -- | Reddish - brown, dry, mostly medium sand, some fine sand, little |
| | | 5 | | | coarse sand, trace muscovite, relict fabric. |
| | | 6 | | 2.0 | **- SAPROLITE (GNEISS) -** |
| 5.0 | | 6 | S2 | 5.0 | **Well Graded Sand (SW)** |
| | | 4 | | -- | Reddish - brown, dry, mostly medium sand, some fine sand, little |
| | | 7 | | | coarse sand, trace muscovite, relict fabric. |
| | | 12 | | 7.0 | |
| 10.0 | | 12 | S3 | 10.0 | **Well Graded Sand (SW)** |
| | | 13 | | -- | Banded, maroon and brownish - gray, moist, mostly medium |
| | | 15 | | | sand, some fine sand, little coarse sand, steeply dipping relict |
| | | 17 | | 12.0 | foliation. |
| 15.0 | | 10 | S4 | 15.0 | **Well Graded Sand (SW)** |
| | | 18 | | -- | Banded, maroon and brownish - gray, moist, mostly medium |
| | | 24 | | | sand, some fine sand, little coarse sand, steeply dipping relict |
| | | 15 | | 17.0 | foliation. |
| | | | | | **- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

**BORING NO. B108**

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B108
PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 18<br>50/5 in. | S5 | 20.0<br>20.75 | **Well Graded Sand (SW)**<br>Maroon and orange - brown, dry, mostly medium sand, some fine sand, little coarse sand, good relict gneiss fabric.<br>**- SAPROLITE (GNEISS) -** |
| 25.0 | | 12<br>24<br>50/5 in. | S6 | 25.0<br>--<br>26.9 | **Well Graded Sand (SW)**<br>Maroon and orange - brown, dry, mostly medium sand, some fine sand, little coarse sand, good relict gneiss fabric. |
| 30.0 | | | | | **Well Graded Sand (SW)**<br>Maroon and orange - brown, dry, mostly medium sand, some fine sand, little coarse sand, good relict gneiss fabric.<br>**- SAPROLITE (GNEISS) -**<br>**AUGER REFUSAL AT 28.1 FEET.** |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B108

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B109**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: D Area
ELEVATION: 2648.41
DATE START: 6/30
DATE FINISH: 6/30
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

? 2736

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S. | |
| 7/5 | 119 | NE | 25.0 | 27.0 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lbs. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>3<br>4<br>10 | S1 | 0.0<br>--<br>2.0 | **Silty Sand (SM)**<br>Brown, moist, mostly fine sand, some silt, trace medium sand, trace muscovite.<br>**- RESIDUAL SOIL -** |
| 5.0 | | 10<br>7<br>6<br>6 | S2 | 5.0<br>--<br>7.0 | **Poorly Graded Sand (SP)**<br>Banded, dark gray and light orange - brown, dry, mostly medium sand, little fine sand, highly weathered biotite forming black laminae.<br>**- SAPROLITE (GNEISS) -** |
| 10.0 | | 15<br>16<br>24<br>21 | S3 | 10.0<br>--<br>12.0 | **Poorly Graded Sand (SP)**<br>Banded, dark gray and light orange - brown, dry, mostly medium sand, little fine sand, highly weathered biotite forming black laminae. |
| 15.0 | | 15<br>12<br>12<br>14 | S4 | 15.0<br>--<br>17.0 | **Poorly Graded Sand (SP)**<br>Banded, light orange - brown and reddish - brown, moist, mostly medium sand, some fine sand, trace silt, pronounced relict schistose / gnessic fabric, moderately fresh muscovite, highly weathered biotite.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY | BLOWS/FT. | CONSISTENCY | SAMPLE ID. | COMPONENT % | GROUND WATER ABBREV. |
|---|---|---|---|---|---|---|
| 0 - 4 | VERY LOOSE | 0 - 2 | VERY SOFT | S SPLIT SPOON | MOSTLY 50 - 100% | WD - WHILE DRILLING |
| 5 - 10 | LOOSE | 3 - 4 | SOFT | T TUBE | SOME 30 - 45% | NE - NOT ENCOUNTERED |
| 11 - 30 | MEDIUM DENSE | 5 - 8 | MEDIUM STIFF | U UNDISTURBED PISTON | LITTLE 15 - 25% | UR - NOT READ |
| 31 - 50 | DENSE | 9 - 15 | STIFF | G GRAB SAMPLE | FEW 5 - 10% | |
| 51+ | VERY DENSE | 16 - 30 | VERY STIFF | X OTHER | TRACE <5% | BORING NO. B109 |
| | | 31+ | HARD | NR NO RECOVERY | | |

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B109



| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 26<br>26<br>24<br>31 | S5 | 20.0<br>--<br>22.0 | **Poorly Graded Sand (SP)**<br>Light orange - brown and light gray, moist, mostly medium sand, some fine sand, trace silt, trace coarse sand, moderate relict schistose / gneiss fabric.<br>**- SAPROLITE (GNEISS) -** |
| 25.0 | | 14<br>10<br>14<br>17 | S6 | 25.0<br>--<br>27.0 | **Poorly Graded Sand (SP)**<br>Light orange - brown and light gray, mosit, mostly medium sand, some fine sand, trace silt, trace coarse sand, moderate relict schistose / gneiss fabric.<br>**- SAPROLITE (GNEISS) -** |
| | | | | | **BOTTOM OF EXPLORATION AT 27.0 FEET.** |
| 30.0 | | | | | **Note:**<br>1. Bulk sample collected off auger flight from 20 to 25 feet. Sample labeled B109. |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B109

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B110**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORTIAON
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: A Area
ELEVATION: 2722.34
DATE START: 6/21
DATE FINISH: 6/21
DRILLER: B. Maxwell
PREPARED BY: C. Budinger

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S. | |
| 6/21 | 12 | NE | 30.0 | 32.0 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lb. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>1<br>3<br>4 | S1 | 0.0<br>--<br>2.0 | **Silt With Sand (ML)**<br>Reddish - brown, moist, mostly silt, little fine sand, few clay, with roots and detritus, 5-10% fine mica.<br>**- RESIDUAL SOIL -** |
| 5.0 | | 6<br>8<br>12<br>14 | S2 | 5.0<br>--<br>7.0 | **Silty Sand (SM)**<br>Reddish - brown, moist, mostly fine sand, little silt, trace clay, some foliation. Slight fabric noted.<br>**- SAPROLITE (GNEISS) -** |
| 10.0 | | 10<br>22<br>28<br>31 | S3 | 10.0<br>--<br>12.0 | **Silt (ML)**<br>Grayish-white to brown, dry, mostly silt, little fine sand, trace clay, micaceous (40-50% mica and biotite). 11.2<br>**Silty Sand (SM)**<br>Brownish-yellow, dry, mostly fine sand, little silt, few clay, 15-20% fine mica. |
| 15.0 | | 17<br>21<br>29<br>22 | S4 | 15.0<br>--<br>17.0 | **Silty Sand (SM)**<br>Brownish - yellow, dry, mostly fine sand, little silt, few clay, trace fine gravel, 10-15% fine mica, vertical foliation and color banding.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B110

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B110
PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20 | | 6<br>12<br>14<br>16 | S5 | 20.0<br>--<br>22.0 | **Silt With Sand (ML)**<br>21.0 Layered orange - brown, dry, mostly silt, little fine sand, trace clay, vertical foliation, micaceous (30-35% fine mica). |
| | | | | | **Silty Sand (SM)**<br>Tan, dry, mostly fine sand, little silt, trace clay, vertical foliation, 5-15% fine grained mica.<br>**- SAPROLITE (SCHIST) -** |
| 25.0 | | 6<br>9<br>14<br>17 | S6 | 25.0<br>--<br>27.0 | **Silt With Sand (ML)**<br>Greenish - brown, moist, mostly silt, little fine sand, few clay, micaceous (50-60% mica flakes). |
| 30.0 | | 10<br>19<br>27<br>60 | S7 | 30.0<br>--<br>32.0 | **Silt With Sand (ML)**<br>Greenish - brown, moist, mostly silt, little fine sand, few clay,<br>31.5 50-60% mica flakes. **- SAPROLITE (SCHIST) -** |
| | | | | | **Silty Sand (SM)**<br>Brownish - orange, moist, mostly fine sand, few coarse sand, little silt, trace clay, trace fine gravel, near vertical bedding (foliations). |
| | | | | | **BOTTOM OF EXPLORATION AT 32.0 FEET.** |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B110

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B111**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 1
LOCATION: A Area
ELEVATION: 2684.55
DATE START: 6/22
DATE FINISH: 6/22
DRILLER: B. Maxwell
PREPARED BY: C. Budinger

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S | |
| 6/22 | 3 | NE | 10.0 | 10.1 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lb. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 10 | | 0.0 | |
| | | 9 | S1 | -- | |
| | | 17 | | | |
| | | 23 | | 2.0 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | 5.0 | |
| 5.0 | | 50/3.5 in | S2 | | |
| | | | | 5.3 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | 10.0 | |
| 10.0 | | 50/2 in. | S3 | | |
| | | | | 10.2 | |
| | | | | | |
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| | | | | | |
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| 15.0 | | | | | |
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| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 20.0 | | | | | |

0.5 **Silt With Sand (ML)**
Brown, moist, mostly silt, little coarse sand, few fine to medium sand, trace to few clay. **- RESIDUAL SOIL -**

**Sand With Gravel (SW)**
Brown to greenish - gray, damp, mostly fine to medium sand, little coarse sand, little fine to coarse gravel, few silt, trace clay, 10-20% fine mica.

**- SAPROLITE (GNEISS) -**

**Silty Sand With Gravel (SM)**
Greenish - brown, red, black, damp, mostly fine to coarse sand, little to some gravel, little silt, trace clay, trace coarse gravel. 20-30% mica, slightly weathered in tact schist, near vertical bedding, iron staining interbeds.
**Note:** Auger penetration has slowed considerably.

**Silty Gravel With Sand (GM)**
Greenish - brown, red, damp, coarse to fine gravel, little fine to coarse sand, little silt.
**Note:** Augers penetrating at 1 inch / minute.

**BOTTOM OF EXPLORATION AT 10.2 FEET.**

**Note:** Auger cuttings are very fine, pulverized rock. Few fine gravel size fragments.

**Note:** Typical penetration rate is about 5 ft. / 3-5 minute.

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B111

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B112**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: D Area
ELEVATION: 2640.78
DATE START: 7/8
DATE FINISH: 7/8
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 7/10 | 54 | NE | 20.0 | 22.0 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lbs. | |
| HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>1<br>2<br>4 | S1 | 0.0<br>--<br>2.0 | **Sandy Silt (ML)**<br>Reddish - brown, moist, mostly silt, some fine sand, little clay, no relict fabric.<br>**- RESIDUAL SOIL -** |
| 5.0 | | 6<br>8<br>12<br>11 | S2 | 5.0<br>--<br>7.0 | **Poorly Graded Sand (SP)**<br>Red - brown, moist, mostly fine sand, few silt, relict schistose / gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 10.0 | | 8<br>12<br>14<br>12 | S3 | 10.0<br>--<br>12.0 | **Well Graded Sand With Gravel (SW)**<br>Light brown and whitish - gray, dry, mostly medium sand, some fine sand, little coarse sand, little fine gravel, predominantly quartz, weathered feldspar. |
| 15.0 | | 7<br>14<br>20<br>21 | S4 | 15.0<br>--<br>17.0 | **Sandy Silt (ML)**<br>Reddish - brown and light brown, moist, mostly silt, some fine sand.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B112

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B112

PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20 | | 11<br>12<br>19<br>16 | S5 | 20.0<br>–<br>22.0 | Sandy Silt (ML)<br>Reddish - brown and light brown, moist, mostly silt, some fine sand, few clay, trace medium sand.<br>- SAPROLITE (GNEISS) - |
| | | | | | BOTTOM OF EXPLORATION AT 22.0 FEET. |
| 25.0 | | | | | |
| 30.0 | | | | | |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B112

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B113**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 3
LOCATION: D Area
ELEVATION: 2677.52
DATE START: 7/6
DATE FINISH: 7/6
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S. | |
| 7/8 | 44 | NE | 48.0 | 50.0 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lbs. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>2<br>4<br>7 | S1 | 0.0<br>--<br>2.0 | **Silty Sand (SM)**<br>Reddish - brown, moist, mostly fine sand, some medium sand, some silt, trace clay, trace muscovite, trace weathered biotite.<br>**- RESIDUAL SOIL -** |
| 5.0 | | 5<br>8<br>10<br>18 | S2 | 5.0<br>--<br>7.0 | **Poorly Graded Sand (SP)**<br>Maroon and light brown, moist, mostly fine sand, few silt, strongly developed relict schistose / gneissic fabric.<br>**- SAPROLITE (GNEISS ) -** |
| 10.0 | | 12<br>20<br>18<br>19 | S3 | 10.0<br>--<br>12.0 | **Poorly Graded Sand (SP)**<br>Maroon and light brown, moist, mostly medium sand, some fine sand, few silt, few muscovite, few partially weathered biotite, good relict schistose / gneissic fabric. |
| 15.0 | | 6<br>11<br>13<br>16 | S4 | 15.0<br>--<br>17.0 | **Poorly Graded Sand (SP)**<br>Maroon and light brown, moist, mostly medium sand, some fine sand, few silt, few muscovite, few partially weathered biotite, good relict schistose / gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B113

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B113



| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20 | | 9<br>13<br>19<br>22 | S5 | 20.0<br>–<br>22.0 | **Poorly Graded Sand (SP)**<br>Maroon and light brown, moist, mostly medium sand, some fine sand, trace silt, few muscovite, few highly weathered biotite, good relict schistose / gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 25.0 | | 6<br>12<br>16<br>15 | S6 | 25.0<br>–<br>27.0 | **Poorly Graded Sand (SP)**<br>Maroon and light brown, moist, mostly medium sand, some fine sand, trace silt, poor relict schistose / gneissic fabric. |
| 30.0 | | 14<br>16<br>26<br>29 | S7 | 30.0<br>–<br>32.0 | **Poorly Graded Sand (SP)**<br>Maroon and brownish - gray, moist, mostly medium sand, some fine sand, few silt, few muscovite, few highly weathered biotite, strong relict schistose / gneissic fabric. |
| 35.0 | | 10<br>17<br>19<br>24 | S8 | 35.0<br>–<br>37.0 | **Poorly Graded Sand (SP)**<br>Maroon and brownish - gray, moist, mostly medium sand, some fien sand, few silt, few silt, few silt, few muscovite, few highly weathered biotite, strong relict schistose / gneissic fabric. |
| 40.0 | | 21<br>29<br>36<br>31 | S9 | 40.0<br>–<br>42.0 | Drop in penetration rate at 39.0 feet.<br>**Poorly Graded Sand (SP)**<br>Maroon and brownish - gray, moist, mostly medium sand, some fine sand, few silt, few muscovite, few highly weathered biotite, strong relict schistose / gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 45.0 | | 12<br>19<br>40<br>36 | S10 | 43.4<br>–<br>45.4 | **Poorly Graded Sand (SP)**<br>Maroon and brownish - gray, moist, mostly medium sand, some fine sand, few silt, 5-10% biotite mica strong relict schistose / gneissic fabric. Temporary auger refusal. split spoon driven to check formation density. |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B113

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B113

PAGE 3 OF 3

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 45.0 | | | | | |
| | | 13 | S11 | 48.0 | **Poorly Graded Sand (SP)** |
| | | 13 | | -- | Maroon and brownish - gray, moist, mostly medium sand, some fine sand, trace silt, few muscovite, few lightly weathered biotite, strong relict schistose / gneissic fabic. |
| | | 16 | | | |
| 50.0 | | 22 | | 50.0 | - SAPROLITE (GNEISS) - |
| | | | | | BOTTOM OF EXPLORATION AT 50.0 FEET. |
| 55.0 | | | | | |
| 60.0 | | | | | |
| 65.0 | | | | | |
| 70.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B113

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B114**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: D Area
ELEVATION: 2632.26
DATE START: 7/7
DATE FINISH: 7/7
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 7/8 | 22.25 | NE | 30.0 | 31.5 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S. | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lbs. | |
| HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>3<br>8<br>8 | S1 | 0.0<br>--<br>2.0 | **Poorly Graded Sand With Silt and Gravel (SP_SM)**<br>Maroon and black, dry, mostly fine sand, some fine gravel (partially weathered, rock fragments), little silt.<br>**- RESIDUAL SOILS -**<br><br>Moderately resistant soils from 0 to 5.0 ft. |
| 5.0 | | 12<br>10<br>17<br>16 | S2 | 5.0<br>--<br>7.0 | **Poorly Graded Sand (SP)**<br>Orange - brown to grayish - maroon, moist, mostly fine sand, few medium sand and fine gravel, trace silt, good relict schistose / gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 10.0 | | 17<br>19<br>19<br>18 | S3 | 10.0<br>--<br>12.0 | **Poorly Graded Sand With Gravel (SP)**<br>Orange - brown to grayish - maroon, moist, mostly fine sand, some fine gravel (weathered rock fragments), few medium sand, good relict schistose / gneissic fabric. |
| 15.0 | | 12<br>11<br>12<br>16 | S4 | 15.0<br>--<br>17.0 | **Poorly Graded Sand (SP)**<br>Orange - brown and light gray, moist, mostly medium sand, some fine sand, trace coarse sand, moderate relict schistose / gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B114

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B114



| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20 | | 9<br>10<br>26<br>27 | S5 | 20.0<br>–<br>22.0 | **Poorly Graded Sand (SP)**<br>Orange - brown and light gray, moist, mostly fine sand, few medium sand, few silt, poor relict fabric. |
| | | | | | Down pressure 700-900 psi for 22 to 23.5 feet. |
| 25.0 | | 10<br>21<br>29<br>27 | S6 | 25.0<br>–<br>27.0 | **Poorly Graded Sand (SP)**<br>Reddish - brown and yellow - brown, moist, mostly fine sand, some medium sand, trace silt and coarse sand, moderate schistose / gneissic fabric. |
| | | | | | 26 to 30 feet drilled at 600 to 800 psi, some fine gravel in cuttings. |
| 30.0 | | 27<br>40<br>50/3 in. | S7 | 30.0<br>–<br>31.5 | **Poorly Graded Sand (SP)**<br>Reddish - brown and yellow - brown, moist, mostly fine sand, some medium sand, few silt, good relict schistose / gneissic fabric. |
| | | | | | - SAPROLITE (GNEISS) - |
| | | | | | **BOTTOM OF EXPLORATION AT 31.5 FEET.** |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 29% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. | |
|---|---|
| WD | WHILE DRILLING |
| NE | NOT ENCOUNTERED |
| UR | NOT READ |

BORING NO. B114

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B115**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 1
LOCATION: D Area
ELEVATION: 2595.97
DATE START: 7/7
DATE FINISH: 7/7
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 7/7 | 0.1 | 3.5 | 15.0 | 15.0 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S. | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lbs. | |
| HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 6<br>6<br>7<br>6 | S1 | 0.0<br>--<br>2.0 | **Sandy Silt (ML)**<br>Reddish - brown, moist, mostly silt, some fine sand, few clay.<br>**- COLLUVIUM -** |
| | | 3<br>2<br>3 | S2 | 2.0<br>--<br>3.5 | **Organic Soil (OL/OH)**<br>Gray - brown, wet, mostly organic silt, some clay<br>**- ALLUVIUM -** |
| | | 3<br>1<br>2 | S3 | 3.5<br>--<br>5.0 | **Silty Sand (SM)**<br>Dark gray - brown, wet, mostly fine sand, some silt (organic rich).<br>**- ALLUVIUM -** |
| 5.0 | | 1<br>1<br>2<br>1 | S4 | 5.0<br>--<br>7.0 | **Poorly Graded Sand With Silt (SP-SM)**<br>Gray, wet, mostly fine sand, some medium sand, little silt, trace coarse sand.<br>7.0 **- ALLUVIUM -** |
| | | 1 FOR<br>1 FOOT<br>1 | S5 | 7.0<br>--<br>8.5 | **Silty Sand (SM)**<br>Greenish - brown, wet, mostly fine sand, some silt, poor relict fabric.<br>**- RESIDUAL SOIL -** |
| | | 3<br>5<br>8 | S6 | 8.5<br>--<br>10.0 | **Silty Sand (SM)**<br>Orange - brown, wet, mostly fine sand, some silt, trace medium sand, poor relict fabric.<br>**- RESIDUAL SOIL -** |
| 10.0 | | 1<br>2<br>3<br>2 | S7 | 10.0<br>--<br>12.0 | **Silty Sand (SM)**<br>Orange - brown, wet, mostly fine sand, some silt, trace medium sand, poor relict fabric.<br>**- RESIDUAL SOIL -** |
| | | | T1 | NR | Shelby tube attempted 12.0 - 12.3 feet. Tube bent at 800 psi down pressure. NR indicates No Recovery. |
| | | 45<br>50 | S8 | 13.5<br>--<br>14.5 | **Poorly Graded Sand With Gravel (SP)**<br>Reddish - brown and yellow - brown, wet, mostly fine sand, some fine gravel (quartz lenses), some medium sand.<br>**- RESIDUAL SOIL -** |
| 15.0 | | | | | **AUGER REFUSAL AT 15 FEET.** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B115

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B116**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 7/12 | 50 | NE | 35.0 | 36.5 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S. | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lbs. | |
| HAMMER FALL | | 30 in. | |

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: D Area
ELEVATION: 2766.74
DATE START: 7/10
DATE FINISH: 7/10
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 1<br>2<br>2<br>6 | S1 | 0.0<br>--<br>2.0 | **Elastic Silt (MH)**<br>Reddish - brown, moist, mostly silt, some clay, trace fine sand.<br>**- RESIDUAL SOILS -** |
| 5.0 | | 8<br>7<br>13<br>10 | S2 | 5.0<br>--<br>7.0 | **Silty Sand (SM)**<br>Reddish - brown and yellow - brown, moist, mostly fine sand, some silt, little muscovite, good relict schistose / gneissic fabric, highly weathered biotite (approximately 5%).<br>**- SAPROLITE (GNEISS) -** |
| 10.0 | | 9<br>10<br>15<br>19 | S3 | 10.0<br>--<br>12.0 | **Sandy Silt (ML)**<br>Reddish - brown and yellow - brown, moist, mostly silt, some fine sand, little muscovite, good relict schistose / gneissic fabric, highly weathered biotite. |
| 15.0 | | 16<br>26<br>28<br>37 | S4 | 15.0<br>--<br>17.0 | **Sandy Silt (ML)**<br>Reddish - brown and yellow - brown, moist, mostly silt, some fine sand, little muscovite, good relict schistose / gneissic fabric, highly weathered brotite.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B116

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B116
PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20 | | 21<br>24<br>33<br>38 | S5 | 20.0<br>--<br>22.0 | **Silty Sand (SM)**<br>Yellow - brown and reddish - brown, moist, mostly fine sand, some silt, moderate relict schistose / gneissic fabric. |
| 25.0 | | 17<br>25<br>36<br>29 | S6 | 25.0<br>--<br>27.0 | **Silty Sand (SM)**<br>Yellow - brown and reddish - brown, moist, mostly fine sand, some silt, trace medium sand, good relict schistose / gneissic fabric. |
| 30.0 | | 12<br>25<br>35<br>50/5.5 in | S7 | 30.0<br>--<br>31.9 | **Silty Sand (SM)**<br>Yellow - brown and reddish - brown, moist, mostly fine sand, some silt, good relict schistose / gneissic fabric<br><br>Down pressure increased to 700 psi at 33.0 feet. |
| 35.0 | | 24<br>38<br>50/5 in. | S8 | 35.0<br>--<br>36.5 | **Silty Sand (SM)**<br>Yellow - brown and reddish - brown, moist, mostly fine sand, some silt, good relict schistose / gneissic fabric.<br>**- SAPROLITE (GNEISS) -**<br>**AUGER REFUSAL AT 36.5 FEET.** |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B116

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B117**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: D Area
ELEVATION: 2699.37
DATE START: 7/10
DATE FINISH: 7/10
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 7/11 | 11.42 | NE | 30.0 | 32.0 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S. | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lbs. | |
| HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>2<br>5<br>8 | S1 | 0.0<br>--<br>2.0 | **Silty Sand (SM)**<br>Reddish - brown, moist, mostly fine sand, little silt.<br>**- RESIDUAL SOILS -** |
| 5.0 | | 11<br>12<br>16<br>17 | S2 | 5.0<br>--<br>7.0 | **Silty Sand (SM)**<br>Dark gray and reddish - brown, moist, mostly fine sand, little silt, poor relict fabric.<br>**- SAPROLITE (GNEISS) -** |
| 10.0 | | 18<br>17<br>20<br>18 | S3 | 10.0<br>--<br>12.0 | **Silty Sand (SM)**<br>Dark gray and reddish - brown, moist, mostly fine sand, little silt, moderate to relict schistose / gneissic fabric. |
| 15.0 | | 27<br>21<br>26<br>29 | S4 | 15.0<br>--<br>17.0 | **Silty Sand (SM)**<br>Light whitish - gray, dry, mostly fine sand, some silt, trace medium sand, trace muscovite and biotite, moderate to weak foliation, predominately quartz and highly weathered feldspar.<br>**- SAPROLITE (GNEISS ) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B117

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B117
PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 18<br>15<br>23<br>24 | S5 | 20.0<br>--<br>22.0 | **Sandy Silt (ML)**<br>Banded whitish - gray and orange - brown, moist, mostly silt, some fine sand, good relict gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 25.0 | | 11<br>9<br>16<br>18 | S6 | 25.0<br>--<br>27.0 | **Silty Sand (SM)**<br>Irregularly banded, whitish - gray and orange - brown, moist, mostly fine sand, some silt, good relict gneissic fabric. |
| 30.0 | | 14<br>13<br>22<br>27 | S7 | 30.0<br>--<br>32.0 | **Sandy Silt (ML)**<br>Irregularly banded, light orange - brown and grayish - brown, moist, mostly silt, little fine sand, good relict gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| | | | | | **BOTTOM OF EXPLORATION AT 32.0 FEET.** |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B117

# SIRRINE
ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B118**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 2
LOCATION: E Area
ELEVATION: 2693.44
DATE START: 7/12
DATE FINISH: 7/12
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE | TYPE | HSA | S. | |
| 7/12 | 0.5 | NE | 30.0 | 31.5 | SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| | | | | | HAMMER WT | | 140 lbs. | |
| | | | | | HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2<br>2<br>3<br>3 | S1 | 0.0<br>--<br>2.0 | **Sandy Silt (ML)**<br>Reddish - brown, moist, mostly silt, little fine sand, trace medium sand, few cly.<br>**- RESIDUAL SOIL -** |
| 5.0 | | 15<br>17<br>23<br>18 | S2 | 5.0<br>--<br>7.0 | **Silty Sand (SM)**<br>Reddish - brown and orange - brown, moist, mostly fine sand, little silt, trace medium sand, good relict gneissic fabric. |
| 10.0 | | 11<br>11<br>15<br>18 | S3 | 10.0<br>--<br>12.0 | **Silty Sand (SM)**<br>Reddish - brown and orange - brown, moist, mostly fine sand, some silt, little fine muscovite, good relict gneissic fabric. |
| 15.0 | | 11<br>12<br>22<br>24 | S4 | 15.0<br>--<br>17.0 | **Silty Sand (SM)**<br>Reddish - brown and orange - brown, moist, mostly fine sand, some silt.<br>**- SAPROLITE (GNEISS) -** |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B118

PAGE 2 OF 2

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 19<br>15<br>30<br>29 | S5 | 20.0<br>--<br>22.0 | Silty Sand (SM)<br>Orange - brown and reddish - brown, moist, mostly fine sand, some silt, good relict gneissic fabric.<br>- SAPROLITE (GNEISS) - |
| 25.0 | | 17<br>23<br>34<br>31 | S6 | 25.0<br>--<br>27.0 | Poorly Graded Sand With Gravel (SP)<br>Whitish - gray, dry, mostly fien sand, little gravel (predominantly quartz and feldspar), few silt.<br>- SAPROLITE (GNEISS) - |
| 30.0 | | 29<br>48<br>50/5 in. | S7 | 30.0<br>--<br>31.5 | Poorly Graded Sand (SP)<br>Whitish - gray to light orange - brown, moist, mostly fine sand, few silt.<br>AUGER REFUSAL AT 33.3 FEET. |
| 35.0 | | | | | |
| 40.0 | | | | | |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B118

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

**BORING NO. B119**

PROJECT: LANDFILL No. 6 EXPANSION
CLIENT: CHAMPION INTERNATIONAL CORPORATION
CONTRACTOR: FROEHLING & ROBERTSON
EQUIPMENT USED: CME55 MOUNTED ON ARDCO ATV

JOB NO: G-9083
PAGE NO: 1 OF 3
LOCATION: E Area
ELEVATION: 2668.20
DATE START: 7/12
DATE FINISH: 7/12
DRILLER: B. Maxwell
PREPARED BY: M. Sheehan

| GROUND WATER | | DEPTH TO: (ft.) | | |
|---|---|---|---|---|
| DATE | HRS AFTER COMP | WATER | BOTTOM OF CASING | BOTTOM OF HOLE |
| 7/12 | 19.1 | 43.2 | 48.0 | 49.9 |
| | | | | |
| | | | | |

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | S. | |
| SIZE ID | 3 1/4 in. | 1 3/8 in. | |
| HAMMER WT | | 140 lbs. | |
| HAMMER FALL | | 30 in. | |

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| | | 2 | | 0.0 | **Sandy Silt (ML)** |
| | | 1 | | | Reddish - brown, moist, mostly silt, , some clay, little fine sand. |
| | | 4 | S1 | -- | |
| | | 4 | | 2.0 | **- RESIDUAL SOILS -** |
| 5.0 | | 9 | | 5.0 | **Silty Sand (SM)** |
| | | 7 | | | Reddish - brown, moist, mostly fine sand, some silt, few clay. |
| | | 11 | S2 | -- | |
| | | 11 | | 7.0 | **- RESIDUAL SOILS -** |
| | | | | | 6 to 8 feet drilled at 700 psi down pressure. |
| 10.0 | | 12 | | 10.0 | **Poorly Graded Sand (SP)** |
| | | 14 | | | Light pinkish - gray, dry, fine sand, poor relict fabric. |
| | | 19 | S3 | -- | |
| | | 23 | | 12.0 | **- SAPROLITE (GNEISS) -** |
| 15.0 | | 10 | | 15.0 | **Silty Sand (SM)** |
| | | 15 | | | 15.5 Grayish - brown and reddish - brown, moist, mostly fine sand, |
| | | 23 | S4 | -- | some silt, moderate relict fabric, no foliation. **SAPROLITE (GNEISS) -** |
| | | 19 | | 17.0 | |
| 20.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B119



| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 20.0 | | 19<br>17<br>20<br>27 | S5 | 20.0<br>--<br>22.0 | **Silty Sand (SM)**<br>Banded, orange - brown and reddish - brown, moist, mostly fine sand, little silt, moderate relict gneissic fabric.<br>**- SAPROLITE (GNEISS) -**<br>22 to 25 feet drilled at 600-900 psi down pressure. |
| 25.0 | | 17<br>19<br>31<br>41 | S6 | 25.0<br>--<br>27.0 | **Silty sand (SM)**<br>Gray - brown, moist, mostly fine sand, some silt, few fine muscovite.<br>25 to 30 feet drilled at 500-700 psi down pressure. |
| 30.0 | | 23<br>28<br>45<br>50/4 in. | S7 | 30.0<br>--<br>31.9 | **Silty Sand (SM)**<br>Gray - brown, moist, mostly fine sand, little silt, trace medium sand, thin (<0.5 cm) widely spaced quartz veins, trace fine muscovite.<br>**- SAPROLITE (GNEISS) -**<br>30-33 feet drilled at 500-900 psi down pressure.<br>33-34 feet drilled at 1000 psi down pressure. |
| 35.0 | | 50/5 in. | S8 | 35.0<br>35.5 | **Silty Sand (SM)**<br>Gray - brown, moist, mosty fine sand, some silt.<br>35-40 feet drilled at 600-900 psi down pressure. |
| 40.0 | | 26<br>19<br>22<br>22 | S9 | 40.0<br>--<br>42.0 | **Silty Sand (SM)**<br>Gray - brown, moist, mostly fine sand, some silt moderate relict gneissic fabric.<br>**- SAPROLITE (GNEISS) -** |
| 45.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. | |
|---|---|
| WD - WHILE DRILLING | |
| NE - NOT ENCOUNTERED | |
| UR - NOT READ | |

BORING NO. B119

# SIRRINE

ENVIRONMENTAL CONSULTANTS

# TEST BORING REPORT

BORING NO. B119

PAGE 3 OF 3

| DEPTH IN FEET | CASING BLOWS PER FOOT | SAMPLER BLOWS PER 6 INCHES | SAMPLE NUMBER | SAMPLE DEPTH RANGE | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|
| 45.0 | | 21<br>20<br>32<br>29 | S11 | 45.0<br>--<br>47.0 | **Sandy Silt (ML)**<br>Gray - brown, moist, mostly silt, some fine sand, moderate relict fabric, few fine muscovite.<br><br>45-50 feet drilled at 600-900 psi, very low penetration rate. |
| | | 21<br>21<br>45<br>50/5 in. | S11 | 48.0<br>--<br>49.9 | **Silty Sand (SM)**<br>Gray - brown, moist, mostly fine sand, little silt, moderate relict fabric.<br>- SAPROLITE (GNEISS) - |
| 50.0 | | | | | **BOTTOM OF EXPLORATION AT 49.9 FEET.** |
| 55.0 | | | | | |
| 60.0 | | | | | |
| 65.0 | | | | | |
| 70.0 | | | | | |

| BLOWS/FT. | DENSITY |
|---|---|
| 0 - 4 | VERY LOOSE |
| 5 - 10 | LOOSE |
| 11 - 30 | MEDIUM DENSE |
| 31 - 50 | DENSE |
| 51+ | VERY DENSE |

| BLOWS/FT. | CONSISTENCY |
|---|---|
| 0 - 2 | VERY SOFT |
| 3 - 4 | SOFT |
| 5 - 8 | MEDIUM STIFF |
| 9 - 15 | STIFF |
| 16 - 30 | VERY STIFF |
| 31+ | HARD |

| SAMPLE ID. | |
|---|---|
| S | SPLIT SPOON |
| T | TUBE |
| U | UNDISTURBED PISTON |
| G | GRAB SAMPLE |
| X | OTHER |
| NR | NO RECOVERY |

| COMPONENT % | |
|---|---|
| MOSTLY | 50 - 100% |
| SOME | 30 - 45% |
| LITTLE | 15 - 25% |
| FEW | 5 - 10% |
| TRACE | <5% |

| GROUND WATER ABBREV. |
|---|
| WD - WHILE DRILLING |
| NE - NOT ENCOUNTERED |
| UR - NOT READ |

BORING NO. B119

## APPENDIX B

## SEC AUGER PROBE SUMMARIES

Soil descriptions noted on the logs are based on visual / manual soil identification techniques conducted in the field by a trained geologist. Soils were classified in accordance with the Unified Soil Classification System and procedures described in ASTM D-2487 and D-2488.

Symbols

Abrupt strata change or bottom of exploration: _____

Inferred or gradational strata change: _____ _____ _____ _____ _____

SIRRINE ENVIRONMENTAL CONSULTANTS

# TEST PROBE SUMMARY

JOB NUMBER G-9083

PROJECT Landfill No. 6 Expansion

PAGE 1 OF 6

LOCATION Canton, N. C.

PROBE TYPE Solid Flight Auger

CLIENT Champion International Corporation

DATE 6/20 thru 6/26/89

CONTRACTOR Froehling and Robertson

DRILLER Bob Maxwell

EQUIPMENT USED CME 55 / ARDCO ATV Carrier

GEOLOGIST C. Budinger

| PROBE NUMBER | GROUND SURFACE ELEV (FT) | DEPTH (FT) FROM | DEPTH (FT) TO | MATERIALS ENCOUNTERED | DEPTH TO WATER (FT) | REMARKS |
|---|---|---|---|---|---|---|
| AP1 | 2720.53 | 0.0 | 33.0 | Silt With Sand (ML) | NE | Bottom of Exploration at 35 feet. |
| | | 33.0 | 35.0 | Silty Sand (SM) | | Bulk sample collected from 20 to 35 feet. |
| AP2 | 2717.33 | 0.0 | 3.0 | Clayey Silt (ML) | NE | Bottom of Exploration at 30 feet. |
| | | 3.0 | 30.0 | Silty Sand (SM) | | Drilling becoming difficult; rock fragments frequent in returns. |
| AP3 | 2705.54 | 0.0 | 27.0 | Silt (ML) | NE | Bottom of Exploration at 30 feet. |
| | | 27.0 | 30.0 | Silt With Sand (ML) | | Bulk sample collected from 14 to 20 feet. |
| AP4 | 2674.96 | 0.0 | 14.0 | Silt With Sand (ML) | NE | Auger refusal at 32.0 feet. |
| | | 14.0 | 32.0 | Gravel With Silt and Sand (GW-GM) | | |
| AP5 | 2690.27 | 0.0 | 30.0 | Silt With Sand (ML) | NE | Bottom of Exploration at 30 feet. |
| | | | | | | Bulk sample collected from 0-18 feet. |
| AP6 | 2706.69 | 0.0 | 28.0 | Silt (ML) | NE | Bottom of Exploration at 30 feet. |
| | | 28.0 | 30.0 | Gravel With Silt (GW-GM) | | |
| AP7 | 2701.93 | 0.0 | 30.0 | Silt With Sand (ML) | NE | Bottom of Exploration at 30 feet. |
| AP8 | 2691.40 | 0.0 | 14.0 | Silt With Sand | | |
| | | 0.0 | 27.0 | Sandy Silt | NE | Auger refusal at 27 feet. |

ADDITIONAL NOTES:
- Borings drilled with 4.25 inch O. D. Solid Flight Augers using a tungsten carbide rock head.
- NE indicates Not Encountered

# SIRRINE ENVIRONMENTAL CONSULTANTS

**TEST PROBE SUMMARY**

JOB NUMBER G-9083

PROJECT Landfill No. 6 Expansion

PAGE 2 OF 6

LOCATION Canton, N. C.

PROBE TYPE Solid Flight Auger

CLIENT Champion International Corporation

DATE 6/20 thru 6/26/89

CONTRACTOR Froehling and Robertson

DRILLER Bob Maxwell

EQUIPMENT USED CME 55 / ARDCO ATV Carrier

GEOLOGIST C. Budinger M. Sheehan

| PROBE NUMBER | GROUND SURFACE ELEV (FT) | DEPTH (FT) FROM | DEPTH (FT) TO | MATERIALS ENCOUNTERED | DEPTH TO WATER (FT) | REMARKS |
|---|---|---|---|---|---|---|
| AP9 | 2689.29 | 0.0 | 9.0 | Silty Sand (SM) | NE | Auger refusal at 9 feet. |
| AP10 | 2682.25 | 0.0 | 16.0 | Silty Sand (SM) | NE | Bottom of Exploration at 30 feet. |
| | | 16.0 | 30.0 | Sand (SP) | | |
| AP11 | 2683.61 | 0.0 | 3.0 | Silty Sand (SM) | NE | Refusal at 8 feet. |
| | | 3.0 | 8.0 | Silty Sand With Gravel (SM) | | |
| AP12 | 2683.64 | 0.0 | 3.0 | Silty Sand (SM) | NE | Refusal at 17.5 feet. |
| | | 3.0 | 17.5 | Silty Sand With Gravel (SM) | | |
| AP13 | 2681.58 | 0.0 | 25.0 | Silty Sand (SM) | NE | Refusal at 25.0 feet. |
| AP14 | 2725.82 | 0.0 | 33.5 | Silty Sand (SM) | NE | Refusal at 43.5 feet. |
| | | 33.5 | 43.5 | Poorly Graded Sand With Silt (SP-SM) | | Bulk sample collected from 28.5 - 38.5 feet. |
| AP15 | 2755.53 | 0.0 | 30.0 | Poorly Graded Sand With Silt (SP-SM) | NE | Bottom of Exploration at 30 feet. |
| AP16 | 2729.32 | 0.0 | 18.5 | Silty Sand (SM) | NE | Bottom of Exploration at 30 feet. |
| | | 18.5 | 30.0 | Poorly Graded Sand (SP) | | Bulk sample collected from 15 to 20 feet. |
| AP17 | 2747.66 | 0.0 | 30.5 | Silty Sand (SM) | NE | Bottom of Exploration at 30.5 feet. |
| AP18 | 2668.07 | 0.0 | 30.0 | Poorly Graded Sand (SP) | NE | Bottom of Exploration at 30 feet. |
| | | | | | | Bulk sample collected from 18.5 to 23.5 feet. |

ADDITIONAL NOTES:
- Borings drilled with 4.25 inch O. D. Solid Flight Augers using a tungsten carbide rock head.
- NE indicates Not Encountered

SIRRINE ENVIRONMENTAL CONSULTANTS

# TEST PROBE SUMMARY

JOB NUMBER G-9083

PROJECT Landfill No. 6 Expansion

PAGE 3 OF 6

LOCATION Canton, N. C.

PROBE TYPE Solid Flight Auger

CLIENT Champion International Corporation

DATE 6/27 thru 7/13/89

CONTRACTOR Froehling and Robertson

DRILLER Bob Maxwell

EQUIPMENT USED CME 55 / ARDCO ATV Carrier

GEOLOGIST C. Budinger / M. Sheehan

| PROBE NUMBER | GROUND SURFACE ELEV (FT) | DEPTH (FT) FROM | DEPTH (FT) TO | MATERIALS ENCOUNTERED | DEPTH TO WATER (FT) | REMARKS |
|---|---|---|---|---|---|---|
| AP19 | 2648.31 | 0.0 | 13.5 | Silty Sand (SM) | NE | Refusal at 17 feet. |
| | | 13.5 | 17.0 | Silty Sand with Gravel (SM) | | |
| AP20 | 2644.22 | 0.0 | 18.5 | Silty Sand (SM) | NE | Refusal at 20.2 feet. |
| | | 18.5 | 20.2 | Silty Gravel With Sand (GM) | | |
| AP21 | 2651.08 | 0.0 | 13.5 | Poorly Graded Sand With Silt (SP-SM) | NE | Refusal at 28 feet. |
| | | 13.5 | 28.0 | Poorly Graded Sand With Gravel (SP) | | |
| AP22 | 2779.22 | 0.0 | 26.0 | Silty Sand (ML) | NE | Refusal at 28 feet. |
| | | 33.5 | 43.5 | Poorly Graded Sand With Gravel (SP) | | Bulk sample collected from 13.5-23.5 feet. |
| AP23 | 2784.71 | 0.0 | 23.5 | Silty Sand (SM) | NE | Refusal at 33 feet. |
| | | 23.5 | 33.0 | Silty Sand With Gravel (SM) | | |
| AP24 | 2774.68 | 0.0 | 36.0 | Silty Sand (SM) | NE | Refusal at 38. feet. |
| | | 36.0 | 38.0 | Poorly Graded Sand With Gravel (SP) | | |
| AP25 | 2757.92 | 0.0 | 18.0 | Silty Sand (SM) | NE | Refusal at 32 feet. |
| | | 18.0 | 32.0 | Poorly Graded Sand With Gravel (SP) | | |

ADDITIONAL NOTES:
- Borings drilled with 4.25 inch O. D. Solid Flight Augers using a tungsten carbide rock head.
- NE indicates Not Encountered

SIRRINE ENVIRONMENTAL CONSULTANTS

# TEST PROBE SUMMARY

JOB NUMBER G-9083

PROJECT Landfill No. 6 Expansion

PAGE 4 OF 6

LOCATION Canton, N. C.

PROBE TYPE Solid Flight Auger

CLIENT Champion International Corporation

DATE 6/27 thru 7/13/89

CONTRACTOR Froehling and Robertson

DRILLER Bob Maxwell

EQUIPMENT USED CME 55 / ARDCO ATV Carrier

GEOLOGIST C. Budinger
M. Sheehan

| PROBE NUMBER | GROUND SURFACE ELEV (FT) | DEPTH (FT) FROM | DEPTH (FT) TO | MATERIALS ENCOUNTERED | DEPTH TO WATER (FT) | REMARKS |
|---|---|---|---|---|---|---|
| AP26 | 2786.91 | 0.0 | 16.0 | Poorly Graded Sand (SP) | NE | Bottom of Exploration at 20 feet. |
| | | 16.0 | 20.0 | Poorly Graded Sand With Silt (SP-SM) | | |
| AP27 | 2747.26 | 0.0 | 8.5 | Silty Sand (ML) | NE | Bottom of Exploration at 40 feet. |
| | | 8.5 | 23.5 | Silty Sand (SM) | | |
| | | 23.5 | 40.0 | Poorly Graded Sand With Silt And Gravel (SP-SM) | | |
| AP28 | 2716.94 | 0.0 | 43.0 | Poorly Graded Sand With Silt And Gravel (SP-SM) | NE | Refusal at 43 feet. Bulk sample collected from 28.5 to 40 feet. |
| AP29 | 2675.33 | 0.0 | 15.0 | Silty Sand (SM) | NE | Bottom of Exploration at 15 feet. |
| AP30 | 2692.09 | 0.0 | 14.0 | Silty Sand (SM) | NE | Bottom of Exploration at 25 feet. |
| | | 14.0 | 25.0 | Poorly Graded Sand With Silt And Gravel (SP-SM) | | |
| AP31 | 2694.71 | 0.0 | 30.0 | Poorly Graded Sand With Silt (SP-SM) | NE | Bottom of Exploration at 30 feet. Bulk sample collected from 20-30 feet. |
| AP32 | 2681.26 | 0.0 | 38.0 | Poorly Graded Sand (SP) | NE | Refusal at 38 feet. Bulk samples collected 10-20 and from 30-38 feet. |
| AP33 | 2687.81 | 0.0 | 48.4 | Poorly Graded Sand (SP) | NE | Refusal at 48.4 feet. |

ADDITIONAL NOTES:
- Borings drilled with 4.25 inch O. D. Solid Flight Augers using a tungsten carbide rock head.
- NE indicates Not Encountered

# SIRRINE ENVIRONMENTAL CONSULTANTS

## TEST PROBE SUMMARY

JOB NUMBER G-9083

PROJECT Landfill No. 6 Expansion

LOCATION Canton, N. C.

CLIENT Champion International Corporaiton

CONTRACTOR Froehling and Robertson

EQUIPMENT USED CME 55 / ARDCO ATV Carrier



PROBE TYPE Solid Flight Auger

DATE 6/27 thru 7/13/89

DRILLER Bob Maxwell

GEOLOGIST C. Budinger, M. Sheehan

| PROBE NUMBER | GROUND SURFACE ELEV (FT) | DEPTH (FT) FROM | DEPTH (FT) TO | MATERIALS ENCOUNTERED | DEPTH TO WATER (FT) | REMARKS |
|---|---|---|---|---|---|---|
| AP34 | 2699.86 | 0.0 | 33.0 | Poorly Graded Sand (SP) | NE | Refusal at 33 feet. |
| AP35 | 2651.54 | 0.0 | 45.0 | Silty Sand (SM) | NE | Bottom of Exploration at 45 feet. |
| AP36 | 2633.81 | 8.5 | 18.5 | Poorly Graded Sand With Silt | NE | Bottom of Exploration at 18.5 feet. |
| | | | | | | Bulk sample collected from 8.5-18.5 feet. |
| AP37 | 2648.69 | 0.0 | 25.5 | Silty Sand (SM) | NE | Bottom of Exploration at 25.5 feet. |
| AP38 | 2653.28 | 0.0 | 8.5 | Silty Sand (SM) | NE | Bottom of Exploration at 25 feet. |
| | | 8.5 | 18.5 | Silty Sand (SM) | | Bulk sample collected from 15-25 feet. |
| | | 18.5 | 25.0 | Silty Sand With Gravel (SM) | | |
| AP39 | 2673.35 | 0.0 | 4.5 | Sandy Silt (ML) | NE | Refusal at 4.5 feet. |
| | | | | | | Refusal at 4.5 feet on second attempt located 25 feet south. |
| AP40 | 2675.14 | 0.0 | 50.0 | Silty Sand (SM) | NE | Bottom of Exploration at 50 feet. |
| AP41 | 2690.67 | 0.0 | 23.75 | Silty Sand (SM) | NE | Bottom of Exploration at 40 feet. |
| | | 23.75 | 40.0 | Poorly Graded Sand With Silt (SP-SM) | | |
| AP42 | 2721.56 | 0.0 | 23.5 | Silty Sand (SM) | NE | Refusal at 27.3 feet. |
| | | 23.5 | 40.0 | Silty Sand With Gravel (SM) | | |

ADDITIONAL NOTES:
- Borings drilled with 4.25 inch O. D. Solid Flight Augers using a tungsten carbide rock head.
- NE indicates Not Encountered

SIRRINE ENVIRONMENTAL CONSULTANTS

# TEST PROBE SUMMARY

JOB NUMBER G-9083

PROJECT Landfill No. 6 Expansion

PAGE 6 OF 6

LOCATION Canton, N. C.

PROBE TYPE Solid Flight Auger

CLIENT Champion International Corporation

DATE 6/27 thru 7/13/89

CONTRACTOR Froehling and Robertson

DRILLER Bob Maxwell

EQUIPMENT USED CME 55 / ARDCO ATV Carrier

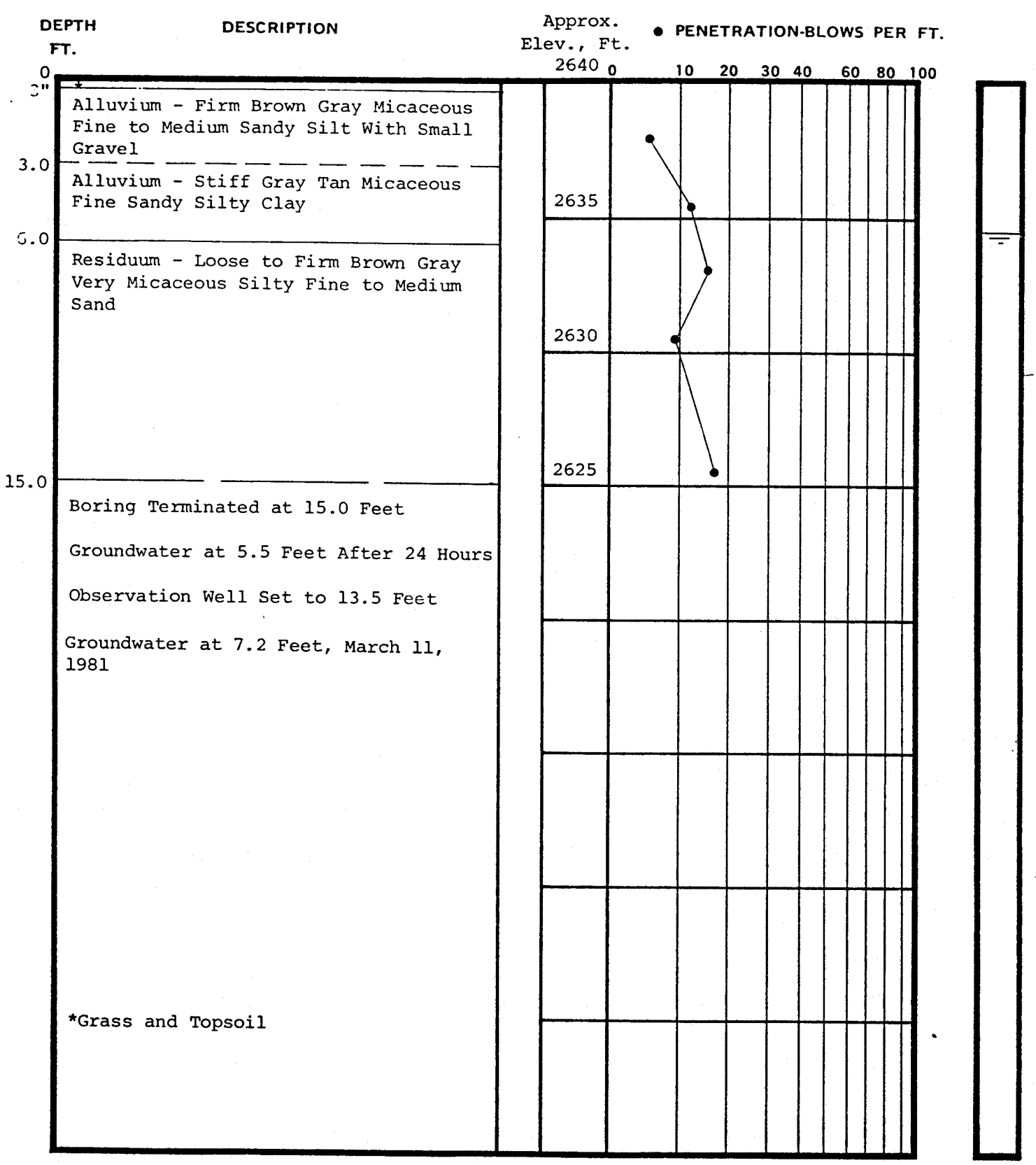
GEOLOGIST C. Budinger
M. Sheehan

| PROBE NUMBER | GROUND SURFACE ELEV (FT) | DEPTH (FT) FROM | DEPTH (FT) TO | MATERIALS ENCOUNTERED | DEPTH TO WATER (FT) | REMARKS |
|---|---|---|---|---|---|---|
| AP43 | 2735.69 | 0.0 | 33.7 | Silty Sand (SM) | NE | Refusal at 38.7 feet. |
| | | 33.7 | 38.7 | Silty Sand With Gravel (SM) | | |
| AP44 | 2689.80 | 0.0 | 20.0 | Silty Sand (SM) | NE | Refusal at 20 feet. |
| AP45 | 2725.07 | 0.0 | 28.3 | Silty Sand (SM) | NE | Bottom of Exploration at 40 feet. |
| | | 28.3 | 40.0 | Poorly Graded Sand With Silt (SP-SM) | | Bulk sample collected form 10-20 feet. |
| AP46 | 2721.54 | 0.0 | 23.0 | Silty Sand (SM) | NE | Refusal at 29.1 feet. |
| | | 23.0 | 29.1 | Silty Sand With Gravel (SM) | | |

ADDITIONAL NOTES:
- Borings drilled with 4.25 inch O. D. Solid Flight Augers using a tungsten carbide rock head.
- NE indicates Not Encountered

# APPENDIX C

## LETCo. TEST BORING LOGS




BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-1

DATE DRILLED 4/23/80

JOB NO. CH 4429

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 0 | Residuum - Firm Brown Red Tan Micaceous Fine to Medium Sandy Silt | 2754 |
| 3.0 | Very Stiff Red Brown White Micaceous Fine to Medium Sandy Silt | 2749 |
| 8.0 | Very Stiff Red Brown Gray Very Micaceous Fine to Medium Very Sandy Silt* | 2744 |
| | | 2739 |
| 18.0 | Dense to Very Dense Brown Gray Very Micaceous Silty Fine to Coarse Sand With Quartz Fragments* | 2734 |
| | | 2729 |
| 26.5 | Very Stiff Purple White Very Micaceous Fine to Medium Sandy Silt* | 2724 |
| 32.0 | Dense to Very Dense Brown Gray Very Micaceous Silty Fine to Coarse Sand With Rock Fragments* | 2719 |
| | | 2714 |
| 40.0 | | |

● PENETRATION-BLOWS PER FT.

0 10 20 30 40 60 80 100

*Sand Sized Particles Are Predominately Mica

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-2

DATE DRILLED 4/24/80

JOB NO. CH 4429

PAGE 1 OF 2

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. | ● PENETRATION-BLOWS PER FT. 0 10 20 30 40 60 80 100 |
|---|---|---|---|
| 40.0 | Dense to Very Dense Brown Gray Very Micaceous Silty Fine to Coarse Sand With Rock Fragments* | 2714 | |
| 45.0 | Partially Weathered Rock That Becomes Brown Black Very Micaceous Silty Fine to Coarse Sand When Sampled | 2709 | 50/2" |
| 50.0 | Auger Refusal at 50.0 Feet<br><br>Boring Terminated at 50.0 Feet<br><br>No Groundwater Encountered After 24 Hours | 2704 | |

*Sand Sized Particles Are Predominately Mica

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

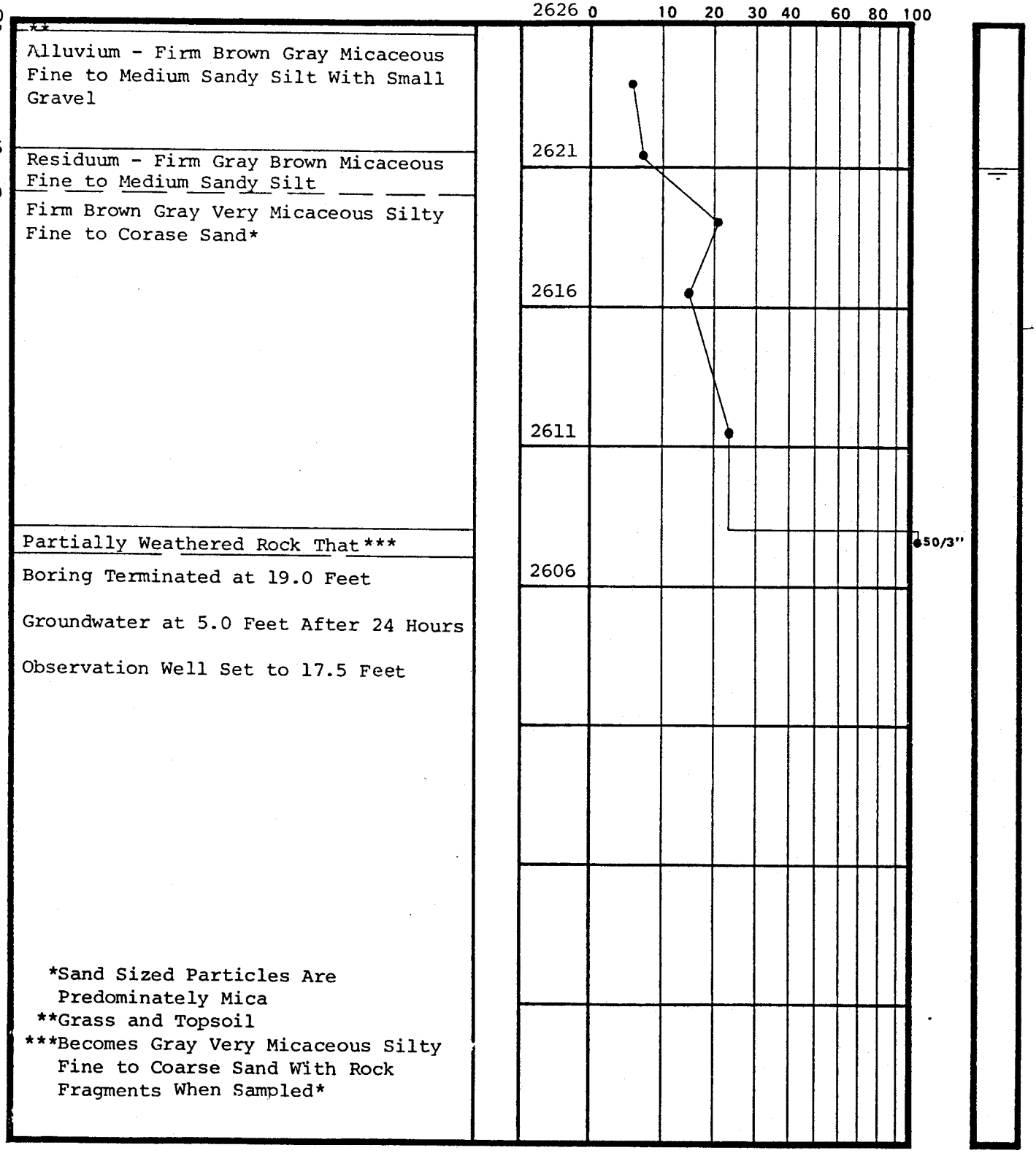
BORING NO. B-2

DATE DRILLED 4/24/80

JOB NO. CH 4429

PAGE 2 OF 2

LAW ENGINEERING TESTING COMPANY




BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

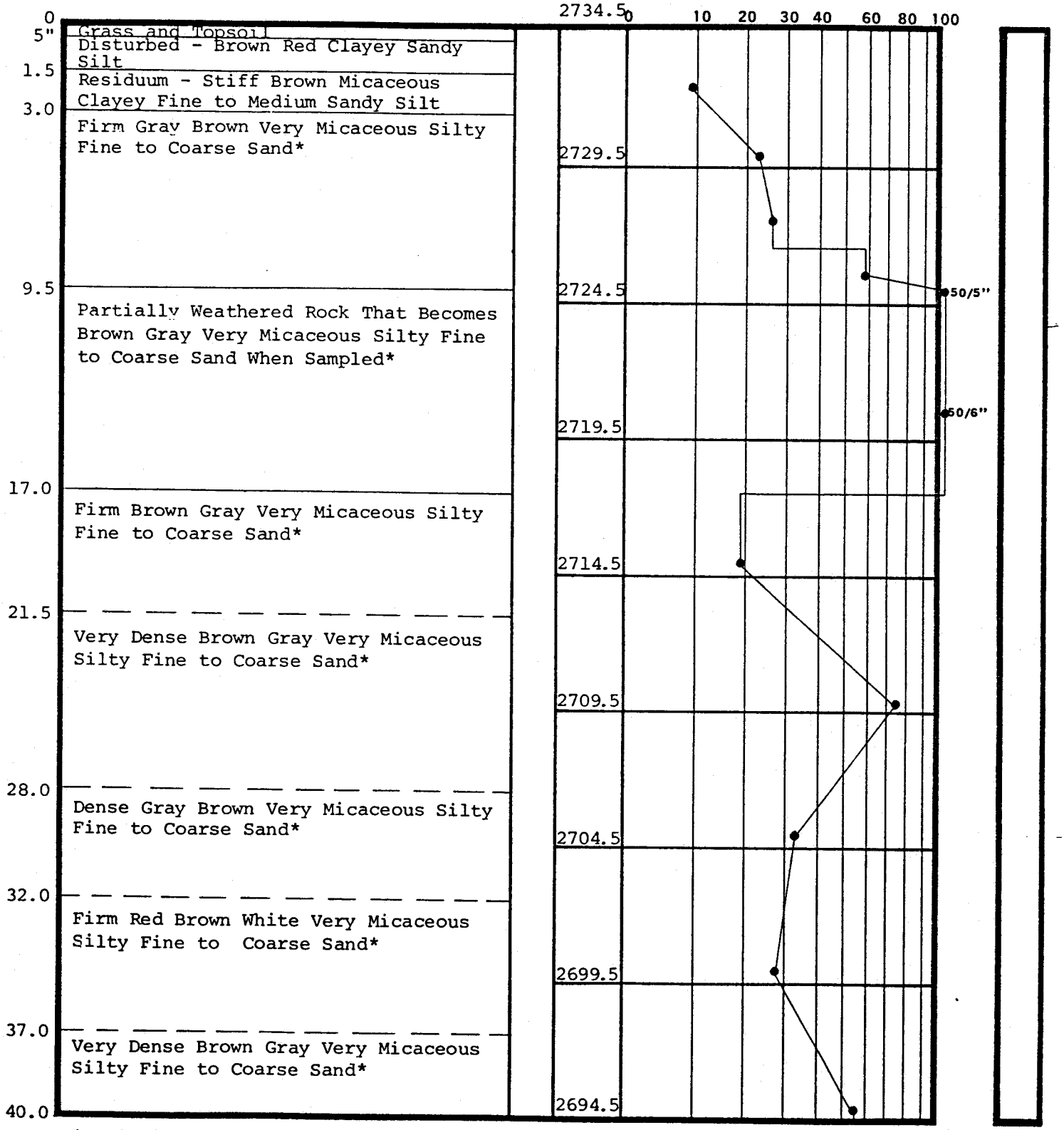
BORING NO. B-3

DATE DRILLED 4/22/80

JOB NO. CH 4429

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY




*Sand Sized Particles Are Predominately Mica

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-4

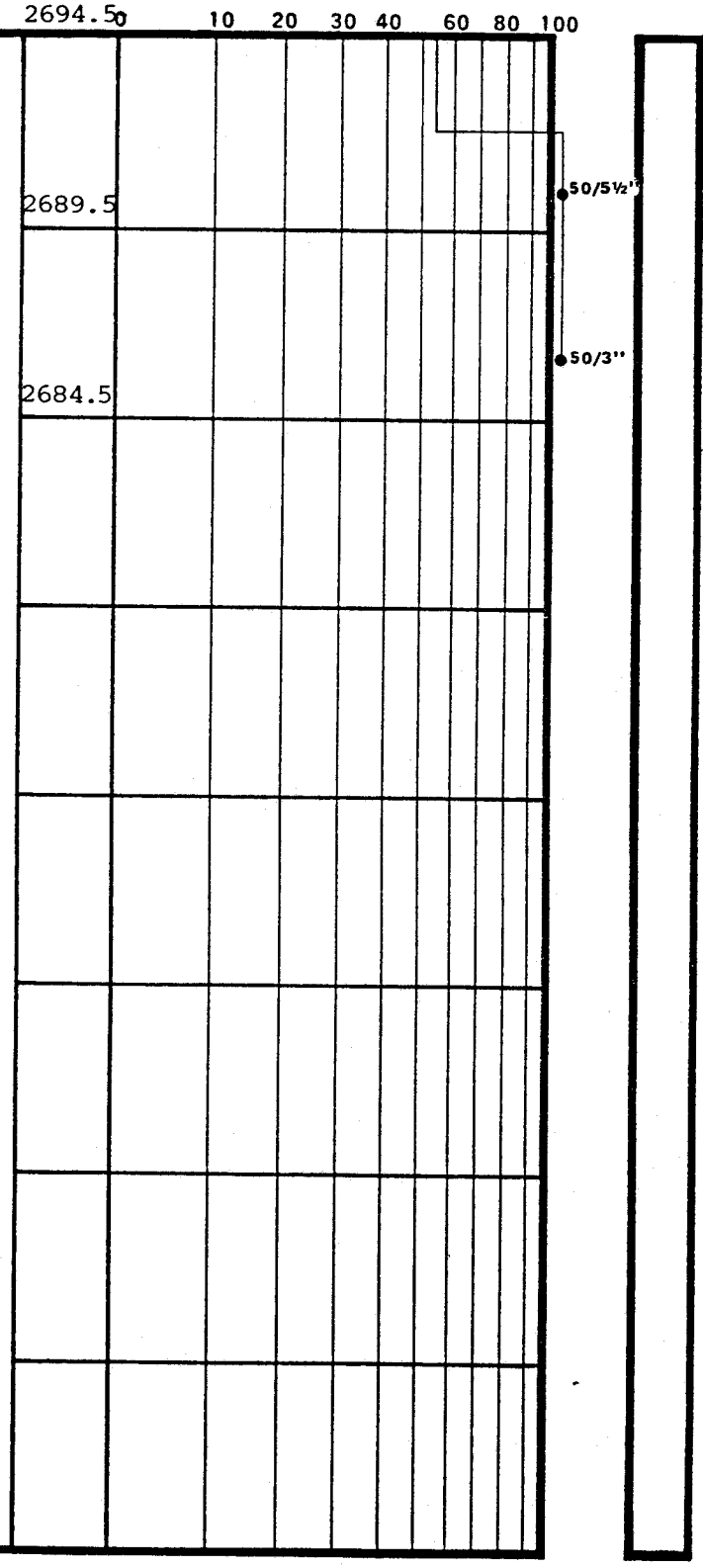
DATE DRILLED 4/24/80

JOB NO. CH 4429



LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 40.0 | Very Dense Brown Gray Very Micaceous Silty Fine to Coarse Sand* | 2694.5 |
| 42.5 | Partially Weathered Rock That Becomes Brown Gray Very Micaceous Silty Fine to Coarse Sand When Sampled* | 2689.5 |
| 49.0 | Boring Terminated at 49.0 Feet<br><br>No Groundwater Encountered After 24 Hours | 2684.5 |




*Sand Sized Particles Are Predominately Mica

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

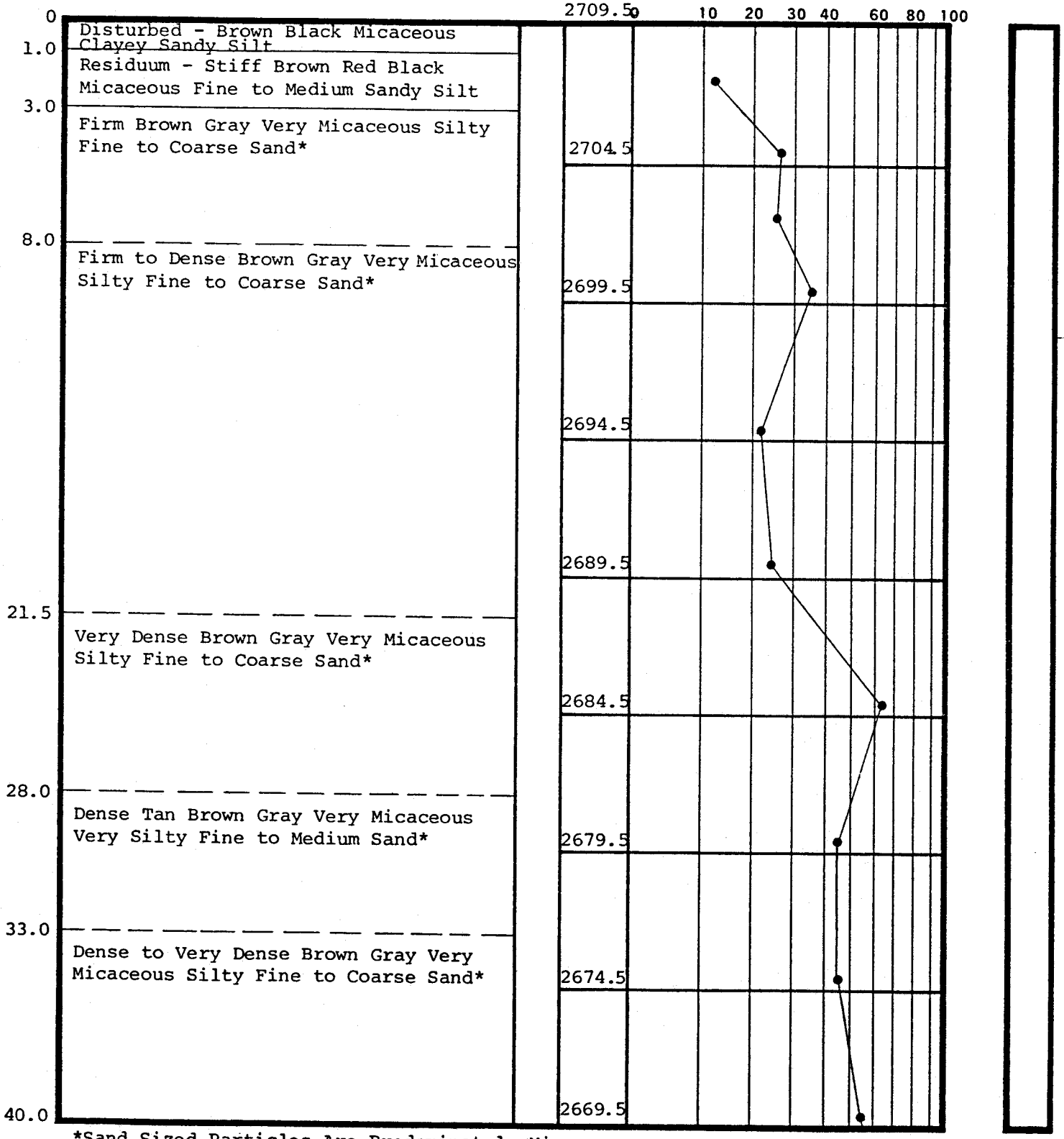
BORING NO. B-4

DATE DRILLED 4/24/80

JOB NO. CH 4429



LAW ENGINEERING TESTING COMPANY




*Sand Sized Particles Are Predominately Mica

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-5

DATE DRILLED 4/22/80

JOB NO. CH 4429

PAGE 1 OF 2

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. | ● PENETRATION-BLOWS PER FT. 10 20 30 40 60 80 100 |
|---|---|---|---|
| 40.0 | Dense to Very Dense Brown Gray Very Micaceous Silty Fine to Coarse Sand* | 2669.50 | |
| | | 2664.5 | |
| 46.5 | | | |
| 47.5 | Partially Weathered Rock That Becomes** | | ● 50/1" |
| | Auger Refusal at 47.5 Feet | 2659.5 | |
| | Boring Terminated at 47.5 Feet | | |
| | No Groundwater Encountered After 24 Hours | | |
| | *Sand Sized Particles are Predominately Mica<br>**Gray White Very Micaceous Silty Fine Sand When Sampled* | | |

BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-5

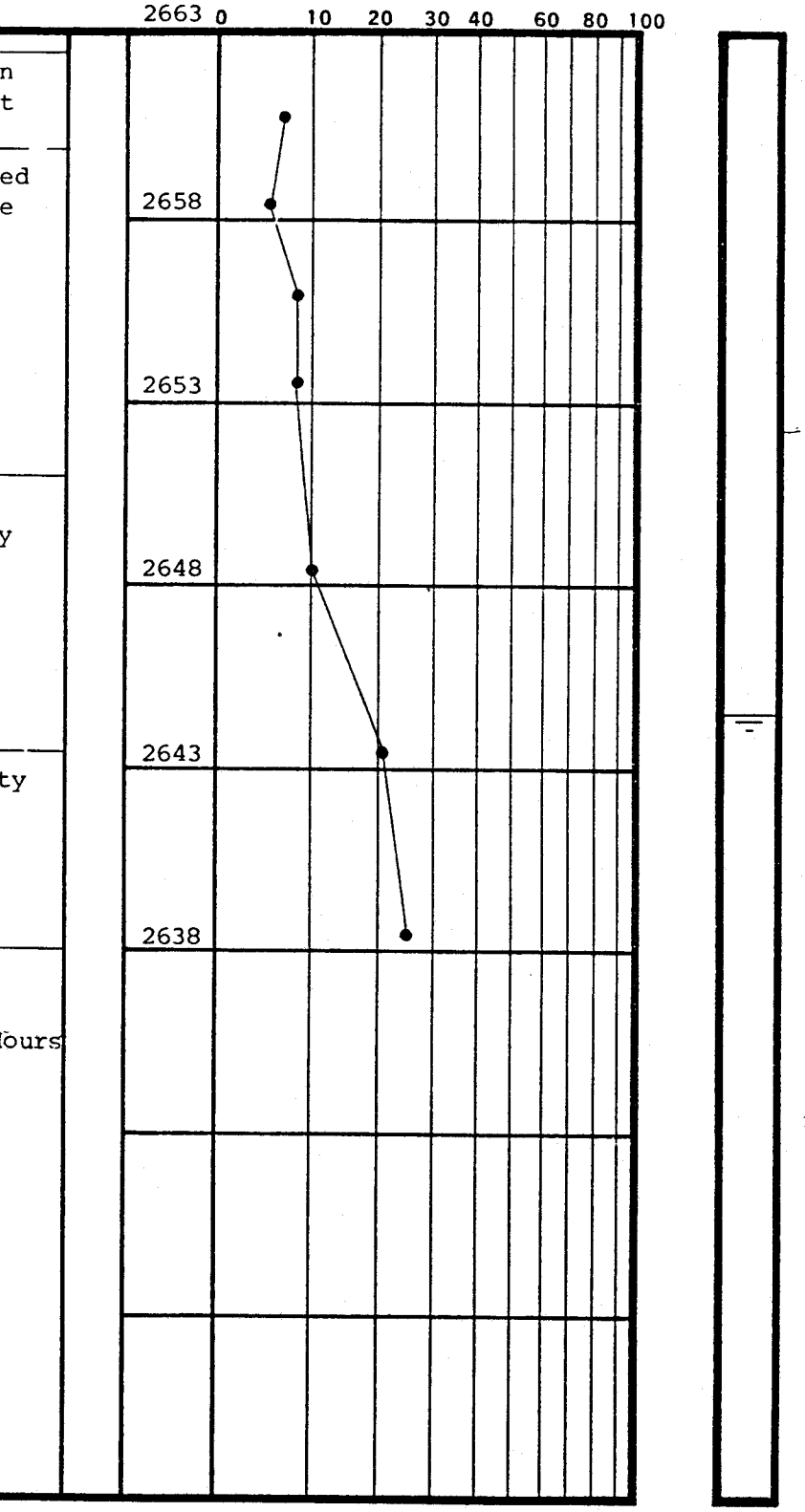
DATE DRILLED 4/22/80

JOB NO. CH 4429

PAGE 2 OF 2

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 0 | | 2663 |
| 5" | Grass and Topsoil | |
| | Possible Colluvium - Firm Red Brown Micaceous Fine to Medium Sandy Silt | |
| 3.0 | | |
| | Possible Colluvium - Loose Brown Red Very Micaceous Silty Fine to Coarse Sand | 2658 |
| | | 2653 |
| 12.0 | | |
| | Residuum - Stiff Brown Gray Very Micaceous Fine to Medium Very Sandy Silt | 2648 |
| 19.5 | | |
| | Firm Gray Brown Very Micaceous Silty Fine to Coarse Sand* | 2643 |
| 25.0 | | 2638 |
| | Boring Terminated at 25.0 Feet | |
| | Groundwater at 18.5 Feet After 24 Hours | |
| | Observation Well Set to 23.0 Feet | |
| | Boring Caved and Wet at 21.9 Feet, March 11, 1981 | |




*Sand Sized Particles Are Predominately Mica

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-6

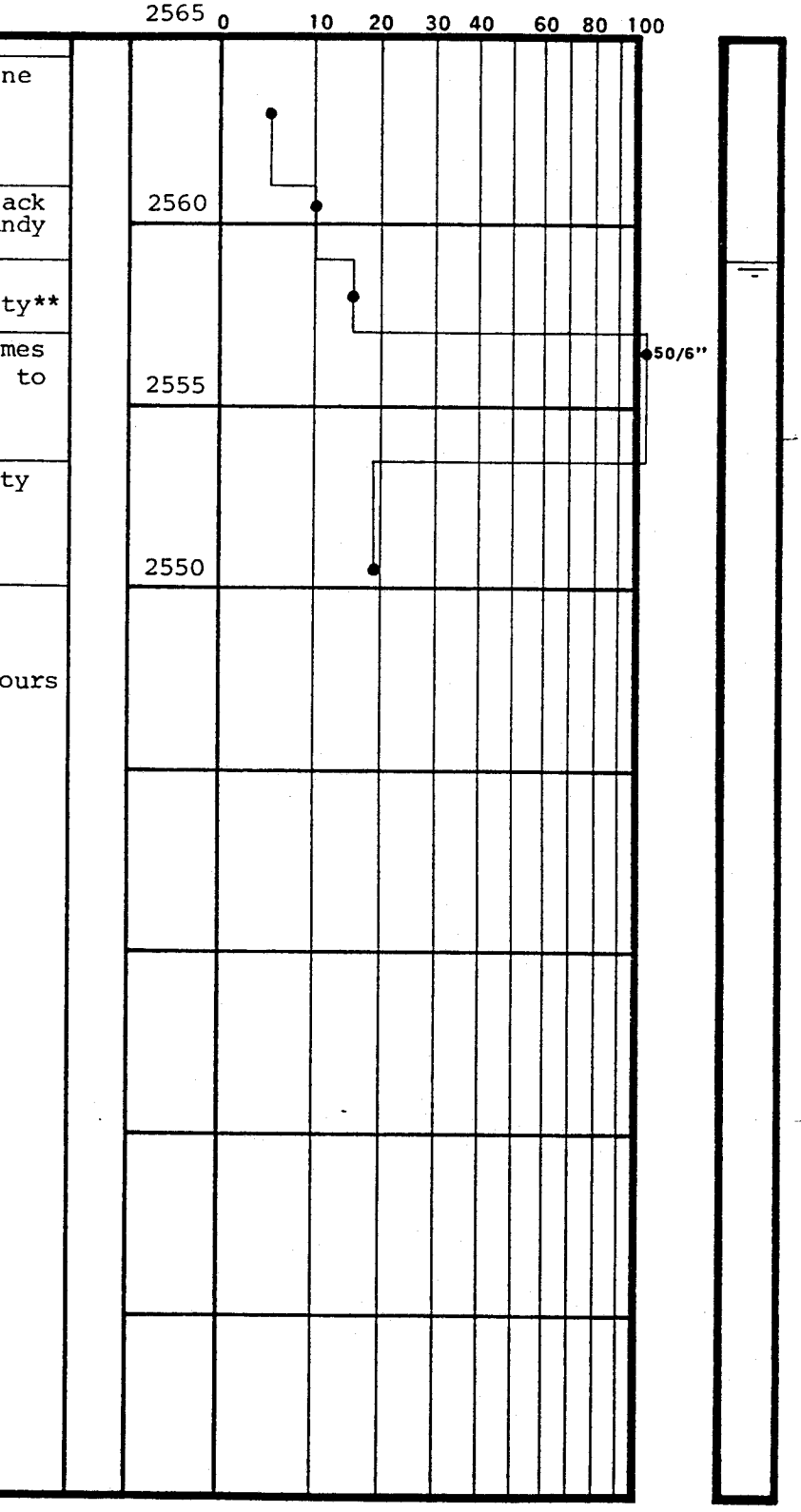
DATE DRILLED 4/23/80

JOB NO. CH 4429

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 0 | | 2565 |
| 5" | Grass and Topsoil | |
| | Alluvium - Firm Brown Micaceous Fine to Medium Sandy Silt | |
| 4.0 | | |
| | Possible Alluvium - Stiff Brown Black Micaceous Clayey Fine to Medium Sandy Silt | 2560 |
| 6.0 | | |
| | Residuum-Stiff Black Gray Brown Micaceous Fine to Medium Sandy Silty** | |
| 8.0 | | |
| | Partially Weathered Rock That Becomes Gray Tan Very Micaceous Silty Fine to Coarse Sand When Sampled* | 2555 |
| 11.5 | | |
| | Firm Gray Green Very Micaceous Silty Fine to Coarse Sand* | 2550 |
| 15.0 | | |
| | Boring Terminated at 15.0 Feet | |
| | Groundwater at 6.0 Feet After 24 Hours | |
| | Observation Well Set to 14.0 Feet | |
| | Groundwater at 9.0 Feet, March 11, 1981 | |
| | *Sand Sized Particles Are Predominately Mica | |
| | **Clay With Rock Fragments | |




BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-7

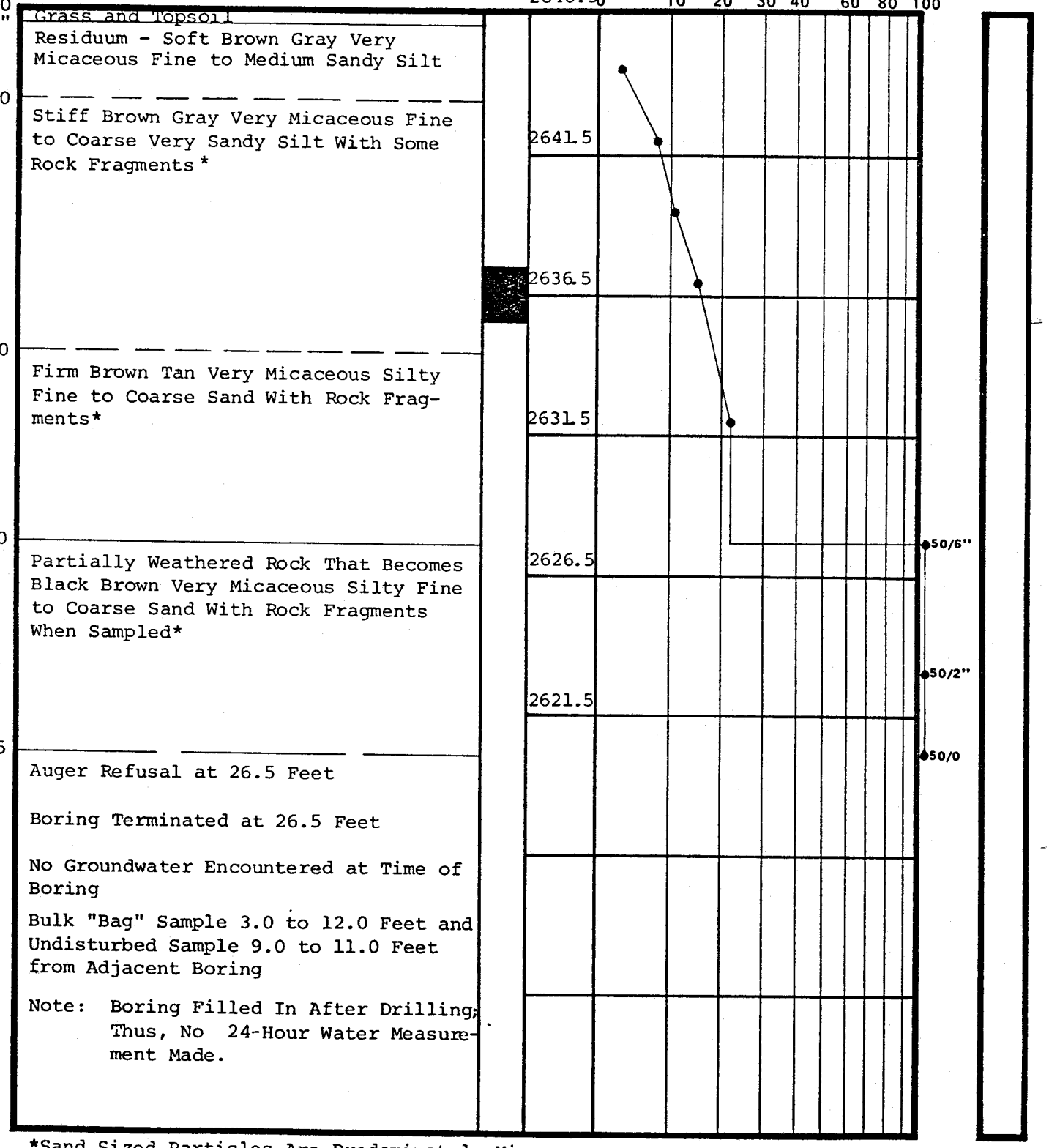
DATE DRILLED 4/22/80

JOB NO. CH 4429

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 0 | | 2646.5 |
| 5" | Grass and Topsoil | |
| | Residuum - Soft Brown Gray Very Micaceous Fine to Medium Sandy Silt | |
| 3.0 | | |
| | Stiff Brown Gray Very Micaceous Fine to Coarse Very Sandy Silt With Some Rock Fragments * | 2641.5 |
| | | 2636.5 |
| 12.0 | | |
| | Firm Brown Tan Very Micaceous Silty Fine to Coarse Sand With Rock Fragments* | 2631.5 |
| 19.0 | | |
| | Partially Weathered Rock That Becomes Black Brown Very Micaceous Silty Fine to Coarse Sand With Rock Fragments When Sampled* | 2626.5 |
| | | 2621.5 |
| 26.5 | | |
| | Auger Refusal at 26.5 Feet | |
| | Boring Terminated at 26.5 Feet | |
| | No Groundwater Encountered at Time of Boring | |
| | Bulk "Bag" Sample 3.0 to 12.0 Feet and Undisturbed Sample 9.0 to 11.0 Feet from Adjacent Boring | |
| | Note: Boring Filled In After Drilling; Thus, No 24-Hour Water Measurement Made. | |




*Sand Sized Particles Are Predominately Mica

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-8

DATE DRILLED 4/25/80

JOB NO. CH 4429

PAGE 1 OF 1

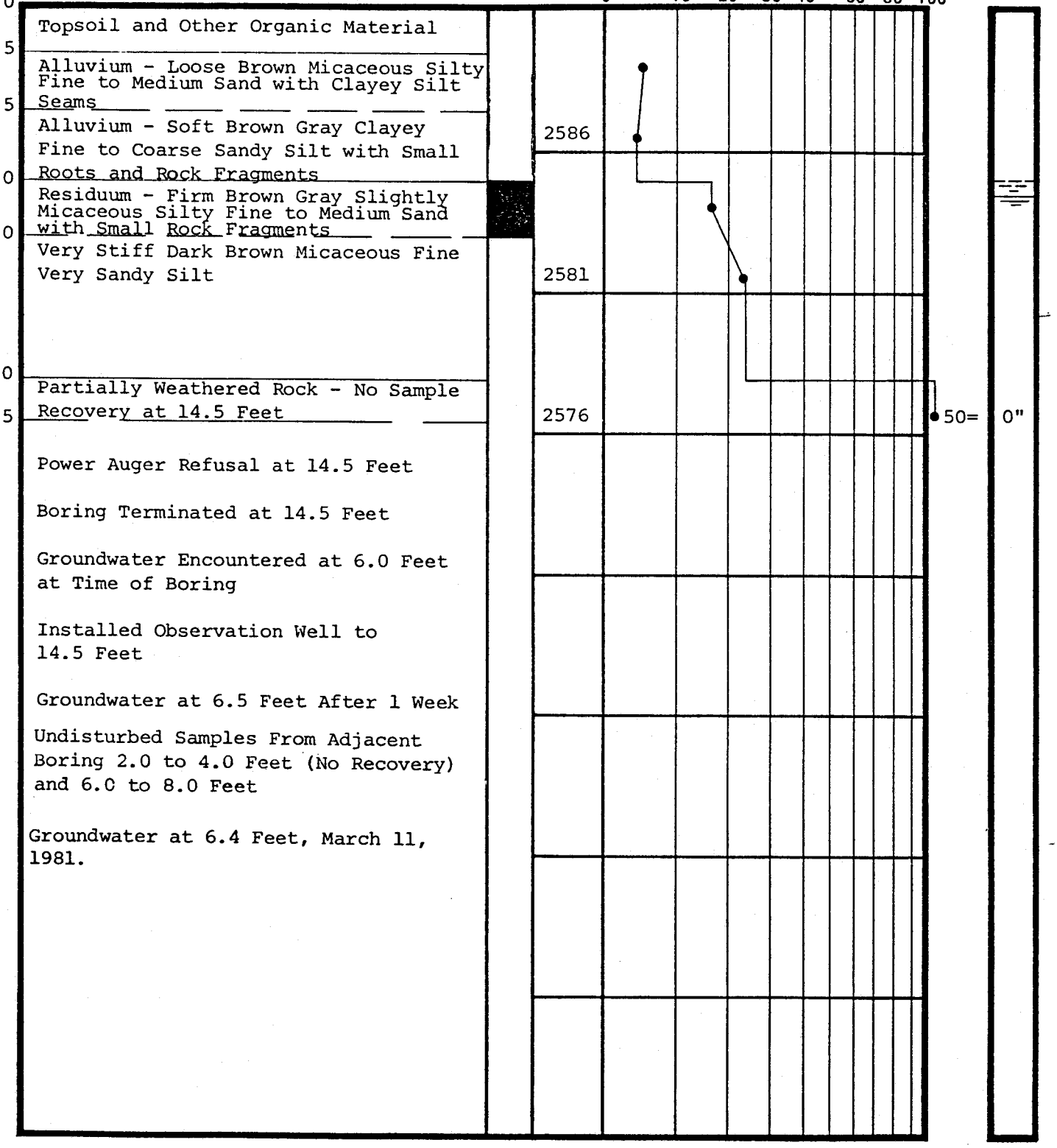
LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 0 | Topsoil and Other Organic Material | 2591 |
| 1.5 | Alluvium - Loose Brown Micaceous Silty Fine to Medium Sand with Clayey Silt Seams | |
| 3.5 | Alluvium - Soft Brown Gray Clayey Fine to Coarse Sandy Silt with Small Roots and Rock Fragments | 2586 |
| 6.0 | Residuum - Firm Brown Gray Slightly Micaceous Silty Fine to Medium Sand with Small Rock Fragments | |
| 8.0 | Very Stiff Dark Brown Micaceous Fine Very Sandy Silt | 2581 |
| 13.0 | Partially Weathered Rock - No Sample Recovery at 14.5 Feet | 2576 |
| 14.5 | Power Auger Refusal at 14.5 Feet<br>Boring Terminated at 14.5 Feet<br>Groundwater Encountered at 6.0 Feet at Time of Boring<br>Installed Observation Well to 14.5 Feet<br>Groundwater at 6.5 Feet After 1 Week<br>Undisturbed Samples From Adjacent Boring 2.0 to 4.0 Feet (No Recovery) and 6.0 to 8.0 Feet<br>Groundwater at 6.4 Feet, March 11, 1981. | |

● PENETRATION-BLOWS PER FT.

0 10 20 30 40 60 80 100

50= 0"



BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

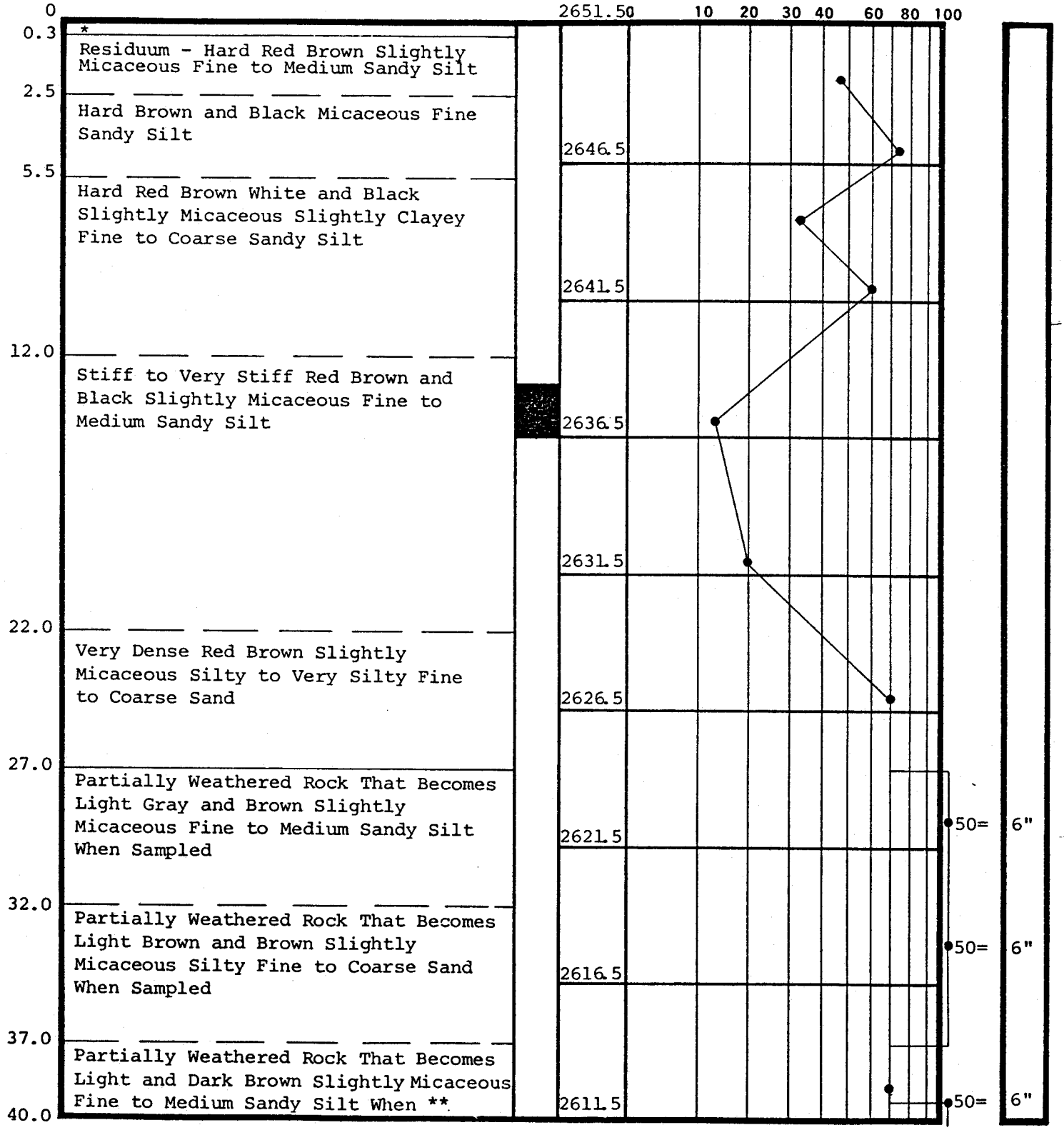
BORING NO. B-9

DATE DRILLED 11/14/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY




*Topsoil **Sampled - Interlayered with Some Thin Soil Lenese

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-10

DATE DRILLED 11/14/80

JOB NO. CH 4507

PAGE 1 OF 2

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. | ● PENETRATION-BLOWS PER FT. 10 20 30 40 60 80 100 | | |
|---|---|---|---|---|---|
| 40.0 | | 2611.5 | | | |
| | Partially Weathered Rock That Becomes Light and Dark Brown Slightly Micaceous Fine to Medium Sandy Silt** | | | | |
| 42.0 | Partially Weathered Rock That Becomes Gray Brown Slightly Micaceous Slightly Silty Fine to Coarse Sand With Small Rock Fragments When Sampled | 2606.5 | | 50= | 3" |
| 47.0 | Partially Weathered Rock That Becomes Brown Micaceous Very Silty Fine to Coarse Sand When Sampled | 2601.5 | | 50= | 6" |
| 53.0 | Residuum - Hard Brown and Black Micaceous to Very Micaceous Fine to Medium Sandy to Very Sandy Silt | 2596.5 | | | |
| 57.0 | Partially Weathered Rock That Becomes Brown Slightly Micaceous Fine to Coarse Sandy Silt When Sampled - Interlayered with Some Thin Soil Lenses<br>No Sample Recovery at 68.5 Feet | 2591.5 | | 50= | 4" |
| | | 2586.5 | | 50= | 6" |
| | | 2581.5 | | 50= | 2" |
| 71.0 | Power Auger Refusal at 71.0 Feet<br>Boring Terminated at 71.0 Feet<br>Groundwater Encountered at 66.0 Feet at Time of Boring<br>Installed Observation Well to 71.0 Feet<br>Groundwater at 65.0 Feet After 1 Week<br>Groundwater at 66.6 Feet, March 11, 1981.<br>Bulk "Bag" Sample 1.0-8.0 Feet and Undisturbed Sample 13.0-15.0 Feet From Adjacent Boring | | | | |

**When Sampled - Interlayered with Some Thin Soil Lenses

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-10

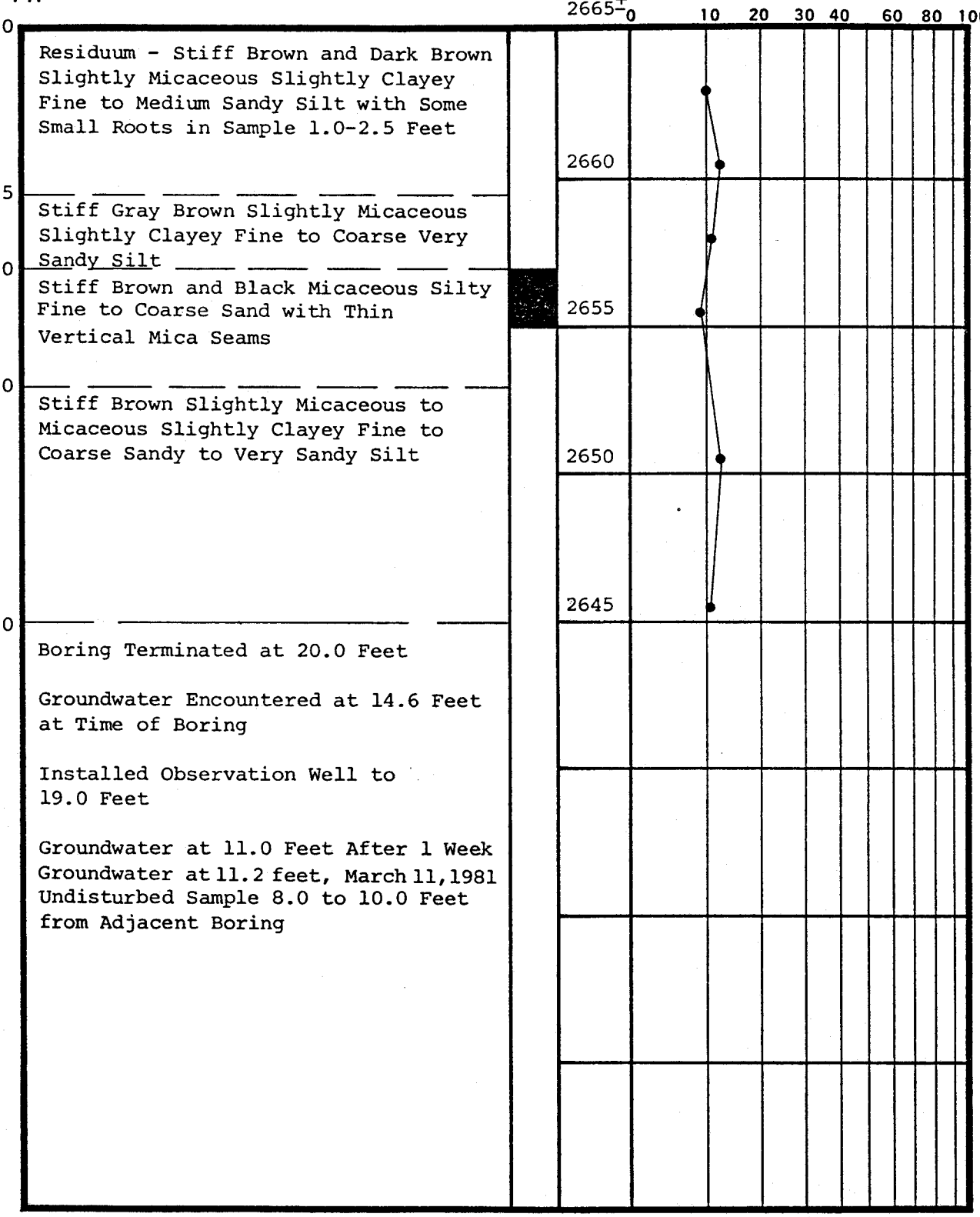
DATE DRILLED 11/14/80

JOB NO. CH 4507

PAGE 2 OF 2

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. $2665^{+}_{0}$ |
|---|---|---|
| 0 | Residuum - Stiff Brown and Dark Brown Slightly Micaceous Slightly Clayey Fine to Medium Sandy Silt with Some Small Roots in Sample 1.0-2.5 Feet | 2660 |
| 5.5 | Stiff Gray Brown Slightly Micaceous Slightly Clayey Fine to Coarse Very Sandy Silt | |
| 8.0 | Stiff Brown and Black Micaceous Silty Fine to Coarse Sand with Thin Vertical Mica Seams | 2655 |
| 12.0 | Stiff Brown Slightly Micaceous to Micaceous Slightly Clayey Fine to Coarse Sandy to Very Sandy Silt | 2650 |
| | | 2645 |
| 20.0 | Boring Terminated at 20.0 Feet<br><br>Groundwater Encountered at 14.6 Feet at Time of Boring<br><br>Installed Observation Well to 19.0 Feet<br><br>Groundwater at 11.0 Feet After 1 Week<br>Groundwater at 11.2 feet, March 11, 1981<br>Undisturbed Sample 8.0 to 10.0 Feet from Adjacent Boring | |




BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-11

DATE DRILLED 11/25/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 0 | | 2736 |
| 0.3 | * Residuum - Firm Red Brown Slightly Micaceous to Micaceous Slightly Clayey Silty Fine to Medium Sand | |
| 5.5 | Very Stiff to Hard Red Brown Black and White Slightly Micaceous to Micaceous Slightly Clayey to Clayey Fine to Coarse Sandy Silt | 2731 |
| | | 2726 |
| | | 2721 |
| 17.0 | Dense to Very Dense Red Brown White and Black Slightly Micaceous to Micaceous Silty Fine to Coarse Sand with Rock Fragments - Possible Slickenside Zone Noted in Sample 18.5-20.0 Feet | 2716 |
| | | 2711 |
| 27.0 | Hard Yellow Brown Slightly Micaceous Slightly Clayey Fine to Medium Sandy Silt | 2706 |
| 32.0 | Very Dense Brown Gray Slightly Micaceous Slightly Silty to Silty Fine to Medium Sand | |
| 34.0 | Partially Weathered Rock That Becomes Brown Gray Slightly Micaceous Slightly Silty Fine to Medium Sand When Sampled | 2701 |
| 37.5 | Power Auger Refusal at 37.5 Feet<br>Boring Terminated at 37.5 Feet<br>Dry at Time of Boring | 2696 |

● PENETRATION-BLOWS PER FT.

0 10 20 30 40 60 80 100

50= 3"

*Topsoil

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-12

DATE DRILLED 12/5/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 0 | Residuum - Stiff Red Brown Slightly Micaceous Fine to Medium Sandy Silt with Some Small Roots and Rock Fragments | 2699.5 |
| 4.5 | Stiff Dark Brown Slightly Micaceous Slightly Clayey Fine to Medium Sandy Silt | 2694.5 |
| 6.5 | Partially Weathered Rock That Becomes* | |
| 7.3 | Power Auger Refusal at 7.3 Feet<br>Boring Terminated at 7.3 Feet<br>Offset 10 Feet West Auger to Refusal at 6.0 Feet<br>Dry at Time of Boring and After 1-1/2 Weeks<br>No Groundwater Encountered at Time of Boring or 1 Week<br>*Brown Slightly Micaceous Slightly Clayey Fine to Coarse Sandy Silt When Sampled | 2689.5 |

● PENETRATION-BLOWS PER FT.

0 10 20 30 40 60 80 100

●50= 4"

BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

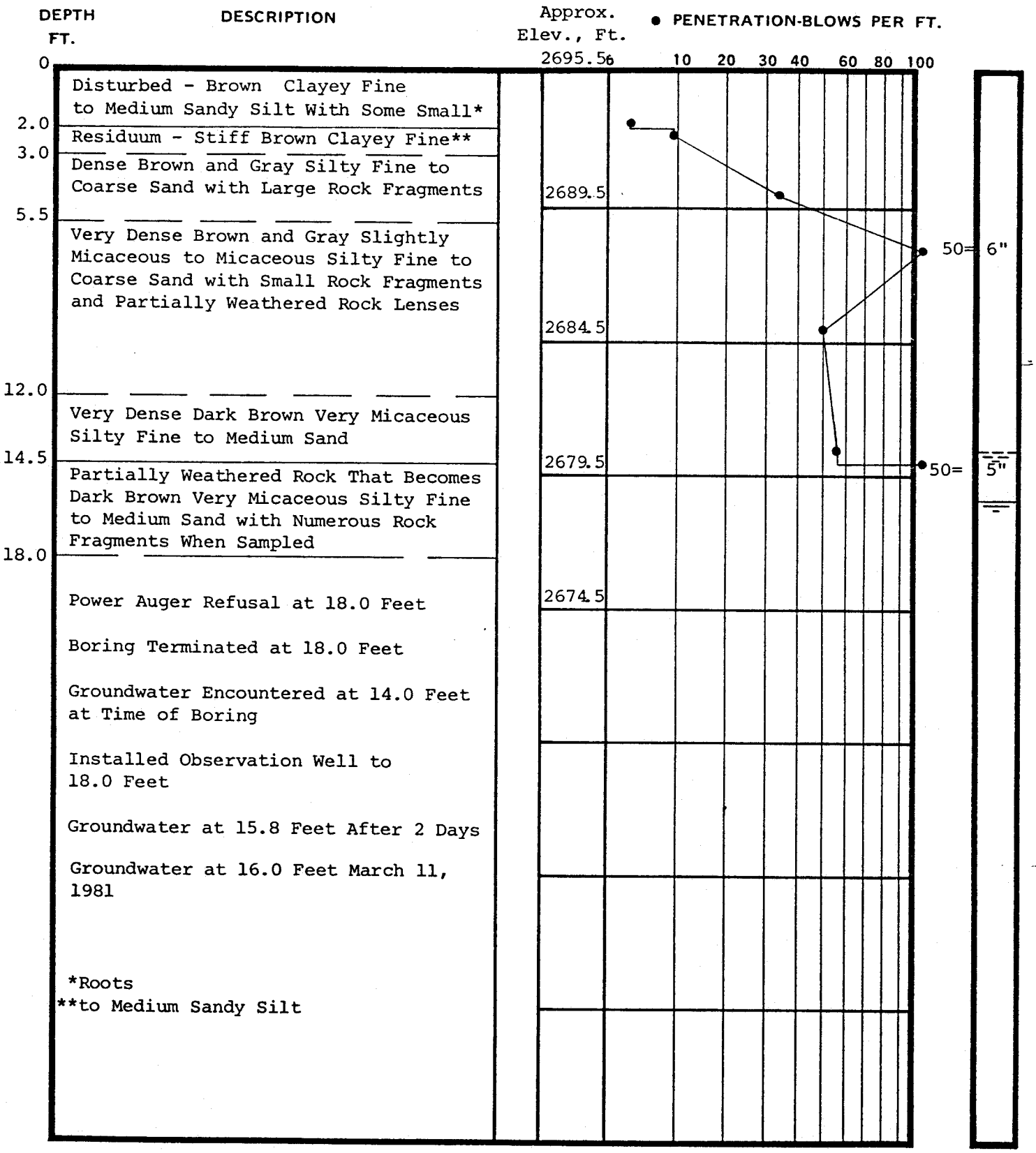
BORING NO. B-13

DATE DRILLED 11/25/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY




BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

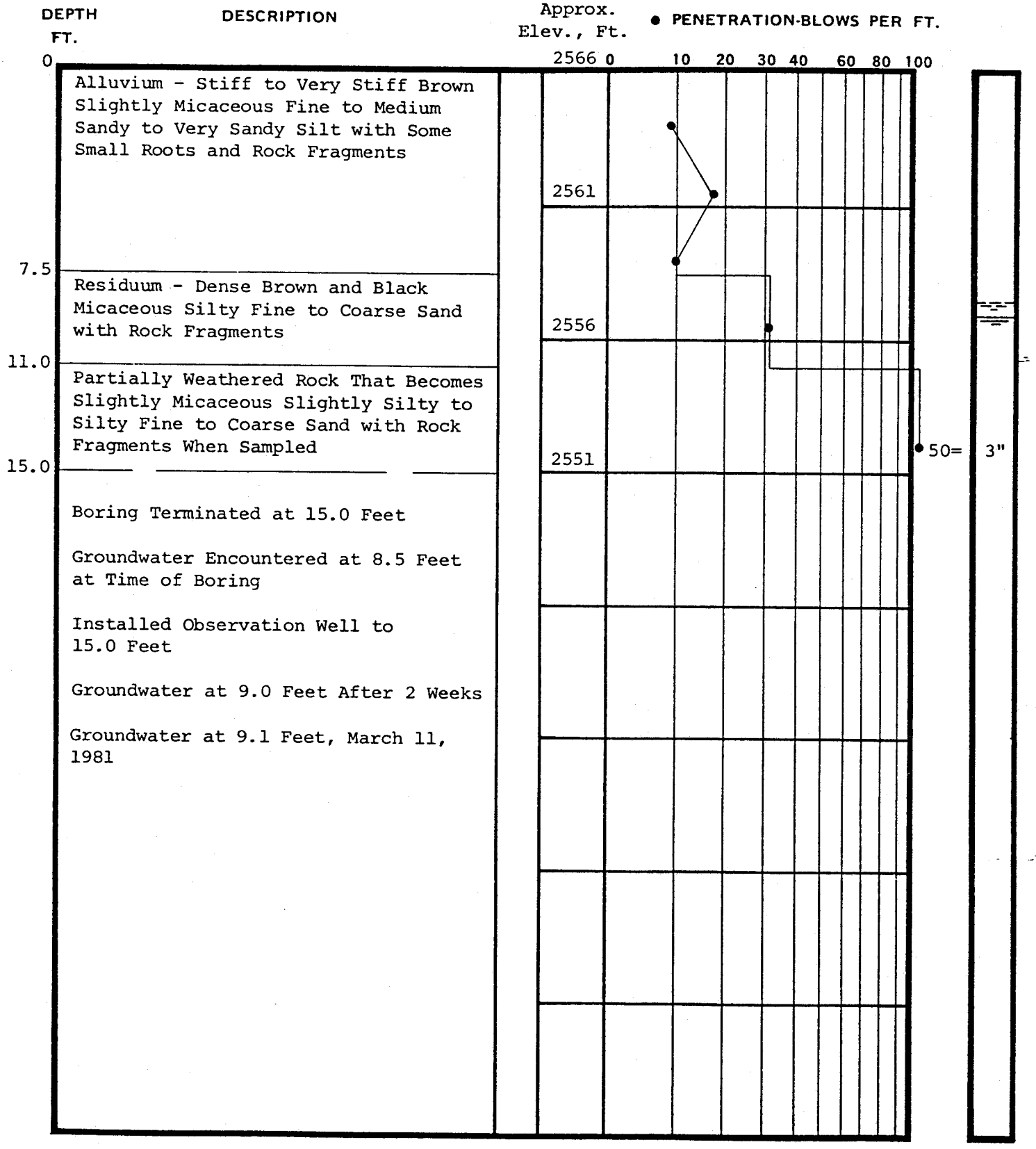
BORING NO. B-14

DATE DRILLED 12/3/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY




BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

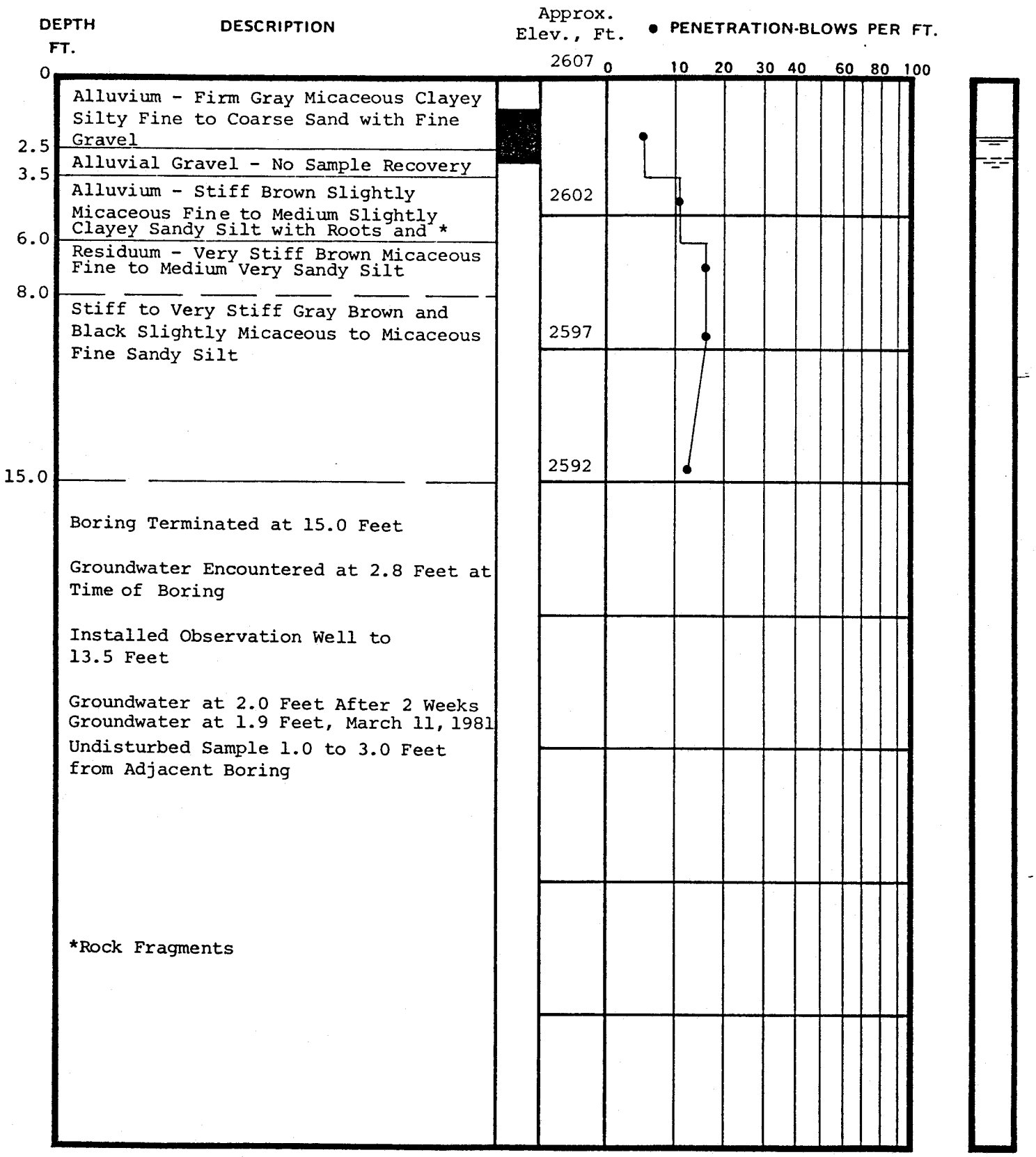
BORING NO. B-15

DATE DRILLED 11/20/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY




BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-16

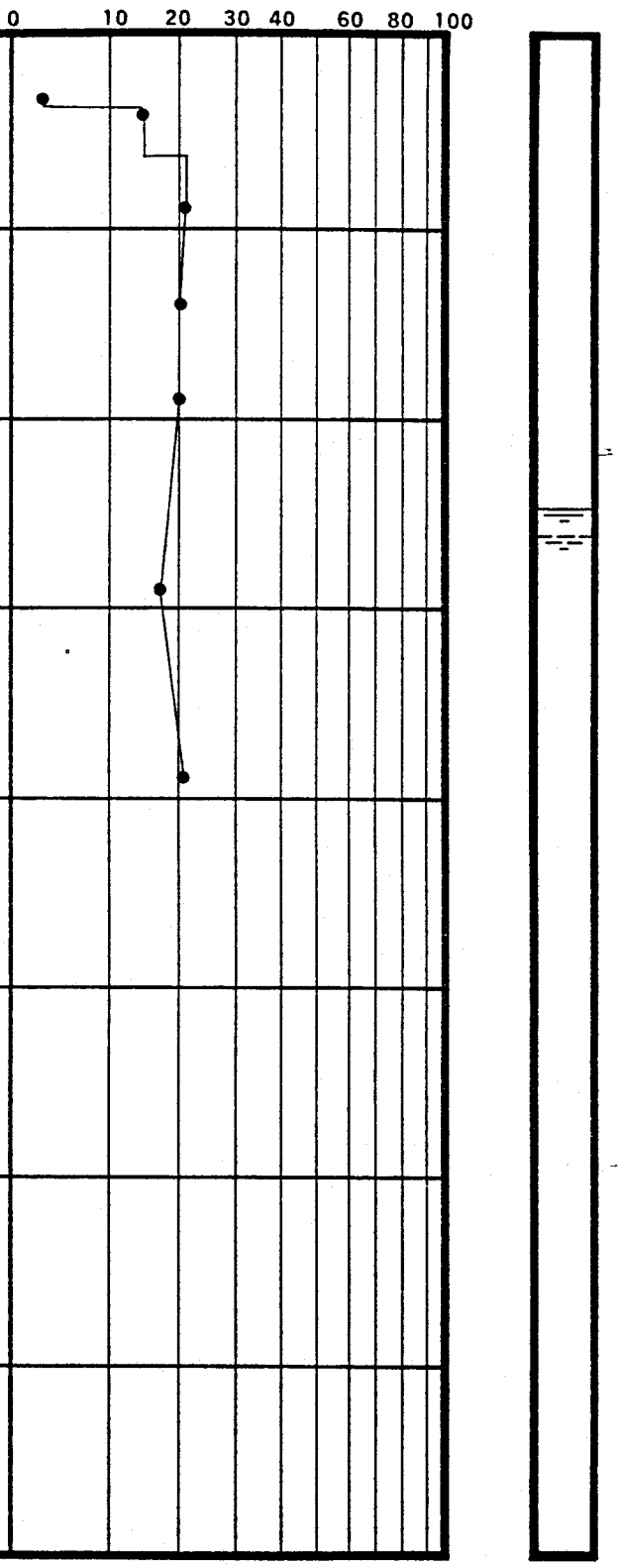
DATE DRILLED 11/21/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. |
|---|---|---|
| 0 | Alluvium - Soft Light Brown Clayey Fine to Coarse Very Sandy Silt with Small Roots and Rock Fragments | 2702 |
| 2.0 | Alluvium - Firm Brown Slightly* | |
| 3.0 | Residuum - Very Stiff Yellow Brown Slightly Micaceous Clayey Fine to Coarse Sandy Silt | 2697 |
| 5.5 | Firm Brown Slightly Micaceous Silty Fine to Medium Sand with Small Rock Fragments | |
| 8.0 | Firm Brown and Gray Micaceous Silty Fine to Coarse Sand with Rock Fragments in Sample 13.5 to 15.0 Feet<br><br>Sand Size Particles are Predominately Mica | 2692 |
| | | 2687 |
| 17.0 | Firm Gray Brown Slightly Micaceous Silty Fine to Medium Sand | |
| 20.0 | | 2682 |
| | Boring Terminated at 20.0 Feet<br><br>Groundwater Encountered at 13.0 Feet at Time of Boring<br><br>Installed Observation Well to 18.5 Feet<br><br>Groundwater at 12.3 Feet After 1-1/2 Weeks<br><br>Groundwater at 12.2 Feet March 11, 1981<br><br>*Micaceous Silty Fine to Coarse Sand with Rock Fragments | |




BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

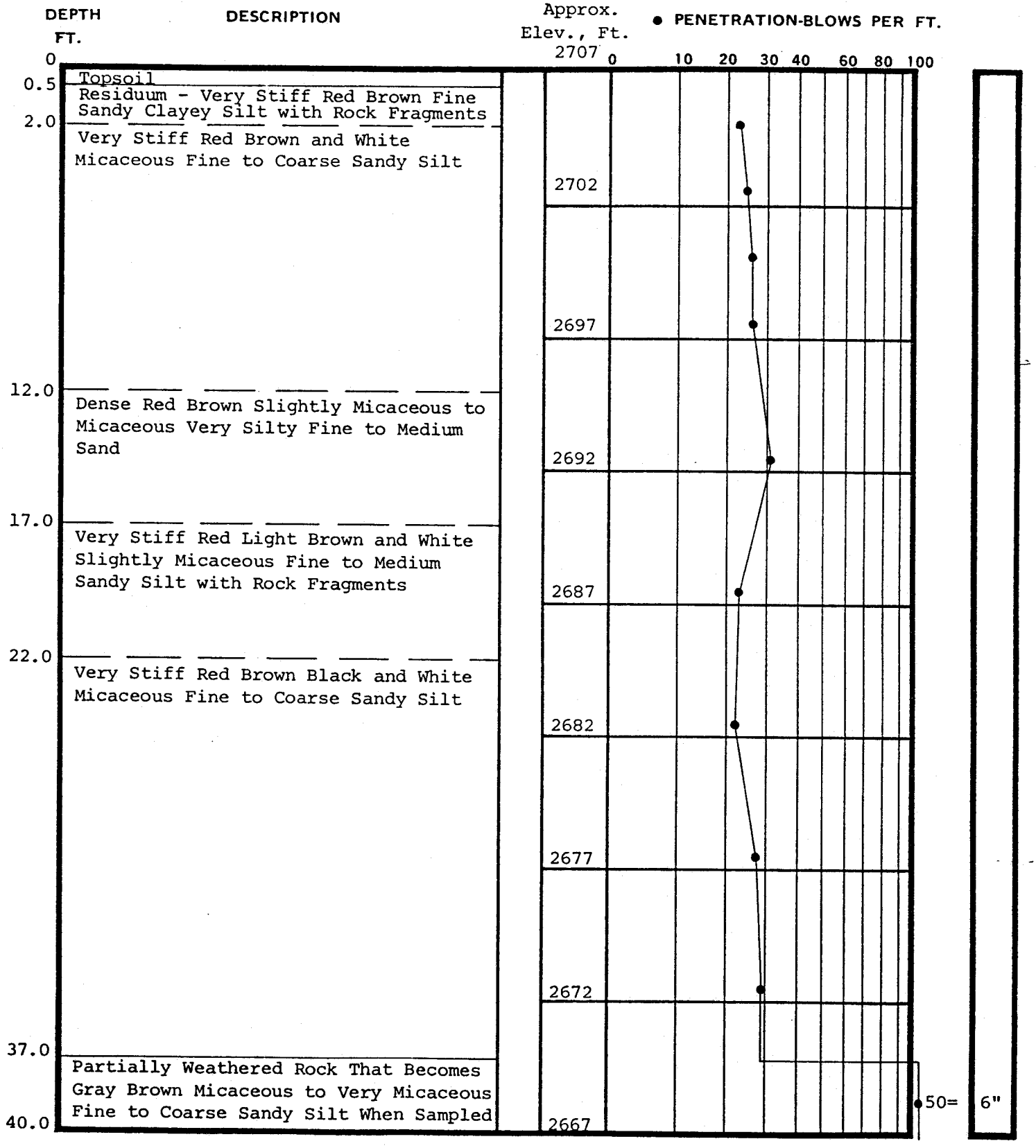
BORING NO. B-17

DATE DRILLED 11/26/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY




BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-18

DATE DRILLED 11/20/80

JOB NO. CH 4507

PAGE 1 OF 2

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | Approx. Elev., Ft. | ● PENETRATION-BLOWS PER FT. 0 10 20 30 40 60 80 100 | | |
|---|---|---|---|---|---|
| 40.0 | Partially Weathered Rock That Becomes Gray Brown Micaceous to Very Micaceous Fine to Coarse Sandy Silt When Sampled | 2667 | | | |
| 42.0 | Residuum - Hard Light Gray Brown and Dark Brown Slightly Micaceous Clayey Fine to Medium Sandy Silt | 2662 | | | |
| | | 2657 | | | |
| 52.0 | Partially Weathered Rock That Becomes Light Gray Brown Slightly Clayey Fine to Coarse Sandy to Very Sandy Silt When Sampled | 2652 | | 50= | 6" |
| 57.0 | Partially Weathered Rock That Becomes Gray Brown Silty to Very Silty Fine to Coarse Sand When Sampled | 2647 | | 50= | 6" |
| | | 2642 | | 50= | 6" |
| 67.0 | Partially Weathered Rock That Becomes Brown Slightly Micaceous to Micaceous Fine to Medium Sandy Silt When Sampled | 2637 | | 50= | 4" |
| 72.0 | Partially Weathered Rock That Becomes Light Brown Black and White Micaceous Silty Fine to Coarse Sand With Rock* | | | | |
| 73.9 | Boring Terminated at 73.9 Feet<br>Dry at Time of Boring<br>Groundwater at 72 Feet After 24 Hours<br>Bulk "Bag" Sample 1.0 to 8.0 Feet and 18.0 to 23.0 Feet | 2632 | | 50= | 4" |

*Fragments When Sampled

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

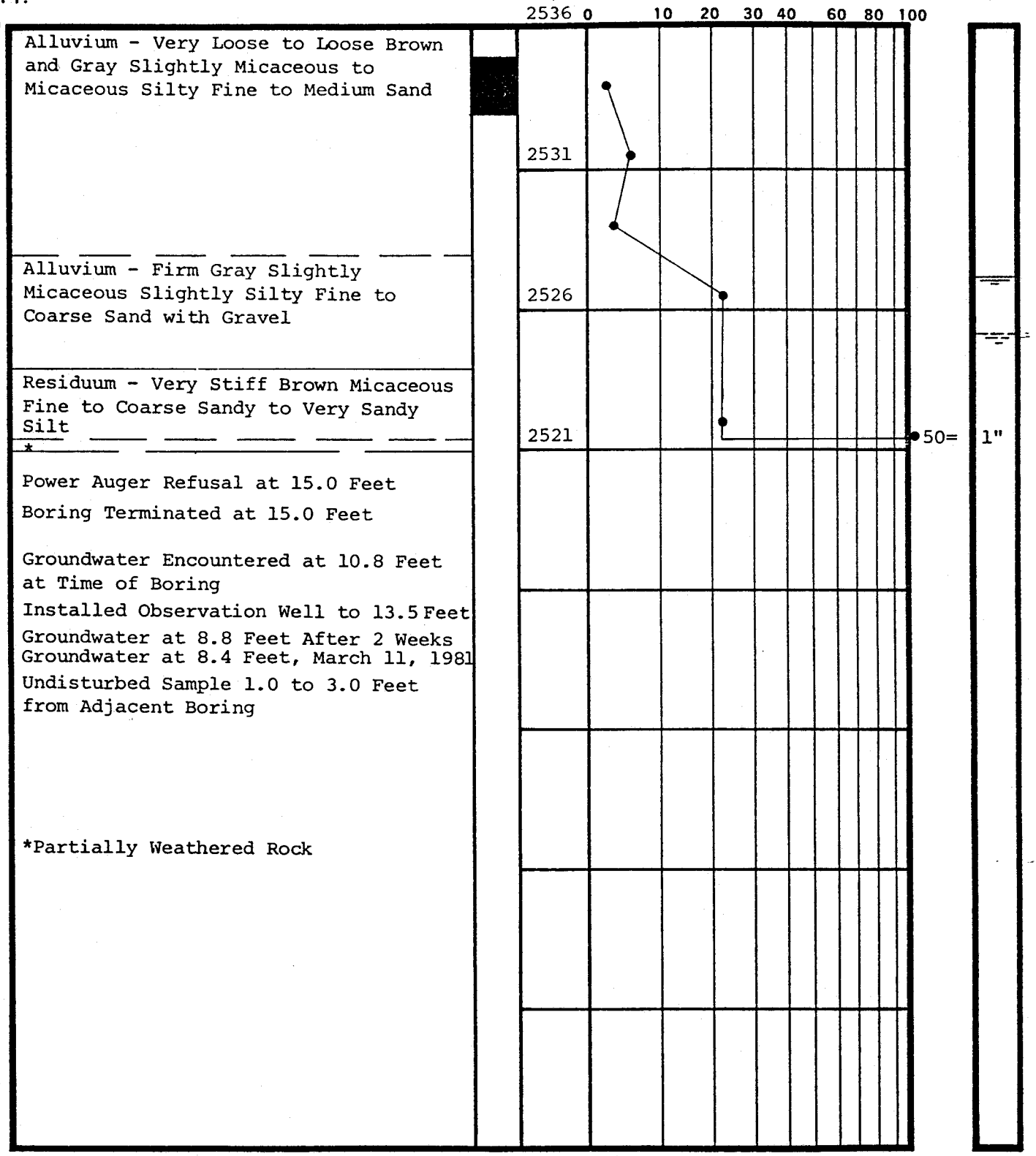
BORING NO. B-18

DATE DRILLED 11/20/80

JOB NO. CH 4507



LAW ENGINEERING TESTING COMPANY




BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. B-19

DATE DRILLED 11/21/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY

# APPENDIX D

# MONITORING WELL CONSTRUCTION DATA

TABLE 1
GROUND-WATER MONITORING WELLS(1)
Champion Papers
Landfill No. 6
Canton, North Carolina
LETCo. Job No. CH 4507C

| Well No. | Ground Surface Elevation | Groundwater(2) Elevation | Groundwater(2) Depth | Depth of Well | Screen Interval | Type Material Exposed to screen | Depth to Top of Sand | Depth to Top of Bentonite |
|---|---|---|---|---|---|---|---|---|
| MW-1 | 2807.82 | 2714.1 | 93.8 | 122.9 | 102.9-122.9 | Rock | 92.1 | 87.4 |
| MW-2 | 2595.31 | 2587.6 | 7.7 | 10.2 | 5.2-10.2 | PWR | 4.5 | 3.5 |
| MW-3 | 2577.70 | 2569.4 | 8.3 | 11.0 | 6.0-11.0 | Soil-PWR | 4.5 | 3.5 |
| MW-4 | 2629.63 | 2574.8 | 54.8 | 84.0 | 64.0-84.0 | Rock | 34.4 | 33.0 |
| MW-5 | 2547.18 | 2542.1 | 5.1 | 15.6 | 5.6-15.6 | Soil-PWR | 5.0 | 3.5 |
| MW-6 | 2549.72 | 2535.6 | 14.1 | 18.5 | 8.5-18.5 | PWR-Rock | 9.0 | 8.0 |
| MW-7 | 2550.44 | 2544.3 | 6.2 | 14.3 | 4.3-14.3 | Soil-PWR | 4.0 | 3.0 |
| MW-8 | 2594.39 | 2583.5 | 10.9 | 27.7 | 17.7-27.7 | Rock | 7.0 | 6.0 |
| MW-9 | 2684.02 | 2652.4 | 31.7 | 64.8 | 44.8-64.8 | PWR-Rock | 41.0 | 39.3 |
| MW-10 | 2677.78 | 2644.9 | 32.8 | 74.0 | 54.0-74.0 | Rock | 52.4 | 49.0 |
| MW-11 | 2639.44 | 2630.6 | 8.9 | 20.4 | 10.4-20.4 | Soil-PWR | 10.0 | 8.0 |
| MW-12 | 2543.73 | 2533.9 | 9.8 | 30.4 | 20.4-30.4 | PWR-Rock | 18.0 | 16.0 |

(1) All measurements in feet.
(2) Based on measurements made on 7/12/83.

PWR - Partially Weathered Rock

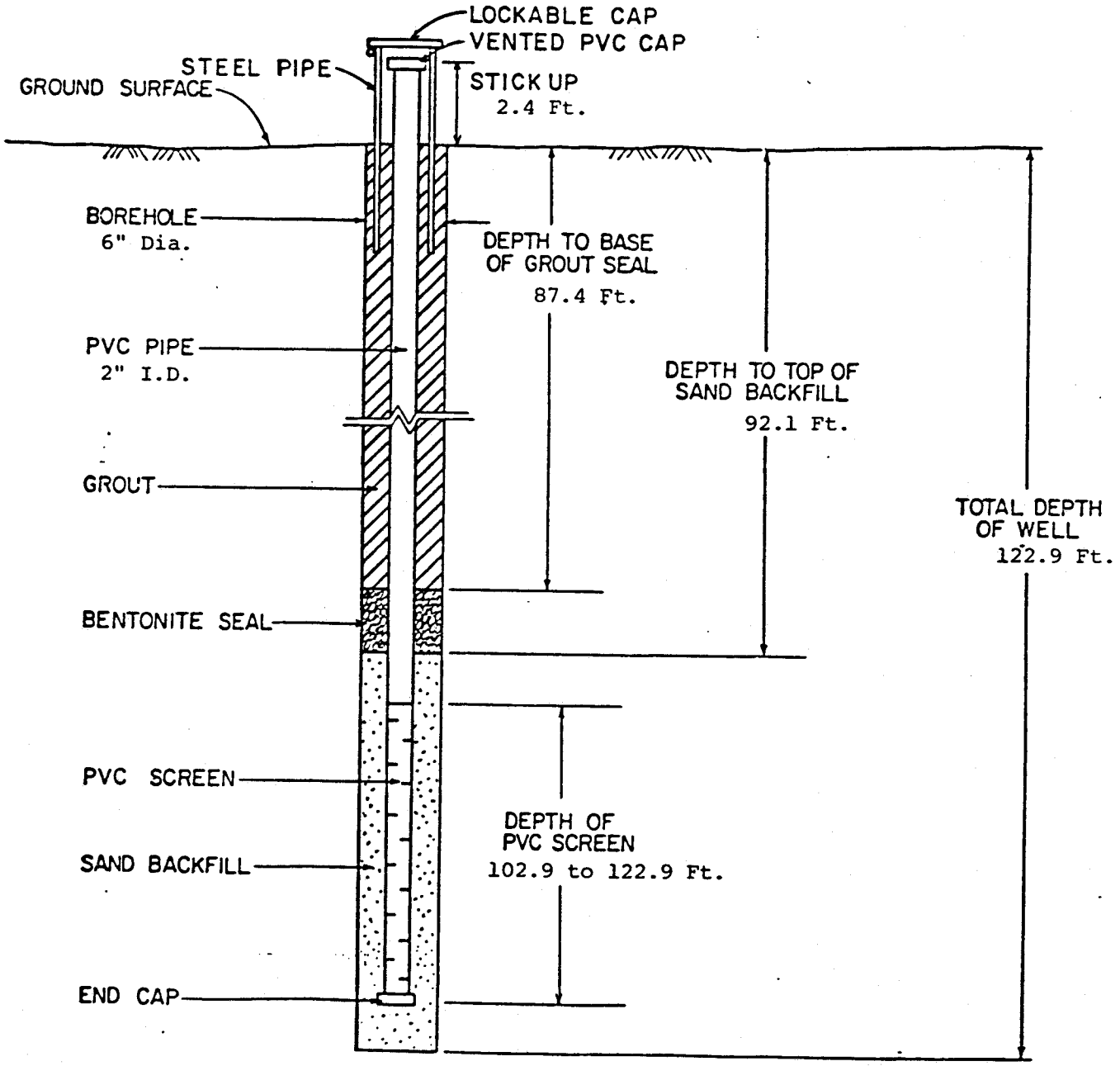
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-1 GROUND SURFACE ELEVATION 2807.82 Ft.

LOCATION Knoll on North Central Part of Site

INSTALLATION DATE 7-6-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-1 |

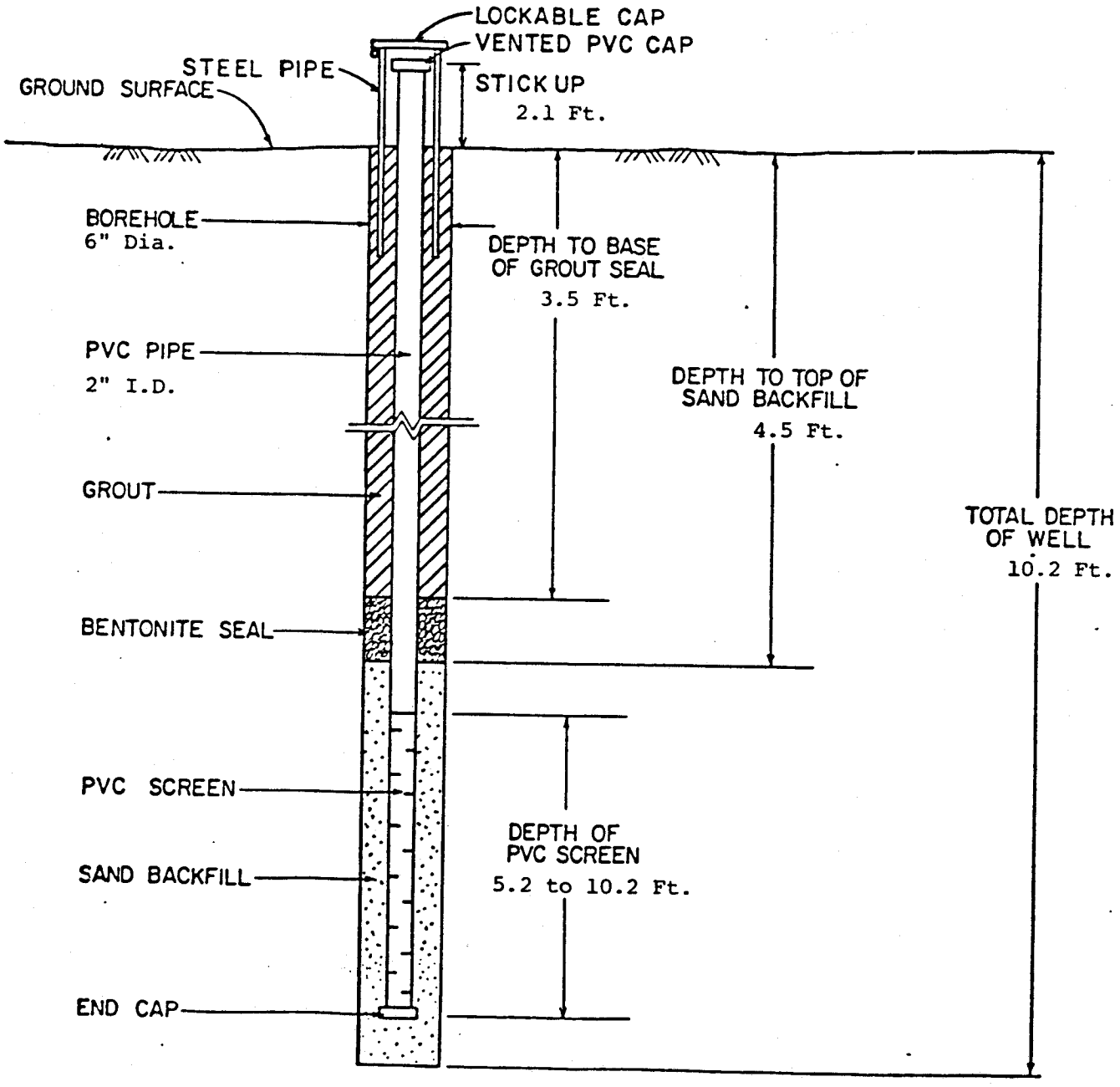
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-2 GROUND SURFACE ELEVATION 2595.31 Ft.

LOCATION Southwest of Area F

INSTALLATION DATE 7-6-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina, | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-2 |

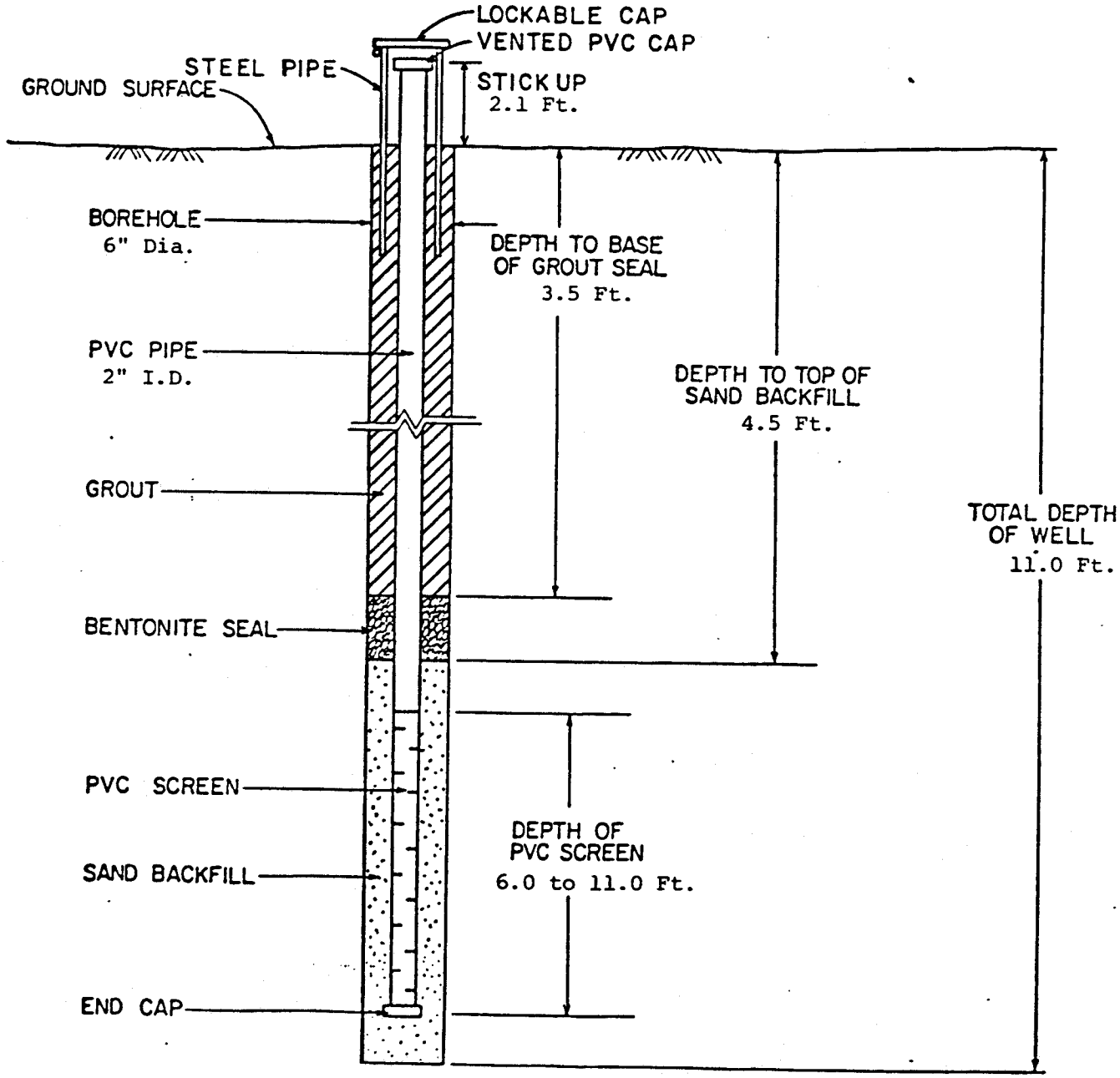
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-3 GROUND SURFACE ELEVATION 2577.70 Ft.

LOCATION East of Area A

INSTALLATION DATE 7-6-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-3 |

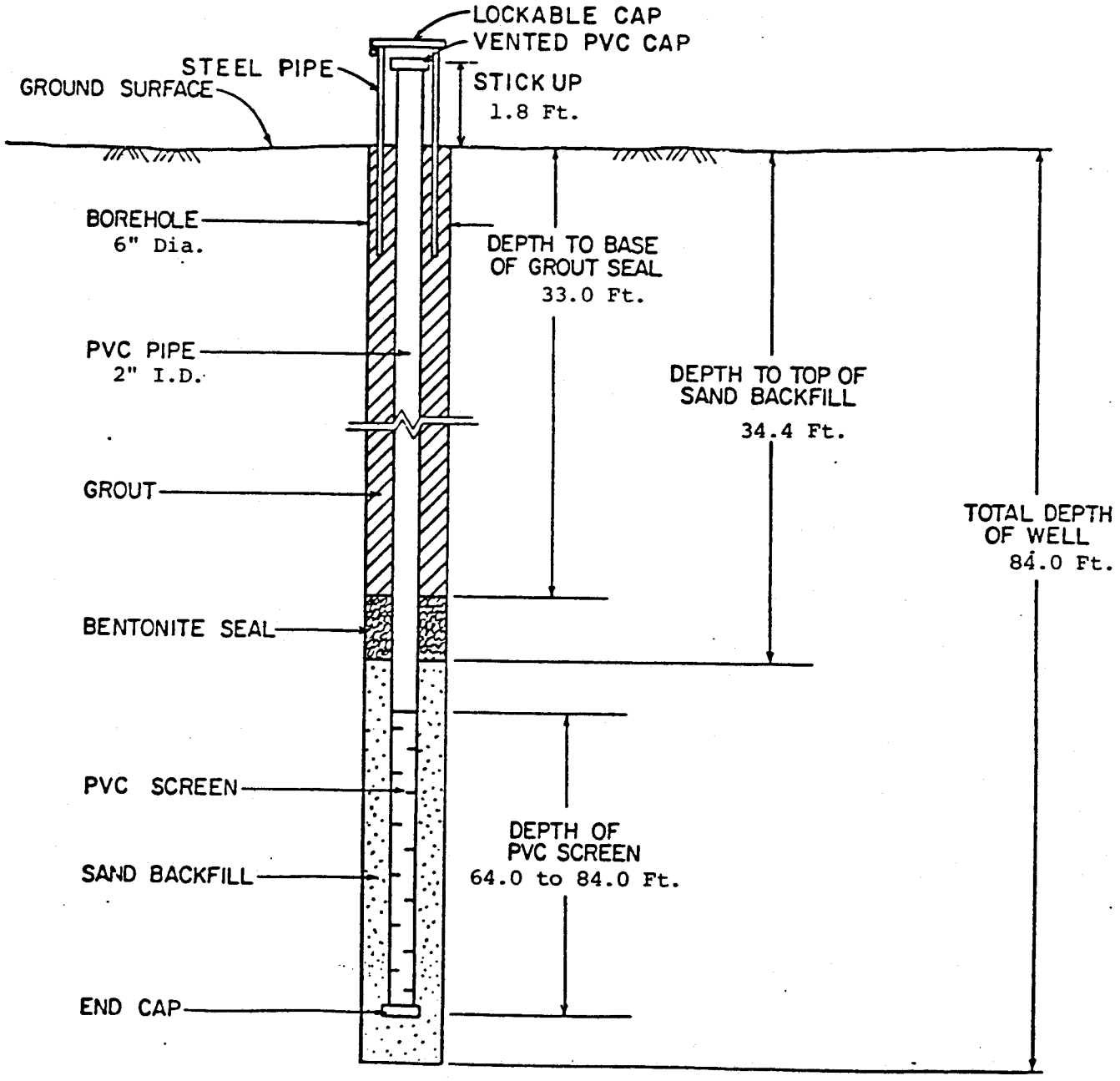
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-4 GROUND SURFACE ELEVATION 2629.63 Ft.

LOCATION Southeast of Area B

INSTALLATION DATE 7-7-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-4 |

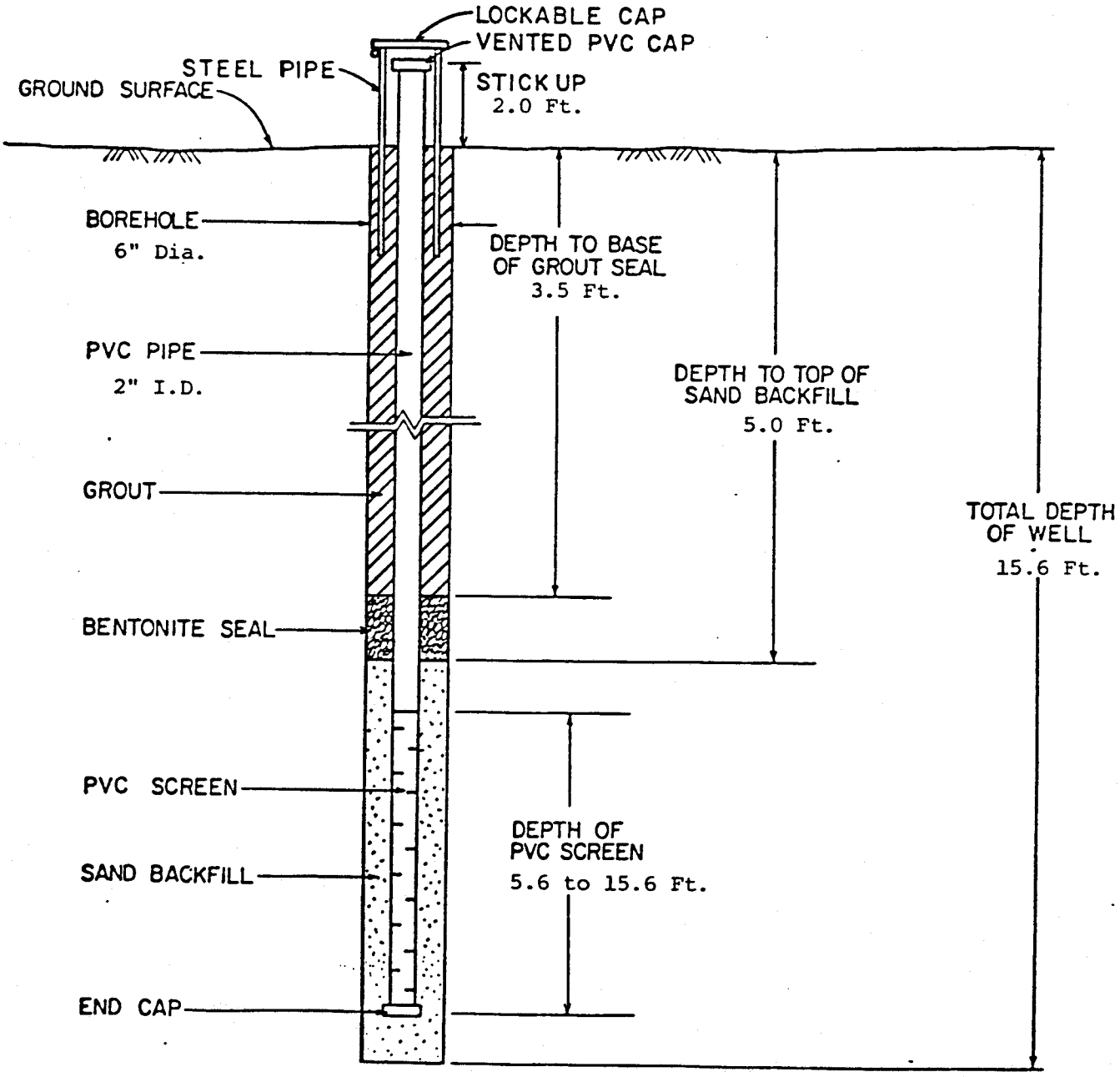
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-5 GROUND SURFACE ELEVATION 2547.18 Ft.

LOCATION South of Area B

INSTALLATION DATE 7-7-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL<br>INSTALLATION RECORD<br>MW-5 |

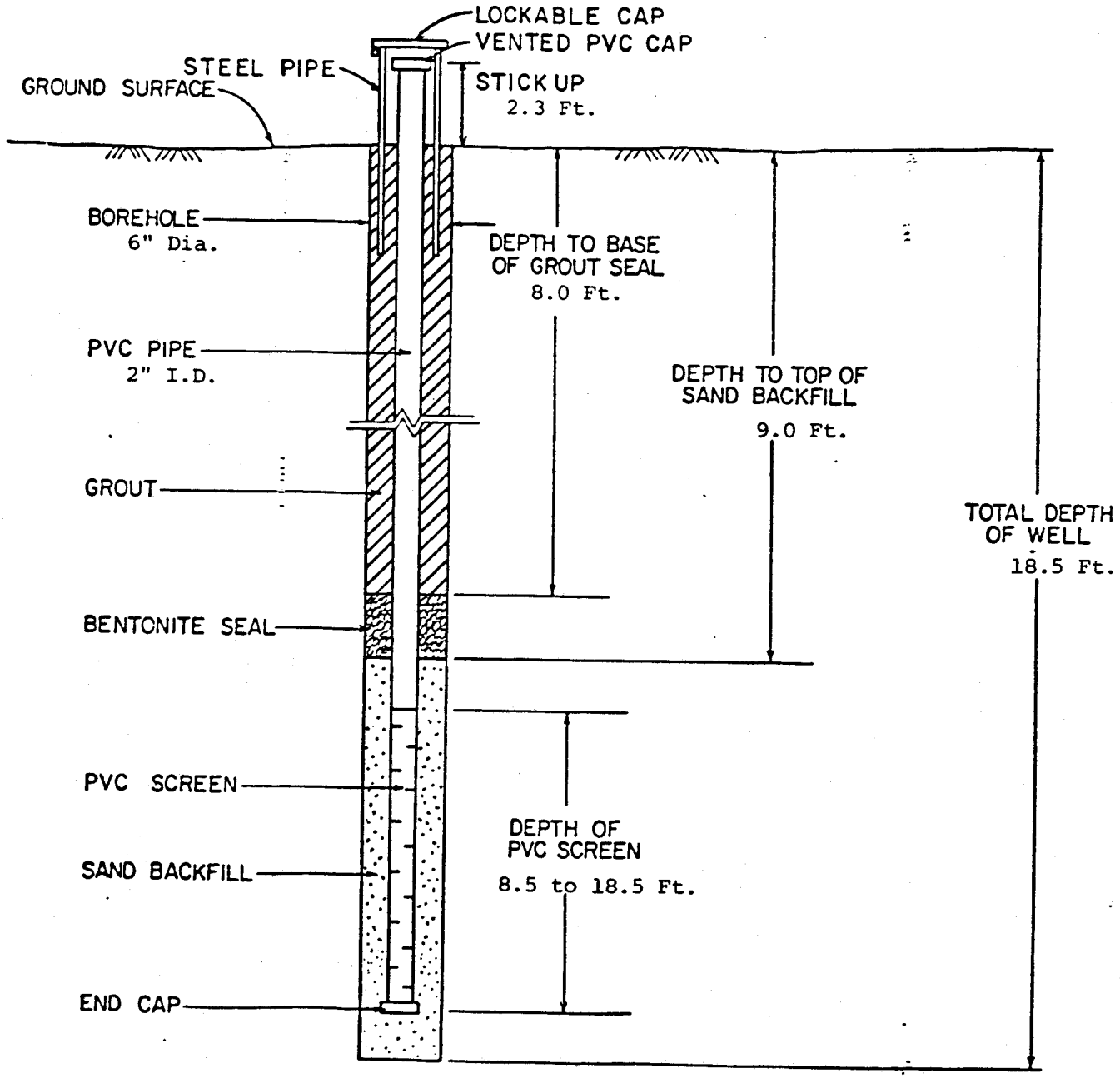
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-6 GROUND SURFACE ELEVATION 2549.72 Ft.

LOCATION South - Southeast of Area C

INSTALLATION DATE 7-7-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-6 |

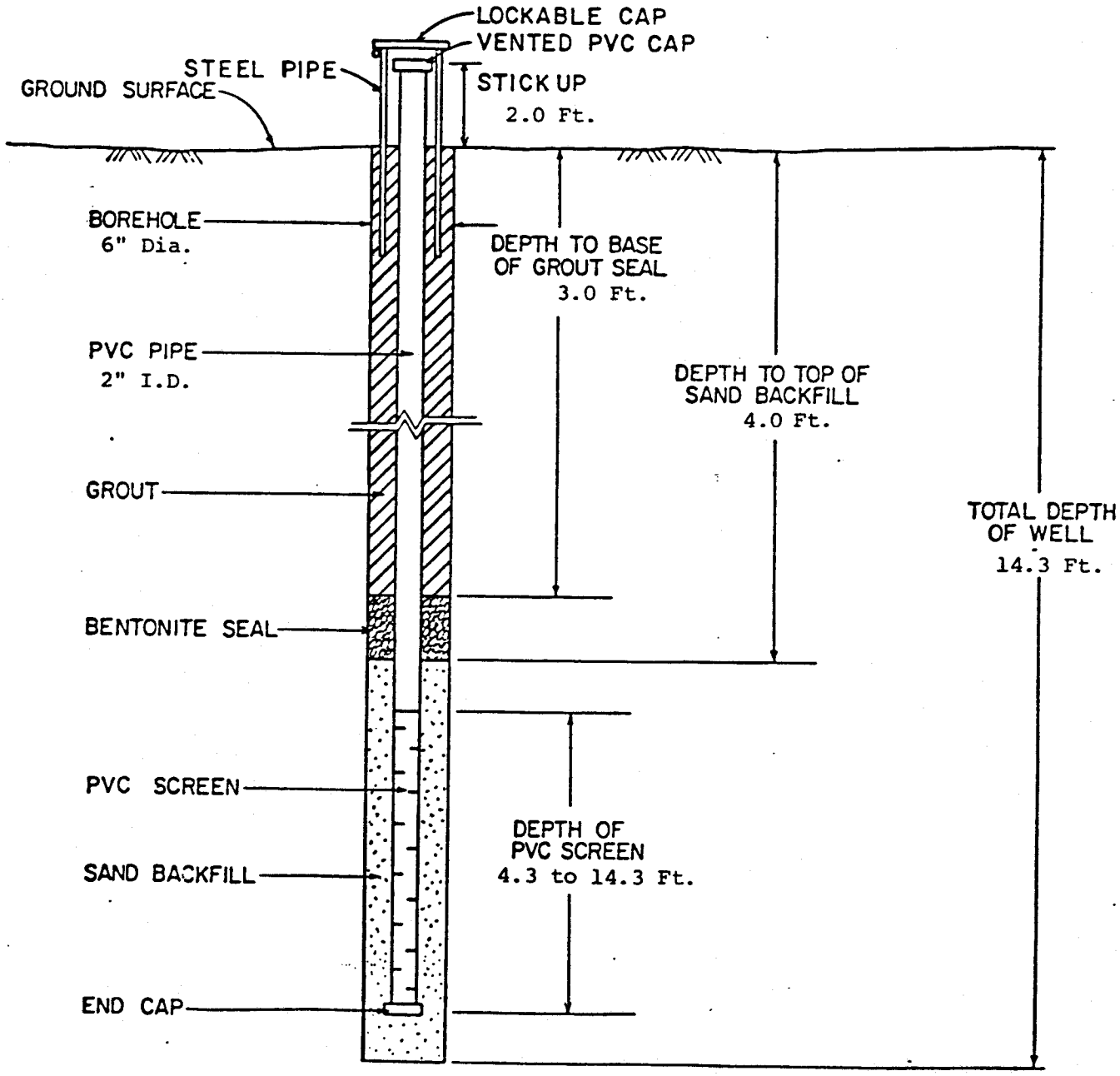
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-7 GROUND SURFACE ELEVATION 2550.44 Ft.

LOCATION South - Southwest of Area C

INSTALLATION DATE 7-7-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-7 |

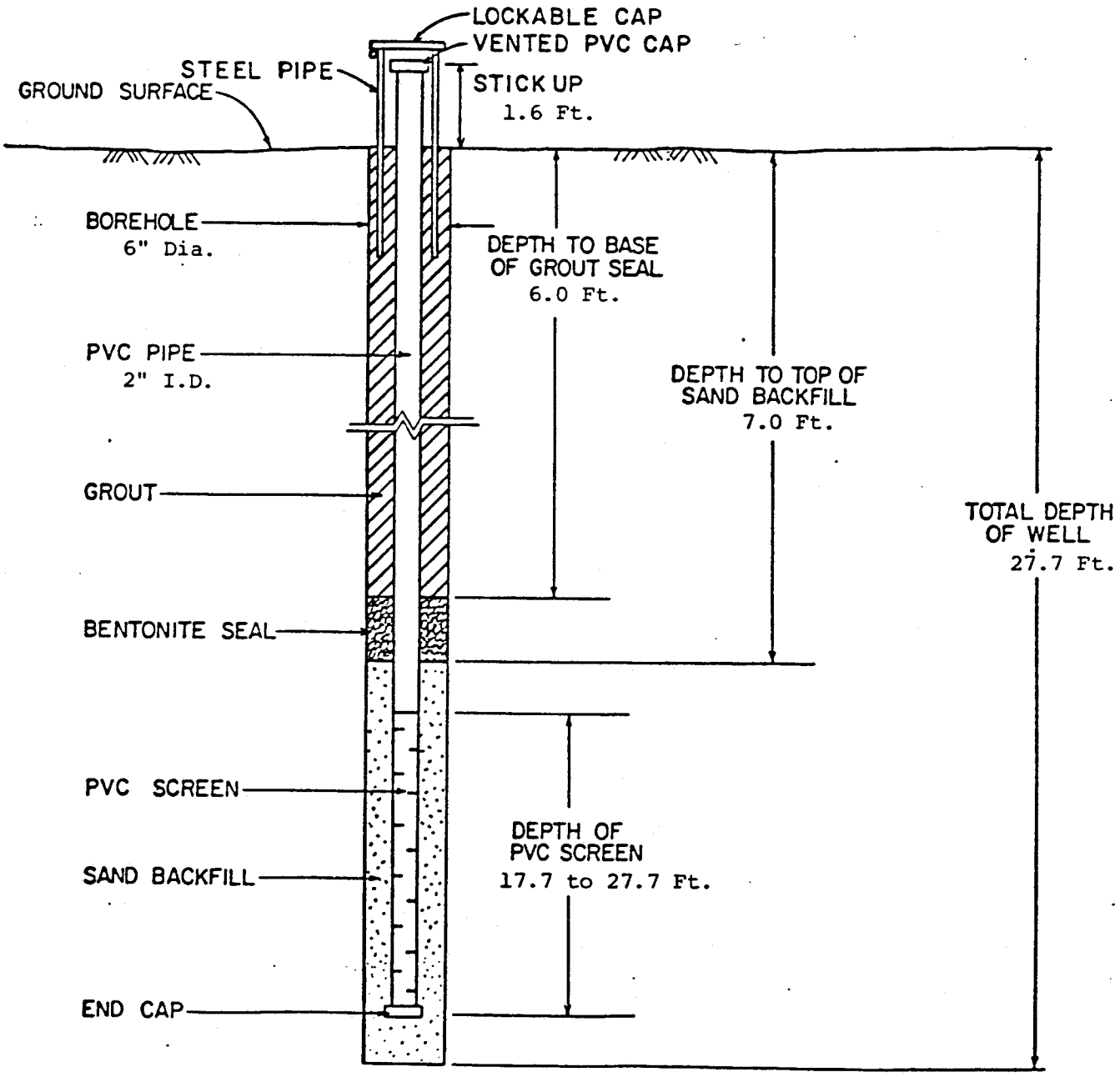
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-8 GROUND SURFACE ELEVATION 2594.39 Ft.

LOCATION South of Area D

INSTALLATION DATE 7-8-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-8 |

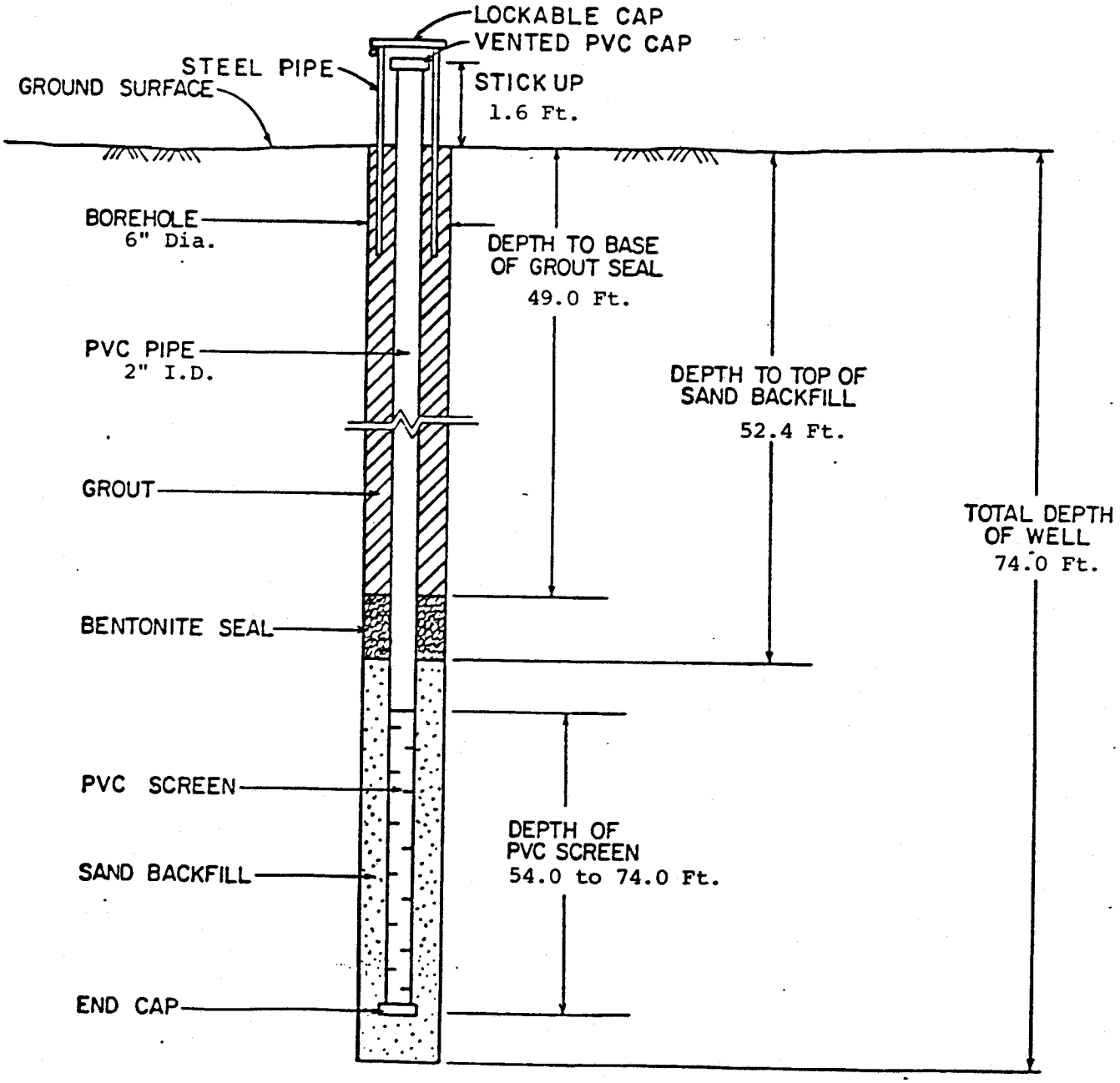
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-10 GROUND SURFACE ELEVATION 2677.78 Ft.

LOCATION West of Area E

INSTALLATION DATE 7-7-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL<br>INSTALLATION RECORD<br>MW-10 |

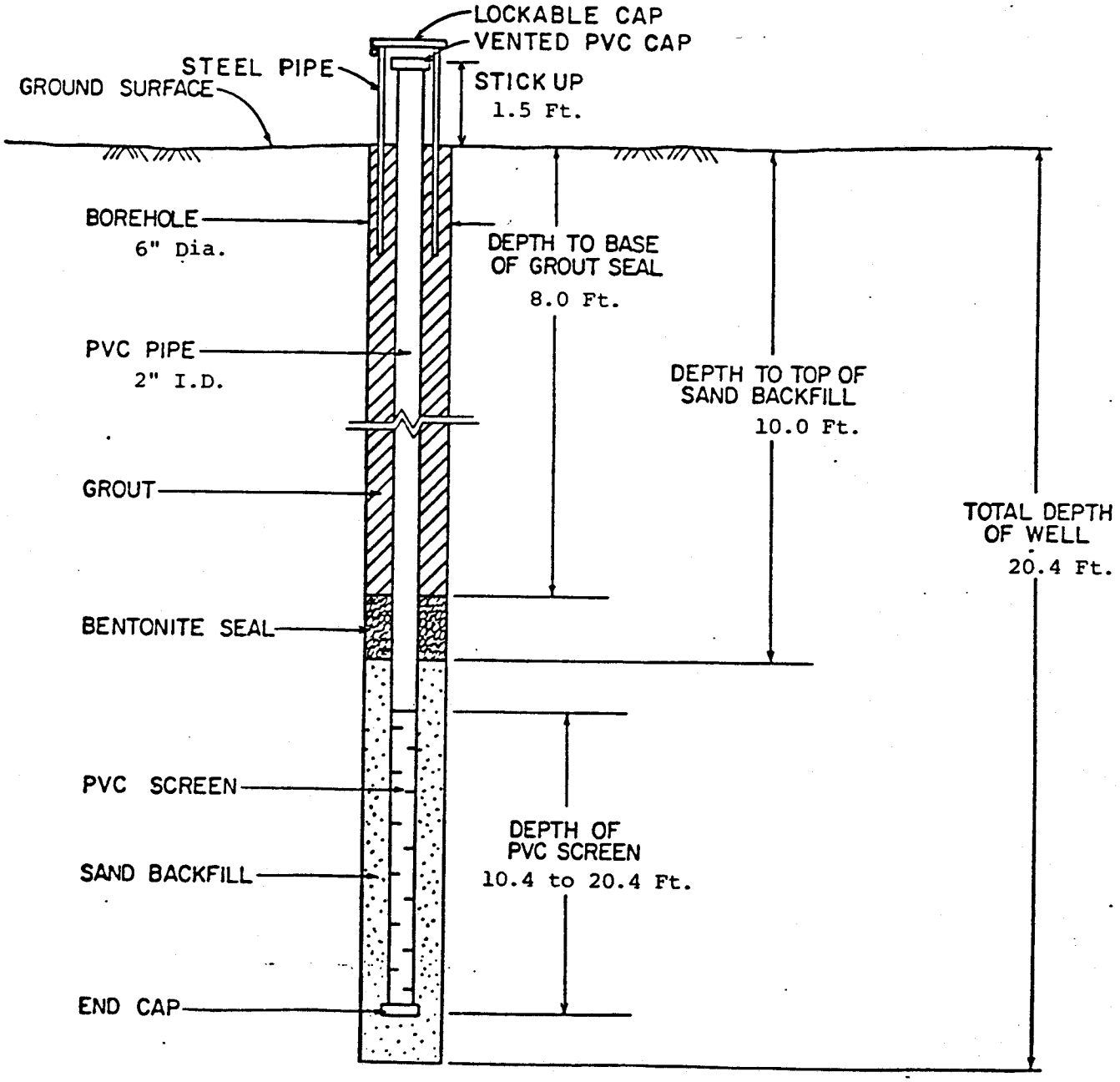
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-11 GROUND SURFACE ELEVATION 2639.44 Ft.

LOCATION West of Area E

INSTALLATION DATE 7-8-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-11 |

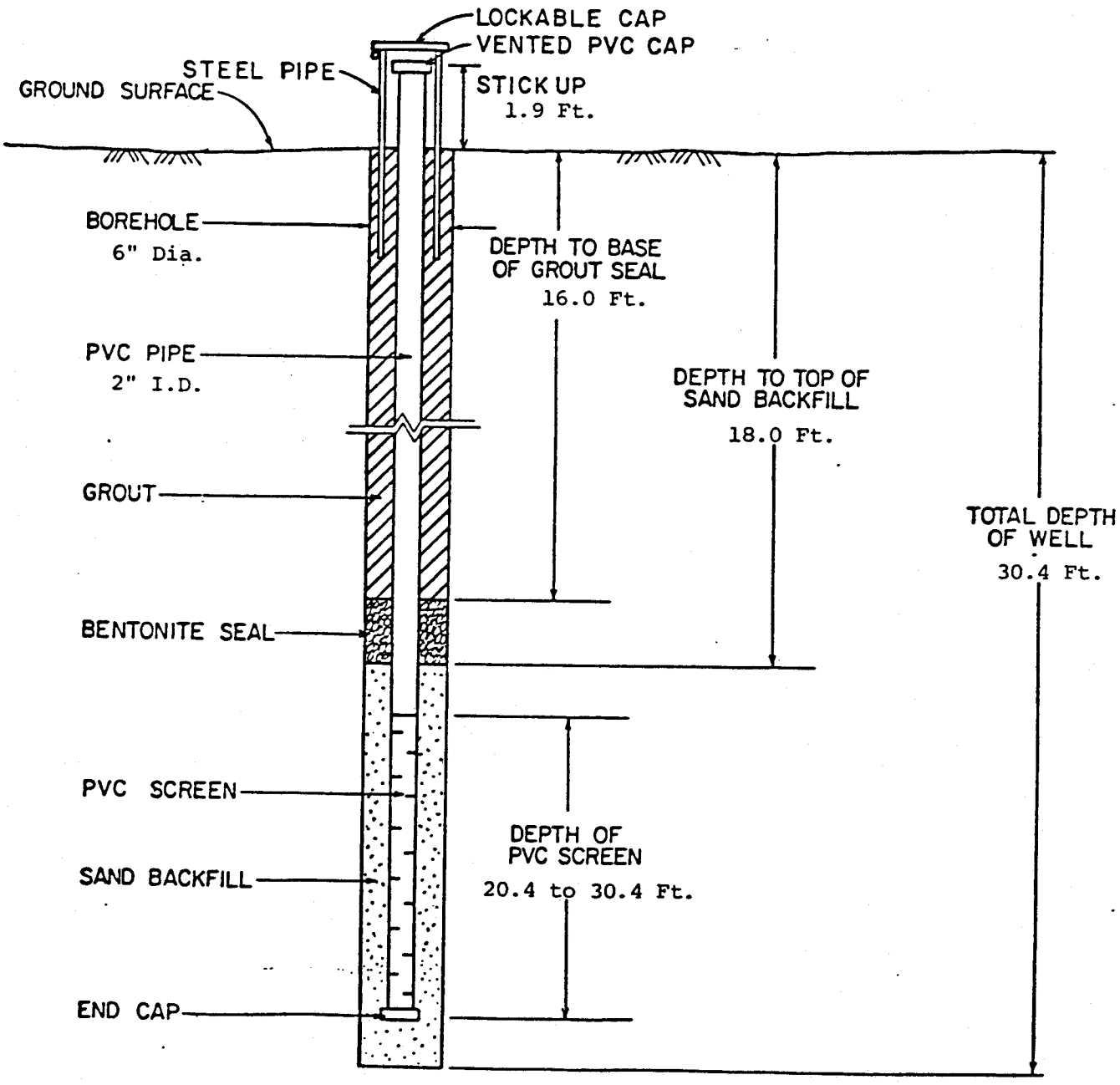
# MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-12 GROUND SURFACE ELEVATION 2543.73 Ft.

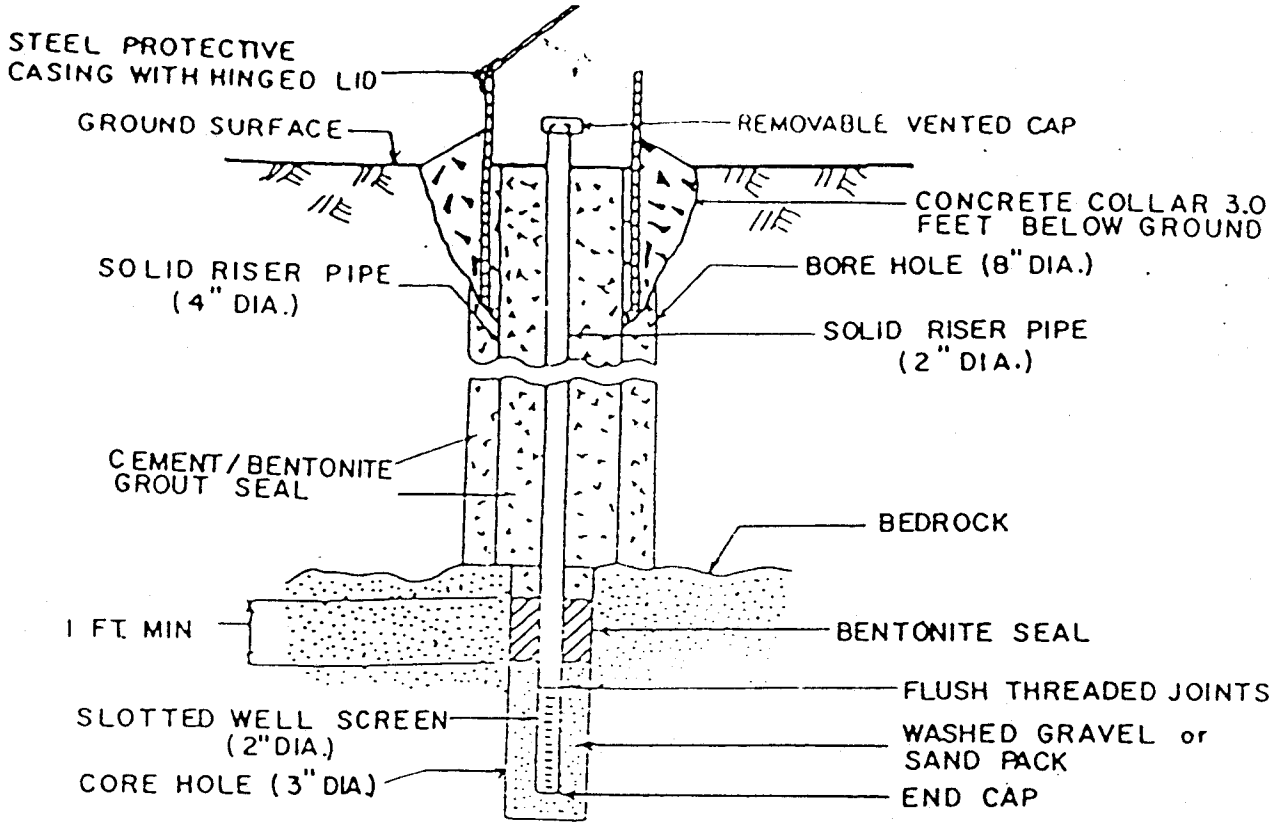
LOCATION Northwest of Junction of Bowen Branch and Pigeon River

INSTALLATION DATE 7-6-83




| | | |
|---|---|---|
| Champion Papers<br>Canton, North Carolina | LAW ENGINEERING TESTING COMPANY<br>CHARLOTTE, NORTH CAROLINA | MONITORING WELL INSTALLATION RECORD<br>MW-12 |

# TYPICAL DIAGRAM – TYPE III MONITORING WELL




## MONITORING WELL INSTALLATION DETAILS

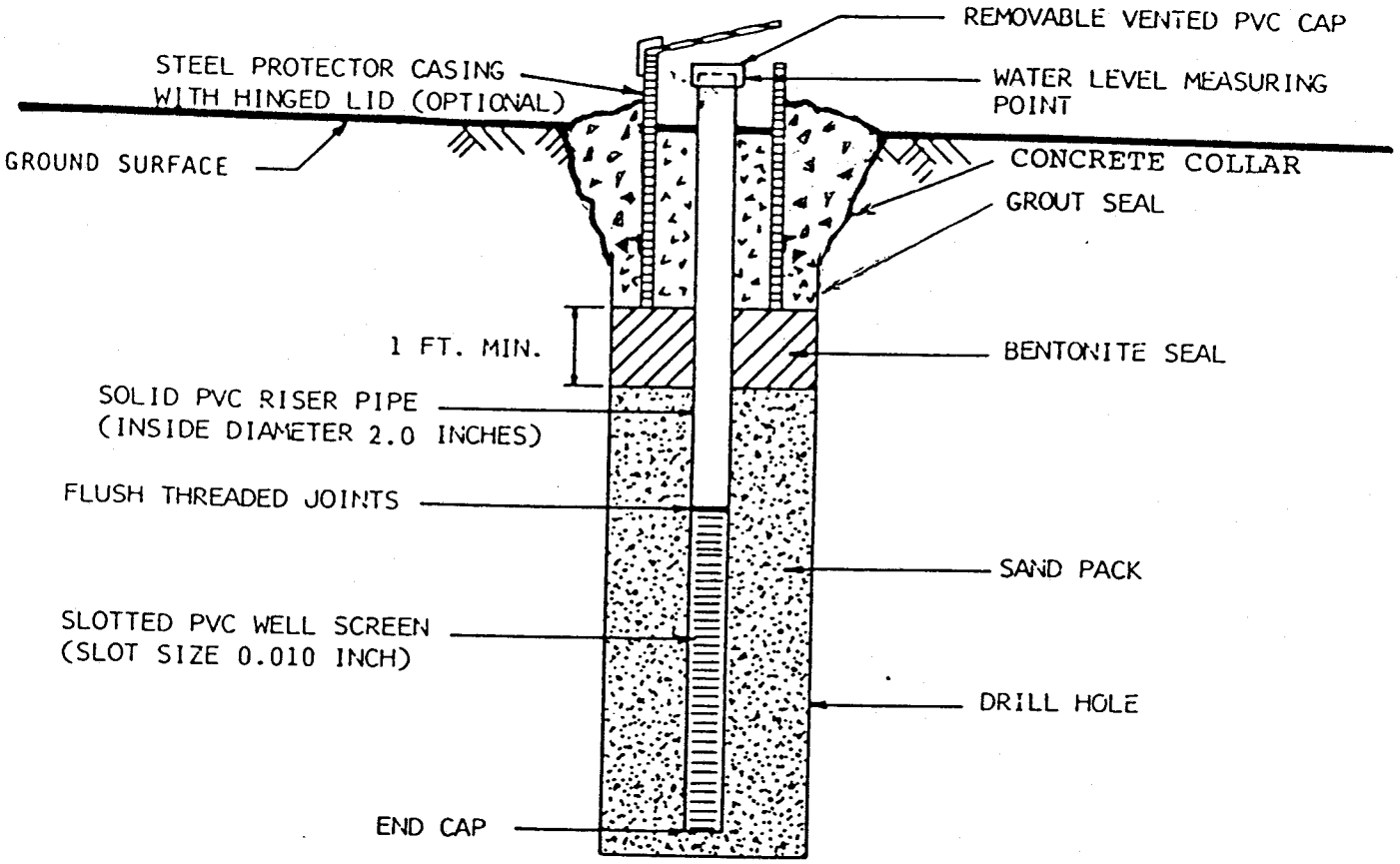
| | | | | | |
|---|---|---|---|---|---|
| WELL NUMBER | MW-3A | | | | |
| GROUND ELEVATION (FT.) | -- | | | | |
| GROUND WATER ELEVATION (FT.) MEASURED ON: | -- | | | | |
| TOTAL DEPTH OF WELL BELOW GROUND SURFACE (FT.) | 17.5 | | | | |
| MEASURING POINT ELEVATION (FT.) | -- | | | | |
| SCREEN LENGTH (FT.) | 10.0 | | | | |
| SOLID RISER LENGTH BELOW GROUND SURFACE (FT.) | 7.5 | | | | |
| PVC HEIGHT ABOVE GROUND (FT.) | 2.5 | | | | |
| THICKNESS OF BENTONITE SEAL | 1.2 | | | | |
| THICKNESS OF CEMENT SEAL | 4.0 | | | | |
| 4 INCH DIAMETER PVC LENGTH BELOW GROUND SURFACE (FT.) | 5.0 | | | | |

Champion International
Canton Landfill
Haywood County, N.C.

LAW ENGINEERING

INSTALLATION DETAILS
TYPE III MONITORING WELLS

JOB NO. AV-1834 | FIGURE 2




TYPICAL DIAGRAM OF MONITORING WELLS
(NOT TO SCALE)

MONITORING WELL INSTALLATION DETAILS

| WELL NUMBER | MW-5A | MW-7A | MW-13 | | |
|---|---|---|---|---|---|
| GROUND ELEVATION (FT.) | --- | --- | --- | | |
| GROUND WATER ELEVATION (FT.) MEASURED ON: | --- | --- | --- | | |
| TOTAL DEPTH OF WELL BELOW GROUND SURFACE (FT.) | 42.0 | 23.5 | 34.0 | | |
| MEASURING POINT ELEVATION (FT.) | --- | --- | --- | | |
| SCREEN LENGTH (FT.) | 10.0 | 10.0 | 10.0 | | |
| SOLID RISER LENGTH BELOW GROUND SURFACE (FT.) | 32.0 | 13.5 | 24.0 | | |
| PVC HEIGHT ABOVE GROUND (FT.) | 2.5 | 2.5 | 2.5 | | |
| THICKNESS OF BENTONITE SEAL (FT.) | 1.1 | 1.3 | 1.5 | | |
| THICKNESS OF CEMENT SEAL (FT.) | 28.3 | 9.5 | 19.6 | | |

NOTES:

Champion International
Canton Landfill
Haywood County, N.C.

LAW ENGINEERING

MONITORING WELL INSTALLATION DETAILS

JOB NO. AV-1834 FIGURE 3

| DEPTH FT. | DESCRIPTION | CORE % & SIZE | TIME MIN. | ELEV. | REMARKS | % R Q D |
|---|---|---|---|---|---|---|
| | Partially weathered rock sampled as red brown and black gray fine to coarse sandy SILT | | | | N = 50/1" | |
| | Auger refusal to 5 feet, moved 20 feet. Auger ** | NQ | | | N = 50/0" | |
| 5.0 | Hard to very hard white and light gray mica gneiss | 100 | | | Weathering slight to fresh 5.0 to 35.3 ft. | 100 |
| | | 100 | | | Severly iron stained and soil filled joint Steep dip 15.6 to 17.1 ft | 100 |
| | | 100 | | | ◁L | 95 |
| | ** bore 0 to 5 feet. Auger refusal at 5 feet, set and grouted 4" PVC casing to 5 feet. Begin NQ coring | 100 | | | Iron and manganize stained joint Steep dip 25.3 to 25.5 ft. | 100 |
| | | | | | ◁S | |
| | | 100 | | | Closely to very closely spaced joints Low dip 32.5 to 33.4 ft. | 100 |
| | | 100 | | | Very closely spaced Healed joints 33.4 to 33.7 | 98 |
| 35.3 | | | | | ◁L | |
| | Coring terminated at 35.3 feet | | | | | |
| | Boring terminated at 35.3 feet | 100 | | | | |
| | Monitoring well installed to 17.5 feet (see Figure 2 for details) | | | | | |
| | Ground water measured at 0.5 feet after 24 hours | | | | | |

NOTE: Boring MW-3B was backfilled with soil.

# TEST BORING RECORD

BORING NO. MW-3A,B

DATE DRILLED 10-30-87

JOB NO. AV-1834

LAW ENGINEERING TESTING CO

|%| % ROCK CORE RECOVERY — WATER TABLE, 1 HR.

N - STANDARD PENETRATION ◀ LOSS OF DRILLING WATER

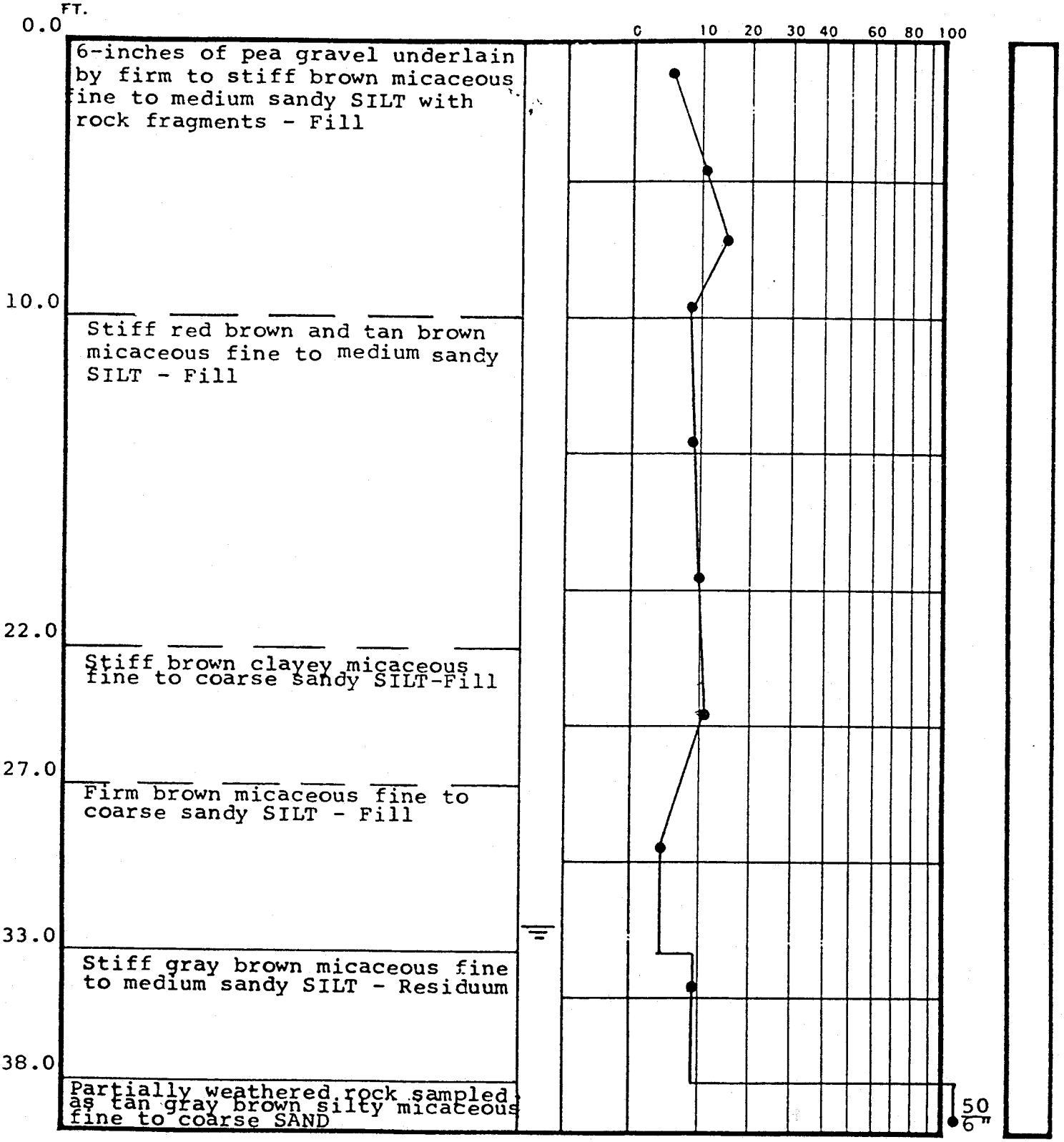
R.Q.D. ROCK QUALITY DESIGNATION

◁ ROCK JOINTS

L = LOW DIP 0–30°

M = MED. DIP 30°–60°

S = STEEP DIP 60°–90°




BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. MW-5A

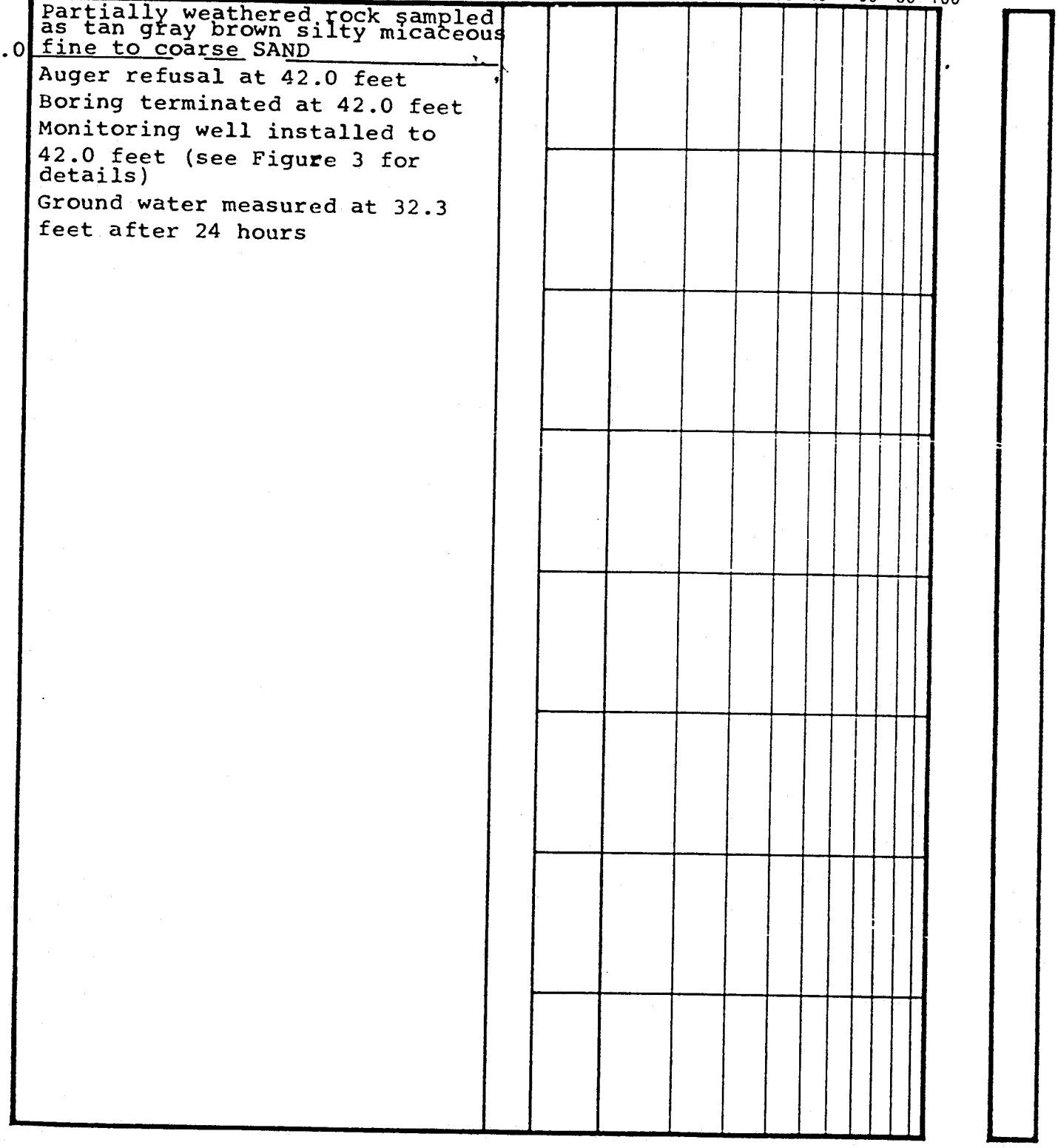
DATE DRILLED 10-29-87

JOB NO. AV-1834

PAGE 1 OF 2

LAW ENGINEERING TESTING COMPANY

| DEPTH FT. | DESCRIPTION | • PENETRATION-BLOWS PER FT. 0 10 20 30 40 60 80 100 |
|---|---|---|
| 38.0 | Partially weathered rock sampled as tan gray brown silty micaceous fine to coarse SAND | |
| 42.0 | Auger refusal at 42.0 feet<br>Boring terminated at 42.0 feet<br>Monitoring well installed to 42.0 feet (see Figure 3 for details)<br>Ground water measured at 32.3 feet after 24 hours | |



BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

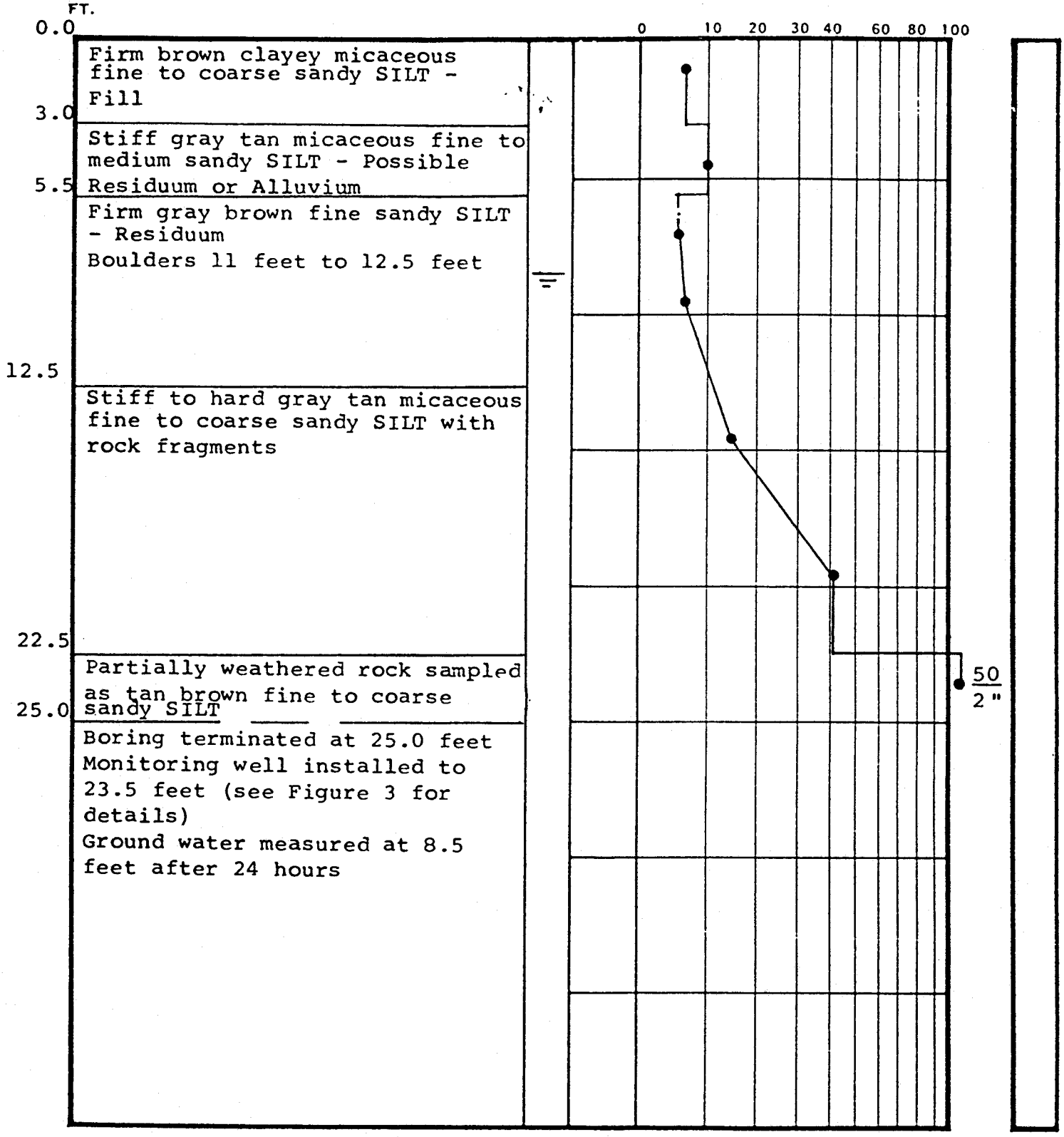
WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. MW-5A
DATE DRILLED 10-29-87
JOB NO. AV-1834
PAGE 2 OF 2

LAW ENGINEERING TESTING COMPANY




BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

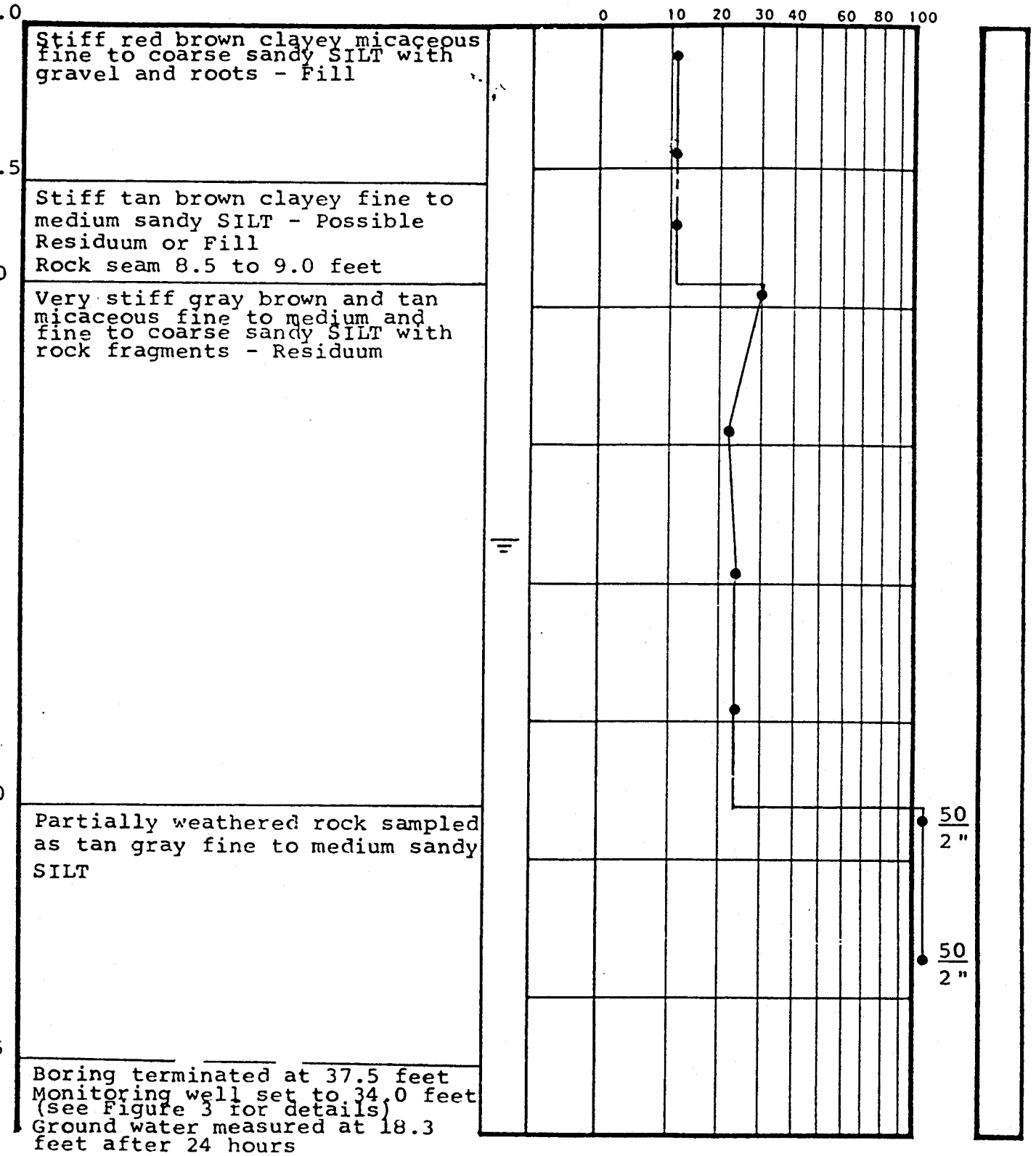
BORING NO. MW-7A

DATE DRILLED 10-27-87

JOB NO. AV-1834

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY




BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

# TEST BORING RECORD

BORING NO. MW-13

DATE DRILLED 10-28-87

JOB NO. AV-1834

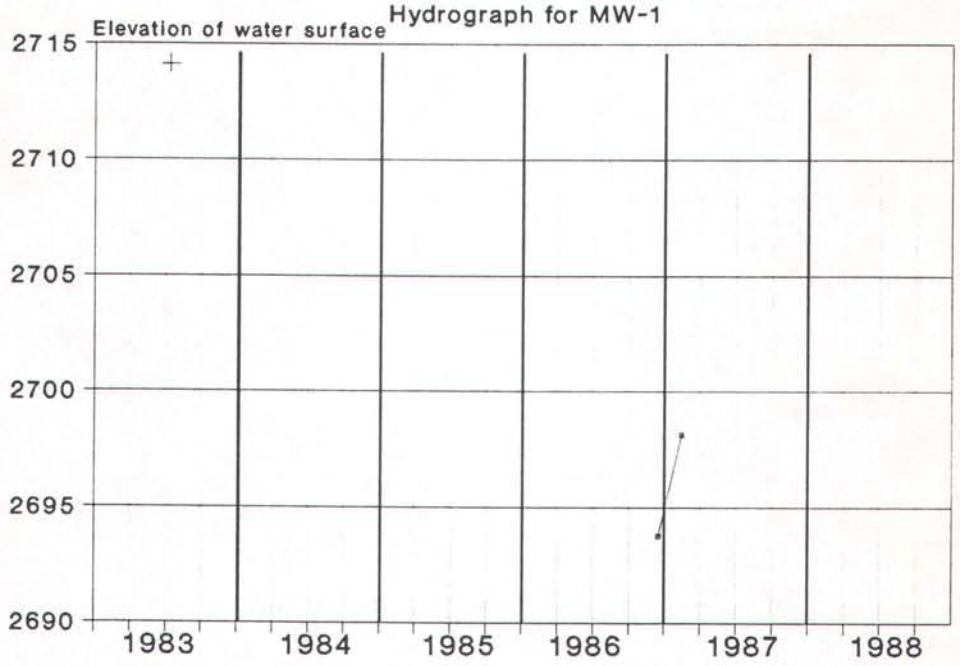
PAGE 1 OF 1

LAW ENGINEERING TESTING COMPANY

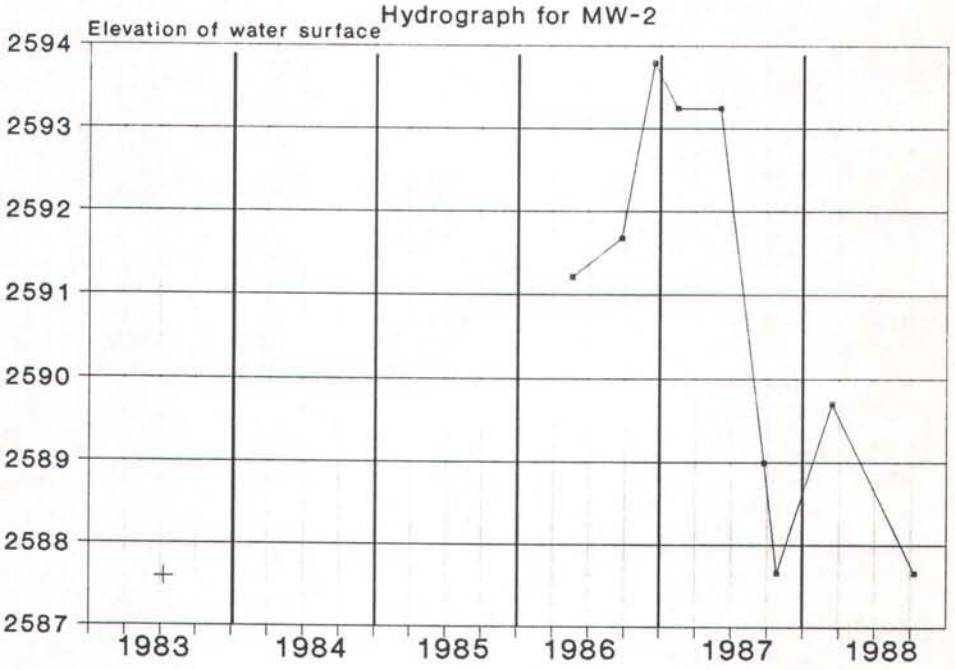
# APPENDIX E

# HYDROGRAPHS

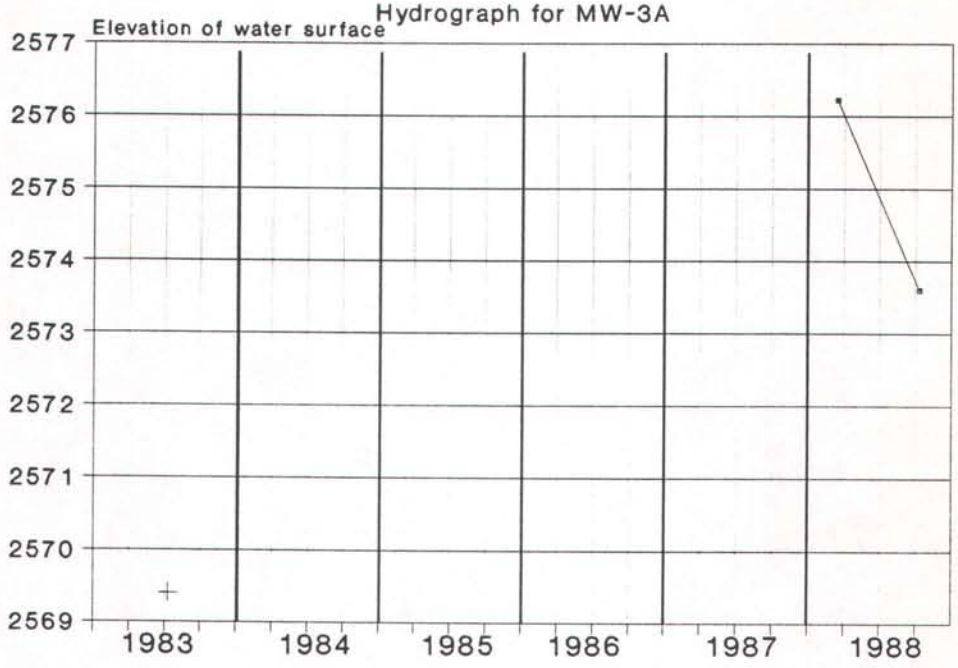
# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6



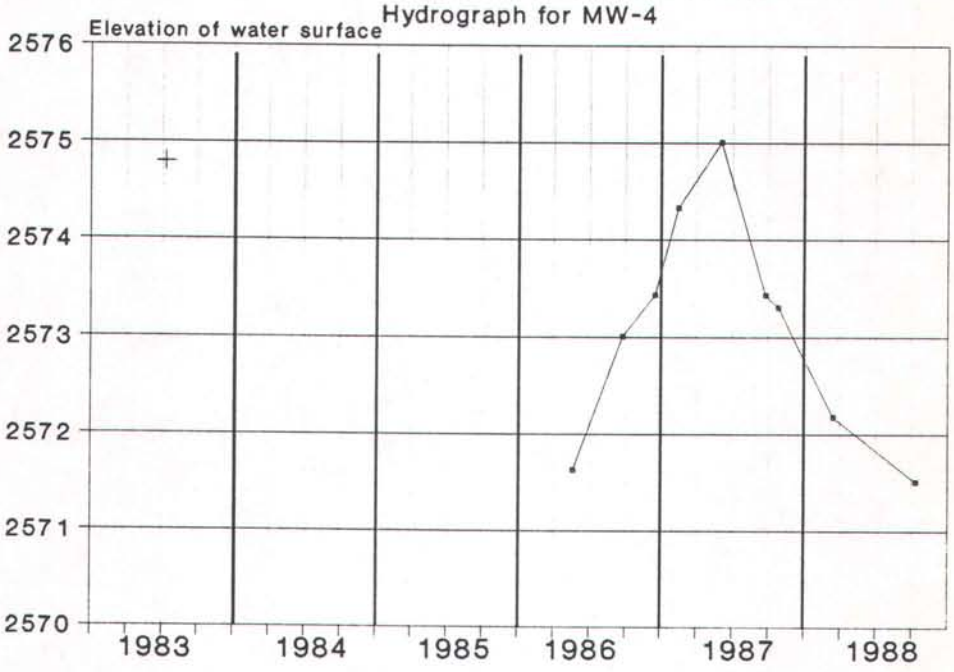

# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6



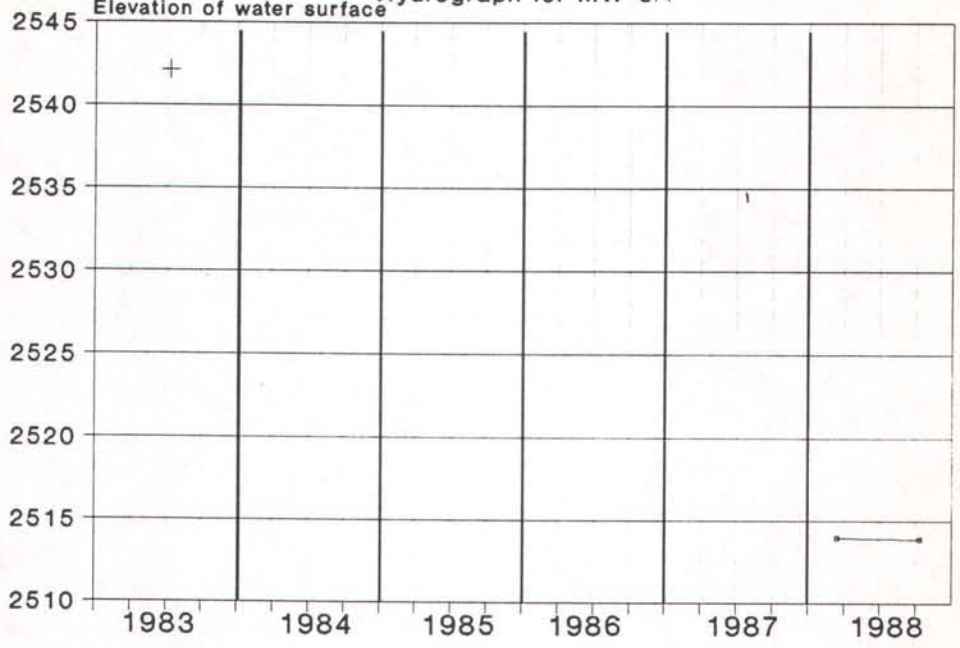
# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
Hydrograph for MW-3A



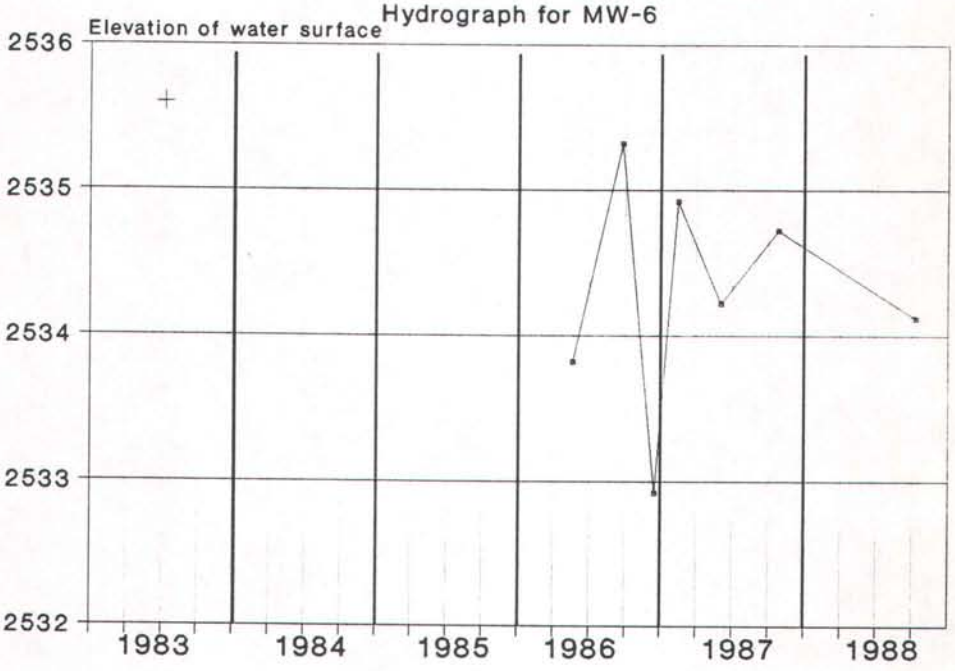

# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
Hydrograph for MW-4



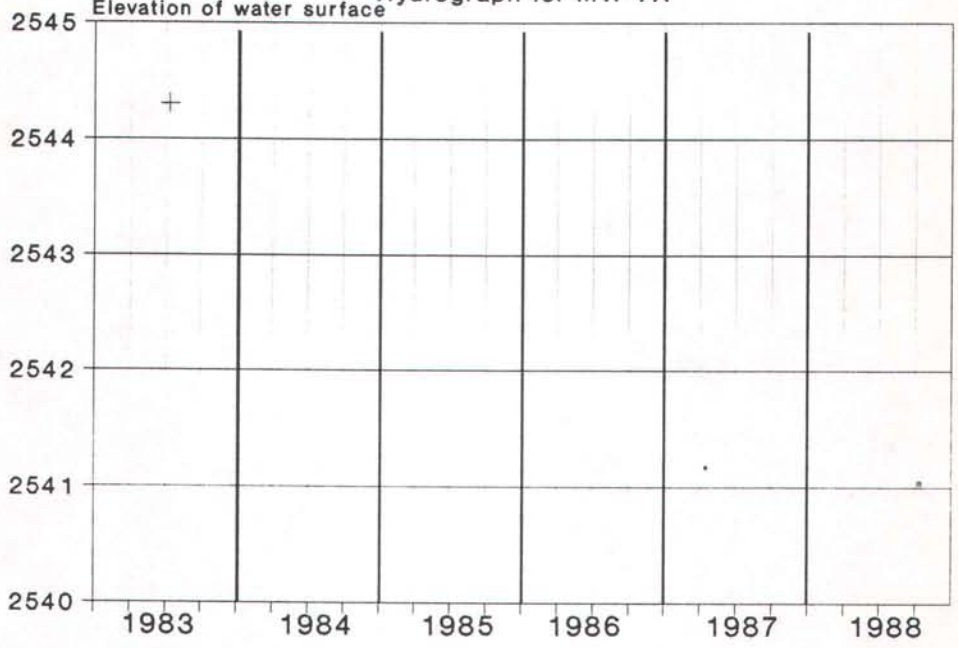
# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
Hydrograph for MW-5A



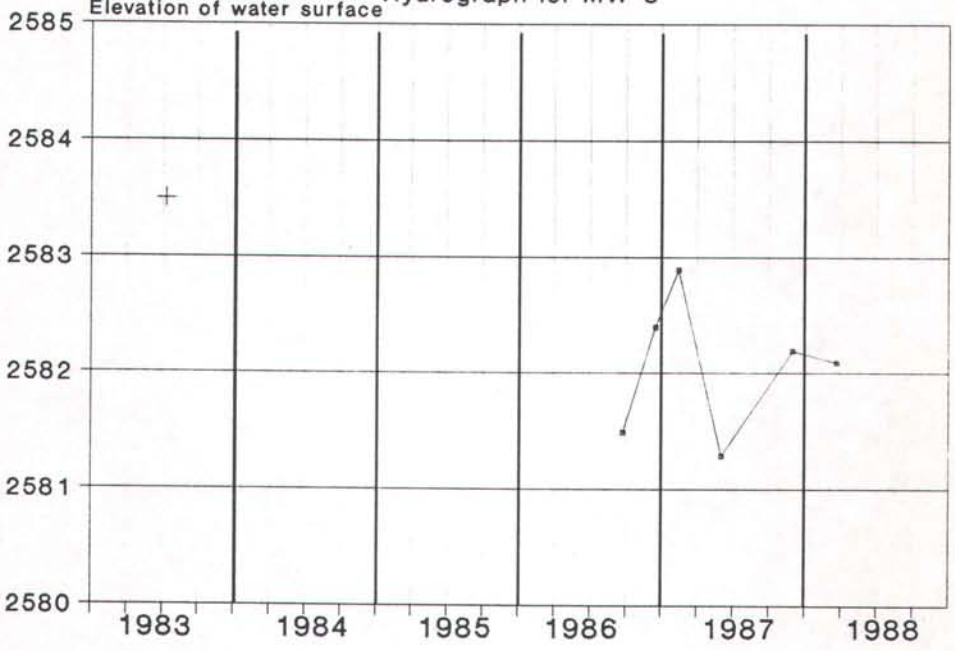

# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
Hydrograph for MW-6



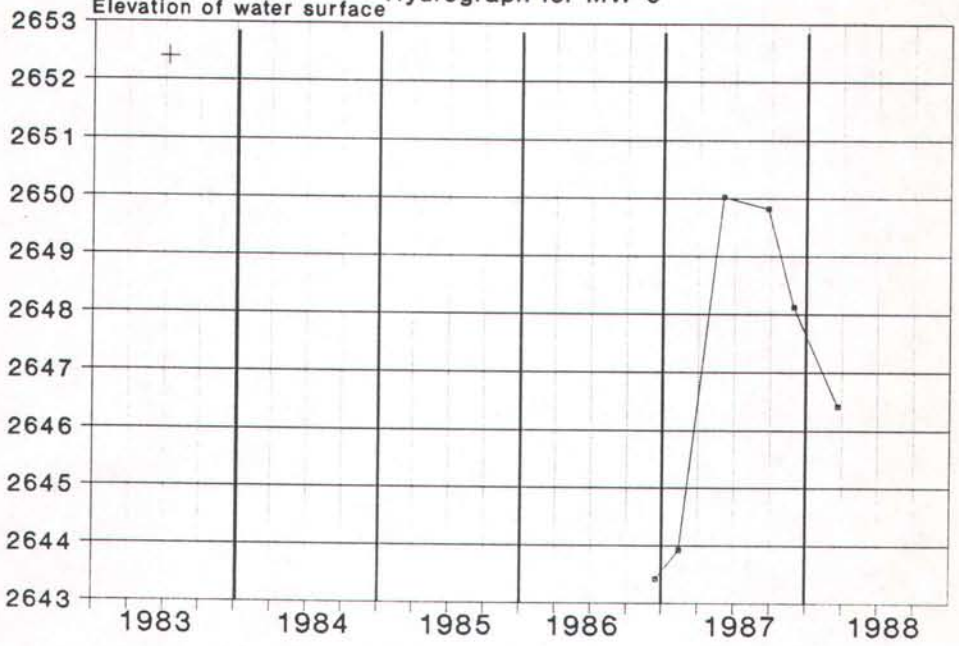
# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
Hydrograph for MW-7A



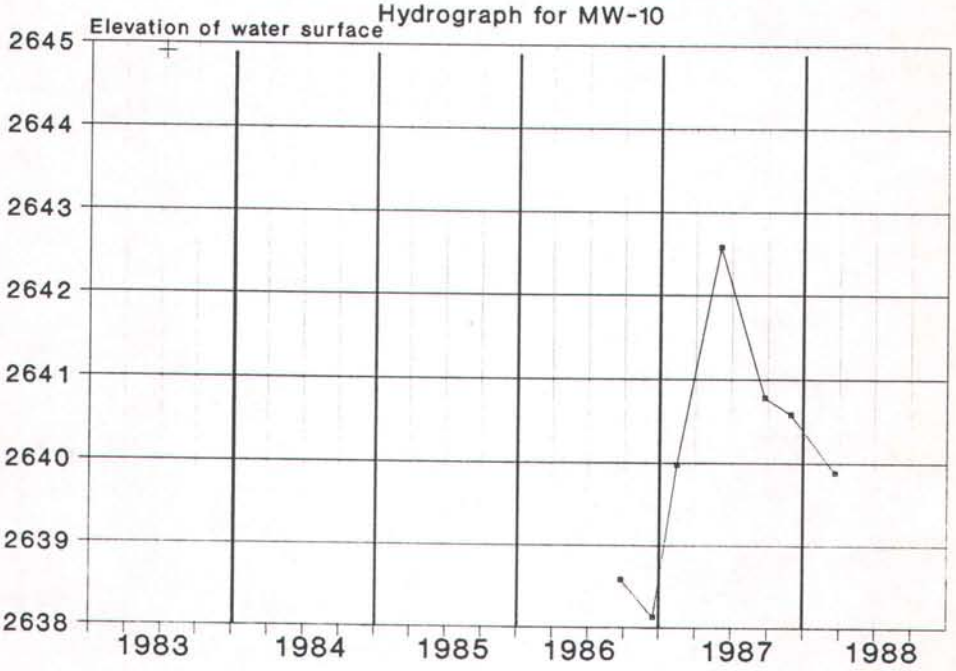

# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
Hydrograph for MW-8



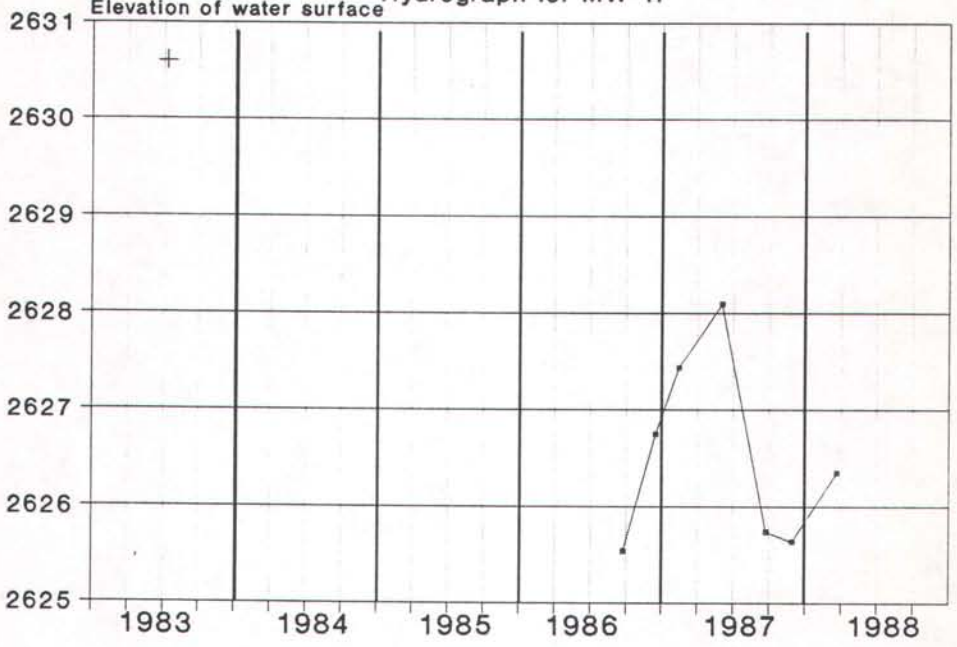
# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
### Hydrograph for MW-9



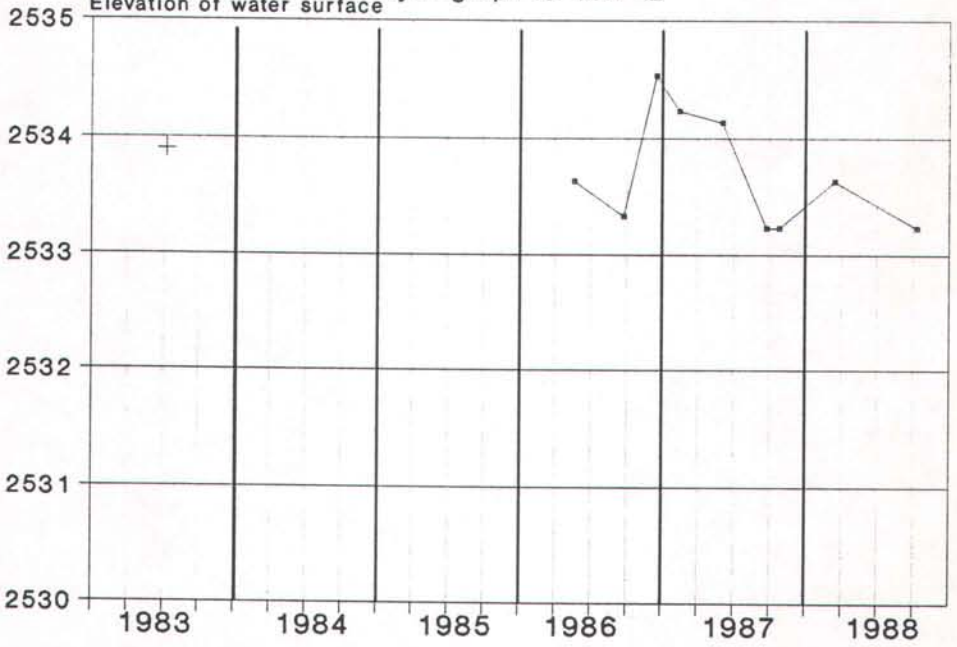

# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
### Hydrograph for MW-10



# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
Hydrograph for MW-11




# CHAMPION PAPER
## CANTON MILL-LANDFILL NO.6
Hydrograph for MW-12



# APPENDIX F

# GEOTECHNICAL SOILS ANALYSES

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**FROEHLING & ROBERTSON, INC.**
FULL SERVICE LABORATORIES • ENGINEERS & CHEMISTS
*"OVER ONE HUNDRED YEARS OF SERVICE"*

P.O. Box 34766
Charlotte, N.C. 28234
(704) 376-1596

October 11, 1989

Sirrine Environmental Consultants, Inc.
Post Office Box 24000
Greenville, South Carolina 29616

Attention: Mr. Jim Chamness

Re: Laboratory Testing
Champion International Landfill Expansion
Landfill No. 6
Canton, North Carolina
F&R File No. Q-63-045

Dear Mr. Chamness:

F&R, Inc. has partially completed testing of samples obtained during our subsurface exploration program of the above referenced project. Testing included moisture content, Atterberg limits, wash #200, standard Proctor compaction and remolded permeability.

## LABORATORY TEST PROCEDURES

### Moisture Content

The water content of representative samples was determined. The moisture content is the ratio expressed as a percentage of the weight of water in a given mass of soil to the weight of the solid particles. This test was conducted in accordance with ASTM Designation D-2216. These test results are presented on the attached Summary of Laboratory Test Data sheet.

### Atterberg Limits

Representative samples of the soils were selected for Atterberg Limits testing to determine the soil plasticity characteristics. The soil's Plastic Index (PI) is representative of this characteristics and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL).

The LL is the moisture content at which the soil will flow as a heavy viscous fluid and is determined in accordance with ASTM D-423. The PL is the moisture content at which the soil begins to lose its plasticity and is determined in accordance with ASTM D-424. The data obtained is presented on the attached Summary of Laboratory Test Data sheet.

Compaction Tests

Compaction tests are run on representative soil samples to determine the dry density obtained by a uniform compactive effort at varying moisture content. The results of the test are used to determine the moisture content and unit weight desired in the field for similar soils. Proper field compaction is necessary to decrease future settlements, increase the shear strength of the soil and decrease the permeability of the soil.

The two most commonly used compaction tests are the Standard Proctor test and the Modified Proctor test. They are performed in accordance with ASTM Specifications D-698 and D-1557, respectively. Generally, the Standard Proctor Compaction Test is run on samples from building areas and areas where small compaction equipment is anticipated. The Modified Compaction Test is generally used for analyses of highways and other areas where large compaction equipment is expected. In both tests a representative soil sample is placed in a mold and compacted with a compaction hammer.

The moisture content and unit weight of each compacted sample is determined. Usually four to five such tests are run at different moisture contents. Test results are presented in the form of a dry unit weight versus moisture content curve. The standard Proctor compaction test was used on the three samples tested.

SINCE F&R 1881

Permeability Test

The coefficient of permeability is a constant of proportionality relating to the ease with which a fluid passes through a porous medium. A sample is remolded to a predetermined density. The cylindrical sample is confined in a latex membrane, placed in a triaxial cell and subjected to a confining pressure of 5 psi. The specimen is then soaked for period of time under a vacuum, from the bottom to the top, to purge air from the soil. Saturation in excess of 90 percent is achieved through the use of back pressure. After saturation is completed the sample is permeated allowing water to flow through it. The volume of fluid passing through the sample and the time elapsed is recorded. The coefficient of permeability is calculated using the constant head permeameter formula. These tests were performed in accordance with EM 1110-2-1906. The results are summarized below:

| Sample | Dry Density,pcf | Degree of Saturation | Coefficient of Permeability |
|---|---|---|---|
| AP3 | 98.2 | 100% | 3.13 E-05 cm/sec |
| AP14 | 104.2 | 90% | 2.67 E-05 cm/sec |
| AP18 | 92.9 | 90% | 1.31 E-04 cm/sec |

F&R, Inc. appreciates the opportunity to provide testing services during this phase of your project as your geotechnical consultant. If you have any questions concerning this letter, please feel free to contact us at your convenience.

Very truly yours,
F&R, INC.

Enrique Blat

Enrique Blat, E.I.T.
Geotechnical Engineering Staff

EB/dp

## SUMMARY OF LABORATORY TEST DATA

| Boring No. | Sample Depth | Sample Type** | USCS Classification | Max. Dry Density pcf | Unit Weight pcf | | Unconfined Compressive Strength KSF | % Finer No. 200 | Specific Gravity | Natural Moisture Content | Atterberg Limits | | | K avg. cm/sec | % mica |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Wet | Dry | | | | | L.L. | P.L. | P.I. | | |
| AP3 | 14-20 | Bulk | SM | 109.3 | 115.1 | 98.2 | | 41.2 | | 17.38 | 47 | 36 | 11 | $3.13 \times 10^{-5}$ | 20-25 |
| AP14 | 28.5-38.5 | Bulk | SP-SM | 116.7 | 120.6 | 104.2 | | 36.2 | | 12.80 | 36 | 32 | 4 | $2.67 \times 10^{-5}$ | 22-26 |
| AP5 | 18.5-23.5 | Bulk | SM | 111.5 | | | | 41.4 | | 9.73 | 38 | 29 | 9 | | 16-21 |
| AP1 | 20-35 | Bulk | SM | 110.0 | 117.8 | 104.2 | | 42.6 | | 15.0 | 40 | 30 | 10 | | 24-28 |
| AP18 | 18.5-23.5 | Bulk | SP | 108.9 | | | | 31.2 | | 13.95 | 33 | 27 | 6 | $1.31 \times 10^{-4}$ | 23-28 |
| B105 | 0-15 | Bulk | SM | | | | | 33.0 | | 14.48 | 34 | 26 | 8 | | 25-30 |
| B105 | 5.0-7.0 | SS | SM | | | | | 31.2 | | 18.20 | | | | | 31-36 |
| B105 | 15.0-17.0 | SS | SM | | | | | | | 19.57 | 36 | 29 | 7 | | |
| B110 | 5.0-7.0 | SS | ML | | | | | 51.9 | | 21.02 | | | | | 23-30 |
| B110 | 25.0-27.0 | SS | ML | | | | | | | 12.90 | 43 | 36 | 7 | | |

*– Graphic Presentations of Results of Triaxial, Consolidation, CBR, Proctor, Grain Size, and other tests follow this summary

**– SS = Split Spoon Sample (ASTM D-1586)
UD = Undisturbed Sample (ASTM D-1587)

FROEHLING & ROBERTSON, INC.
CHARLOTTE, NORTH CAROLINA

JOB NUMBER: _____

## SUMMARY OF LABORATORY TEST DATA

| Boring No. | Sample Depth | Sample Type** | USCS Classification | Max. Dry Density pcf | Unit Weight pcf | | Unconfined Compressive Strength KSF | % Finer No. 200 | Specific Gravity | Natural Moisture Content | Atterberg Limits | | | | % mica |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Wet | Dry | | | | | L.L. | P.L. | P.I. | | |
| B109 | 20-25 | Bulk | SP | | | | | 20.4 | | 12.43 | | | | | 20-25 |
| AP32 | 30-38 | Bulk | SP | | | | | 35.4 | | 13.79 | | | | | 26-34 |
| AP45 | 10-20 | Bulk | SP-SM | | | | | 38.1 | | 12.33 | 37 | 28 | 9 | | 35-40 |
| B117 | 5-7 | SS | SM | .Combine | | | | 43.5 | | 15.04 | 42 | 37 | 5 | | 29-39 |
| | 10-12 | SS | SM | jar samples | | | | | | | | | | | |
| B118 | 10-12 | SS | SM | .Combine | | | | 34.3 | | 18.42 | 36 | 32 | 4 | | 37-42 |
| | 15-17 | SS | SM | jar samples | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

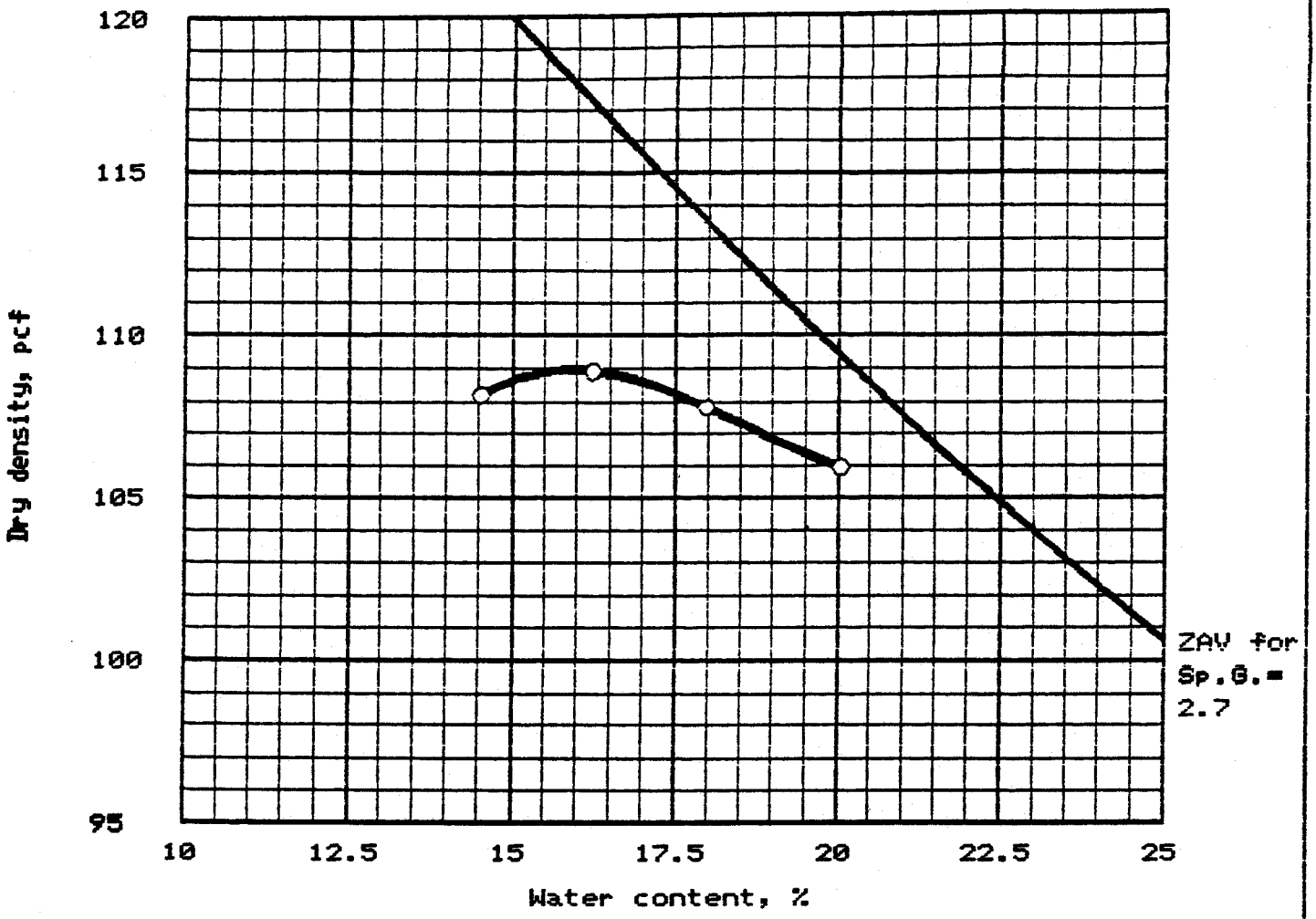
*– Graphic Presentations of Results of Triaxial, Consolidation, CBR, Proctor, Grain Size, and other tests follow this summary

**– SS = Split Spoon Sample (ASTM D-1586)
UD = Undisturbed Sample (ASTM D-1587)

FROEHLING & ROBERTSON, INC.
CHARLOTTE, NORTH CAROLINA

JOB NUMBER: _____

# PROCTOR TEST REPORT




"Standard" Proctor, ASTM D 698, Method A

| Elev/ Depth | Classification USCS | Classification AASHTO | Nat. Moist. | Sp.G. | LL | PI | % > No.4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | SP | | 13.9 % | | 33 | 6 | % | 31.2 % |

| TEST RESULTS | MATERIAL DESCRIPTION |
|---|---|
| Optimum moisture = 15.9 %<br>Maximum dry density = 108.9 pcf | LIGHT BROWN SILTY SAND |

Project No.: Q-63-045
Project: CHAMPION LANDFILL
Location:

Date: 9-11-1989

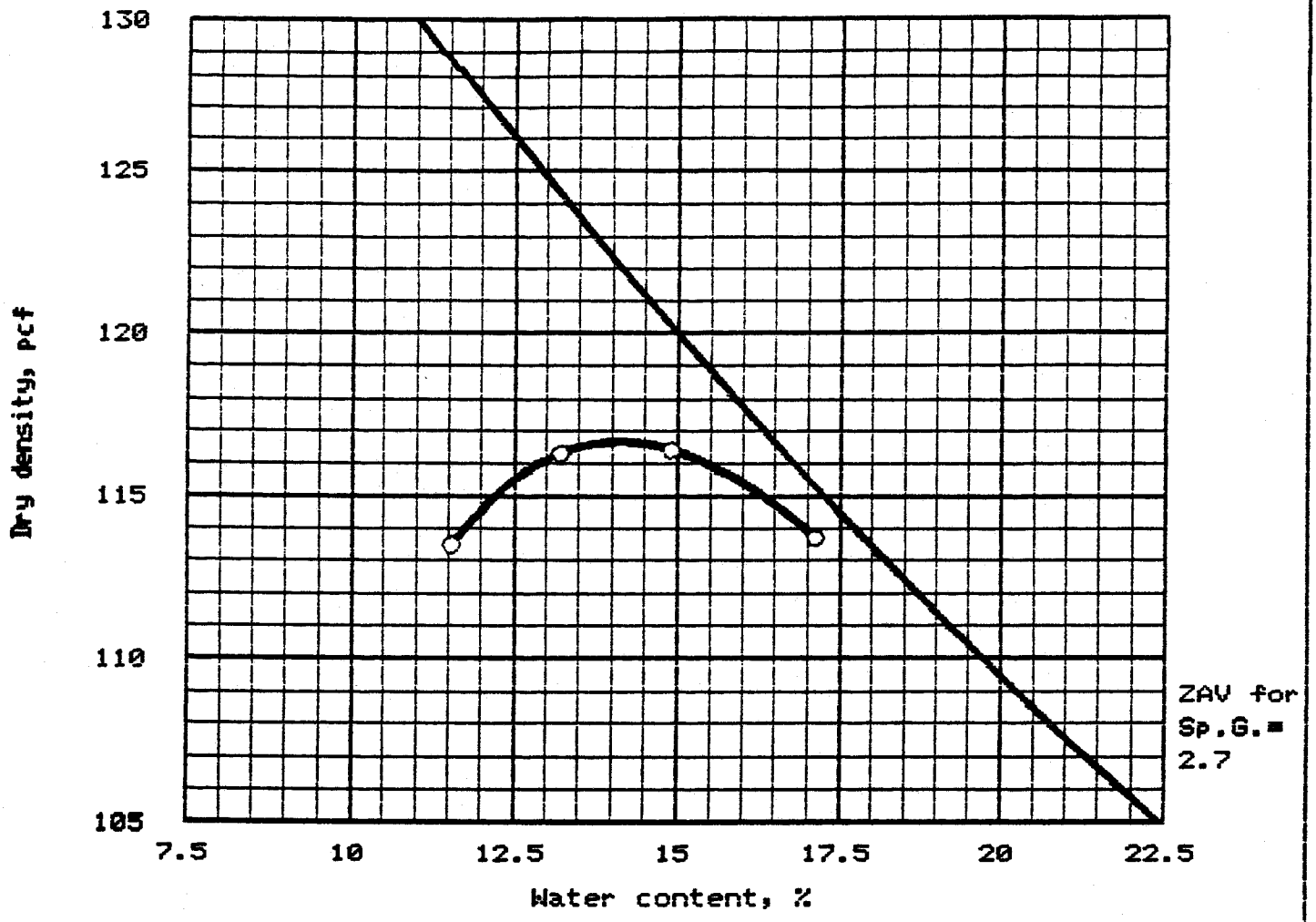
Remarks:
AP 18
18.5'-23.5'

PROCTOR TEST REPORT

FROEHLING & ROBERTSON, INC.

Fig. No. _____

# PROCTOR TEST REPORT




"Standard" Proctor, ASTM D 698, Method A

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > No.4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| | SP-SM | | 12.8 % | | 36 | 4 | % | 36.2 % |

**TEST RESULTS**

Optimum moisture = 14.1 %
Maximum dry density = 116.7 pcf

**MATERIAL DESCRIPTION**

LIGHT BROWN SILTY SAND

Project No.: Q-63-045
Project: CHAMPION LANDFILL
Location:

Date: 9-11-1989

**Remarks:**

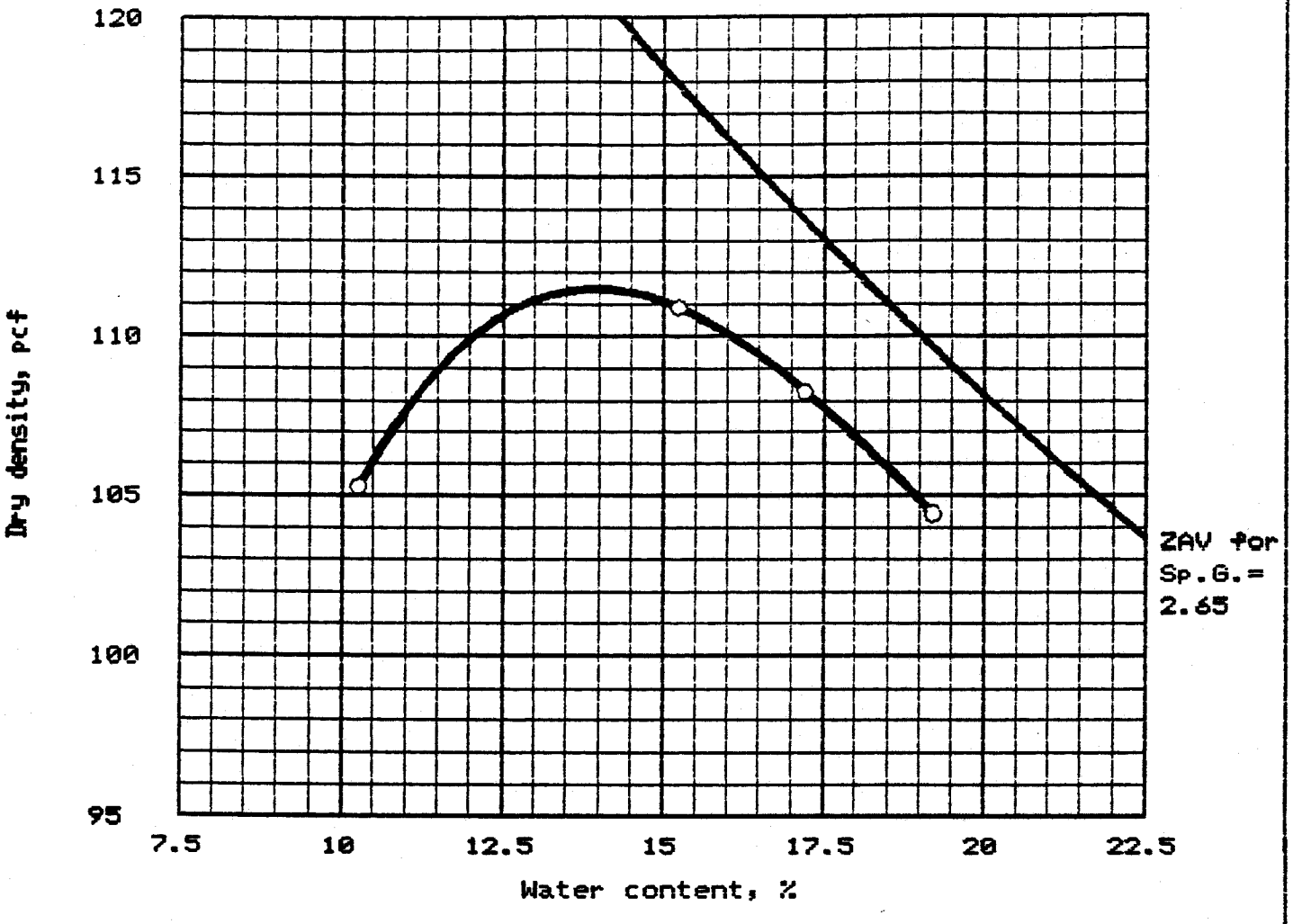
AP 14
28.5'-38.5'

PROCTOR TEST REPORT

FROEHLING & ROBERTSON, INC.

Fig. No. _____

# PROCTOR TEST REPORT




"Standard" Proctor, ASTM D 698, Method A

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > No.4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| | SM | | 9.73 % | | 38 | 9 | % | 41.4 % |

| TEST RESULTS | MATERIAL DESCRIPTION |
|---|---|
| Optimum moisture = 13.9 %<br>Maximum dry density = 111.5 pcf | TAN SILTY SAND |

Project No.: Q-63-045
Project: CHAMPION LANDFILL
Location:

Date: 9-11-1989

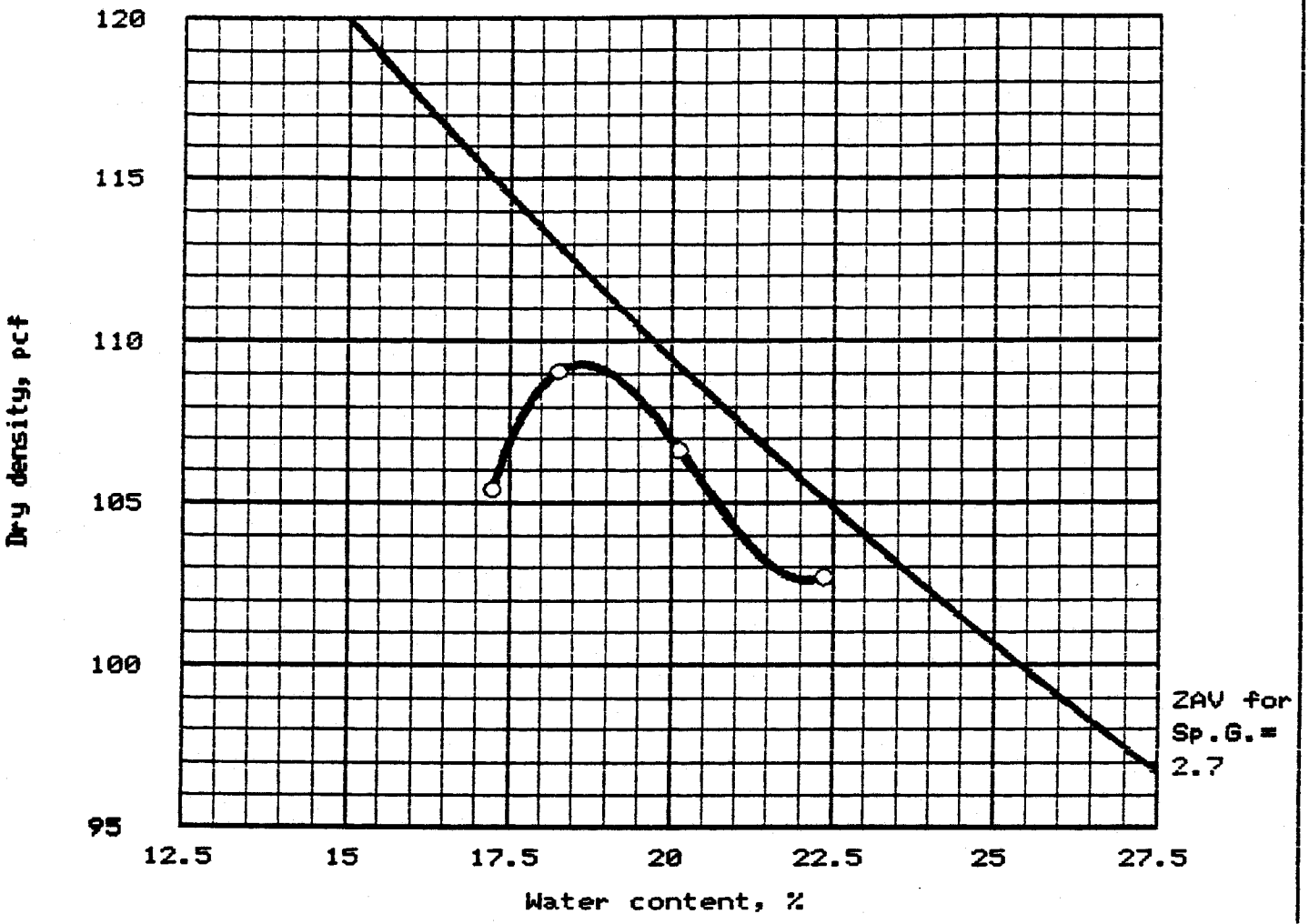
Remarks:
AP 5
18.5'-23.5'

PROCTOR TEST REPORT

FROEHLING & ROBERTSON, INC.

Fig. No. _____

# PROCTOR TEST REPORT




"Standard" Proctor, ASTM D 698, Method A

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > No.4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| | SM | | 17.4 % | | 47 | 11 | % | 41.2 % |

| TEST RESULTS | MATERIAL DESCRIPTION |
|---|---|
| Optimum moisture = 18.6 %<br>Maximum dry density = 109.3 pcf | BROWN SILTY SAND |

Project No.: Q-63-045
Project: CHAMPION LANDFILL
Location:

Date: 9-08-1989

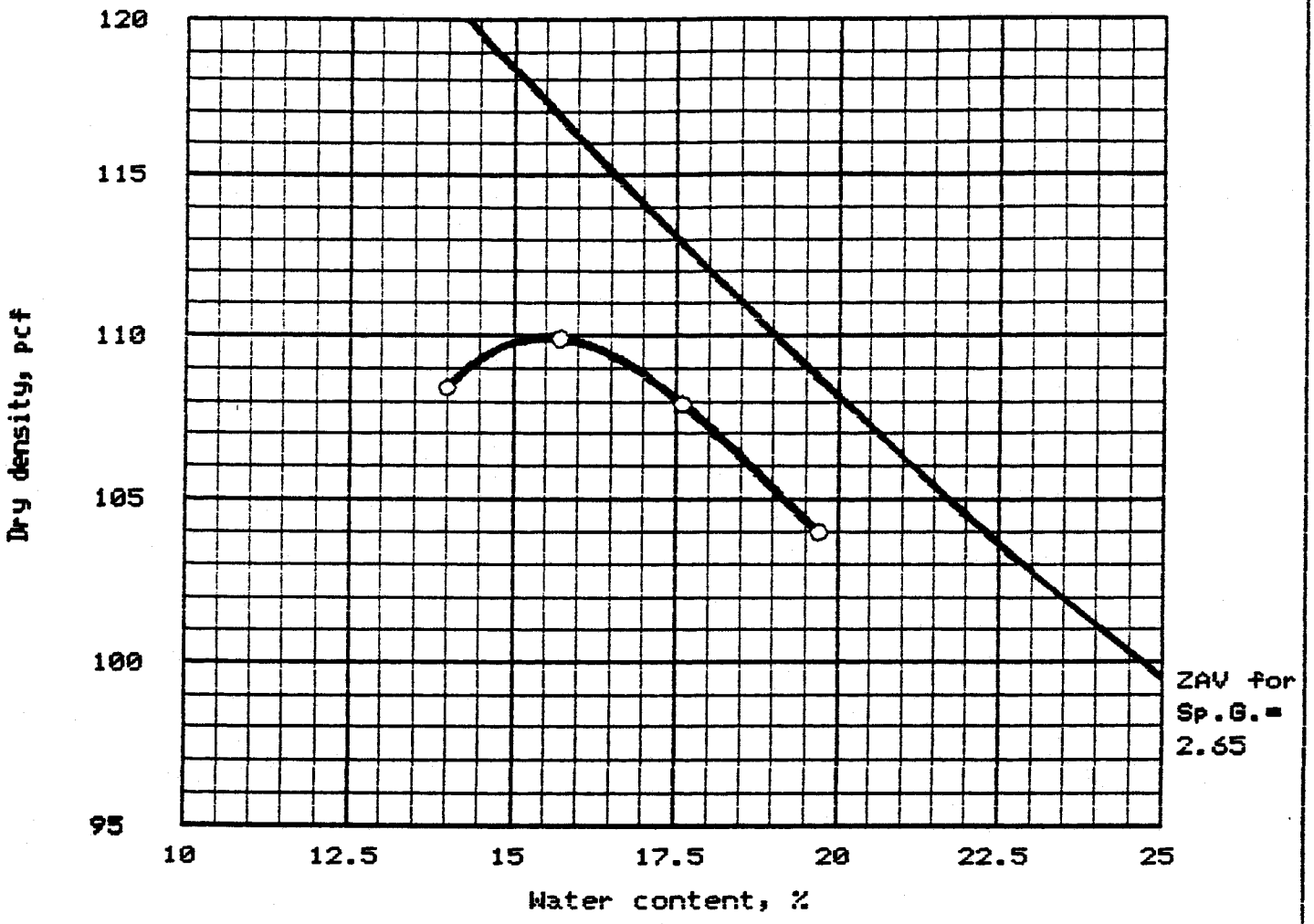
Remarks:
AP 3
14'-20'

PROCTOR TEST REPORT

FROEHLING & ROBERTSON, INC.

Fig. No. _____

# PROCTOR TEST REPORT




"Standard" Proctor, ASTM D 698, Method A

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > No.4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| | SM | | 15.0 % | | 40 | 10 | % | 42.6 % |

| TEST RESULTS | MATERIAL DESCRIPTION |
|---|---|
| Optimum moisture = 15.5 %<br>Maximum dry density = 110.0 pcf | TAN SILTY SAND |

Project No.: Q-63-045
Project: CHAMPION LANDFILL
Location:

Date: 9-08-1989

Remarks:
AP 1
20'-35'

PROCTOR TEST REPORT

FROEHLING & ROBERTSON, INC.

Fig. No. _____

SINCE
1881

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*"OVER ONE HUNDRED YEARS OF SERVICE"*

P.O. Box 34766
Charlotte, N.C. 28234
(704) 376-1596

October 19, 1989

Sirrine Environmental Consultants, Inc.
Post Office Box 24000
Greenville, South Carolina 29616

Attention: Mr. Jim Chamness

Re: Addendum to Report of Laboratory Testing.
Champion International Landfill Expansion
Landfill No. 6
Canton, North Carolina
F&R File No. Q-63-045

Dear Mr. Chamness:

F&R, Inc. has completed testing of samples obtained during our subsurface exploration program of the above referenced project. Testing includes consolidated undrained triaxial compression test.

## CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST

This test method covers the determination of strength and stress-strain relationship for a cylindrical specimen of either an undisturbed or remolded saturated cohesive soil when it is isotopically consolidated and sheared undrained in compression at a constant rate of axial deformation. The method provides for the calculation of total stresses and effective stresses on, and axial compression of the test specimen by measurement of axial load, axial deformation and pore-water pressure. The test provides data useful in determining strength and deformation properties of cohesive soils. Three specimens are tested at different effective consolidation stresses to define a strength envelope. Samples were saturated to at least 98% using the back pressure method of saturation. Tests were performed in

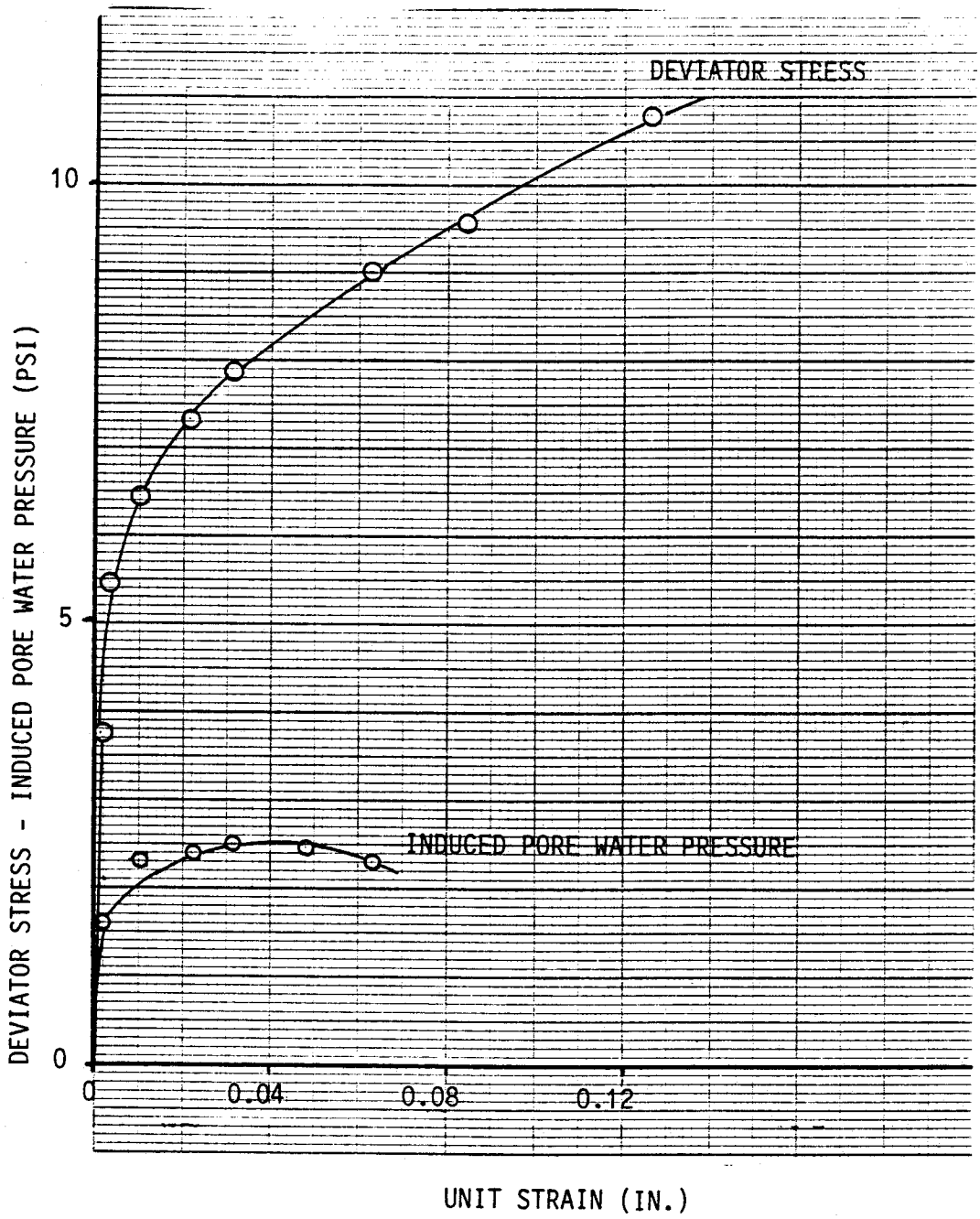
accordance with EM 1110-2-1906. Results of our tests are attached to this letter.

Very truly yours,
F&R, INC.

Enrique Blat

Enrique Blat, E.I.T.
Geotechnical Engineering Staff

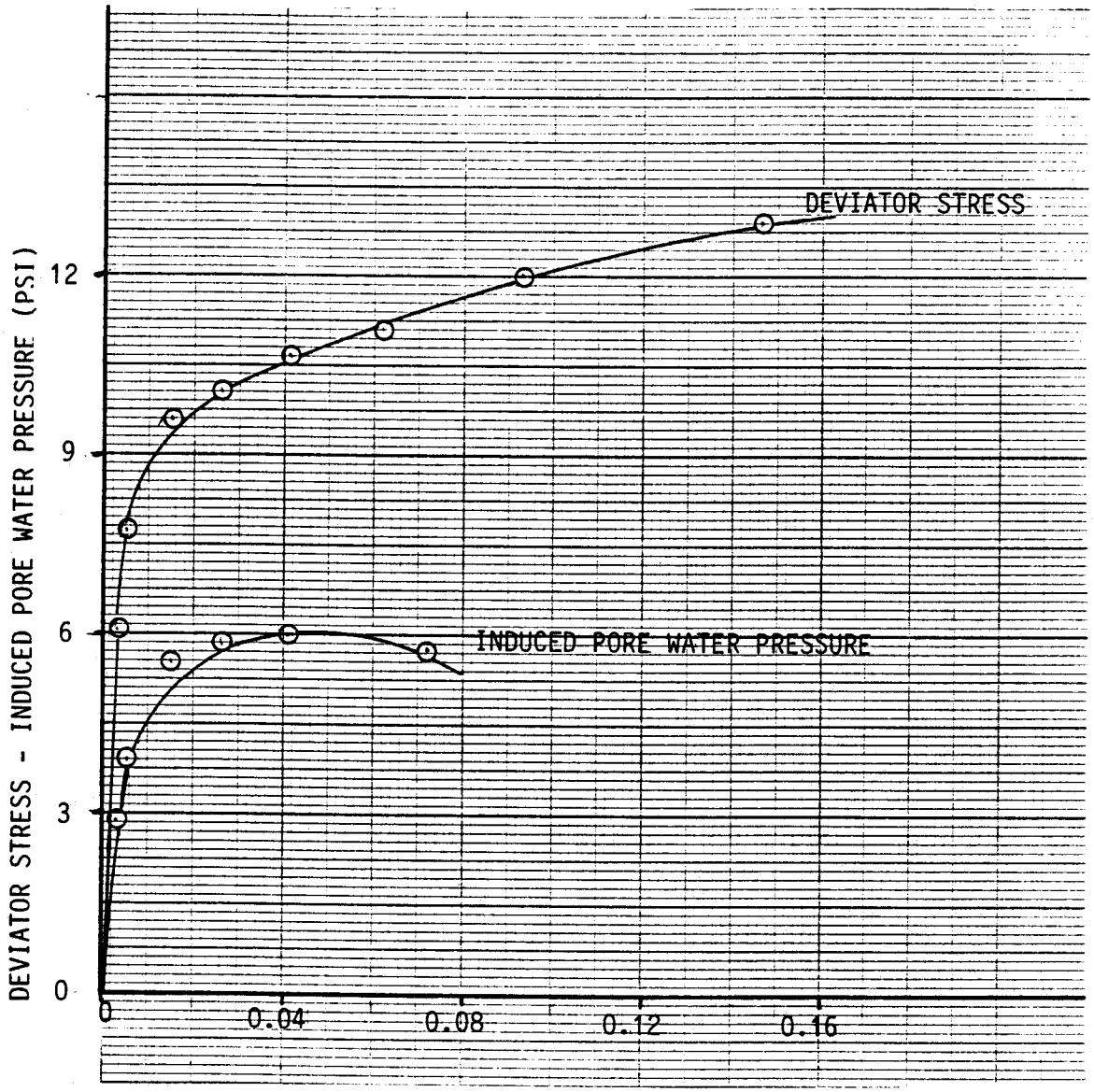
EB/akl




DEVIATOR STRESS - INDUCED PORE WATER PRESSURE VS UNIT STRAIN

SAMPLE AP1
CONFINING PRESSURE = 7 PSI

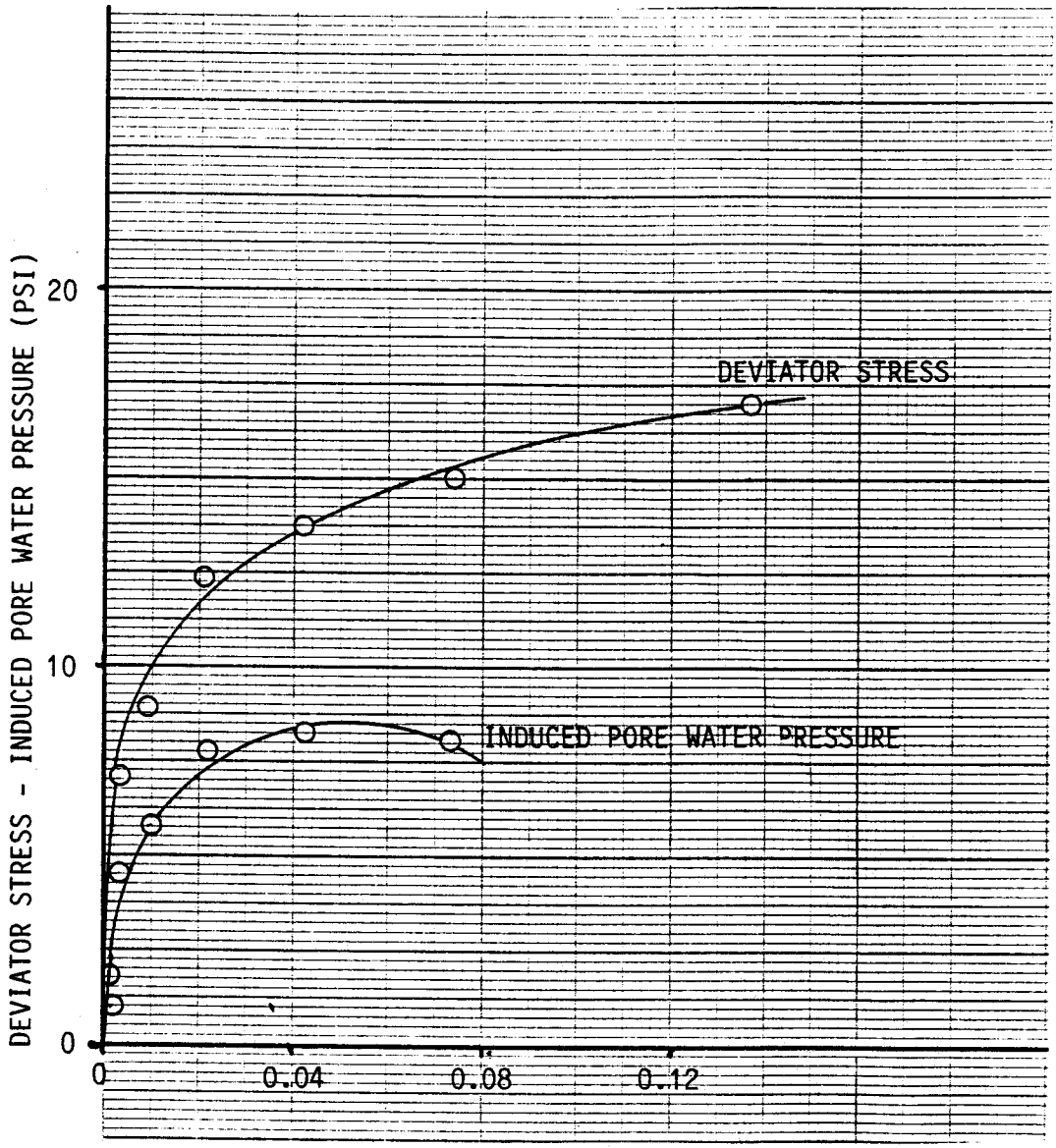
# CONSOLIDATED—UNDRAINED TRIAXIAL COMPRESSION TEST




DEVIATOR STRESS - INDUCED PORE WATER PRESSURE VS UNIT STRAIN

SAMPLE AP1
CONFINING PRESSURE = 10 PSI

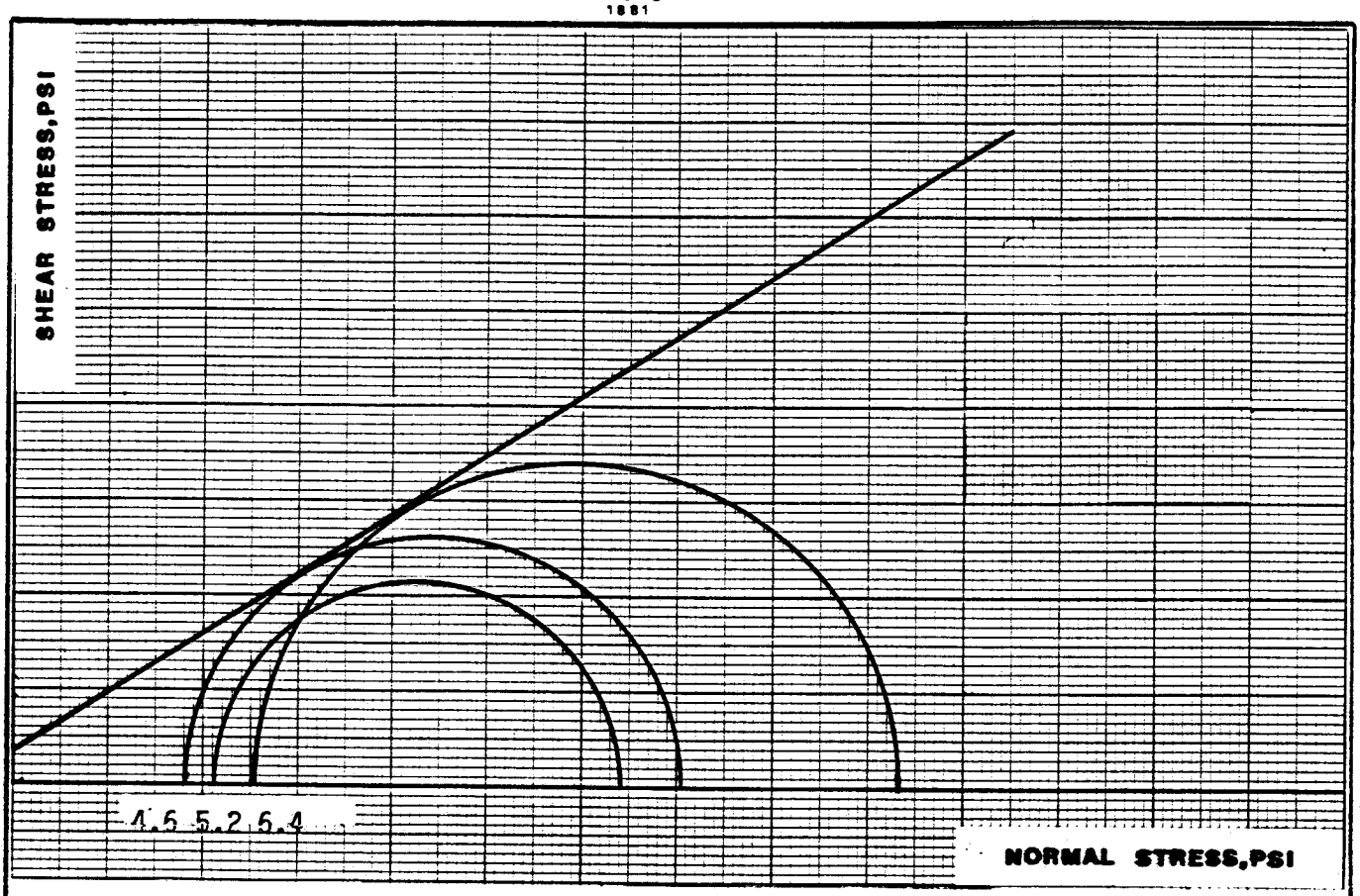
# CONSOLIDATED–UNDRAINED TRIAXIAL COMPRESSION TEST




DEVIATOR STRESS - INDUCED PORE WATER PRESSURE VS UNIT STRAIN

SAMPLE AP1
CONFINING PRESSURE = 14 PSI

# CONSOLIDATED—UNDRAINED TRIAXIAL COMPRESSION TEST




**MORH STRESS CIRCLES**

EFFECTIVE PARAMETERS

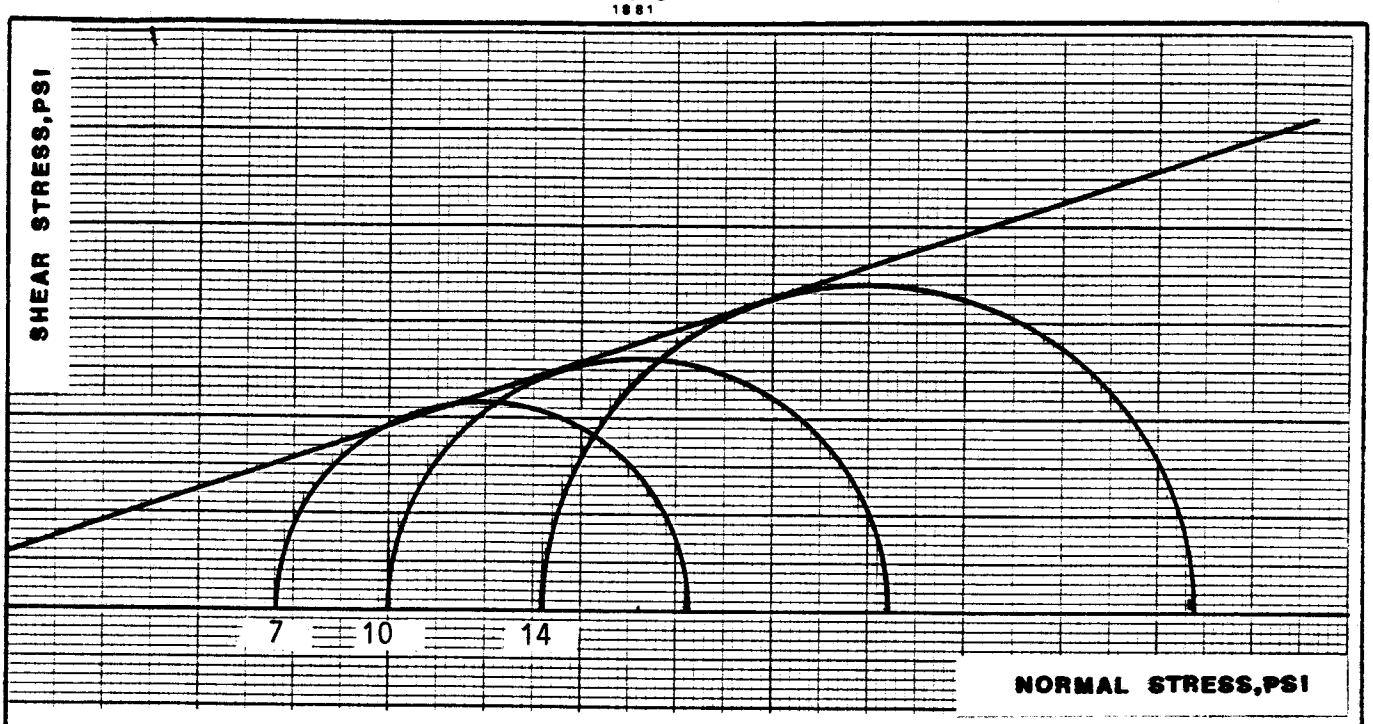
SAMPLE AP1

SAMPLE IDENTIFICATION: LIGHT BROWN SILTY SAND

$C' = 0.8$ PSI
$\emptyset' = 32°$

SAMPLES ARE REMOLDED TO 95 PERCENT OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.

# CONSOLIDATED—UNDRAINED TRIAXIAL COMPRESSION TEST




## MORH STRESS CIRCLES

TOTAL PARAMETERS

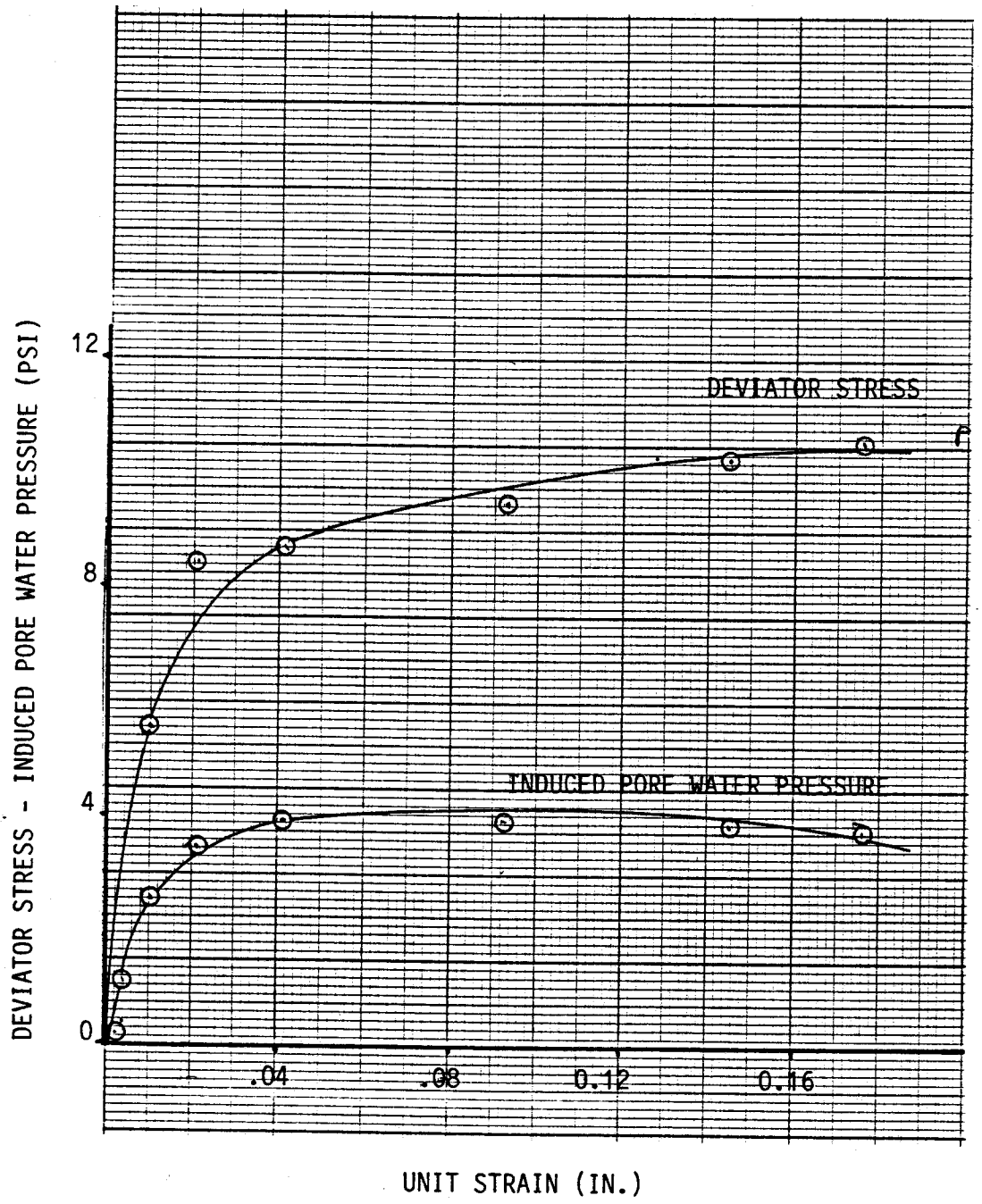
SAMPLE AP1

SAMPLE IDENTIFICATION: LIGHT BROWN SILTY SAND

C≃ 1.4 PSI
Ø= 18.5°

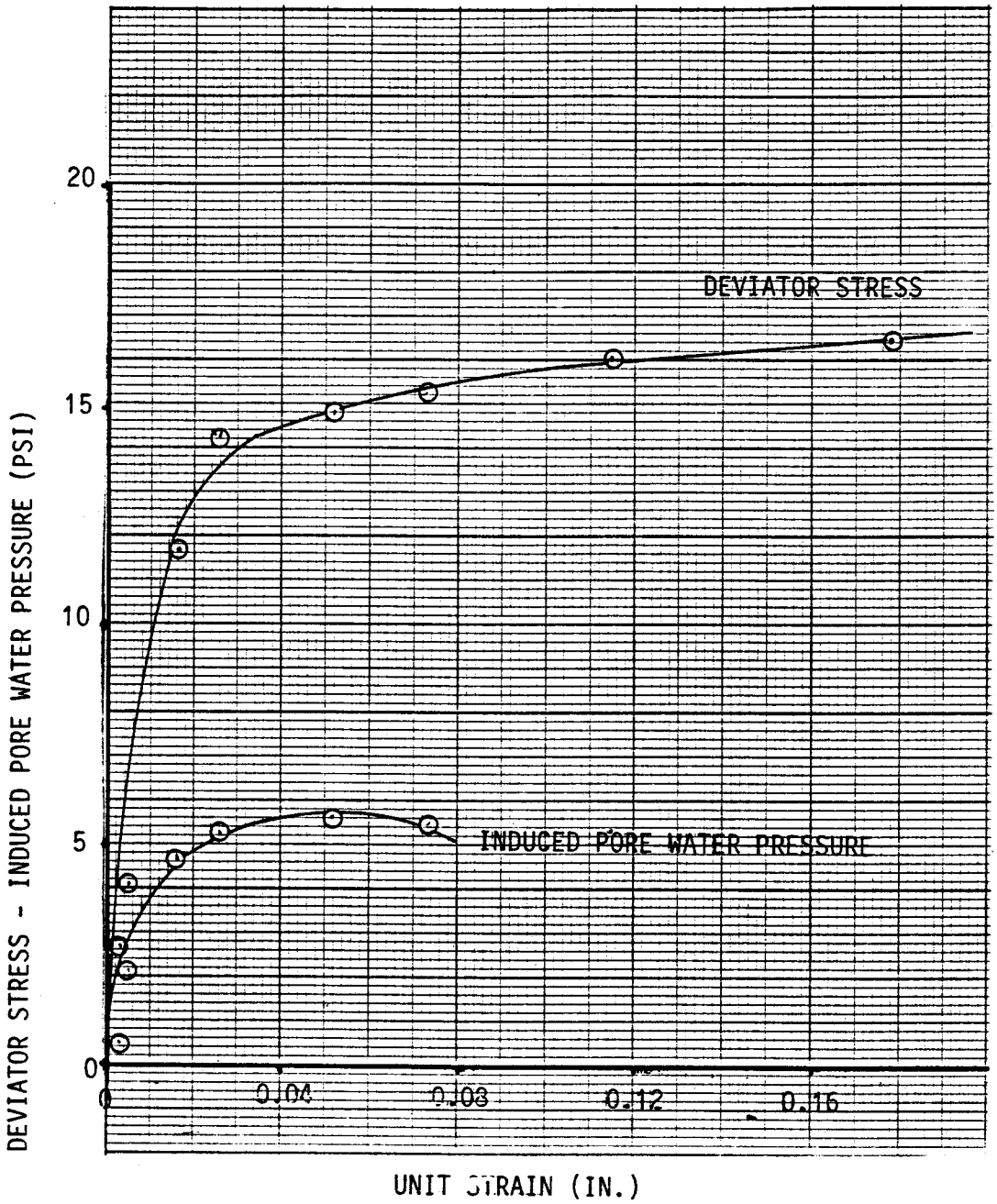
SAMPLES ARE REMOLDED TO 95 PERCENT OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.

# CONSOLIDATED–UNDRAINED TRIAXIAL COMPRESSION TEST



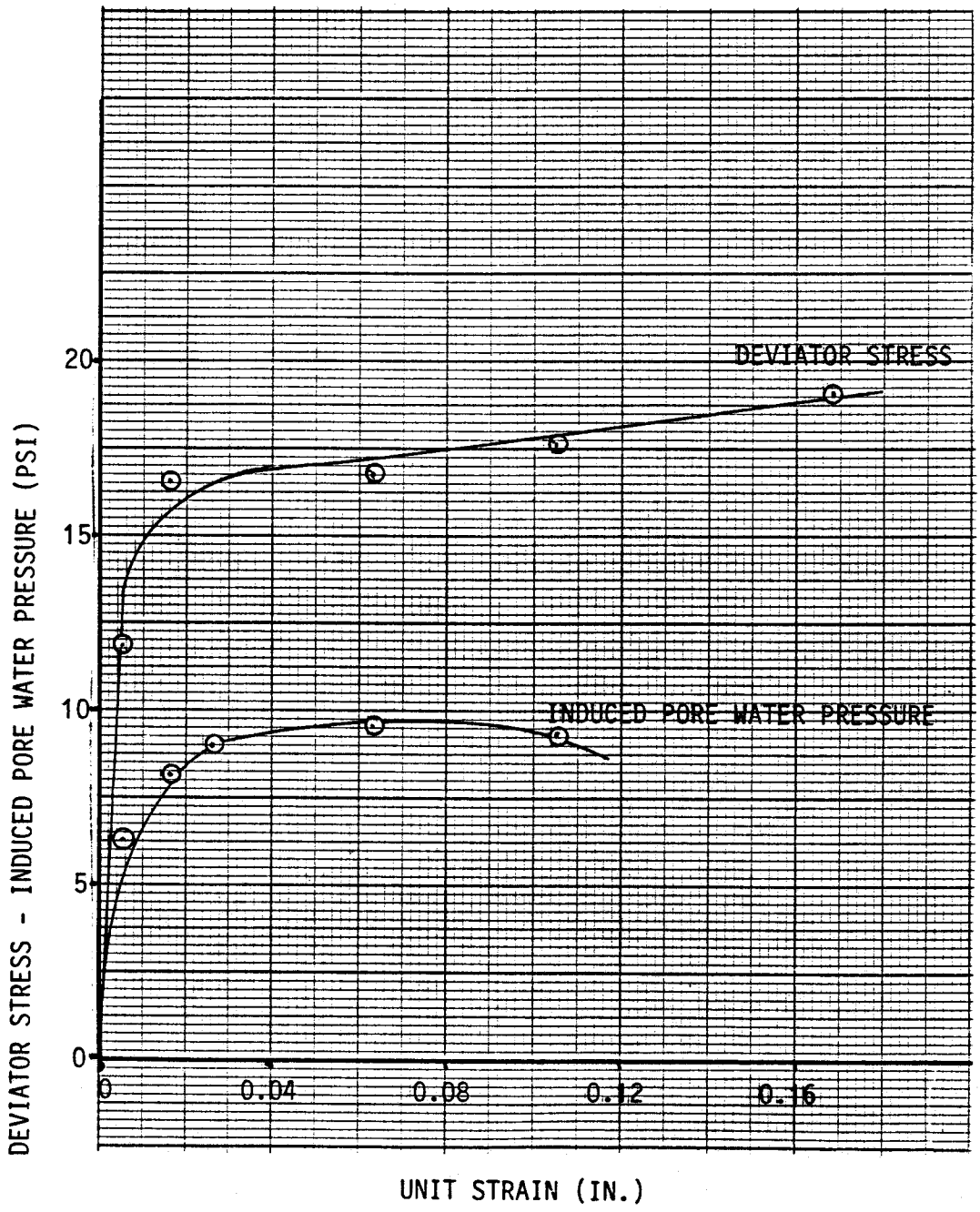

DEVIATOR STRESS - INDUCED PORE WATER PRESSURE
VS UNIT STRAIN
SAMPLE AP5
CONFINING PRESSURE = 7PSI

# CONSOLIDATED—UNDRAINED TRIAXIAL COMPRESSION TEST



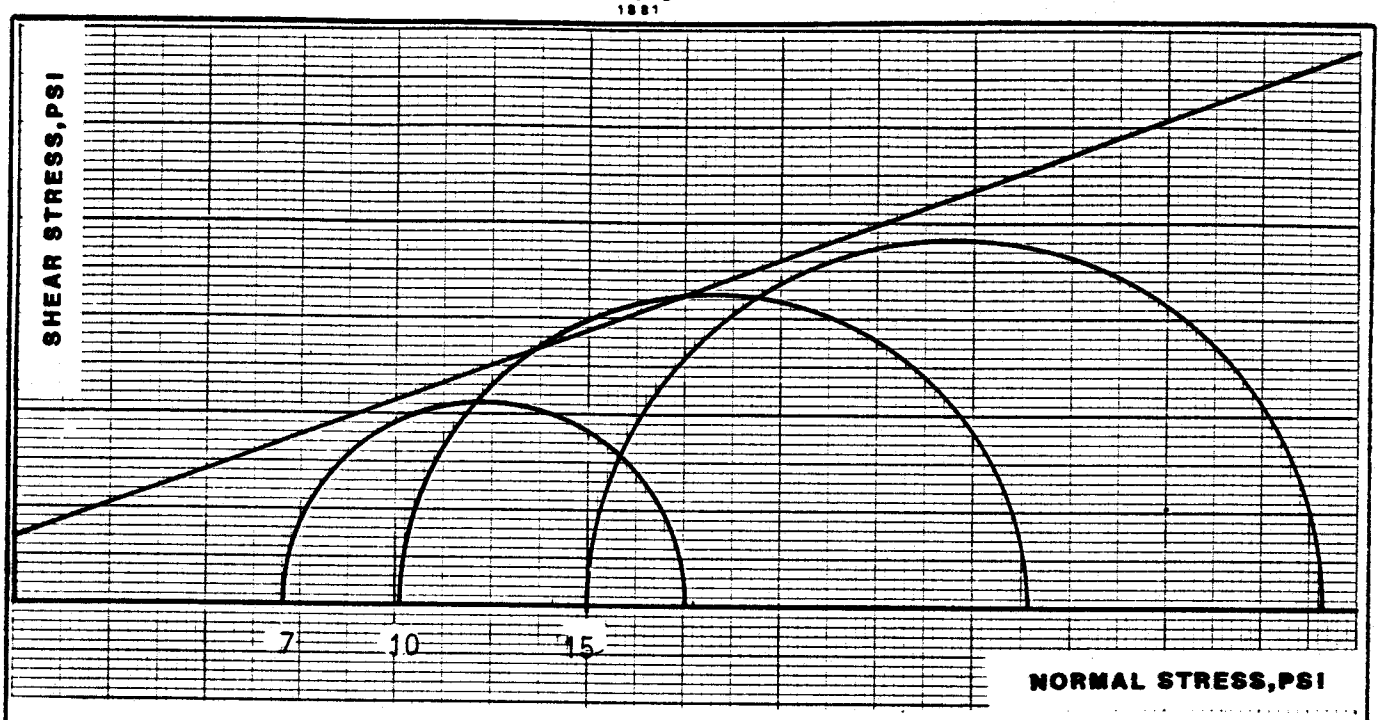

DEVIATOR STRESS - INDUCED PORE WATER PRESSURE VS
UNIT STRAIN
SAMPLE AP5
CONFINING PRESSURE = 10 PSI

# CONSOLIDATED—UNDRAINED TRIAXIAL COMPRESSION TEST




DEVIATOR STRESS - INDUCED PORE WATER PRESSURE
VS UNIT STRAIN
SAMPLE AP5
CONFINING PRESSURE = 15 PSI

# CONSOLIDATED—UNDRAINED TRIAXIAL COMPRESSION TEST




## MORH STRESS CIRCLES

TOTAL PARAMETERS

SAMPLE AP5

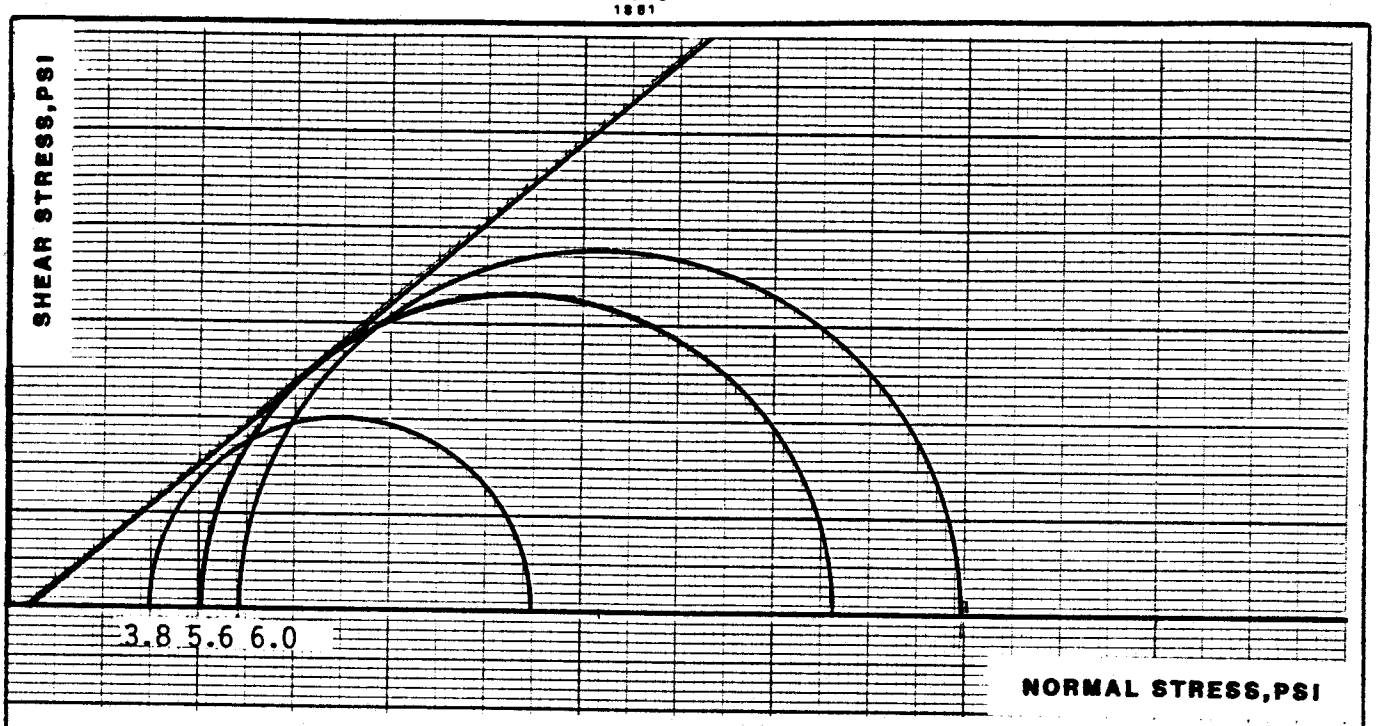
SAMPLE IDENTIFICATION: LIGHT BROWN SILTY SAND

C = 1.5 PSI
0 = 20°

SAMPLES ARE REMOLDED TO 95 PERCENT OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY

# CONSOLIDATED–UNDRAINED TRIAXIAL COMPRESSION TEST

SINCE
F&R
1881




## MORH STRESS CIRCLES

EFFECTIVE PARAMETERS

SAMPLE AP5

SAMPLE IDENTIFICATION = LIGHT BROWN SILTY SAND

C' = 0
$\phi'$ = 40°

SAMPLES ARE REMOLDED TO 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY

# CONSOLIDATED—UNDRAINED TRIAXIAL COMPRESSION TEST

# LABORATORY TESTING PROCEDURES AND RESULTS

## Grain Size Distribution

Grain size tests were performed on representative soil samples to determine the particle size distribution of these materials. After initial drying, the samples were washed over a U. S. standard No. 200 sieve to remove the fines (particles finer than a No. 200 mesh sieve). The samples were then dried and sieved through a standard set of nested sieves. This test was performed in a manner similar to that described by ASTM D 422. The results are presented as percent finer by weight versus particle size curves on the attached Grain Size Distribution sheets.

## Soil Plasticity

During the preliminary exploration, representative samples of the upper clayey soils were selected for Atterberg Limits testing to determine their soil plasticity characteristics. The soil's Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The LL is the moisture content at which the soil will flow as a heavy viscous fluid and is determined in accordance with ASTM D 423. The PL is the moisture content at which the soil begins to lose its plasticity and is determined in accordance with ASTM D 424. The data obtained are presented on the attached Summary of Plasticity Tests Data.

## Natural Moisture Content

The natural moisture content of selected samples was determined in accordance with ASTM D 2216. The moisture content of the soil is the ratio, expressed as a percentage, of the weight of water in a given mass of soil to the weight of the soil particles. The results are presented on the attached laboratory data sheets.

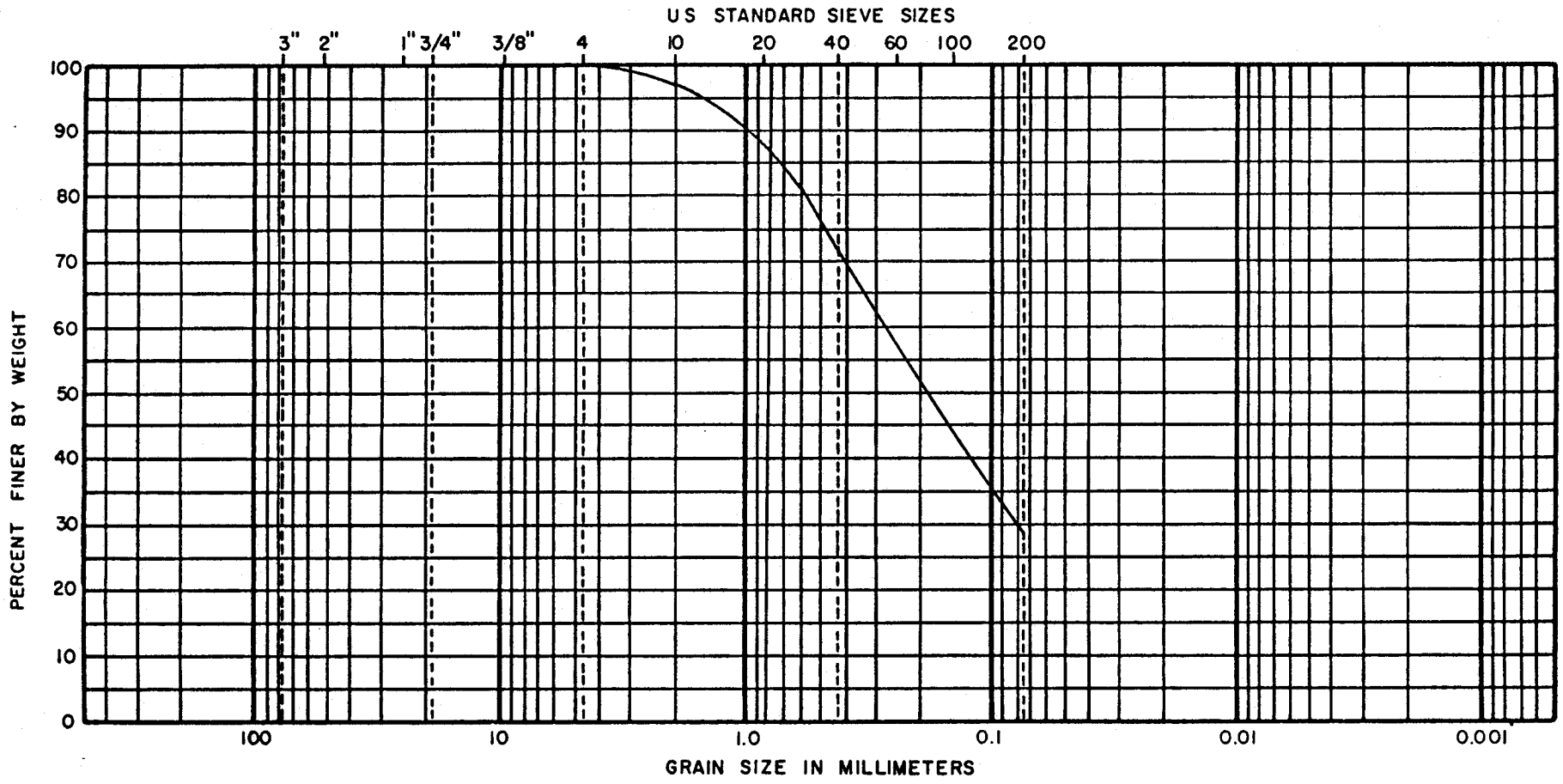
## Compaction Test

Representative loose samples of potential borrow soils from the project site were collected, placed in cloth sacks and returned to the laboratory for compaction testing. Standard Proctor compaction tests (ASTM D 698) were performed on selected samples to determine their compaction characteristics, including their maximum dry density and optimum moisture content. Test results are presented on the attached Compaction Test sheets.

## Triaxial Shear

Selected bulk samples of on-site borrow material were remolded and undisturbed samples of potential foundation soils were trimmed into cylinders approximately 2.4 inches in diameter and 6 inches in length and encased in rubber membranes. Each was then placed in a compression chamber and confined by isotropic fluid pressure. The samples were also saturated under back pressure to simulate the conditions that will exist after the dike has been saturated by the landfilling.

Consolidated undrained triaxial shear tests with pore pressure measurements ($\overline{R}$) were conducted on these samples. In this type of test, drainage is allowed from the sample under the confining stress until equilibrium is reached, but no drainage is allowed during loading to failure. The results obtained can be used to approximate strength parameters obtained from a consolidated drained test(s). Results are presented on the attached Triaxial Shear Test Sheets.




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-1 |
| DEPTH OR ELEV. | 8.5' - 10' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

Brown Gray Very Micaceous Silty Fine to Medium Sand

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

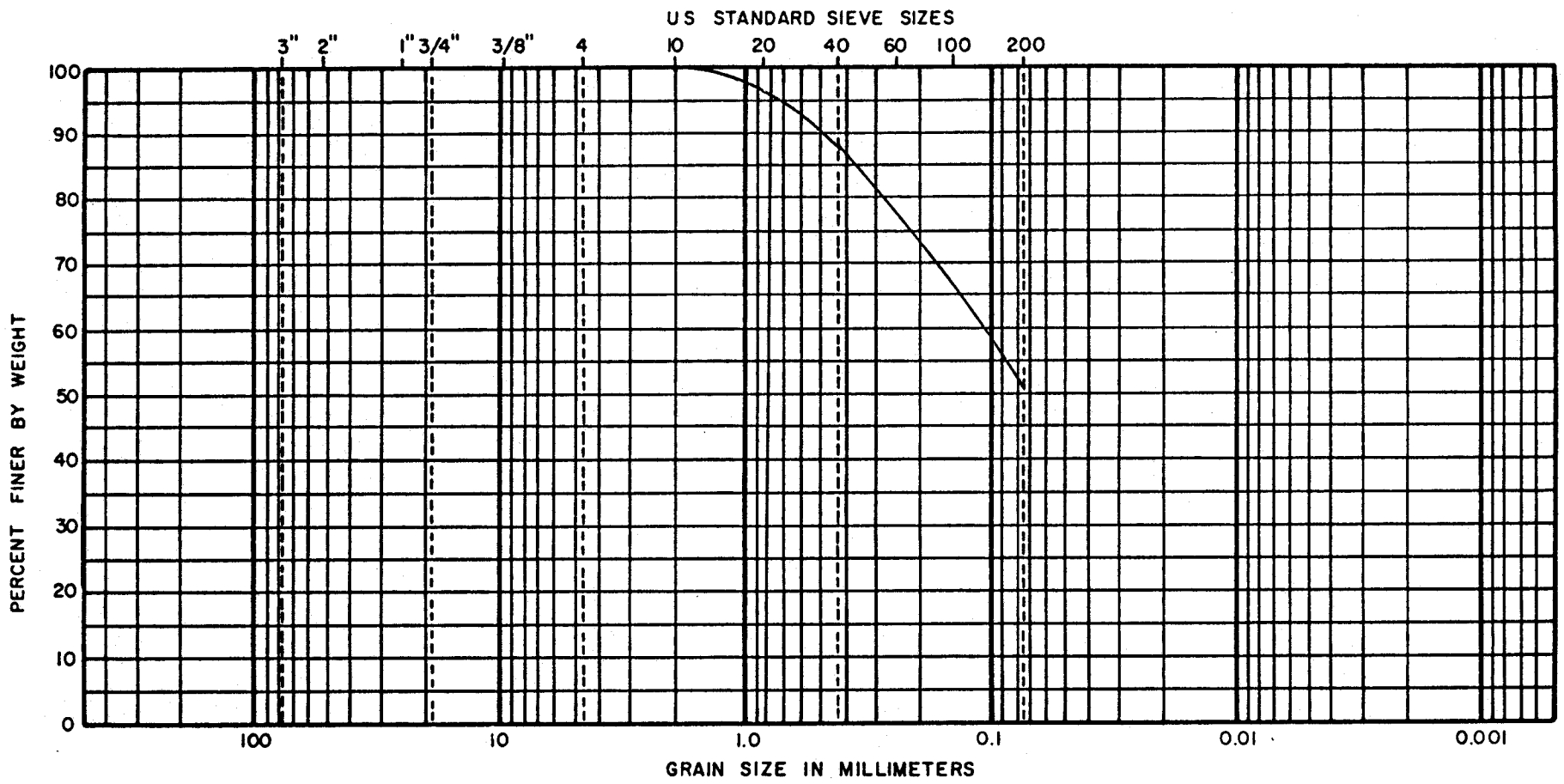
DUNCAN-PARNELL, INC., CHARLOTTE 770

## SUMMARY OF PLASTICITY TESTS DATA

| Boring Number | Sample Depth, Ft. | Soil Description | Natural Moisture Content (%) | Atterberg Limits | | |
|---|---|---|---|---|---|---|
| | | | | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) |
| B-1 | 3.5 - 5.0 | Gray Tan Micaceous Fine Sandy Silty Clay | 21 | 30 | 21 | 9 |
| B-7 | 6.0 - 7.5 | Black Gray Brown Micaceous Fine to Medium Sandy Silty Clay | 18 | 35 | 21 | 14 |



DUNCAN-PARNELL, INC., CHARLOTTE 280




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-2 |
| DEPTH OR ELEV. | 28.5'-30' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

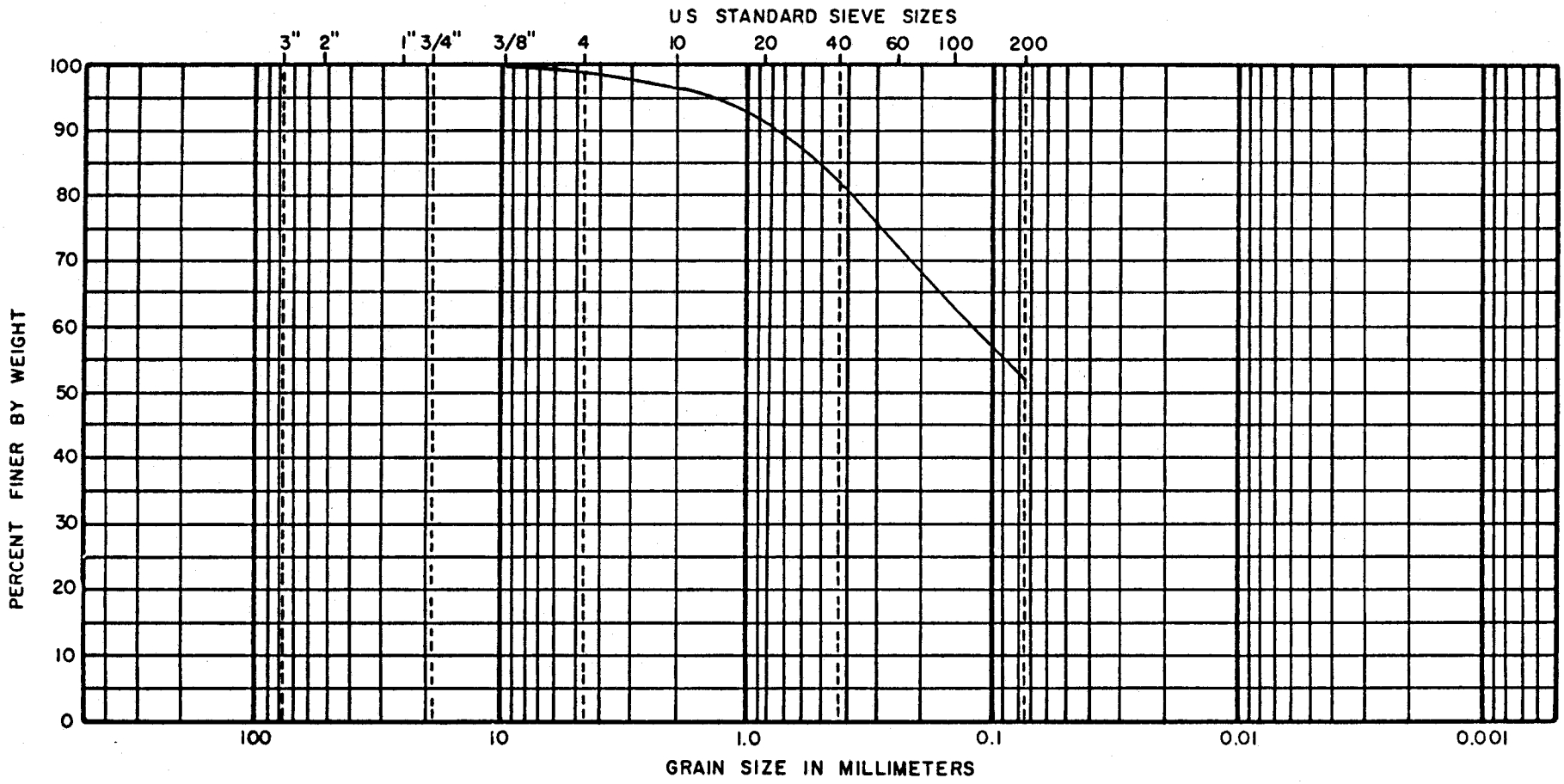
Purple White Very Micaceous Fine to Medium Sandy Silt
Sand Sized Particles Are Predominately Mica

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-2 |
| DEPTH OR ELEV. | 3.5' - 5' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

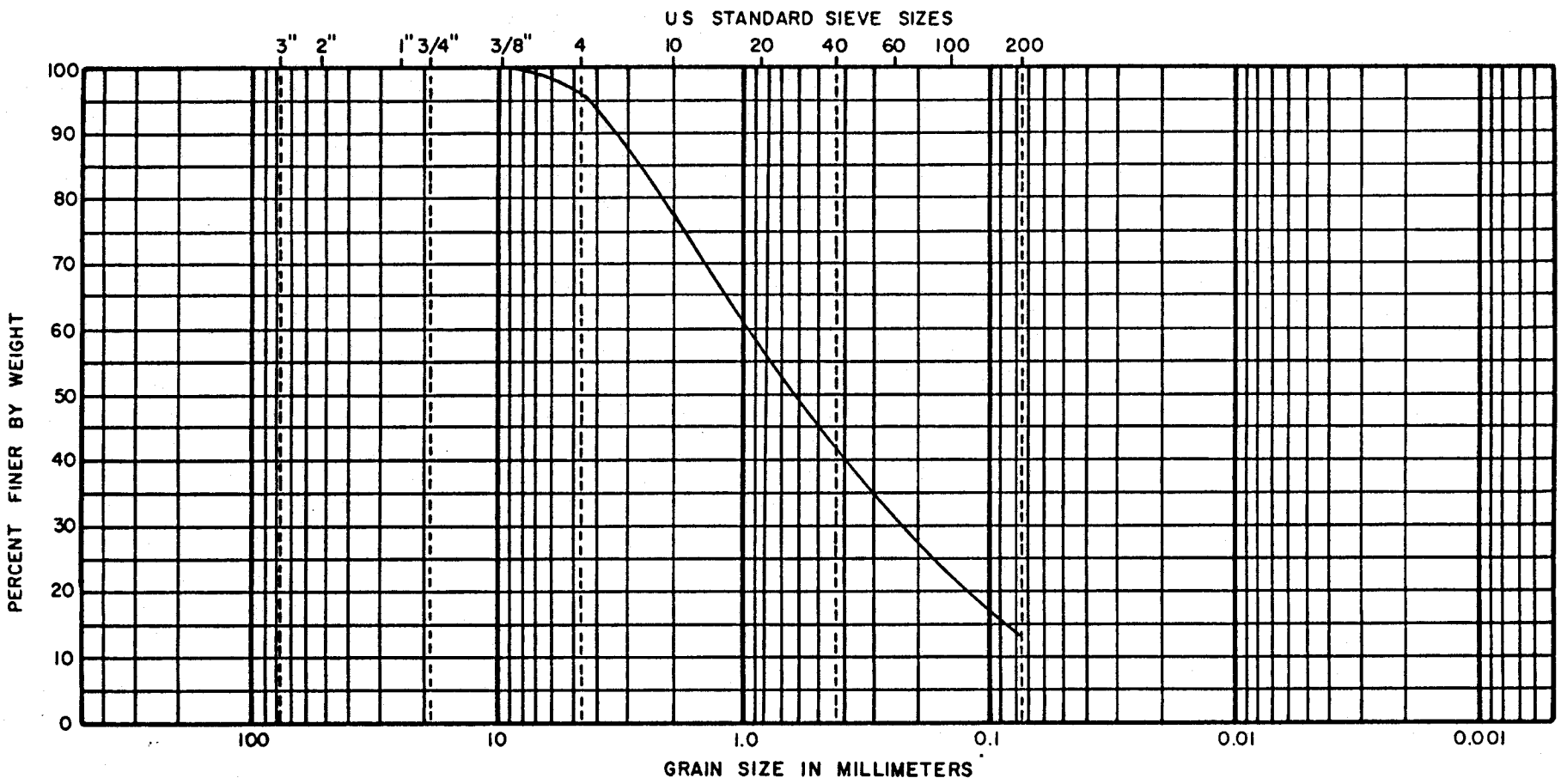
Red Brown White Micaceous Fine to Medium Sandy Silt

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

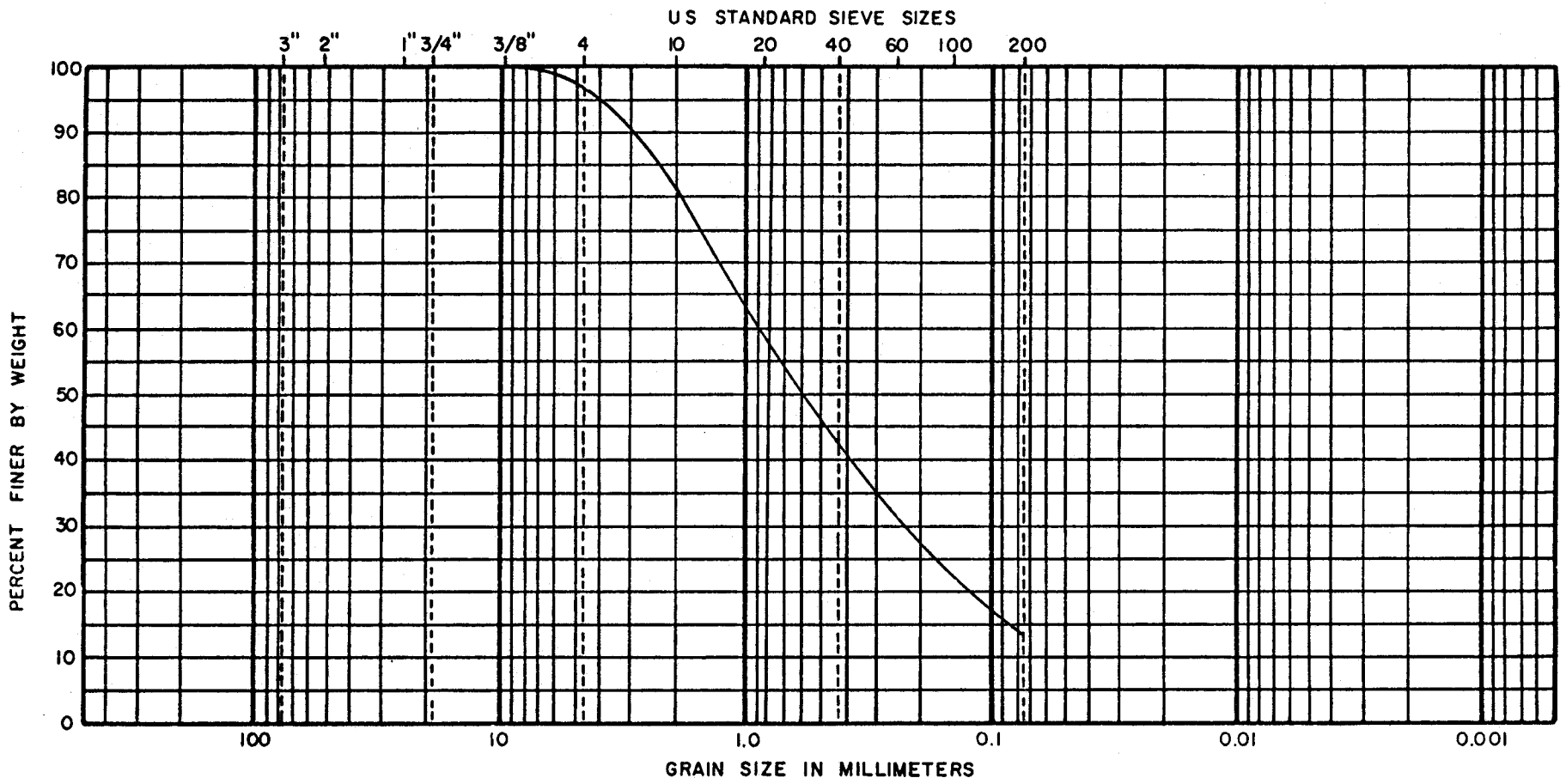
| | | |
|---|---|---|
| BORING NO. | B-3 | DESCRIPTION OR CLASSIFICATION |
| DEPTH OR ELEV. | 6' - 7.5' | Brown Gray Very Micaceous Silty Fine to Coarse Sand<br>Sand Sized Particles Are Predominately Mica |
| MOISTURE % | | |
| LIQUID LIMIT | | |
| PLASTIC LIMIT | | |
| PLASTICITY INDEX | | |

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-3 |
| DEPTH OR ELEV. | 13.5' - 15' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

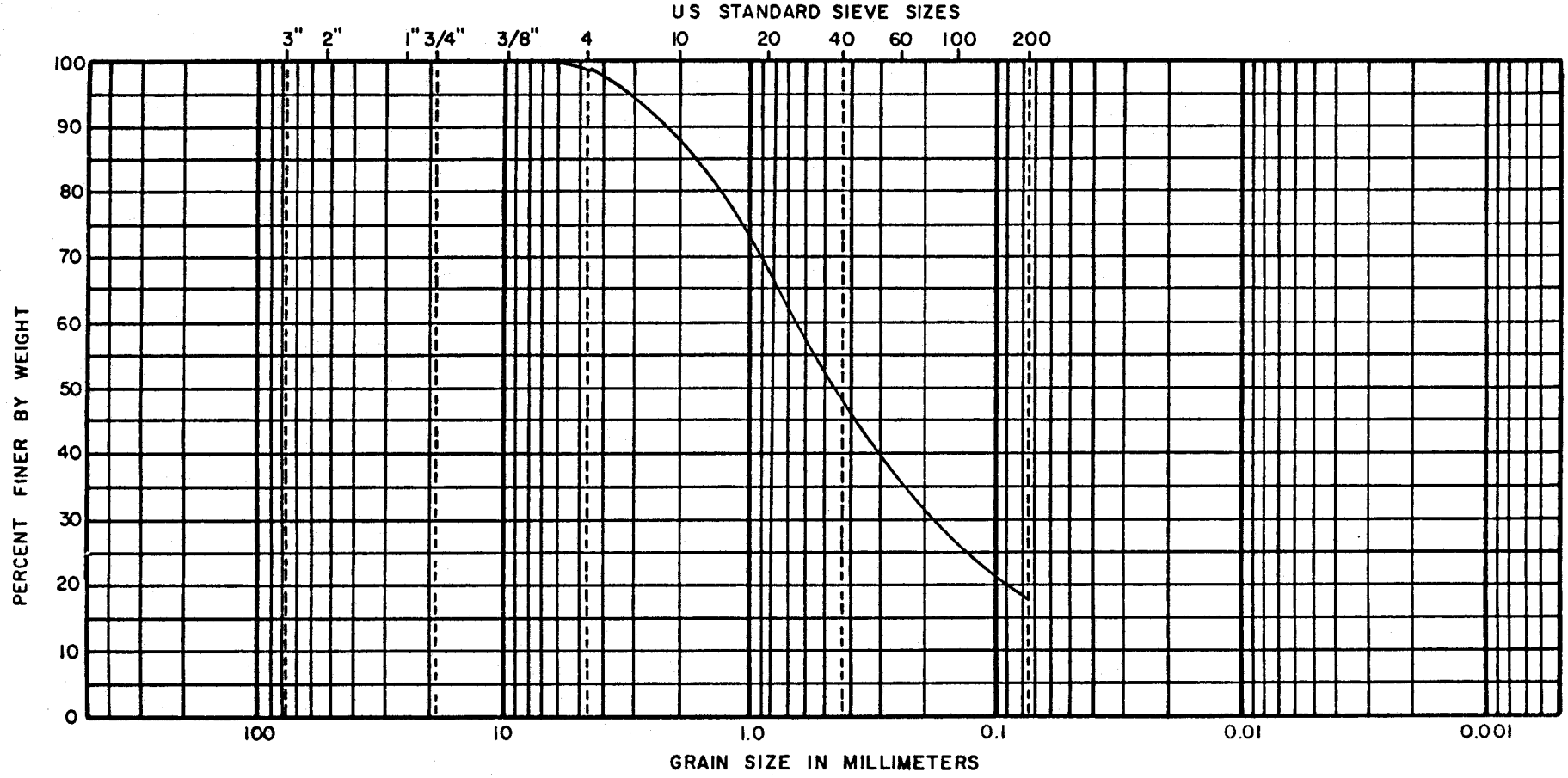
Brown Gray Very Micaceous Silty Fine to Coarse Sand
Sand Sized Particles Are Predominately Mica

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-4 |
| DEPTH OR ELEV. | 3.5' - 5' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

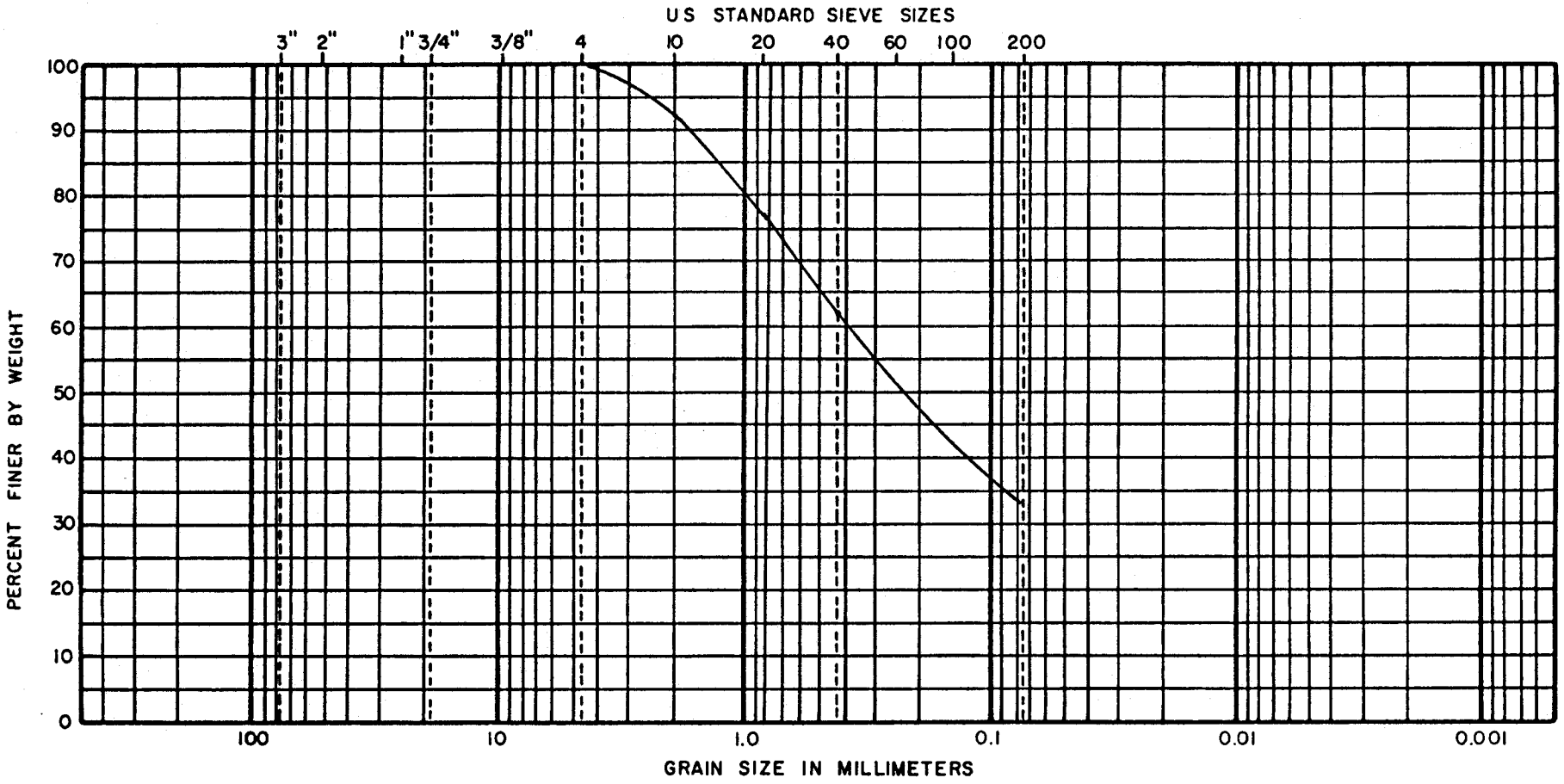
Gray Brown Very Micaceous Silty Fine to Coarse Sand
Sand Sized Particles Are Predominately Mica

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-4 |
| DEPTH OR ELEV. | 33.5' - 35' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

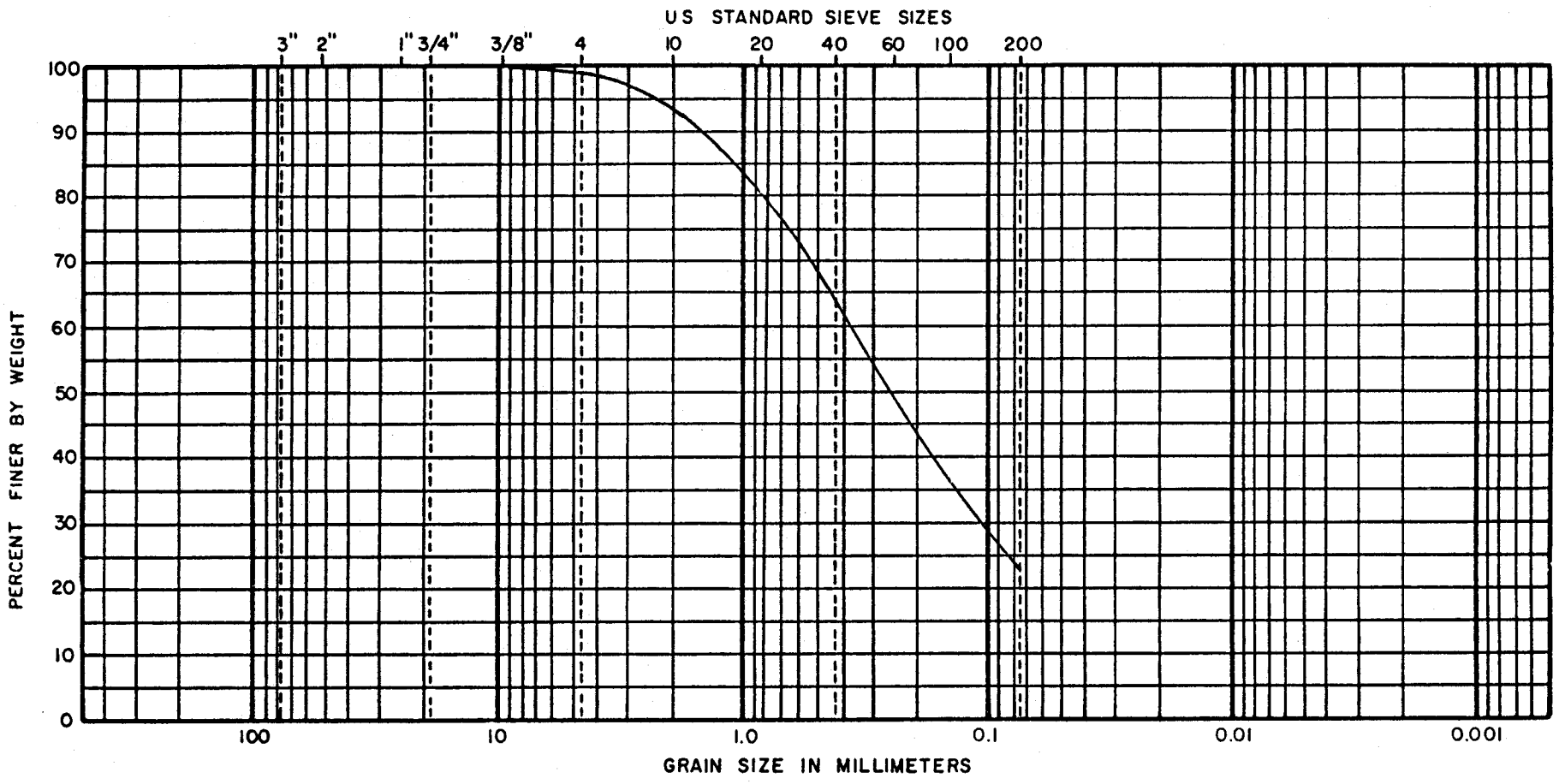
Red Brown White Very Micaceous Silty Fine to Coarse Sand
Sand Sized Particles Are Predominately Mica

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-5 |
| DEPTH OR ELEV. | 6' - 7.5' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

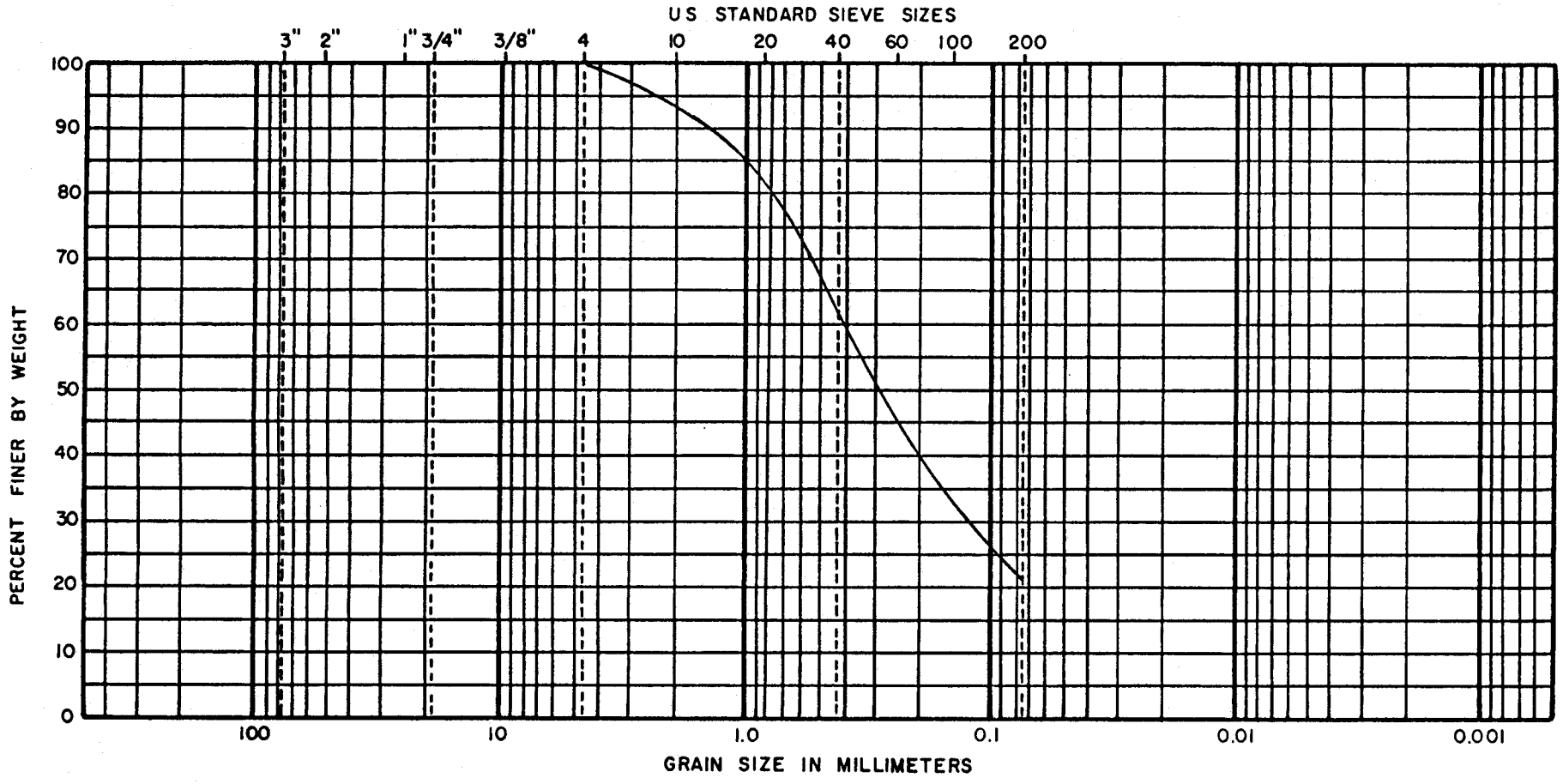
Brown Gray Very Micaceous Silty Fine to Coarse Sand
Sand Sized Particles Are Predominately Mica

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-5 |
| DEPTH OR ELEV. | 23.5' - 25' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

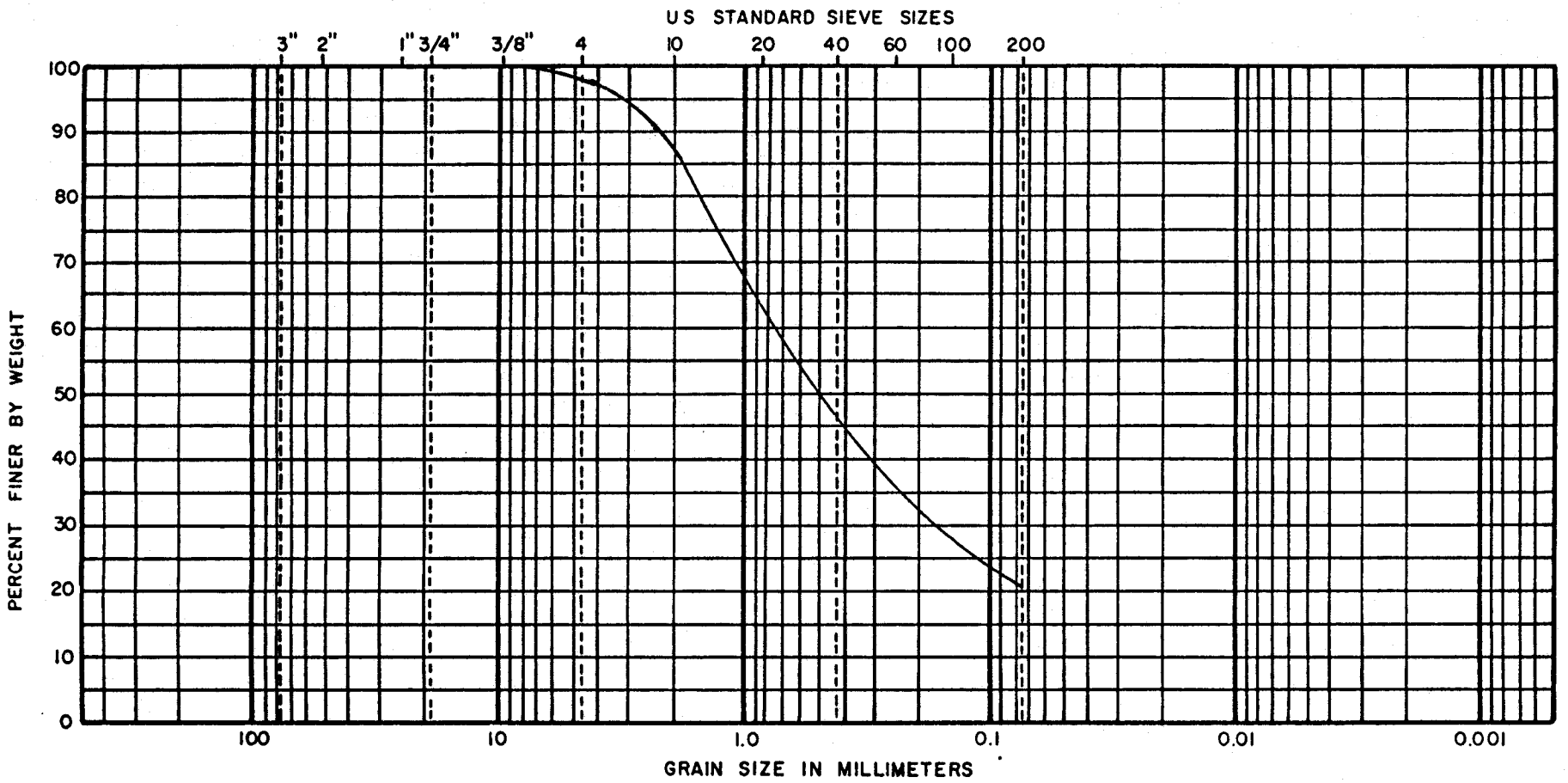
Brown Gray Very Micaceous Silty Fine to Coarse Sand
Sand Sized Particles Are Predominately Mica

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 778




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-6 |
| DEPTH OR ELEV. | 6' - 7.5' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

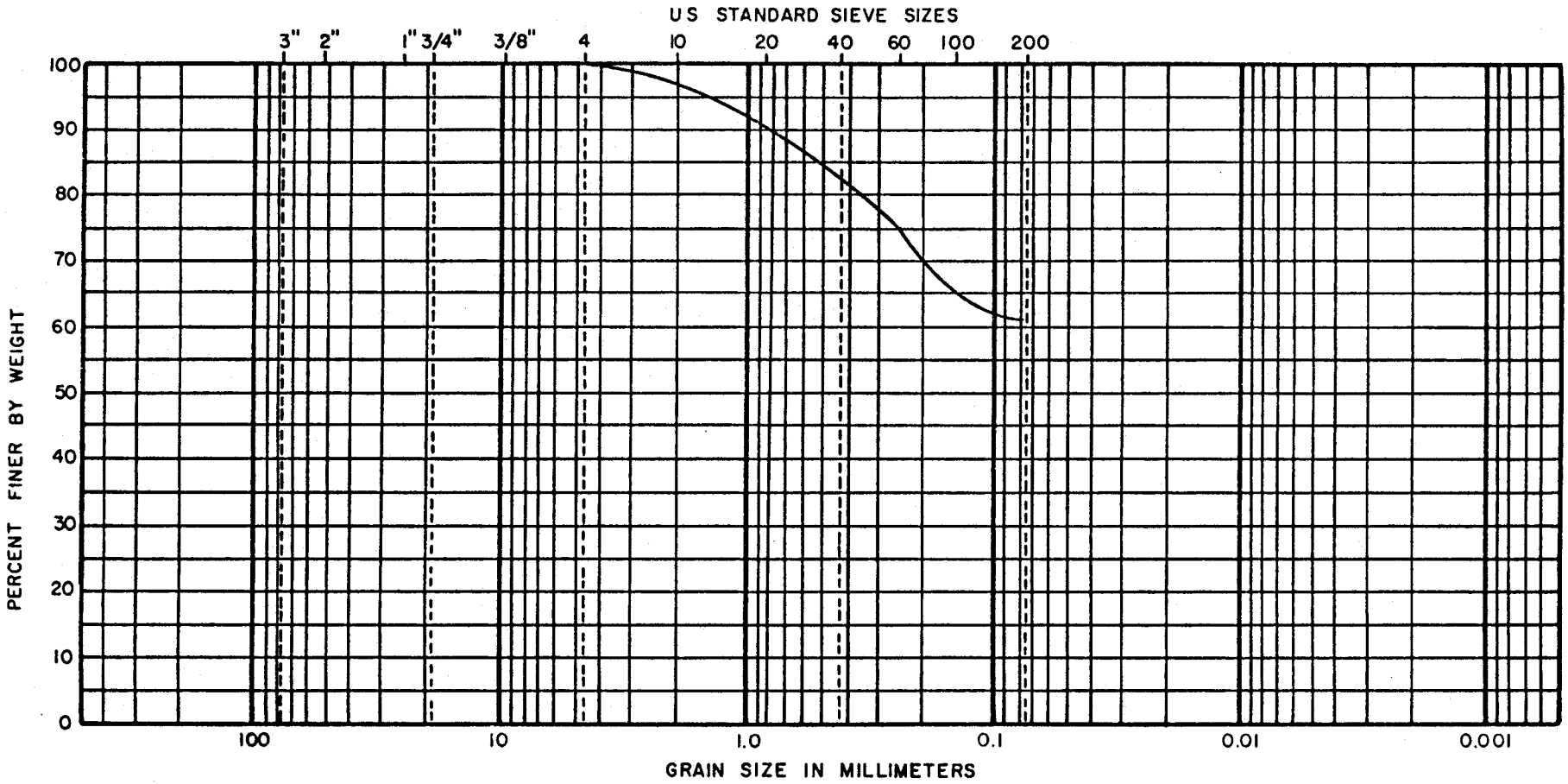
Brown Red Very Micaceous Silty Fine to Coarse Sand

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-8 |
| DEPTH OR ELEV. | Bag 1-8 Ft. |
| MOISTURE % | 14.0 |
| LIQUID LIMIT | -- |
| PLASTIC LIMIT | -- |
| PLASTICITY INDEX | -- |

DESCRIPTION OR CLASSIFICATION

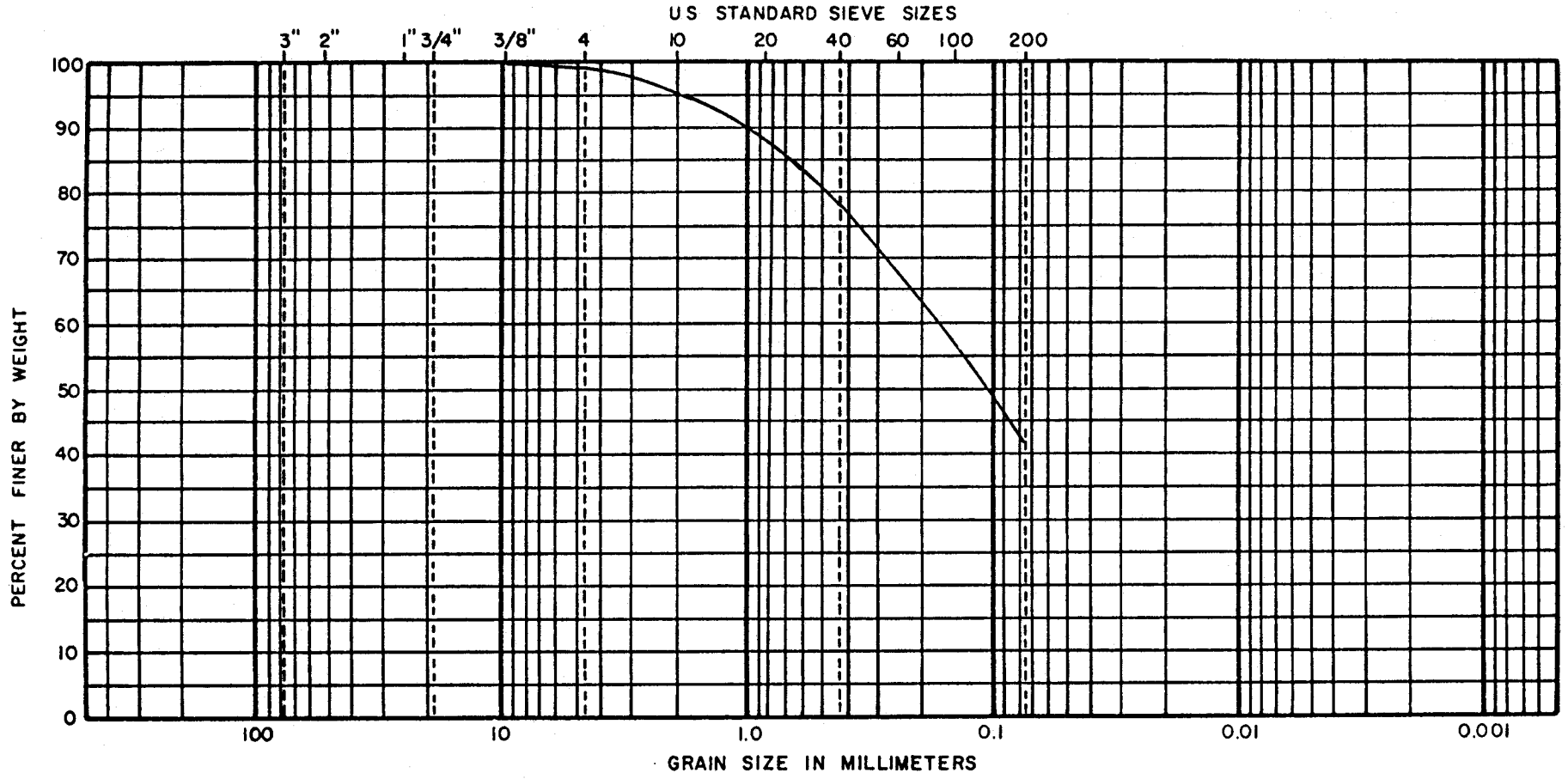
Light Brown Micaceous Fine to Coarse Sandy Silt

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-8 |
| DEPTH OR ELEV. | 6' - 7.5' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

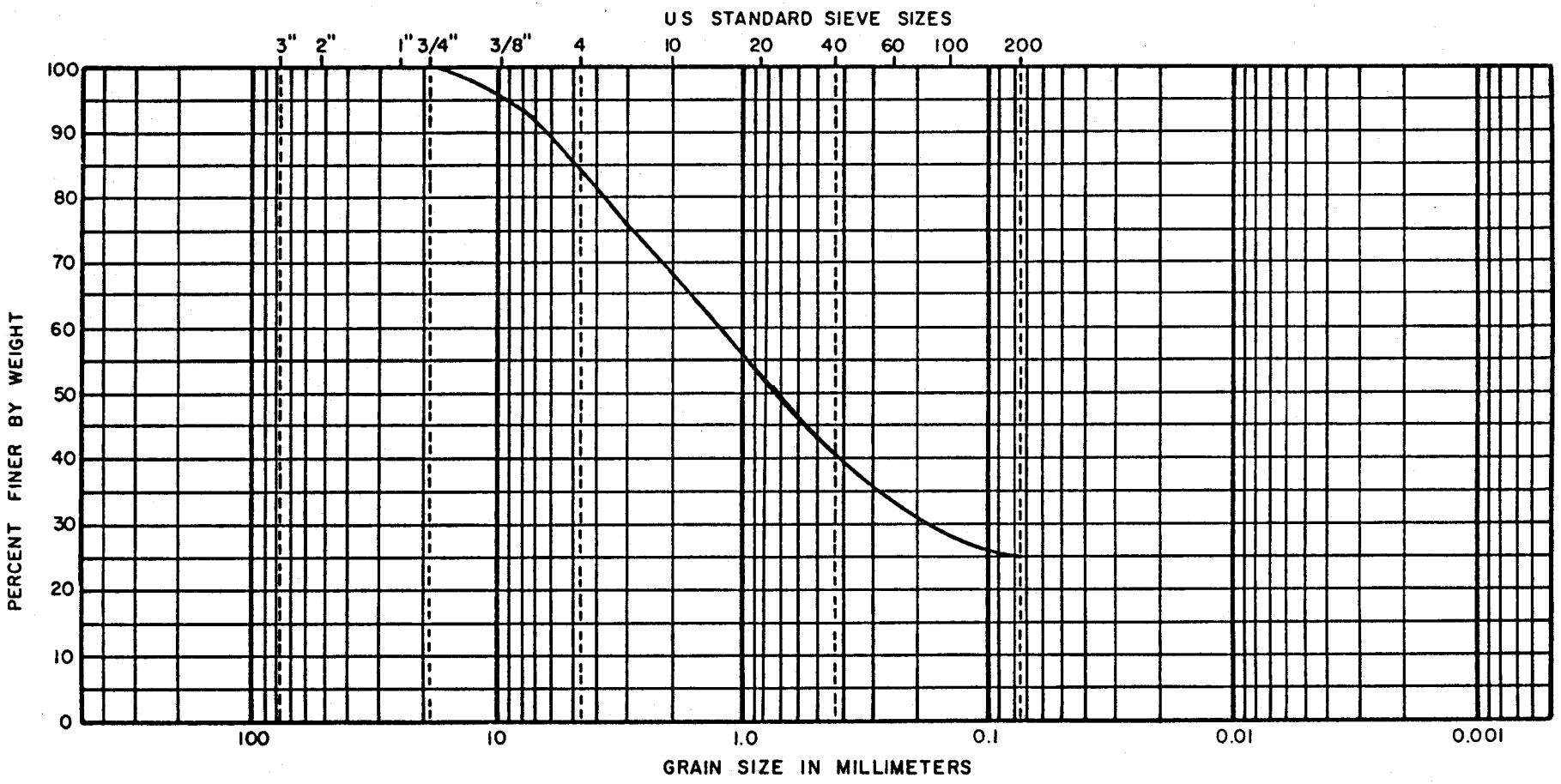
Brown Gray Very Micaceous Very Silty Fine to Coarse Sand
Sand Sized Particles Are Predominately Mica

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-8 |
| DEPTH OR ELEV. | UD 9-11 ft |
| MOISTURE % | 13.2 |
| LIQUID LIMIT | - |
| PLASTIC LIMIT | - |
| PLASTICITY INDEX | - |

DESCRIPTION OR CLASSIFICATION

Red Brown Very Micaceous Silty Fine to Coarse Sand With Rock Fragments

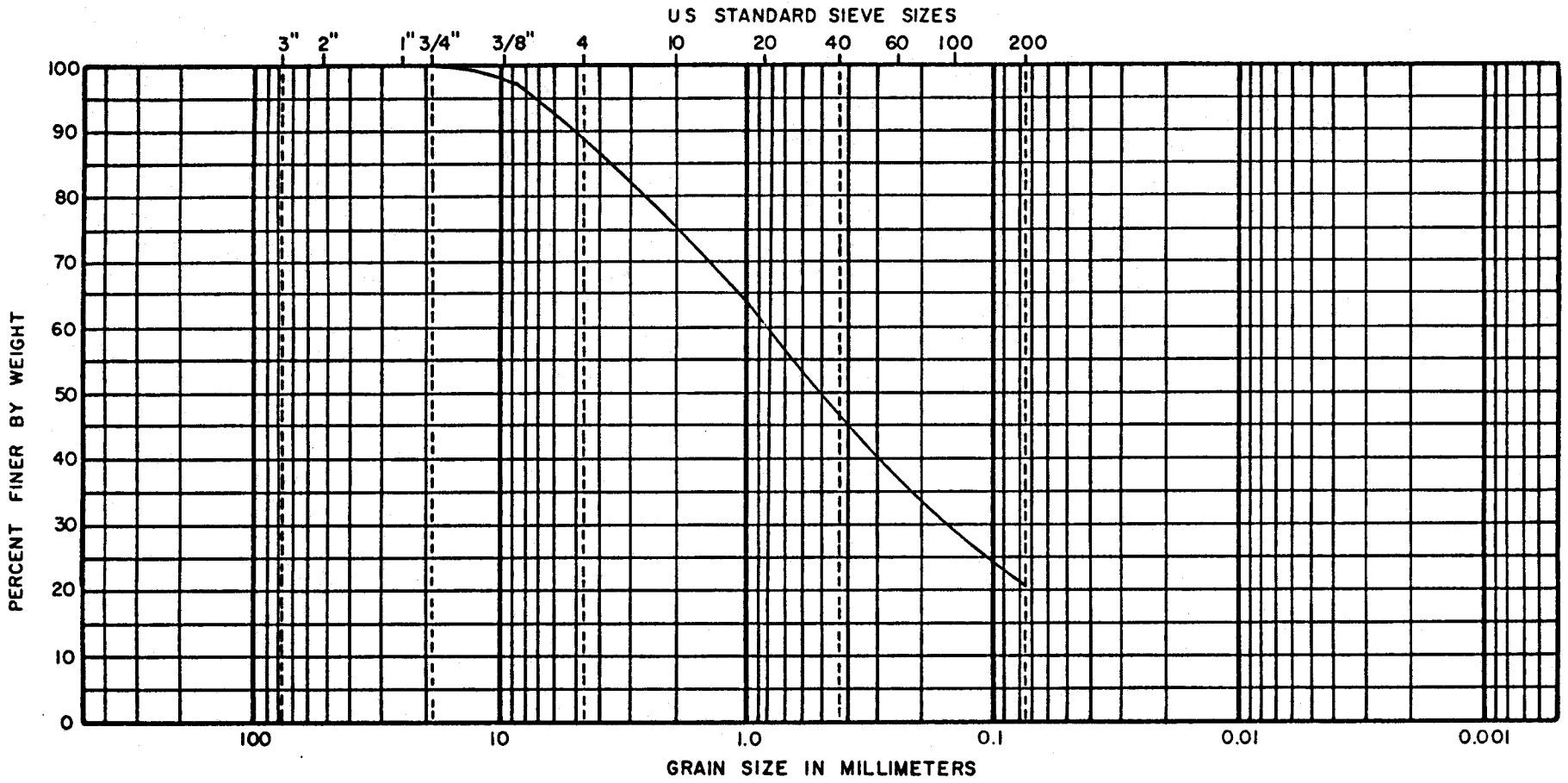
(Most Sand Size Particles are Mica)

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-8 |
| DEPTH OR ELEV. | 18.5' - 20' |
| MOISTURE % | |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |
| PLASTICITY INDEX | |

DESCRIPTION OR CLASSIFICATION

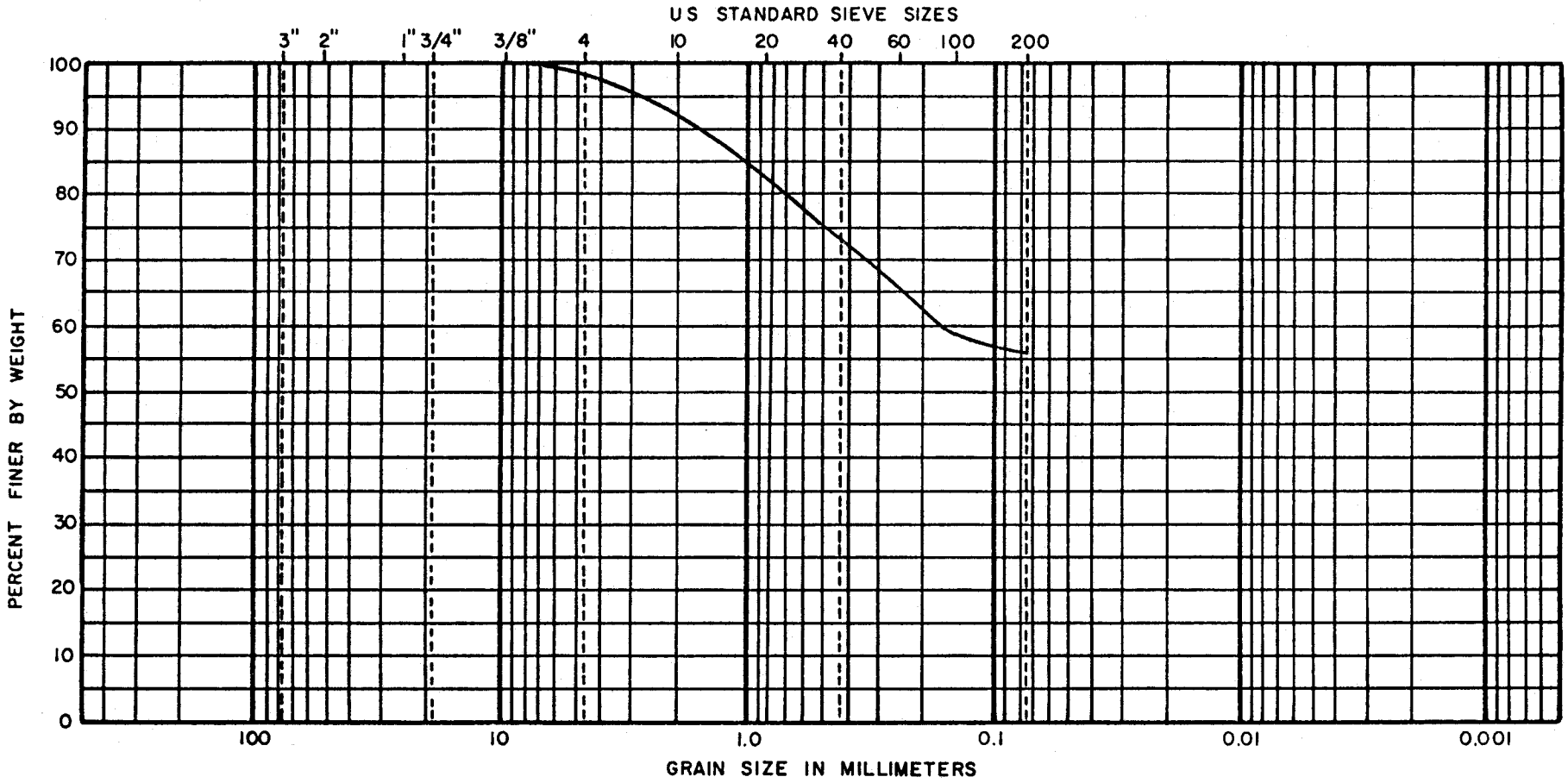
Brown Tan Very Micaceous Silty Fine to Coarse Sand With Rock Fragments
Sand Sized Particles Are Predominately Mica

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4429

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-10 |
| DEPTH OR ELEV. | Bag 1-8ft |
| MOISTURE % | 13.7 |
| LIQUID LIMIT | - |
| PLASTIC LIMIT | - |
| PLASTICITY INDEX | - |

DESCRIPTION OR CLASSIFICATION

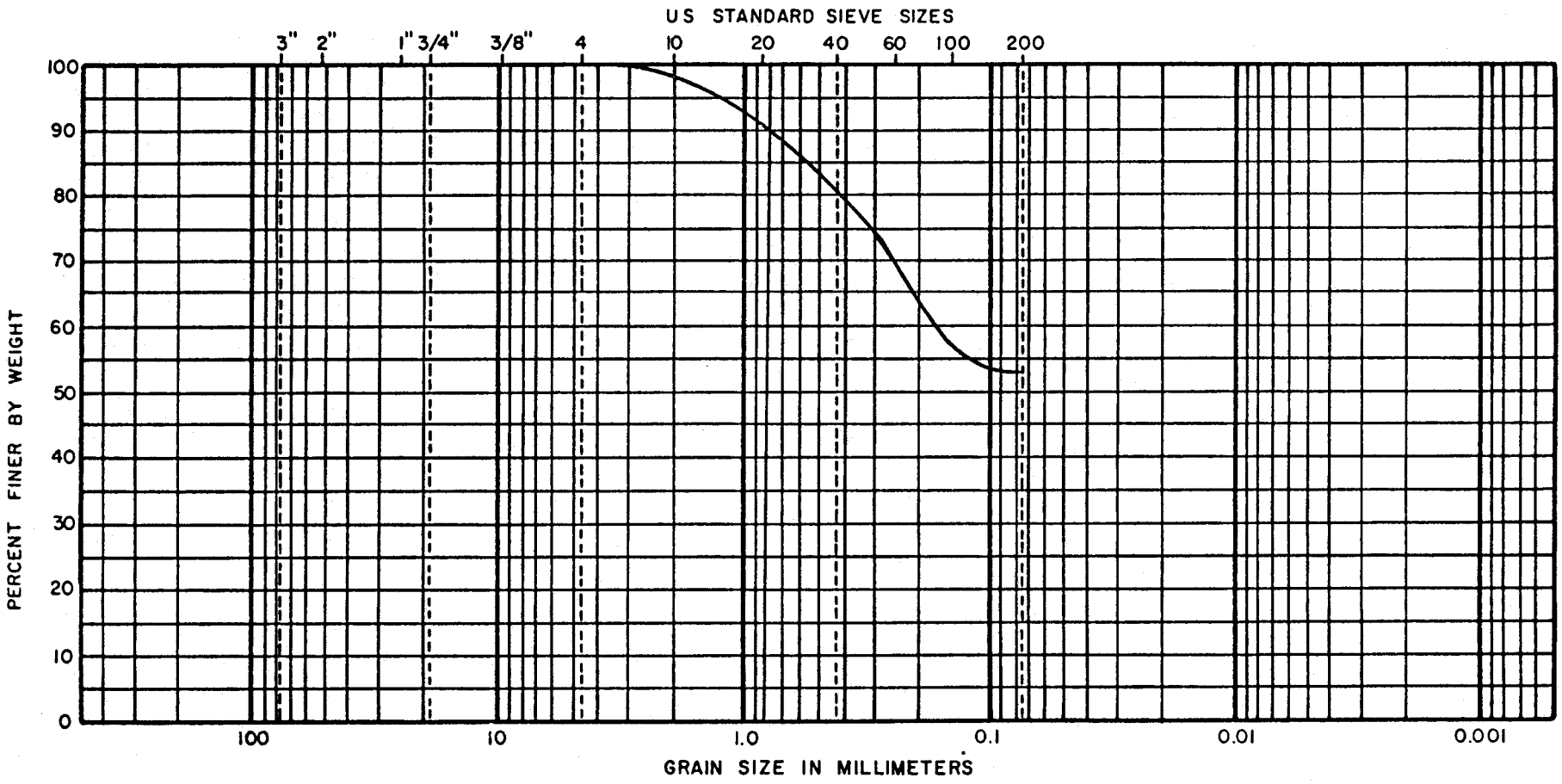
Brown Micaceous Fine to Coarse Sandy Silt (Most Sand Size Particles are Mica)

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-10 |
| DEPTH OR ELEV. | UD 13-15 ft |
| MOISTURE % | 19.7 |
| LIQUID LIMIT | - |
| PLASTIC LIMIT | - |
| PLASTICITY INDEX | - |

DESCRIPTION OR CLASSIFICATION

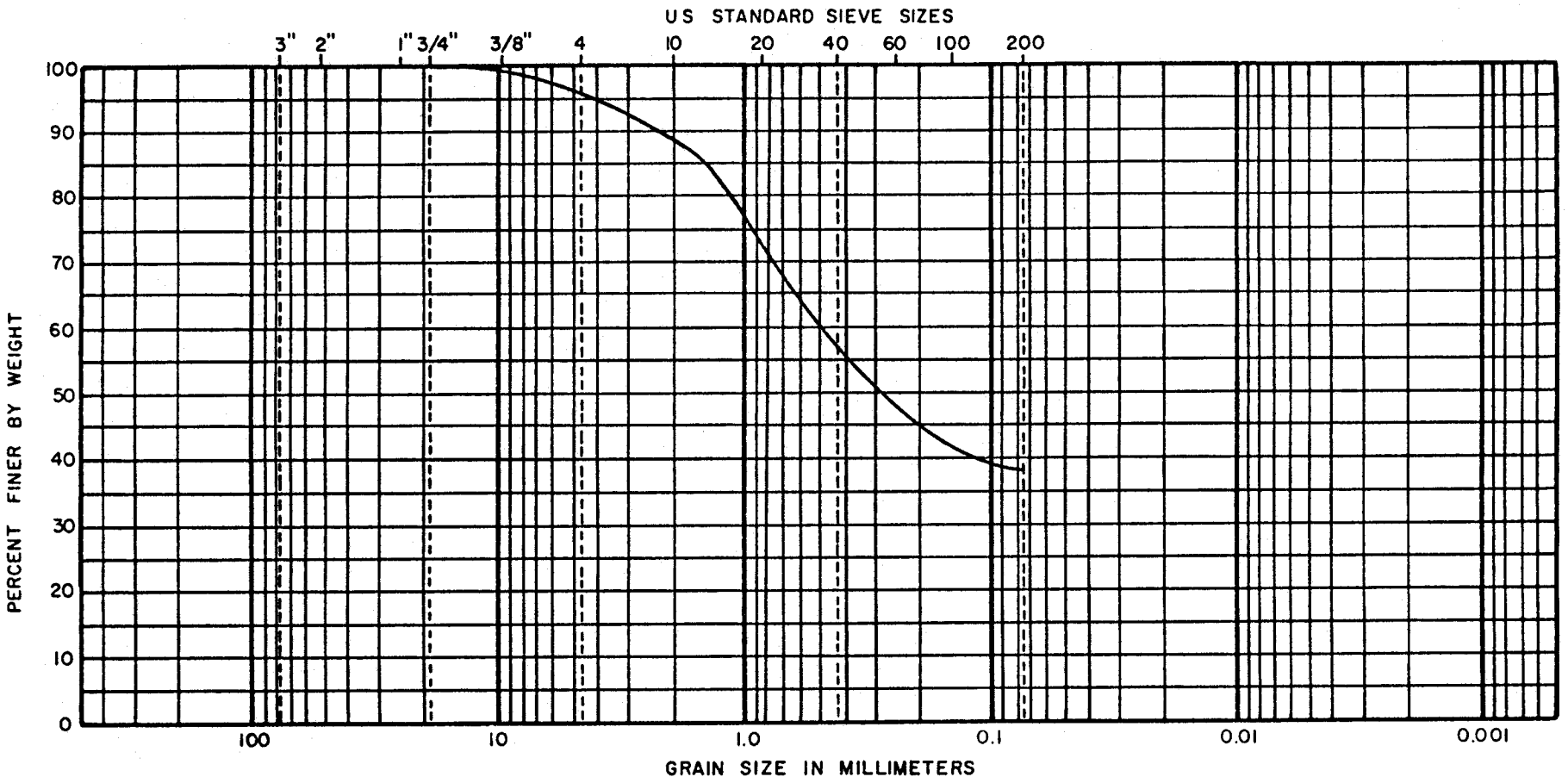
Red Brown Slightly Micaceous Fine to Medium Sandy Silt

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-11 |
| DEPTH OR ELEV. | UD 8-10 ft |
| MOISTURE % | 28.3 |
| LIQUID LIMIT | - |
| PLASTIC LIMIT | - |
| PLASTICITY INDEX | - |

DESCRIPTION OR CLASSIFICATION

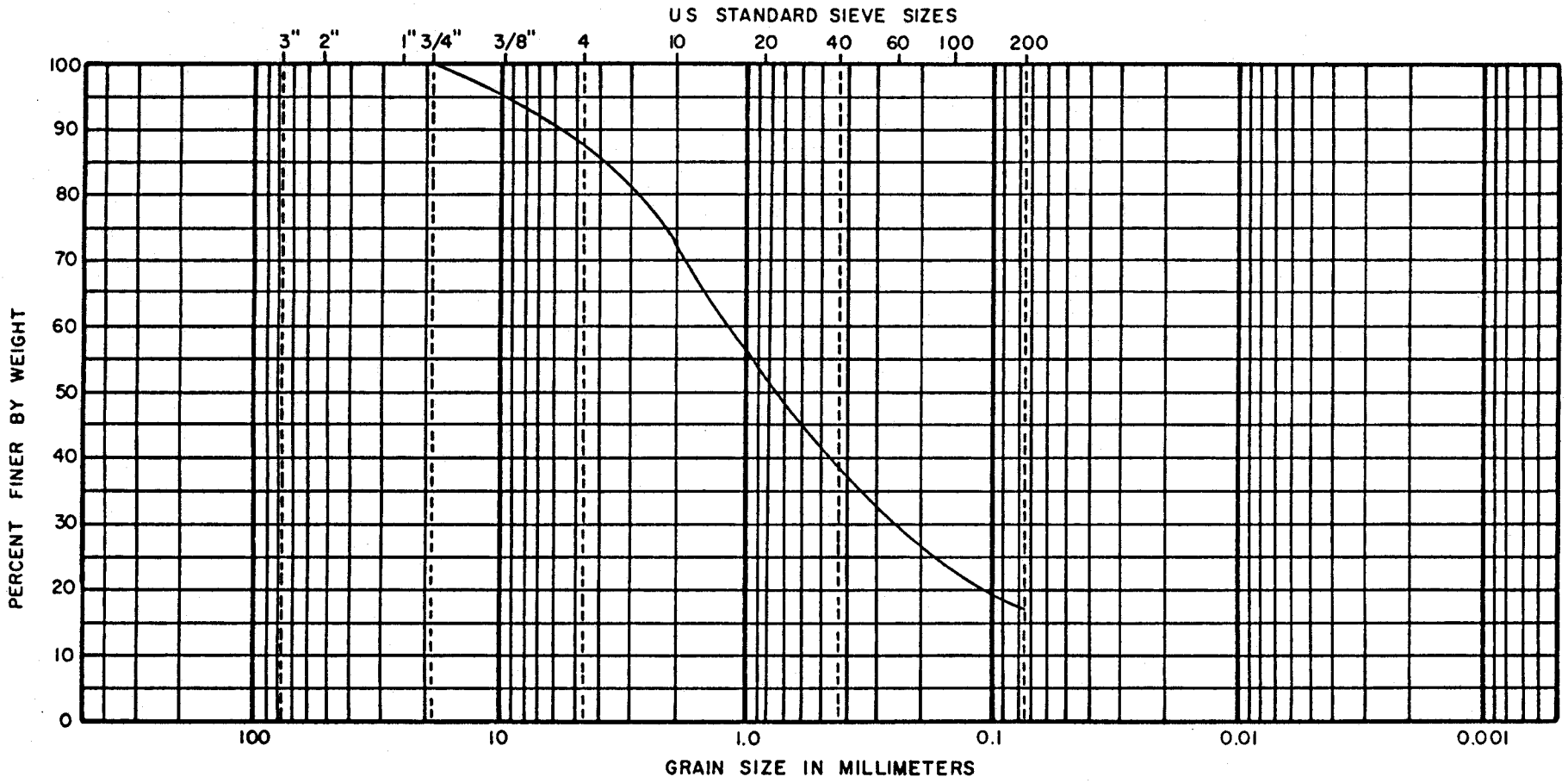
Light Brown Very Micaceous Silty Fine to Coarse Sand (Most Sand Size Particles are Mica)

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-16 |
| DEPTH OR ELEV. | UD 1 to 3 ft |
| MOISTURE % | 27.0 |
| LIQUID LIMIT | - |
| PLASTIC LIMIT | - |
| PLASTICITY INDEX | - |

DESCRIPTION OR CLASSIFICATION

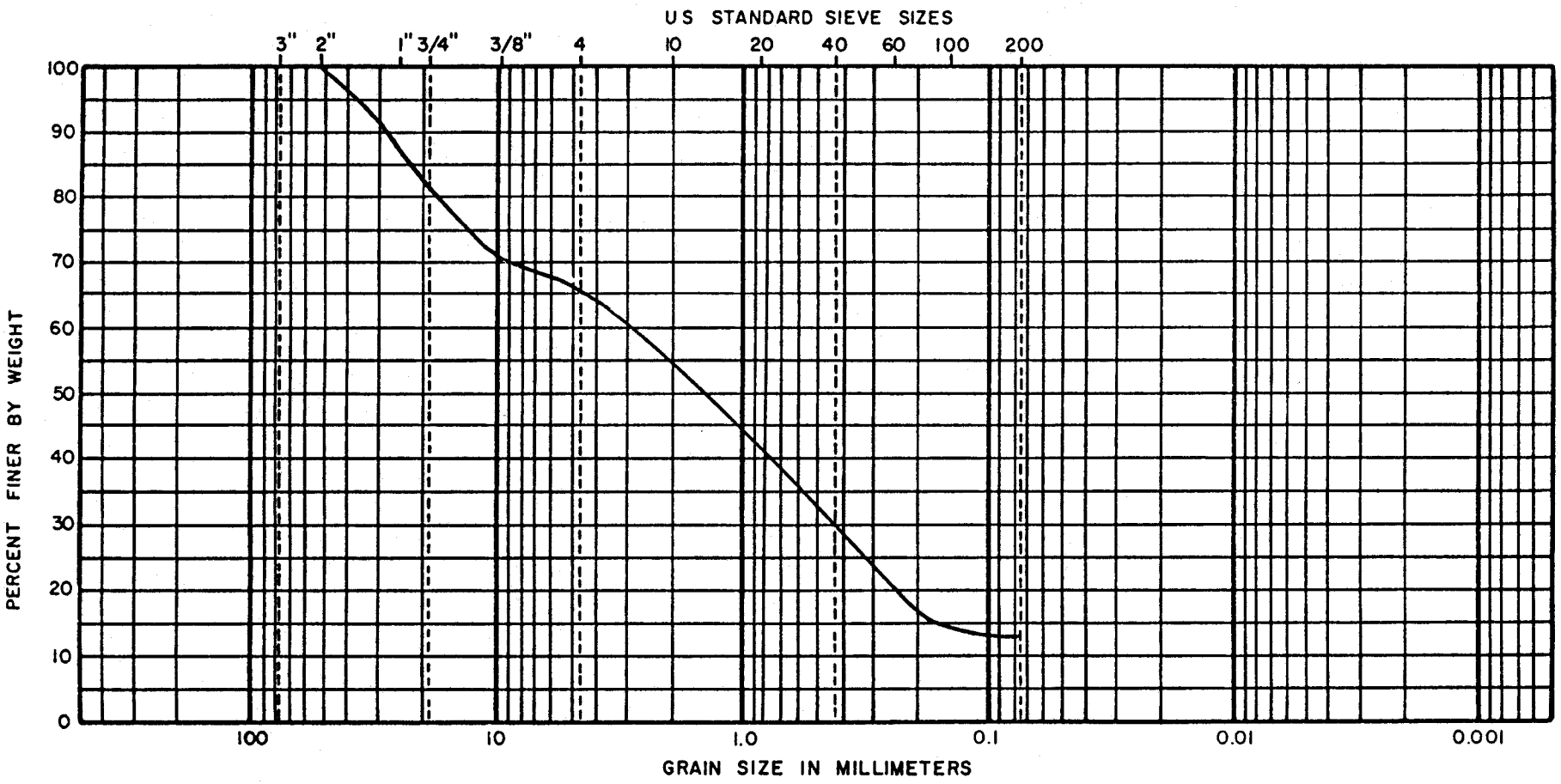
Gray Micaceous Silty Fine to Coarse Sand with Fine Gravel

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-16 |
| DEPTH OR ELEV. | UD 1-3 ft |
| MOISTURE % | 27.0 |
| LIQUID LIMIT | - |
| PLASTIC LIMIT | - |
| PLASTICITY INDEX | - |

DESCRIPTION OR CLASSIFICATION

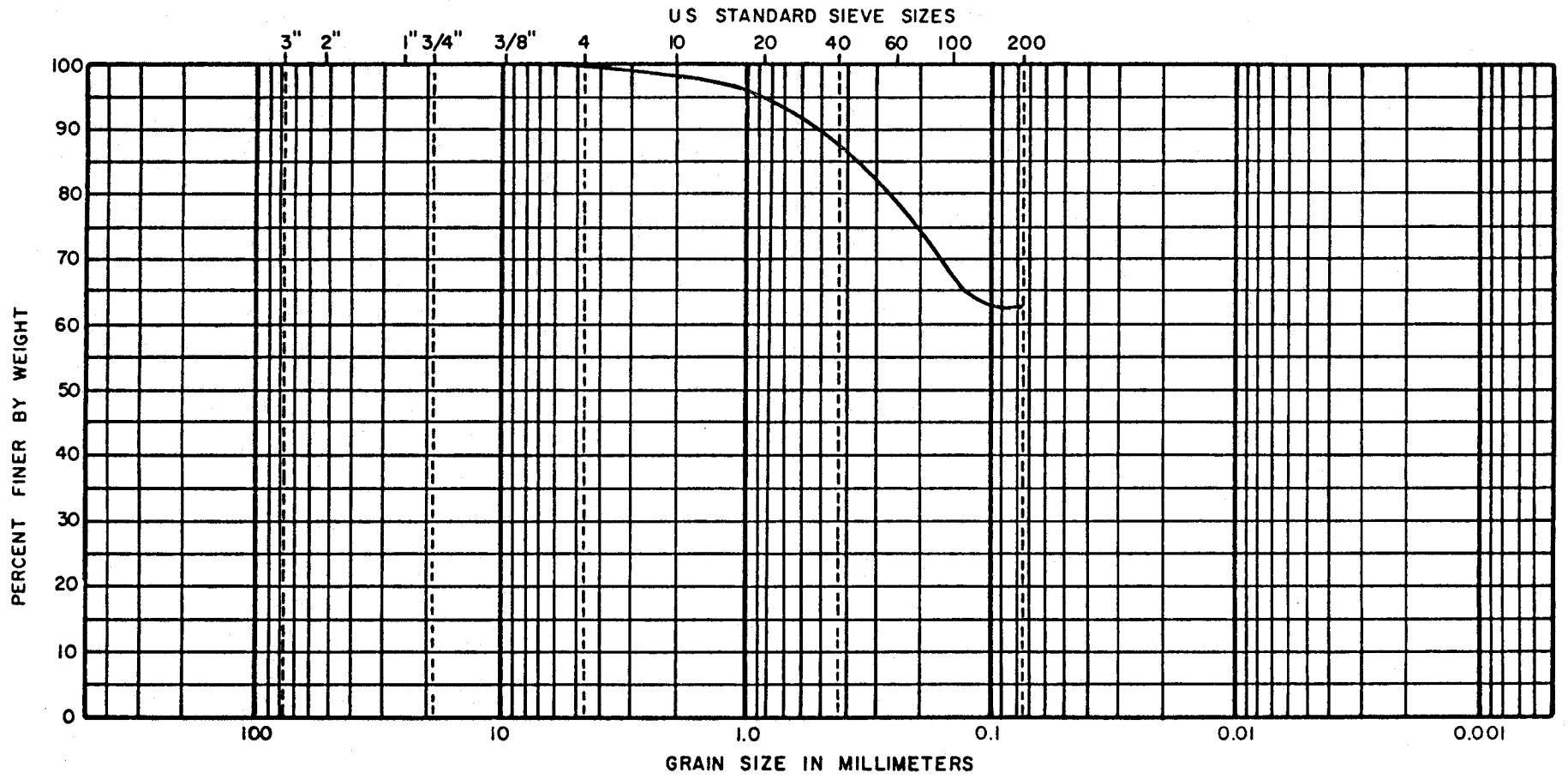
Gray Micaceous Silty Fine to Coarse Sand with Fine to Coarse Gravel

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 770




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-18 |
| DEPTH OR ELEV. | Bag 1-8 ft |
| MOISTURE % | 11.5 |
| LIQUID LIMIT | - |
| PLASTIC LIMIT | - |
| PLASTICITY INDEX | - |

DESCRIPTION OR CLASSIFICATION

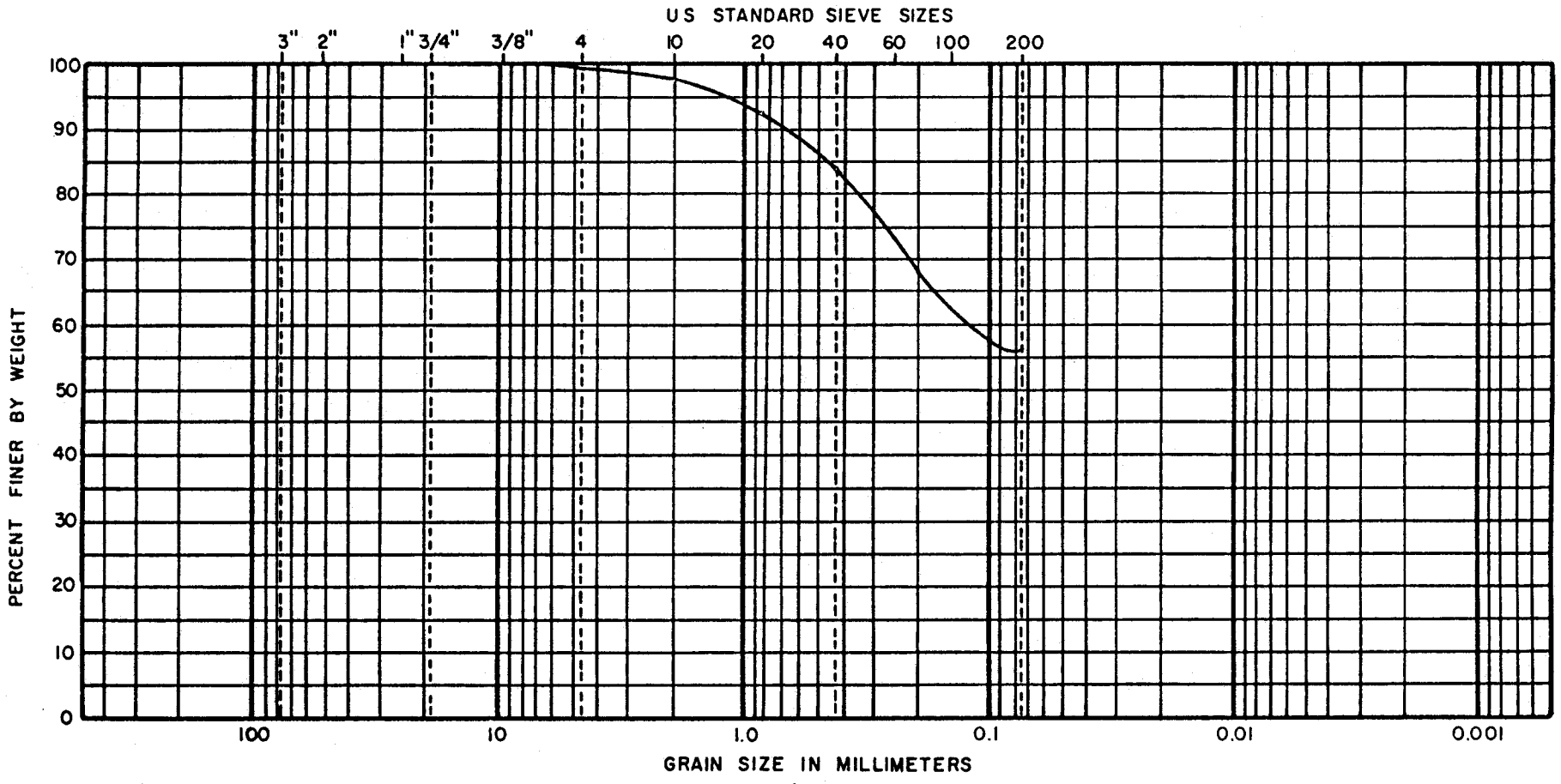
Red Brown Micaceous Fine to Medium Sandy Silt

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-18 |
| DEPTH OR ELEV. | Bag 18-23 Ft. |
| MOISTURE % | 14.9 |
| LIQUID LIMIT | -- |
| PLASTIC LIMIT | -- |
| PLASTICITY INDEX | -- |

DESCRIPTION OR CLASSIFICATION

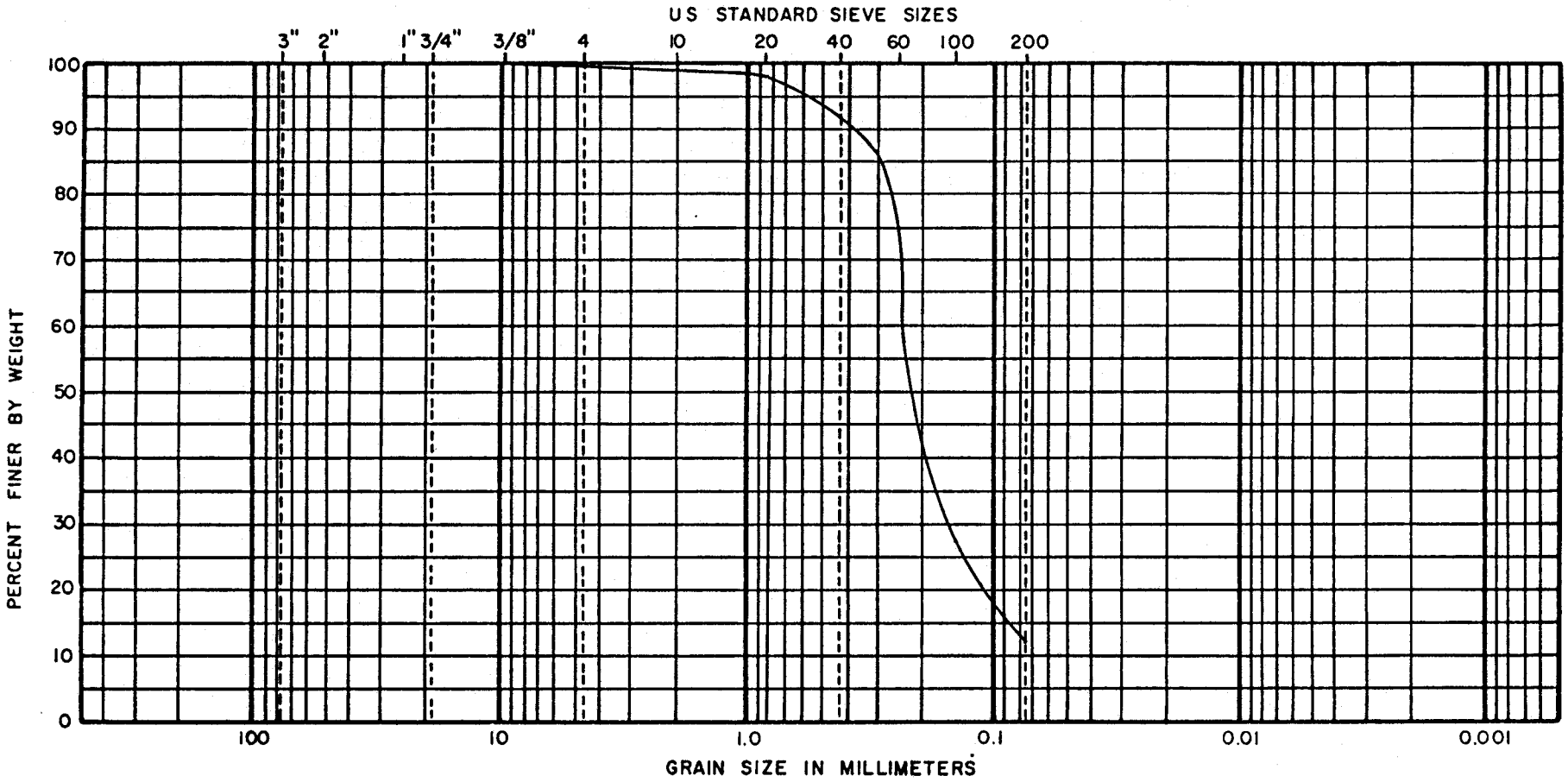
Red Brown Slightly Micaceous Fine to Medium Sandy Silt

# GRAIN SIZE DISTRIBUTION

JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| | |
|---|---|
| BORING NO. | B-19 |
| DEPTH OR ELEV. | UD 1 to 3 ft |
| MOISTURE % | 7.3 |
| LIQUID LIMIT | - |
| PLASTIC LIMIT | - |
| PLASTICITY INDEX | - |

DESCRIPTION OR CLASSIFICATION

Gray Slightly Micaceous to Micaceous Silty Fine to Medium Sand

# GRAIN SIZE DISTRIBUTION

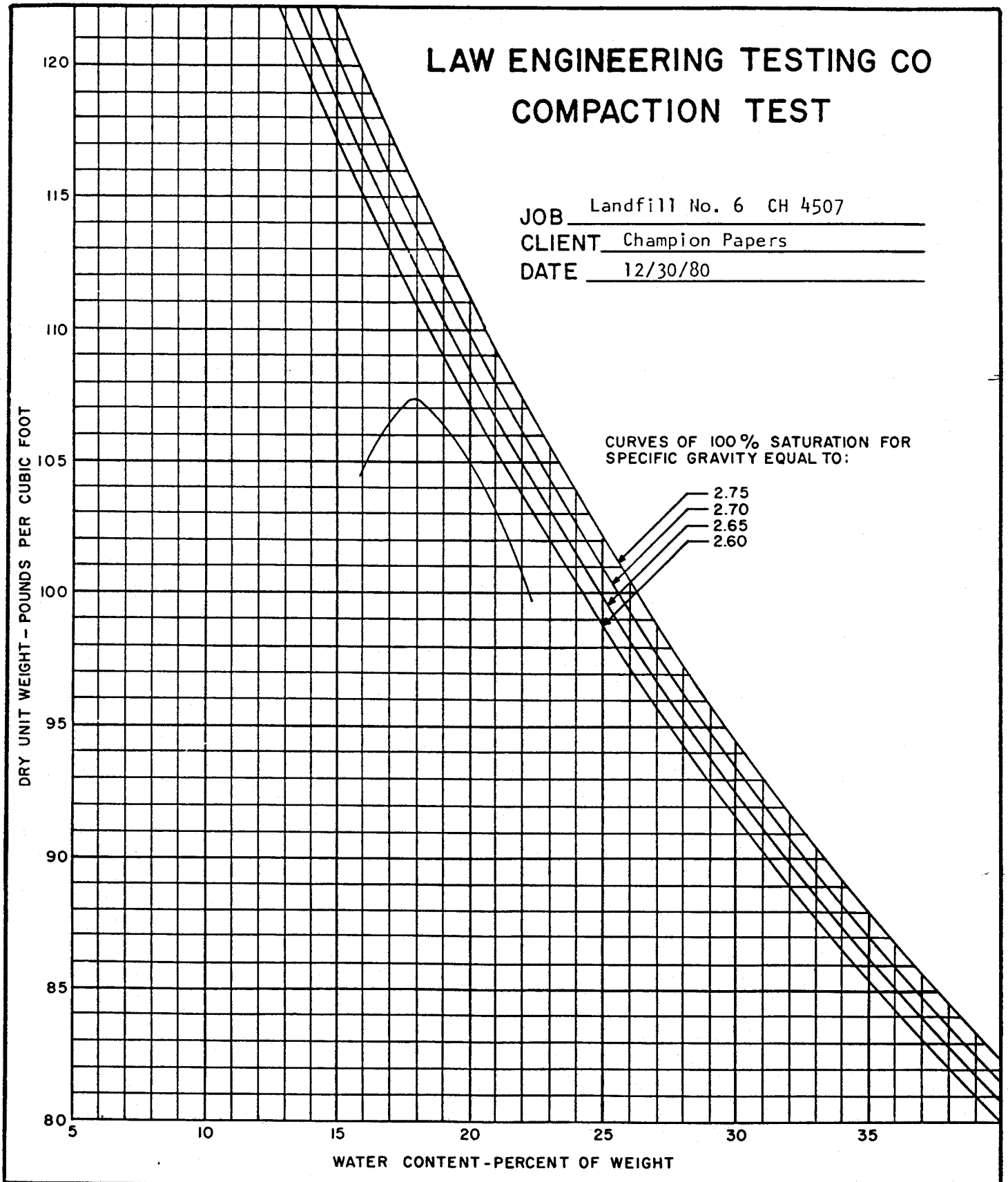
JOB NO. CH 4507

LAW ENGINEERING TESTING COMPANY

DUNCAN-PARNELL, INC., CHARLOTTE 779

# LAW ENGINEERING TESTING CO
# COMPACTION TEST

JOB Landfill No. 6 CH 4507
CLIENT Champion Papers
DATE 12/30/80

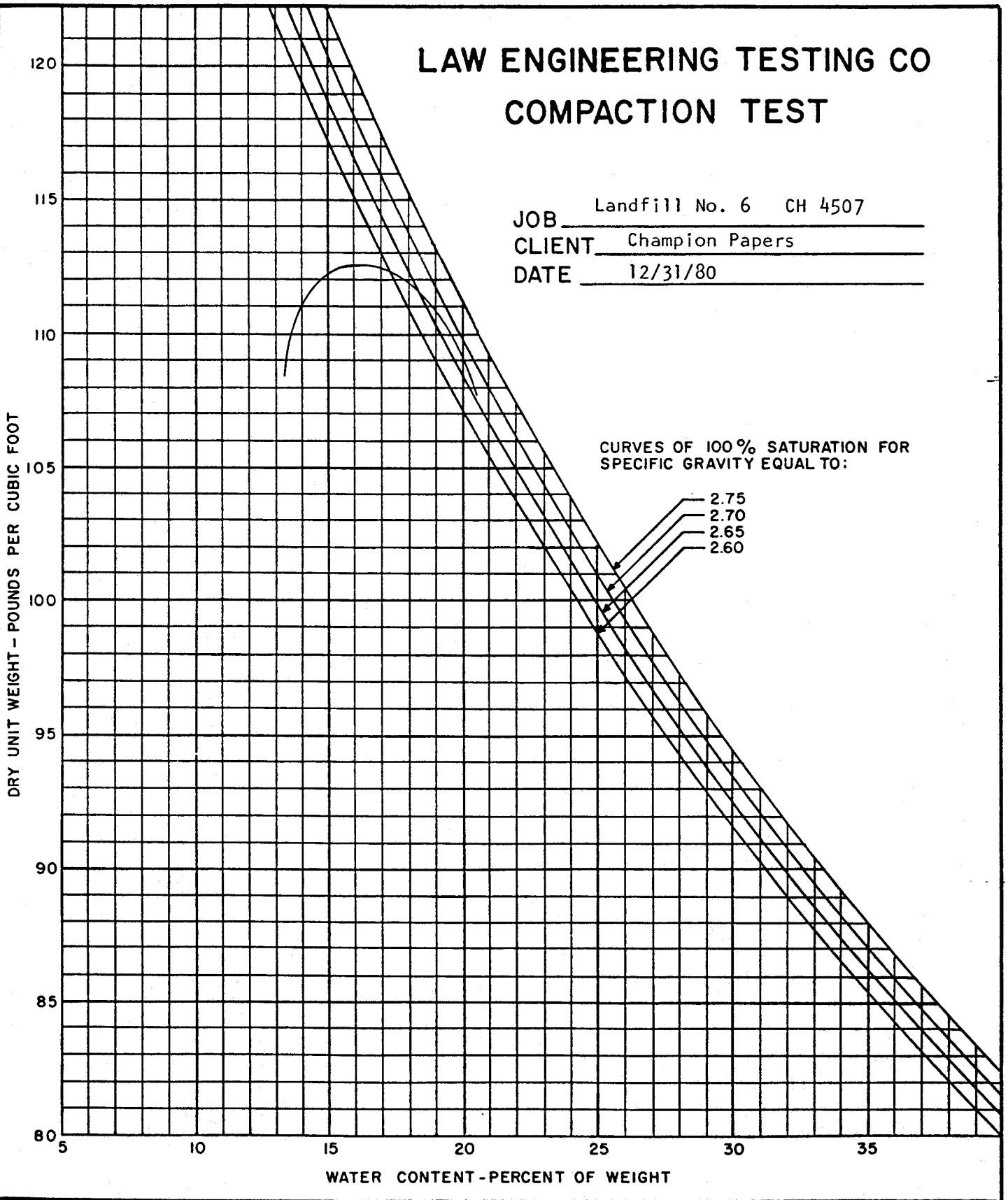



| MOISTURE DENSITY RELATION | METHOD OF TEST | MAX. DRY DENSITY PCF | OPTIMUM MOISTURE CONTENT % | SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION |
|---|---|---|---|---|
| 1 | Standard Proctor ASTM D698 | 107.4 | 17.9 | Light Brown Micaceous Fine to Coarse Sandy Silt<br>Sampled from Boring B-8 3 to 12 Ft. |

DUNCAN-PARNELL, INC., CHARLOTTE 1278

# LAW ENGINEERING TESTING CO
# COMPACTION TEST

JOB Landfill No. 6 CH 4507
CLIENT Champion Papers
DATE 12/31/80

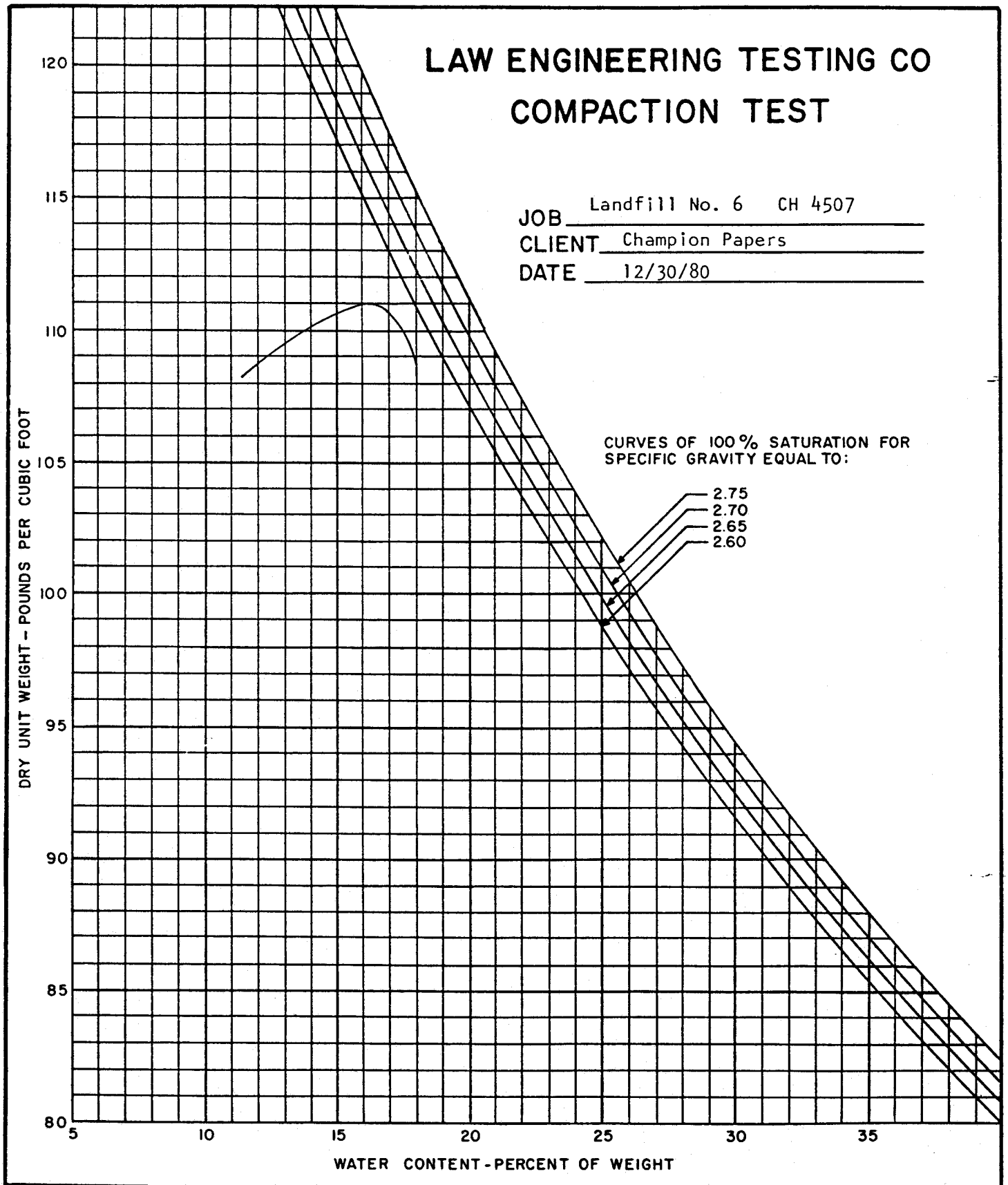



| MOISTURE DENSITY RELATION | METHOD OF TEST | MAX. DRY DENSITY PCF | OPTIMUM MOISTURE CONTENT % | SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION |
|---|---|---|---|---|
| 2 | Standard Proctor ASTM D698 | 112.6 | 16.3 | Brown Micaceous Fine to Coarse Sandy Silt (Most of Sand Size Particles are Mica) Sampled from Boring B-10 1 to 8 Ft. |

DUNCAN-PARNELL, INC., CHARLOTTE 1278

# LAW ENGINEERING TESTING CO
# COMPACTION TEST

JOB Landfill No. 6 CH 4507
CLIENT Champion Papers
DATE 12/30/80

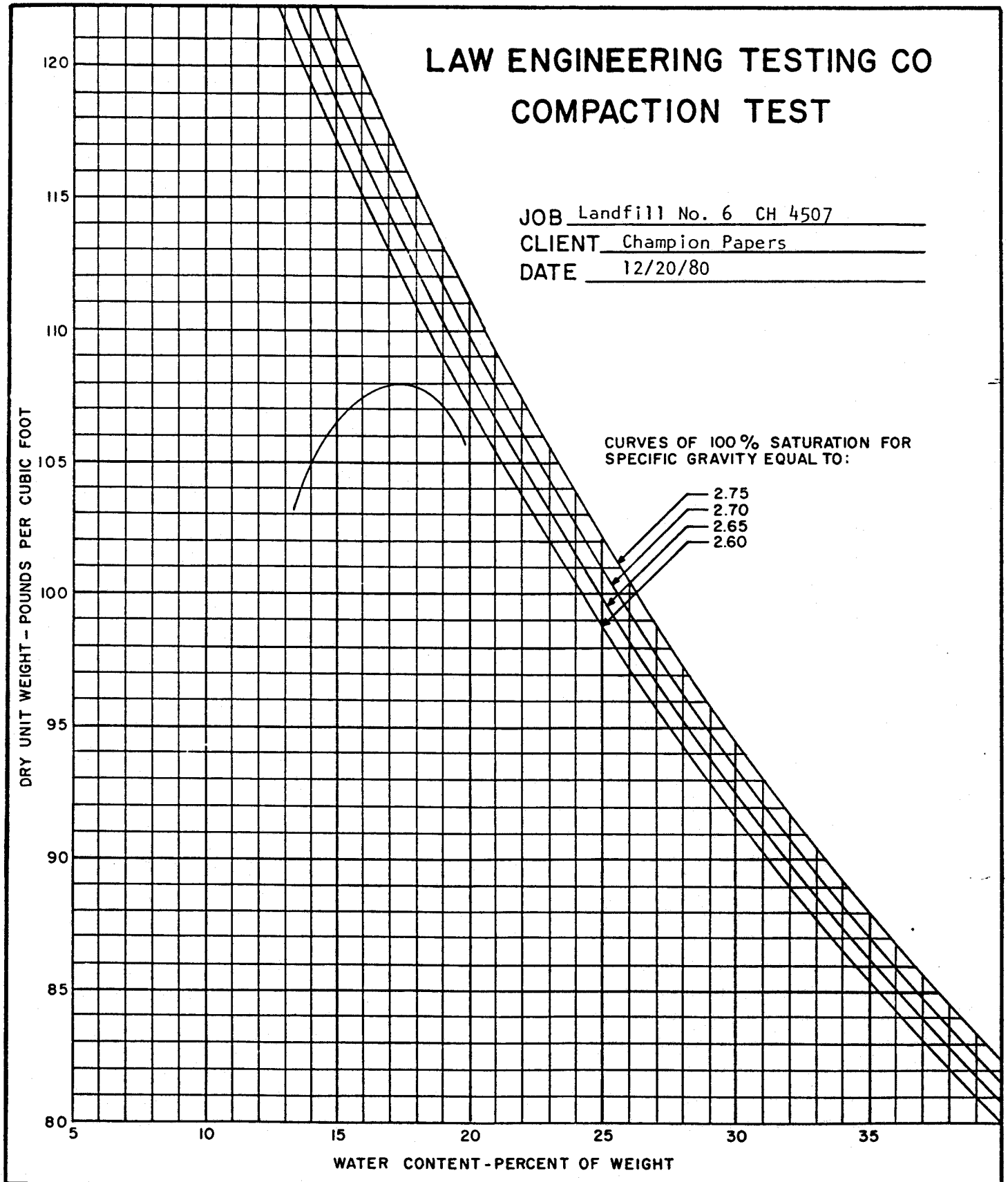



| MOISTURE DENSITY RELATION | METHOD OF TEST | MAX. DRY DENSITY PCF | OPTIMUM MOISTURE CONTENT % | SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION |
|---|---|---|---|---|
| 3 | Standard Proctor ASTM D698 | 111.0 | 16.3 | Red Brown Micaceous Fine to Medium Sandy Silt<br>Sampled from Boring B-18 1 to 8 Ft. |

DUNCAN-PARNELL, INC., CHARLOTTE 1278

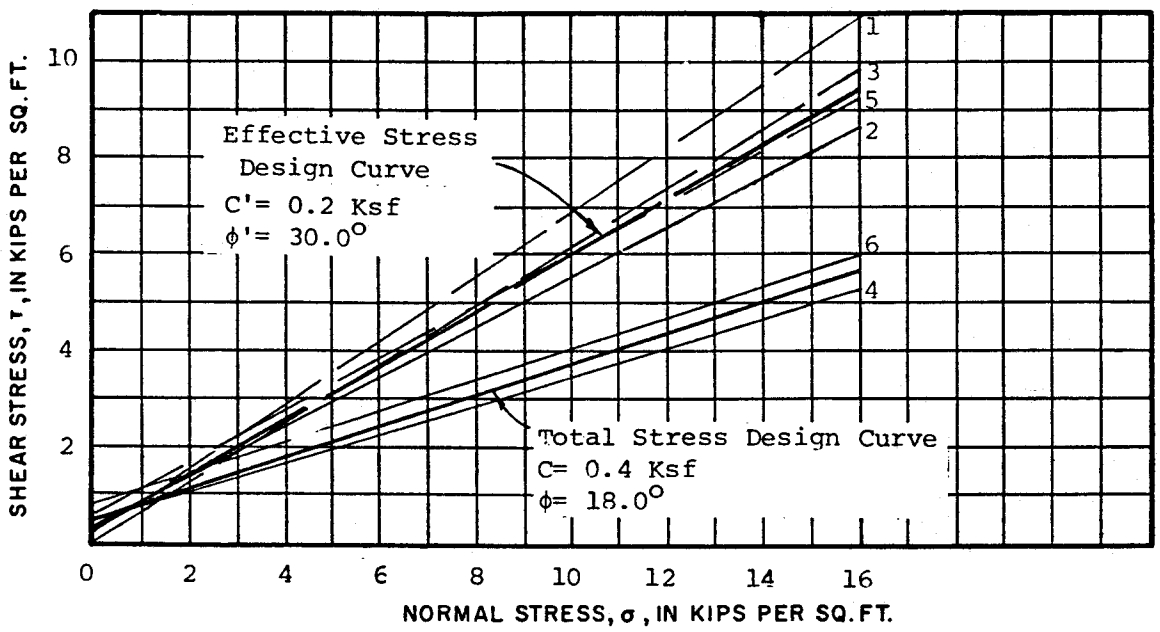
# LAW ENGINEERING TESTING CO
# COMPACTION TEST

JOB Landfill No. 6 CH 4507
CLIENT Champion Papers
DATE 12/20/80




| MOISTURE DENSITY RELATION | METHOD OF TEST | MAX. DRY DENSITY PCF | OPTIMUM MOISTURE CONTENT % | SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION |
|---|---|---|---|---|
| 4 | Standard Proctor ASTM D698 | 108.0 | 17.3 | Red Brown Slightly Micaceous Fine to Medium Sandy Silt<br>Sampled from Boring B-18 18 to 23 Ft. |

DUNCAN-PARNELL, INC., CHARLOTTE 1278



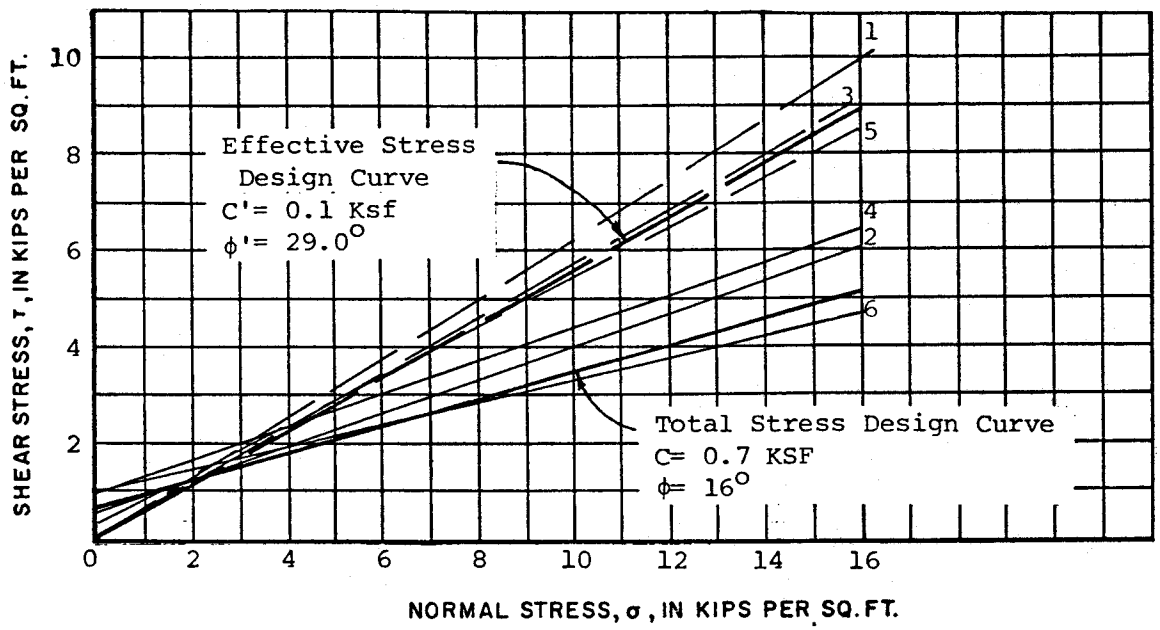

| Legend | Stress Type | Boring Number | Depth (Ft) | Material |
|---|---|---|---|---|
| 1 | Effective | B-8 | 9-11 | Very Micaceous Fine to Coarse Sandy Silt |
| 2 | Total | | | |
| 3 | Effective | B-10 | 13-15 | Slightly Micaceous Fine to Medium Sandy Silt |
| 4 | Total | | | |
| 5 | Effective | B-11 | 8-10 | Micaceous Silty Fine to Coarse Sand |
| 6 | Total | | | |

Note: Results of Saturated Consolidated Undrained Triaxial Shear Test With Pore Pressure Measurements. Slope Stability Analyses Utilize Total Stress for End of Construction Condition and Effective Stress, Which Approximates Consolidated Drained Results for Steady State Condition.

**LAW ENGINEERING TESTING CO.**
**CHARLOTTE, NORTH CAROLINA**

FOUNDATION SOILS
CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST
CHAMPION PAPERS LANDFILL NO. 6
CANTON, NORTH CAROLINA

JOB NO. CH 4507 | DRAWING NO. 5



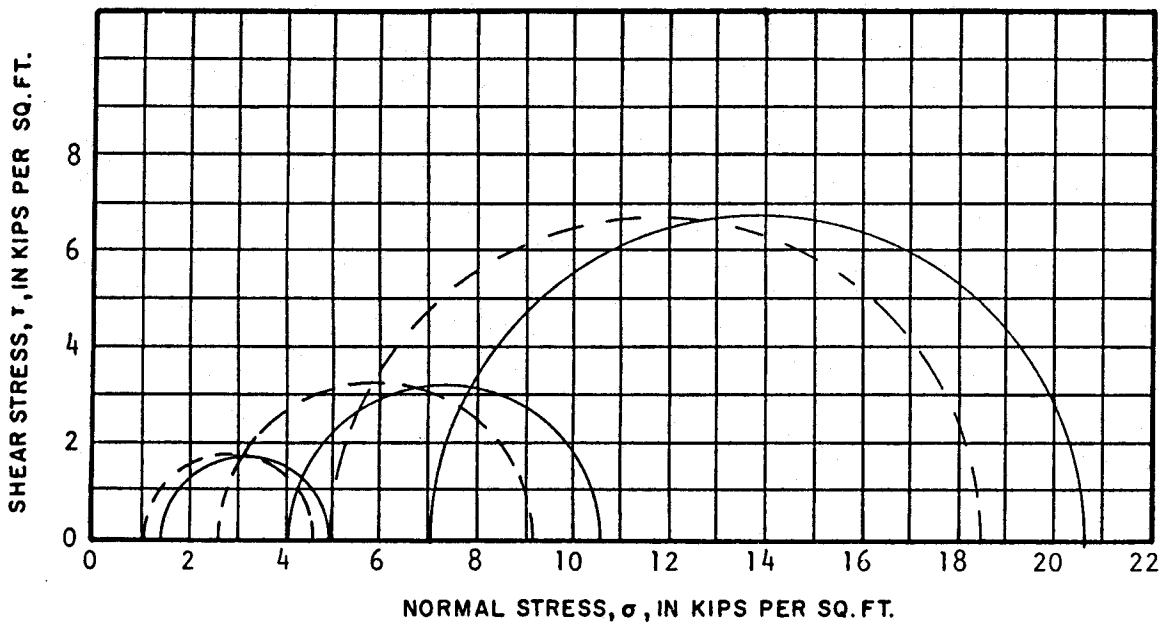

| Legend | Stress Type | Boring Number | Depth (Ft) | Material |
|---|---|---|---|---|
| 1 | Effective | B-10 | 1-8 | Micaceous Fine to Coarse Sandy Silt |
| 2 | Total | | | |
| 3 | Effective | B-18 | 1-8 | Micaceous Fine to Medium Sandy Silt |
| 4 | Total | | | |
| 5 | Effective | B-18 | 18-23 | Slightly Micaceous Fine to Medium Sandy Silt |
| 6 | Total | | | |

Note: Results of Saturated Consolidated Undrained Triaxial Shear Test with Pore Pressure Measurements. Slope Stability Analysis Utilize Total Stress for End of Construction Condition and Effective Stress, Which Approximates Consolidated Drained Results for Steady State Condition.

**LAW ENGINEERING TESTING CO.**
**CHARLOTTE, NORTH CAROLINA**

EMBANKMENT SOILS
CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST
CHAMPION PAPERS LANDFILL NO. 6
CANTON, NORTH CAROLINA

**JOB NO.** CH 4507 | DRAWING NO. 6




MOHR DIAGRAMS

EFFECTIVE COHESION, c' 0.2 KSF
EFFECTIVE SHEAR ANGLE, Φ' 34.0°
TOTAL COHESION, c 0.3 KSF
TOTAL SHEAR ANGLE, Φ 27.5°

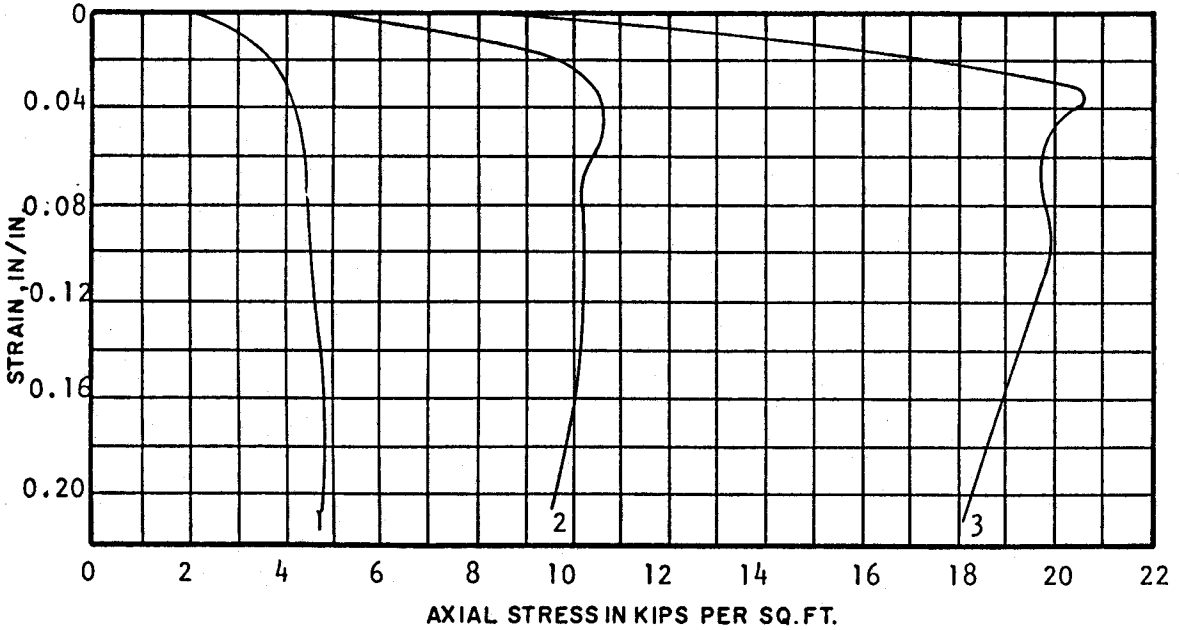
INITIAL PROPERTIES:

| | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT γ | 118.6 | 116.9 | 116.7 | 117.4 | pcf |
| WATER CONTENT, w | 14.0 | 13.1 | 12.4 | 13.2 | % |
| VOID RATIO, e | 0.637 | 0.648 | 0.640 | 0.642 | |
| SATURATION, s | 60.2 | 55.2 | 52.9 | 56.1 | % |

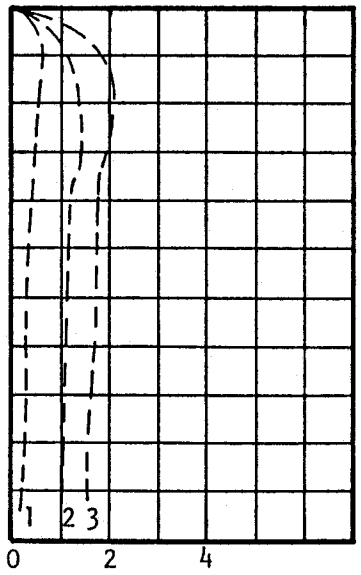
FINAL PROPERTIES:

| | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT, γ | 128.7 | 129.4 | 130.7 | 129.6 | pcf |
| WATER CONTENT, w | 23.0 | 22.4 | 21.3 | 22.2 | % |
| VOID RATIO, e | 0.629 | 0.610 | 0.581 | 0.607 | |
| SATURATION, s | 100.0 | 100.0 | 100.0 | 100.0 | % |

SAMPLE DESCRIPTION:
Red Brown Very Micaceous Fine to Coarse Sandy Silt With Rock Fragments




EXCESS PORE PRESSURE IN KIPS PER SQ.FT.

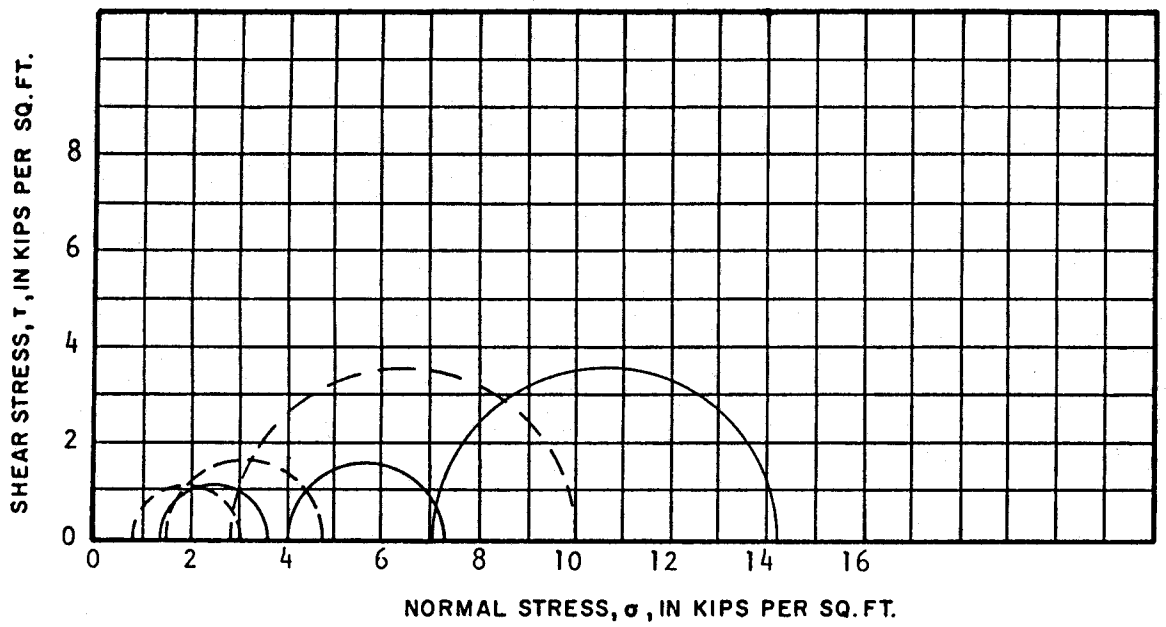



TOTAL STRESSES 4.8 10.6 20.7
EFECTIVE STRESSES 4.5 9.2 18.6

STRESS - STRAIN AND PORE PRESSURE - STRAIN CURVES

SATURATED, CONSOLIDATED, UNDRAINED TRIAXIAL SHEAR TEST WITH PORE PRESSURE MEASUREMENTS

JOB NO. CH 4507 BORING NO. B-8
DEPTH 9'-11' SAMPLE TYPE UD




MOHR DIAGRAMS

| | |
|---|---|
| EFFECTIVE COHESION, c' | 0.1 KSF |
| EFFECTIVE SHEAR ANGLE, Φ' | 31.5° |
| TOTAL COHESION, c | 0.4 KSF |
| TOTAL SHEAR ANGLE, Φ | 16.5° |

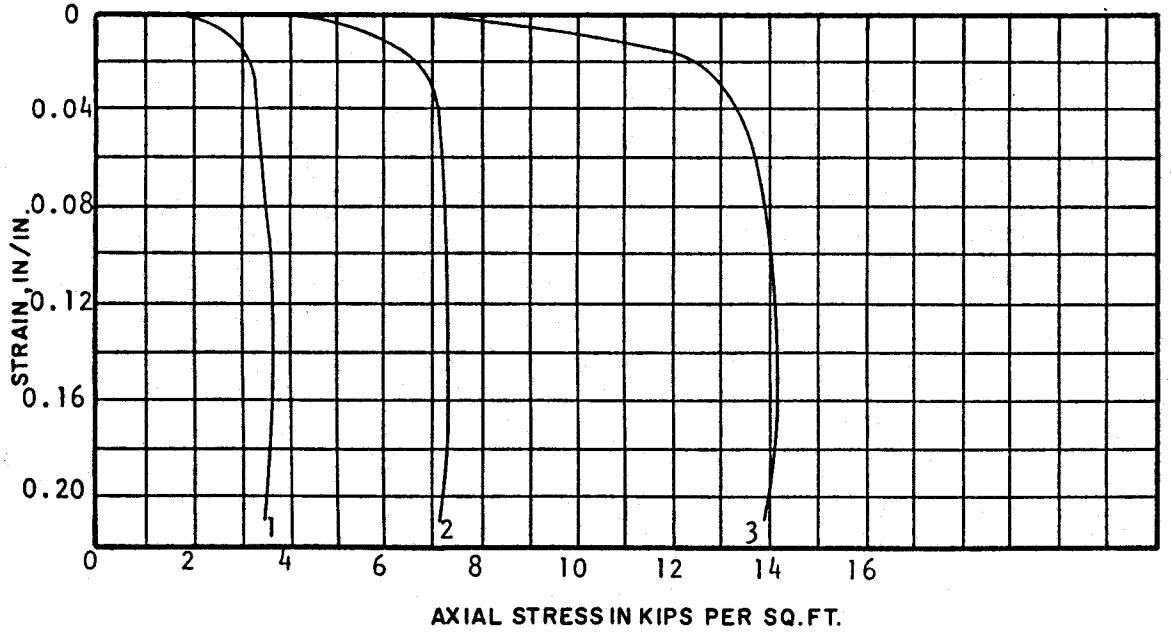
INITIAL PROPERTIES:

| | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT γ | 108.4 | 102.3 | 101.7 | 104.1 | pcf |
| WATER CONTENT, w | 25.5 | 17.1 | 16.4 | 19.7 | % |
| VOID RATIO, e | 0.884 | 0.864 | 0.862 | 0.870 | |
| SATURATION, s | 75.1 | 51.7 | 49.5 | 58.8 | % |

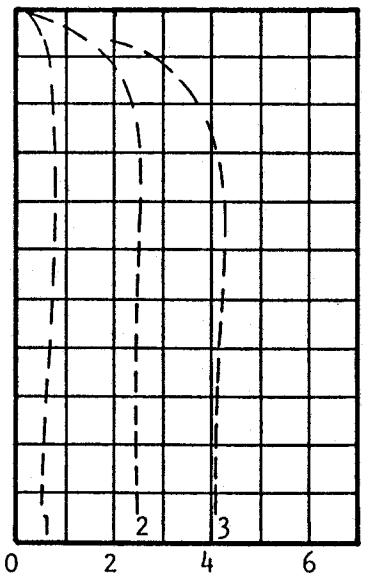
FINAL PROPERTIES:

| | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT, γ | 116.1 | 118.7 | 119.1 | 118.0 | pcf |
| WATER CONTENT, w | 33.4 | 30.1 | 29.6 | 31.0 | % |
| VOID RATIO, e | 0.870 | 0.784 | 0.772 | 0.809 | |
| SATURATION, s | 100.0 | 100.0 | 100.0 | 100.0 | % |

SAMPLE DESCRIPTION:
Red Brown Slightly Micaceous Fine to Medium Sandy Silt




EXCESS PORE PRESSURE IN KIPS PER SQ.FT.




TOTAL STRESSES 3.6 7.4 14.3

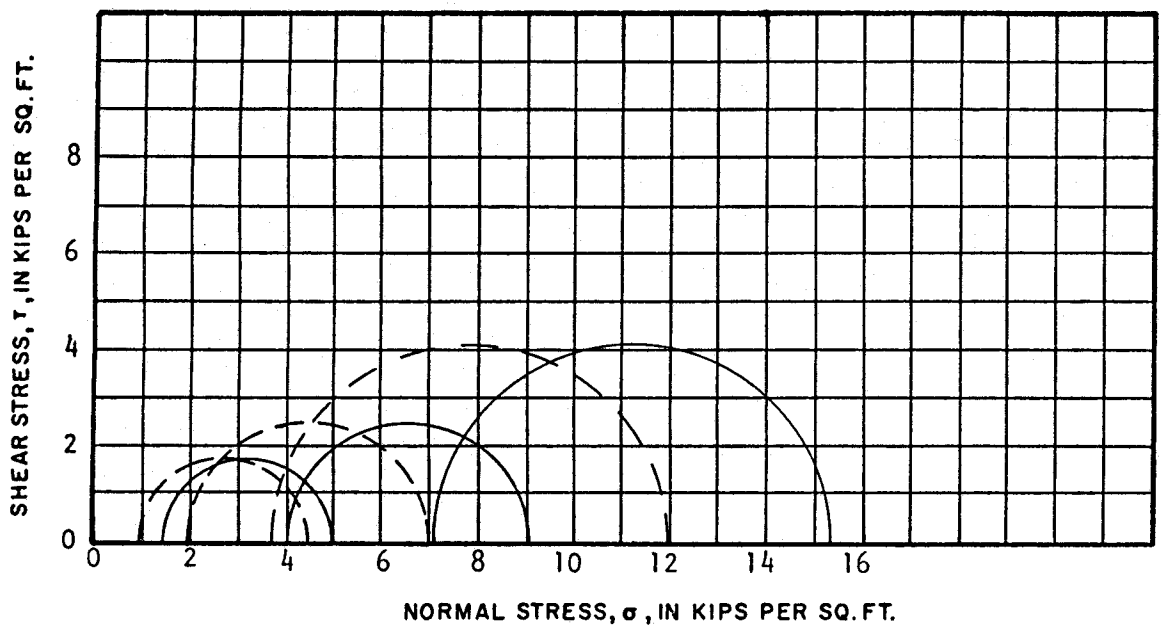
EFECTIVE STRESSES 3.0 4.8 10.1

STRESS - STRAIN AND PORE PRESSURE - STRAIN CURVES

SATURATED, CONSOLIDATED, UNDRAINED TRIAXIAL SHEAR TEST WITH PORE PRESSURE MEASUREMENTS

JOB NO. CH 4507 BORING NO. B-10

DEPTH 13'-15' SAMPLE TYPE UD



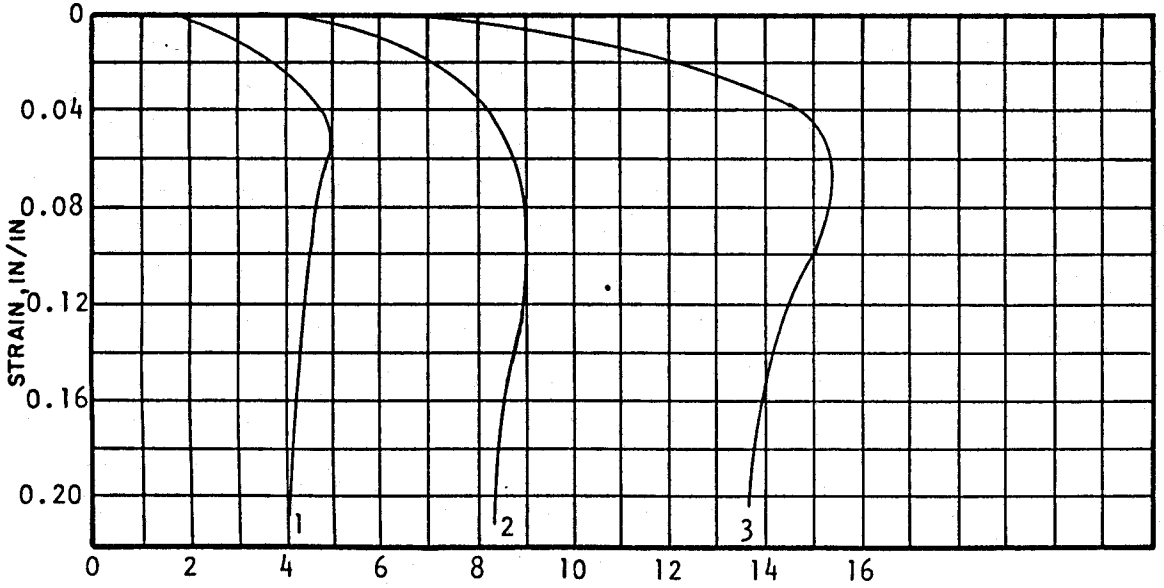

MOHR DIAGRAMS

EFFECTIVE COHESION, c' 0.6 KSF
EFFECTIVE SHEAR ANGLE, Φ' 28.5°
TOTAL COHESION, c 0.8 KSF
TOTAL SHEAR ANGLE, Φ 17.5°

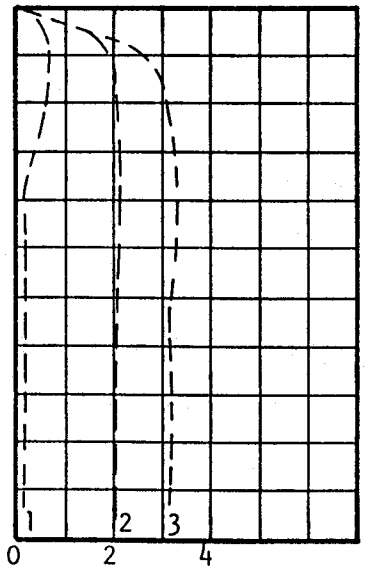
| INITIAL PROPERTIES: | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT γ | 124.1 | 122.3 | 126.1 | 124.2 | pcf |
| WATER CONTENT, w | 30.7 | 28.5 | 25.7 | 28.3 | % |
| VOID RATIO, e | 0.728 | 0.725 | 0.637 | 0.697 | |
| SATURATION, s | 100+ | 100+ | 100+ | 100+ | % |

| FINAL PROPERTIES: | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT, γ | 121.3 | 123.7 | 128.7 | 124.6 | pcf |
| WATER CONTENT, w | 27.7 | 25.1 | 20.3 | 24.4 | % |
| VOID RATIO, e | 0.728 | 0.660 | 0.535 | 0.641 | |
| SATURATION, s | 100.0 | 100.0 | 100.0 | 100.0 | % |

SAMPLE DESCRIPTION:
Light Brown Micaceous Silty Fine to Coarse Sand




EXCESS PORE PRESSURE IN KIPS PER SQ.FT.

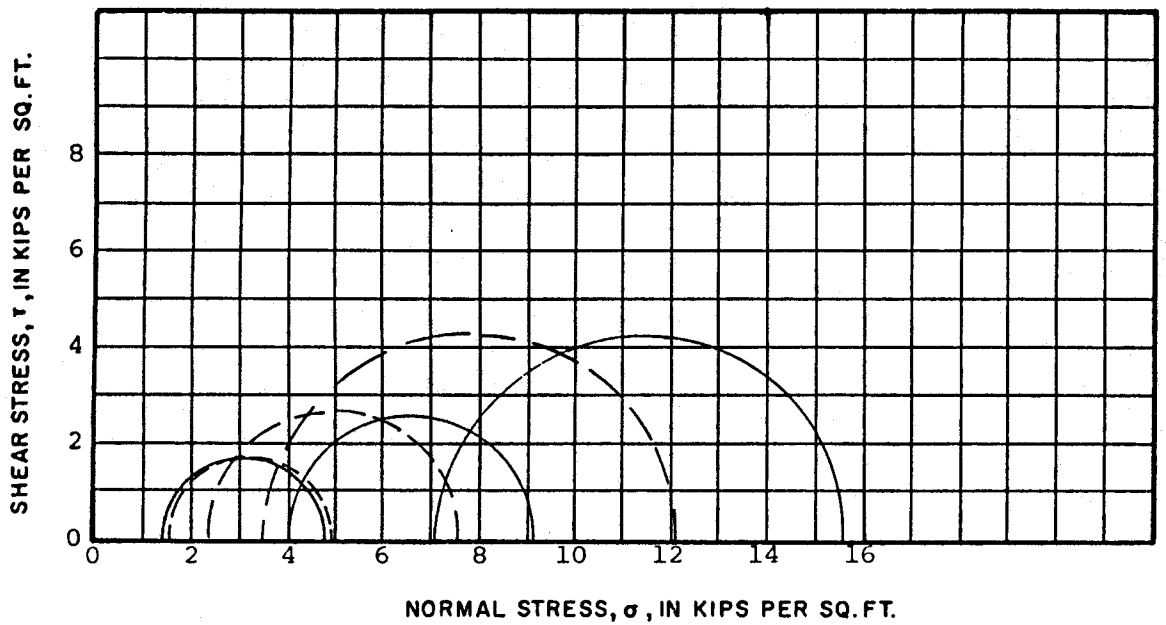



TOTAL STRESSES 4.9 9.0 15.3
EFECTIVE STRESSES 4.5 6.9 12.0

STRESS - STRAIN AND PORE PRESSURE - STRAIN CURVES

**SATURATED, CONSOLIDATED, UNDRAINED TRIAXIAL SHEAR TEST WITH PORE PRESSURE MEASUREMENTS**

JOB NO. CH 4507 BORING NO. B-11
DEPTH 8'-10' SAMPLE TYPE UD




MOHR DIAGRAMS

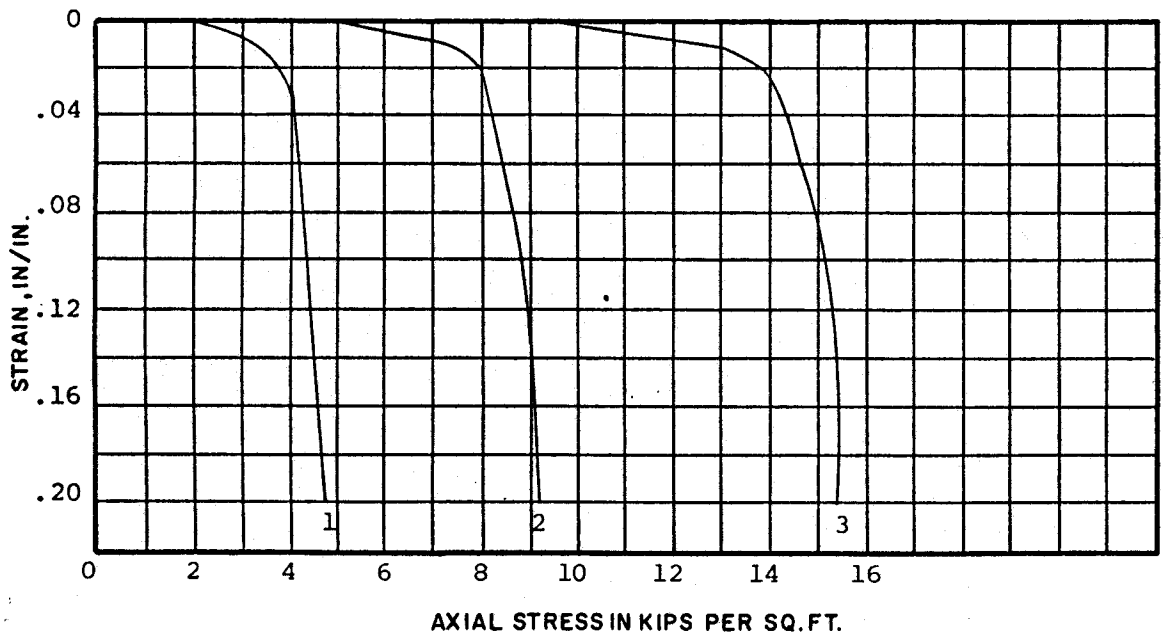
| | |
|---|---|
| EFFECTIVE COHESION, c' | 0 |
| EFFECTIVE SHEAR ANGLE, Φ' | 32.0° |
| TOTAL COHESION, c | 0.6 Ksf |
| TOTAL SHEAR ANGLE, Φ | 19.0° |

INITIAL PROPERTIES:

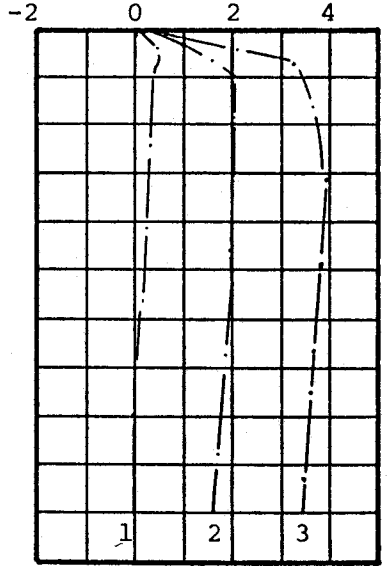
| | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT γ | 126.7 | 126.7 | 126.7 | 126.7 | pcf |
| WATER CONTENT, w | 17.8 | 17.7 | 17.6 | 17.7 | % |
| VOID RATIO, e | 0.688 | 0.688 | 0.686 | 0.687 | |
| SATURATION, s | 75.2 | 74.9 | 74.7 | 74.9 | % |

FINAL PROPERTIES:

| | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT, γ | 133.2 | 134.4 | 136.6 | 134.7 | pcf |
| WATER CONTENT, w | 23.5 | 22.5 | 20.8 | 22.3 | % |
| VOID RATIO, e | 0.684 | 0.655 | 0.606 | 0.648 | |
| SATURATION, s | 100 | 100 | 100 | 100 | % |




EXCESS PORE PRESSURE IN KIPS PER SQ.FT.




STRESS - STRAIN AND PORE PRESSURE - STRAIN CURVES

SAMPLE DESCRIPTION: Brown Micaceous Fine to Coarse Sandy Silt (Most Sand Size Particles are Mica)

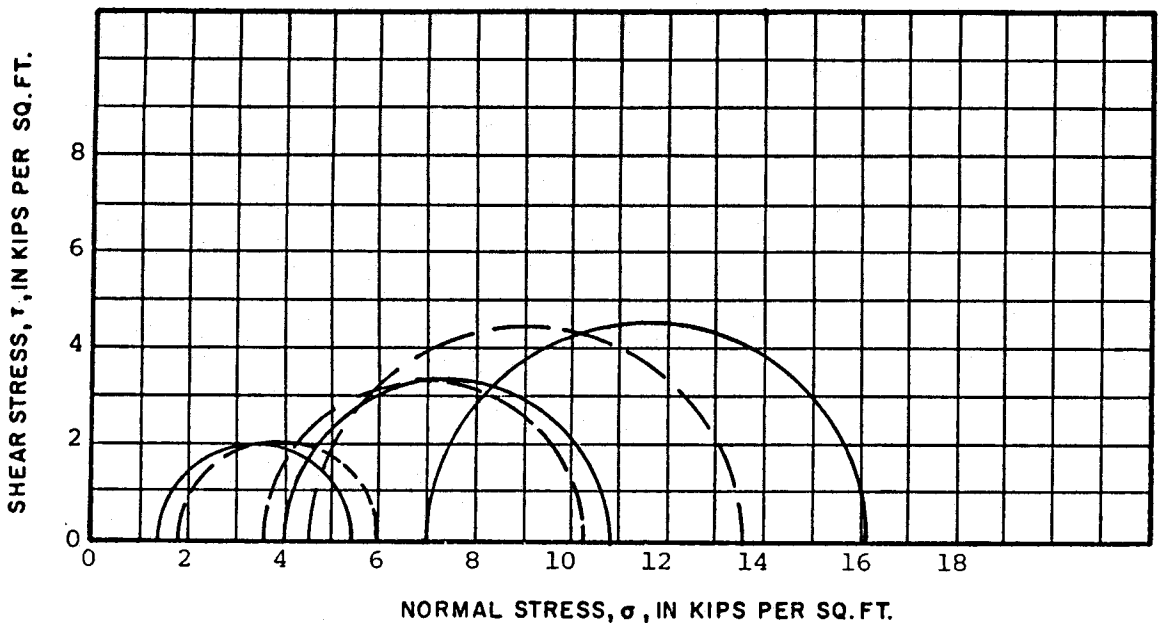
| | | | |
|---|---|---|---|
| TOTAL STRESSES | 4.8 | 9.2 | 15.7 |
| EFECTIVE STRESSES | 4.9 | 7.6 | 12.1 |

**SATURATED, CONSOLIDATED, UNDRAINED TRIAXIAL SHEAR TEST WITH PORE PRESSURE MEASUREMENTS**

JOB NO. CH 4507 BORING NO. B-10

DEPTH 1 - 8 ft SAMPLE TYPE Remolded

Average Compaction: 95.5% Standard Proctor Maximum Dry Density



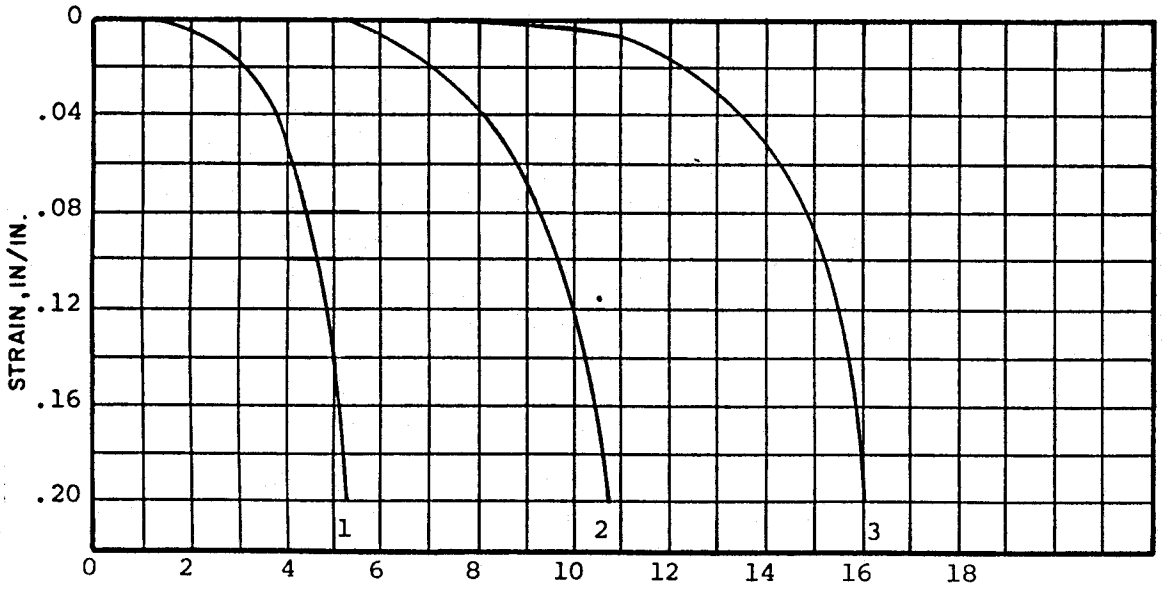

MOHR DIAGRAMS

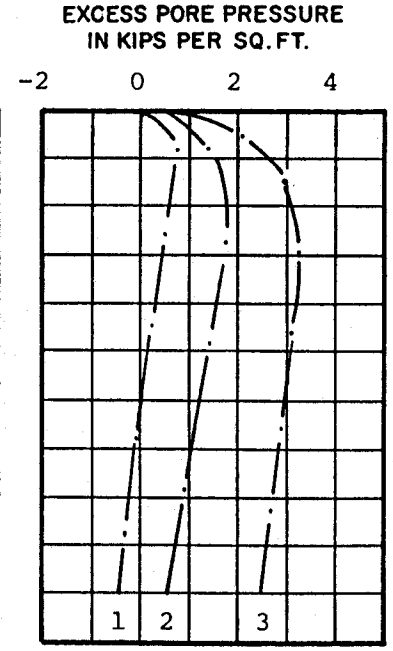
| | |
|---|---|
| EFFECTIVE COHESION, c' | 0 |
| EFFECTIVE SHEAR ANGLE, Φ' | 30.0° |
| TOTAL COHESION, c | 0.9 Ksf |
| TOTAL SHEAR ANGLE, Φ | 19.0° |

| INITIAL PROPERTIES: | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT γ | 124.2 | 124.2 | 124.2 | 124.2 | pcf |
| WATER CONTENT, w | 17.6 | 17.6 | 17.6 | 17.6 | % |
| VOID RATIO, e | 0.600 | 0.601 | 0.601 | 0.601 | |
| SATURATION, s | 79.3 | 79.3 | 79.3 | 79.3 | % |

| FINAL PROPERTIES: | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT, γ | 120.3 | 130.7 | 131.5 | 130.5 | pcf |
| WATER CONTENT, w | 21.9 | 20.7 | 20.1 | 20.9 | % |
| VOID RATIO, e | 0.594 | 0.562 | 0.545 | 0.567 | |
| SATURATION, s | 100 | 100 | 100 | 100 | % |

SAMPLE DESCRIPTION:
Red Brown Micaceous Fine to Medium Sandy Silt




STRESS - STRAIN AND PORE PRESSURE - STRAIN CURVES

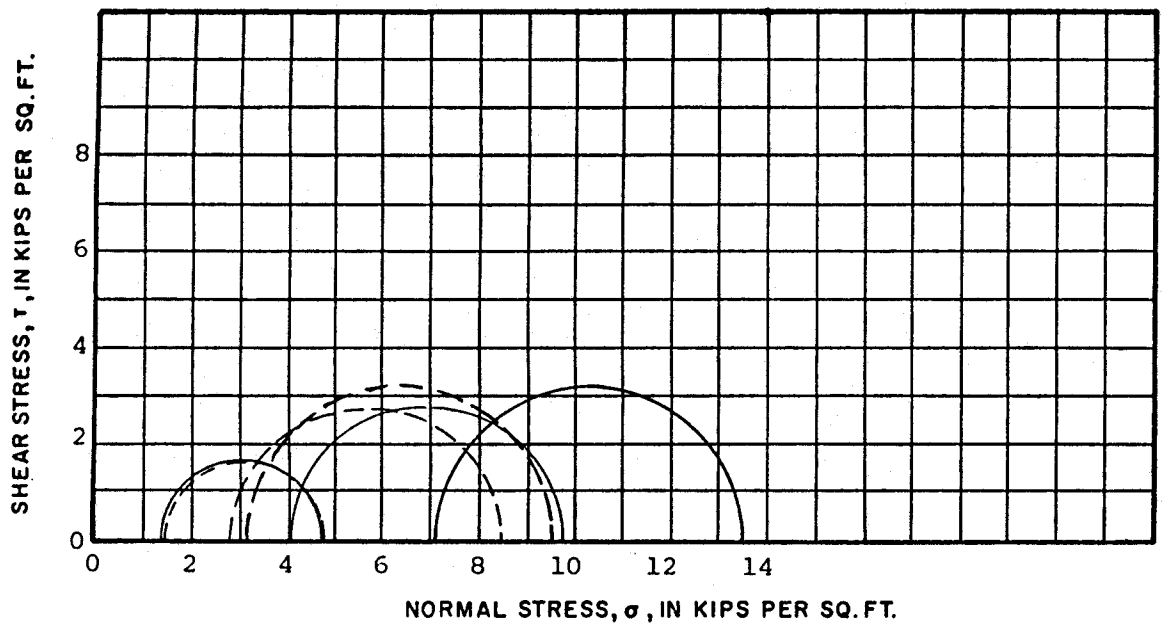
| | | | |
|---|---|---|---|
| TOTAL STRESSES | 5.5 | 10.8 | 16.1 |
| EFECTIVE STRESSES | 5.9 | 10.3 | 13.6 |

**SATURATED, CONSOLIDATED, UNDRAINED TRIAXIAL SHEAR TEST WITH PORE PRESSURE MEASUREMENTS**

JOB NO. CH 4507 BORING NO. B-18

DEPTH 1.0 - 8.0 ft SAMPLE TYPE Remolded

Average Compaction: 97.8% Standard Proctor Maximum Dry Density




MOHR DIAGRAMS

| | |
|---|---|
| EFFECTIVE COHESION, c' | 0.3 Ksf |
| EFFECTIVE SHEAR ANGLE, Φ' | 27.5° |
| TOTAL COHESION, c | 1.0 Ksf |
| TOTAL SHEAR ANGLE, Φ | 13.0° |

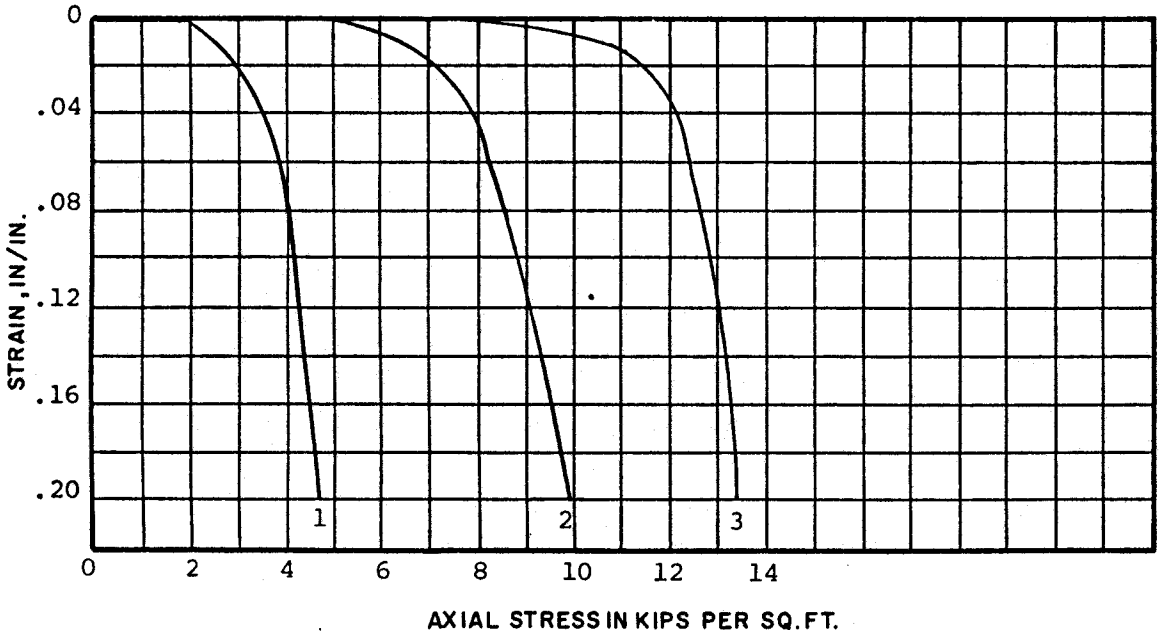
INITIAL PROPERTIES:

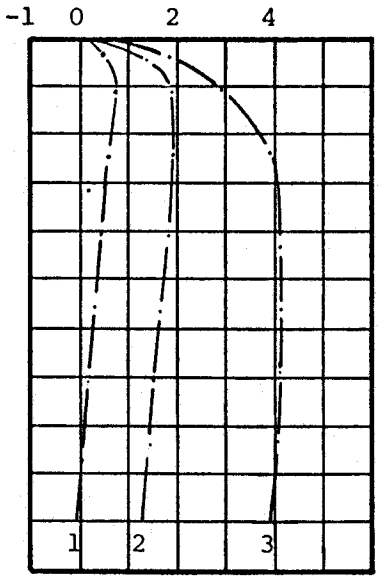
| | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT γ | 122.5 | 122.5 | 122.5 | 122.5 | pcf |
| WATER CONTENT, w | 19.2 | 19.7 | 19.4 | 19.4 | % |
| VOID RATIO, e | 0.688 | 0.695 | 0.691 | 0.691 | |
| SATURATION, s | 77.6 | 78.7 | 78.1 | 78.1 | % |

FINAL PROPERTIES:

| | ① | ② | ③ | AVG. | |
|---|---|---|---|---|---|
| UNIT WEIGHT, γ | 128.5 | 129.5 | 132.1 | 130.0 | pcf |
| WATER CONTENT, w | 24.5 | 23.5 | 21.3 | 23.1 | % |
| VOID RATIO, e | 0.680 | 0.653 | 0.593 | 0.642 | |
| SATURATION, s | 100 | 100 | 100 | 100 | % |

SAMPLE DESCRIPTION:
Red Brown Slightly Micaceous Fine to Medium Sandy Silt




STRESS - STRAIN AND PORE PRESSURE - STRAIN CURVES

| | |
|---|---|
| TOTAL STRESSES | 4.7 9.7 13.5 |
| EFECTIVE STRESSES | 4.8 8.4 9.6 |

**SATURATED, CONSOLIDATED, UNDRAINED TRIAXIAL SHEAR TEST WITH PORE PRESSURE MEASUREMENTS**

JOB NO. CH 4507 BORING NO. B-18
DEPTH 18 - 23 ft SAMPLE TYPE Remolded

Average Compaction: 95% Standard Proctor Maximum Dry Density

# APPENDIX G

# SLOPE STABILITY ANALYSES

GEO-SYSTEMS DESIGN & TESTING, INC.
GEOTECHNICAL SERVICES AND MATERIALS TESTING

October 19, 1989

Sirrine Environmental Consultants, Inc.
James Chamness
Post Office Box 5456
Greenville, S.C. 29606

ATTN: Mr. James Chamness

RE: Champion International
Canton Paper Mill

Dear Mr. Chamness:

Enclosed are the tests performed on the sludge and a 4:1 mixture of the sludge and fly-ash. Natural moisture contents of 161.4 and 158.5 for the sludge and sludge with fly-ash mixture.

Proctor density tests were performed with points varying from being dry to in excess of 'natural' moisture contents with maximum dry densities indicated to be 27.4 pcf and 39.5 for the sludge and 4:1 sludge/fly-ash mix with corresponding optimum moisture contents of 160.0 and 90.0.

Utilizing the findings above, samples were remolded for UU and CU triaxial testing. The unconsolidated-undrained (UU) tests indicated cohesion values of 0.57 ksf for sludge at 90% compaction and 0.55 ksf for sludge with fly-ash at natural moisture. Cohesion values nearly double at 1.10 ksf for sludge with fly-ash compacted to 90% the standard Proctor value.

Several efforts to perform consolidated-undrained (CU) tests proved unsatisfactory due to the difficulties of consolidating the sample and handling emissions of gas from the sample during consolidation and test performance which blocked pore fluid movement and the measurement of pore pressures.

One CU test performed without pore pressure readings indicated comparable data as discussed in the research material enclosed for your files.

Stability Analyses:

Based on the soils' data available and indicated sludge properties, analyses have been performed on the worst case (highest) interior dike, two (2) exterior dikes proposed and the sludge itself. A minimum factor of safety of 1.5 is considered acceptable. The results indicate satisfactory stability for proposed 2:1 (H:V) slopes on the exterior dikes and 4:1 (H:V) to even 3:1 (H:V) slopes on the sludge embankments within the landfill cells. We do recommend lateral sheet drainage, however, atleast every fifteen (15) feet height during the sludge placement as well as slope drainage along the dike facial slope.

The interior dike indicates some concern at 1.5:1 (H:V) slope without any reinforcing. A factor of safety of 1.3 and less is indicated. Alternative sections have been run with a 1.75:1 (H:V) slope, 1.5:1 slope with reinforcing and a 90 feet height slope in lieu of 120 feet as original proposed. All three (3) provide favorable factor of safety above 1.5 with the 1.75:1 slope the more conservative.

The above three (3) options are being refined in our analyses routine and will be sent to you within the following day. We appreciate the opportunity to be of service. If there are any questions, please contact us.

Sincerely,

**GEO-SYSTEMS DESIGN & TESTING, INC.**

JOE A. SMITH, P.E.
PRESIDENT

JAS/klr

**PROJECT NAME:** Champion International - Canton Mill

**DATE:** 10/6/89

TYPE OF TEST: Unconsolidated - Undrained

SAMPLE NO.: Bulk #1

**SAMPLE DESCRIPTION:** Sludge at 90% Compaction

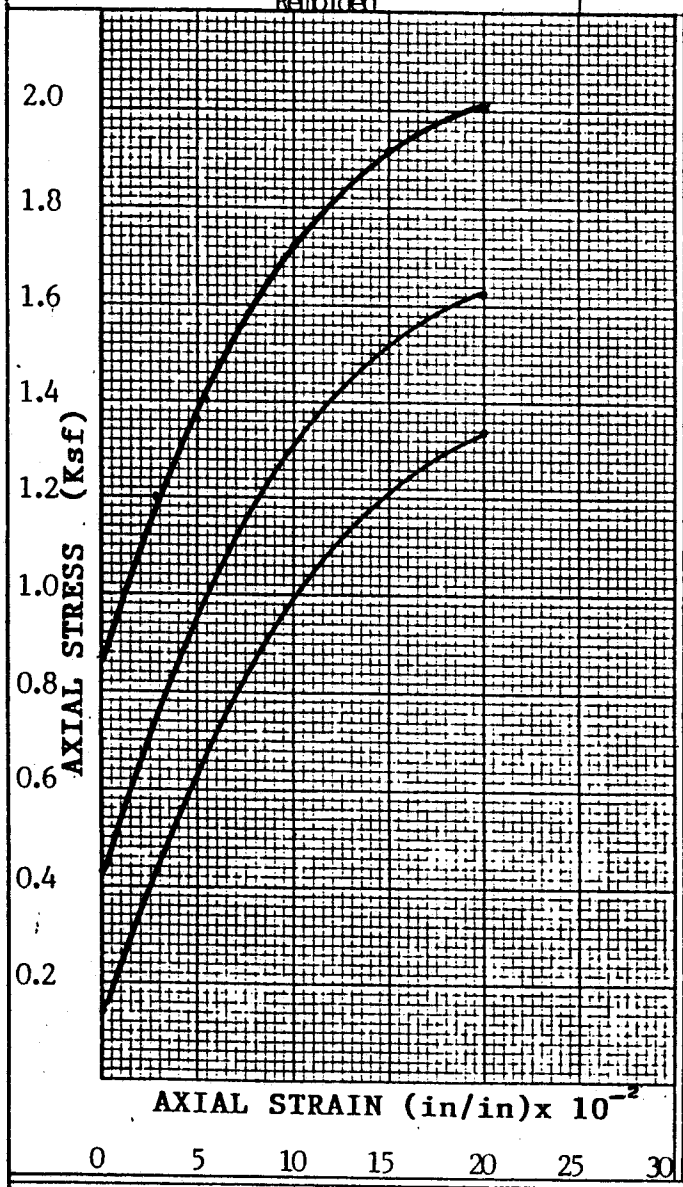
TYPE OF SPECIMEN: Remolded

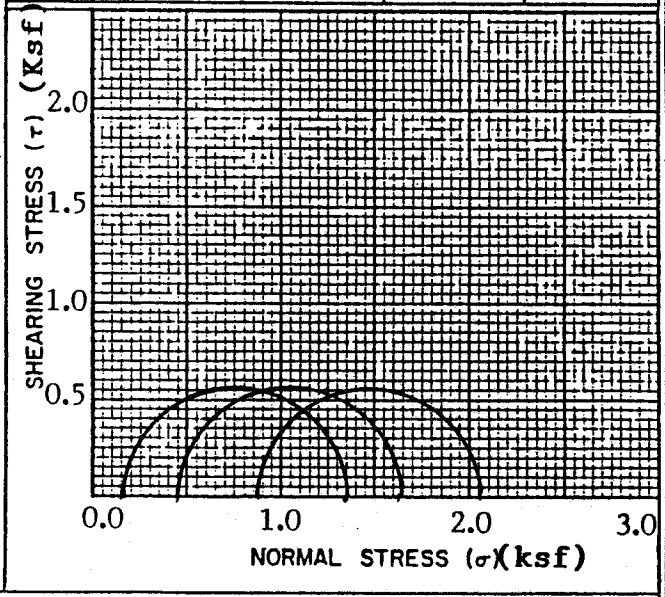
AREA (sq.in.): 6.158

HEIGHT (in.): 7.0

| TEST NO. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| INIT MOISTURE, % | 160.2 | 161.4 | 158.5 | |
| DRY DENSITY, □ g/cc ■ pcf | 24.6 | 24.4 | 24.8 | |
| INIT. VOID RATIO | - | | | |
| | | | | |
| FINAL MOISTURE, % | 158.6 | 160.2 | 156.4 | |
| NORMAL STRESS | 0.75 | 1.05 | 1.48 | |
| MAX. SHEAR STRESS | 0.57 | 0.57 | 0.58 | |
| | | | | |

| SHEAR VALUES | ϕ | C |
|---|---|---|
| AT MAXIMUM STRESS | - | 0.57 |
| | | |



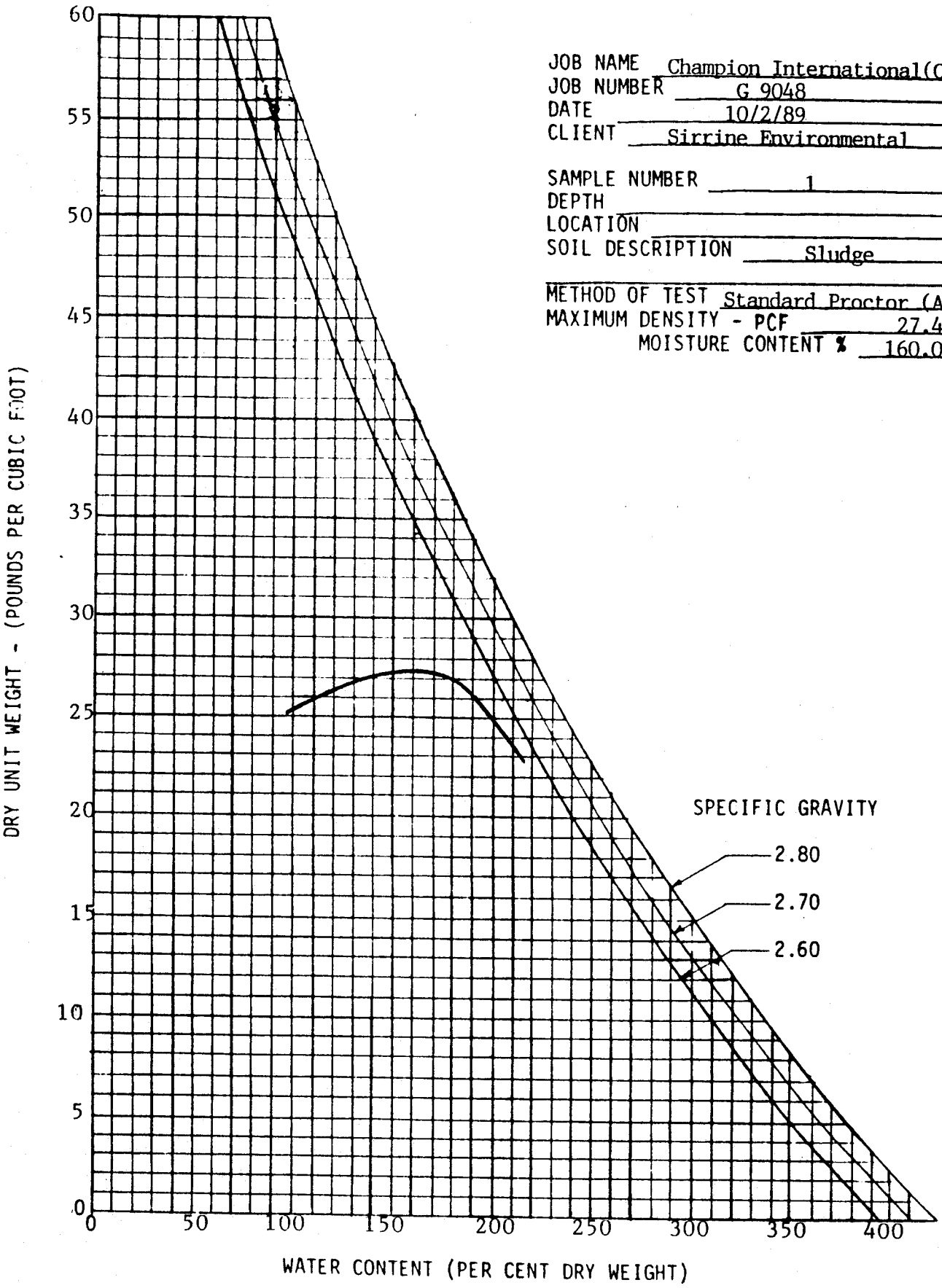




REMARKS

JOB NAME Champion International(Canton Mill)
JOB NUMBER G 9048
DATE 10/2/89
CLIENT Sirrine Environmental

SAMPLE NUMBER 1
DEPTH
LOCATION
SOIL DESCRIPTION Sludge

METHOD OF TEST Standard Proctor (ASTM D-698)
MAXIMUM DENSITY - PCF 27.4
MOISTURE CONTENT % 160.0



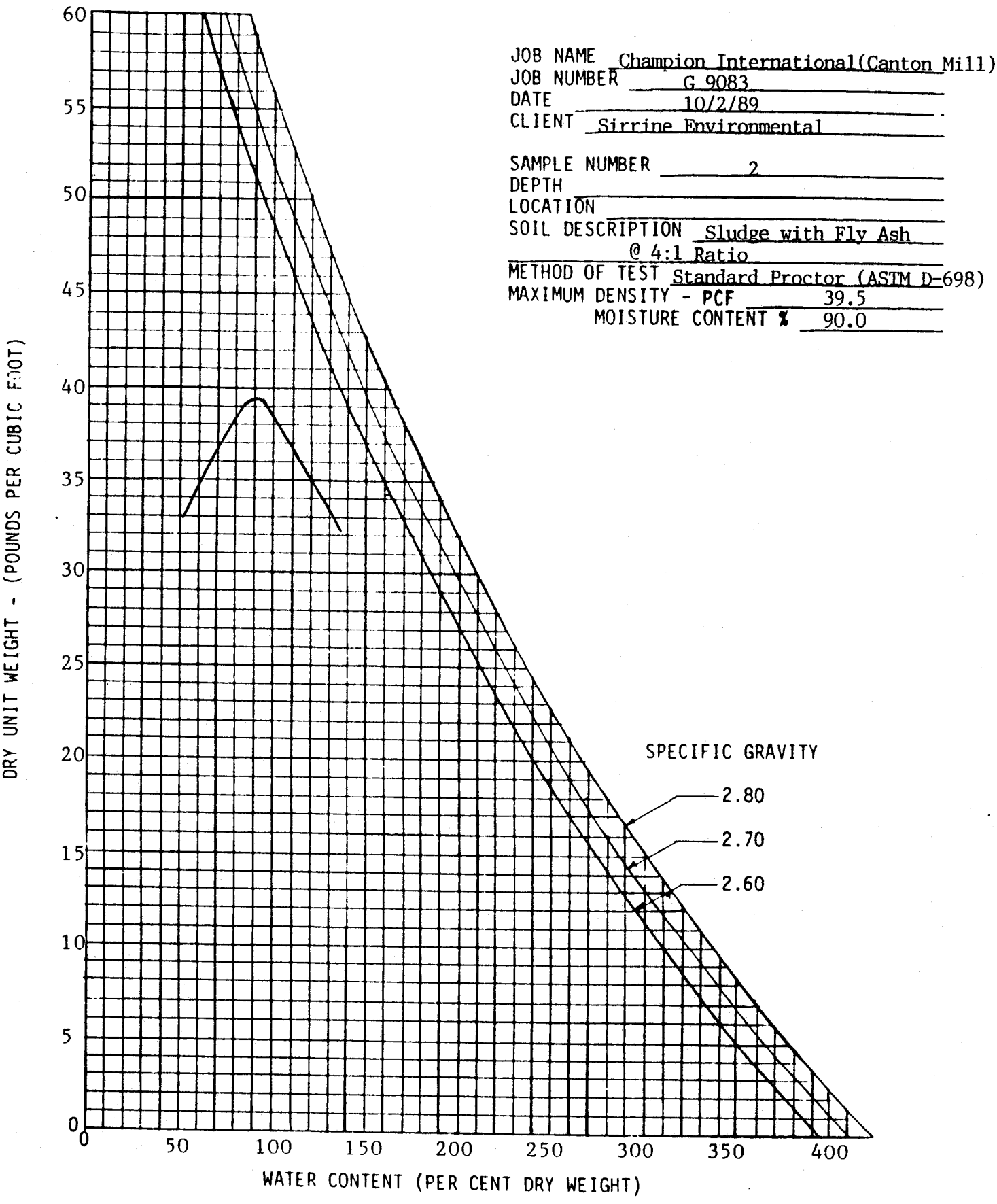

# LABORATORY COMPACTION TEST

GEO-SYSTEMS DESIGN & TESTING, INC.
GEOTECHNICAL SERVICES AND MATERIALS TESTING
P.O. Box 2656, West Columbia, South Carolina 29171
(803) 791-7528

Form No. J800

JOB NAME Champion International(Canton Mill)
JOB NUMBER G 9083
DATE 10/2/89
CLIENT Sirrine Environmental

SAMPLE NUMBER 2
DEPTH
LOCATION
SOIL DESCRIPTION Sludge with Fly Ash @ 4:1 Ratio
METHOD OF TEST Standard Proctor (ASTM D-698)
MAXIMUM DENSITY - PCF 39.5
MOISTURE CONTENT % 90.0




# LABORATORY COMPACTION TEST

GEO-SYSTEMS DESIGN & TESTING, INC.
GEOTECHNICAL SERVICES AND MATERIALS TESTING
P.O. Box 2656, West Columbia, South Carolina 29171
(803) 791-7528

Form No. J800

**PROJECT NAME:** Champion International - Canton Mill

**DATE:** 10/7/89

TYPE OF TEST: Unconsolidated - Undrained

SAMPLE NO.: Bulk #2

**SAMPLE DESCRIPTION:** Sludge with Fly-Ash at natural moisture

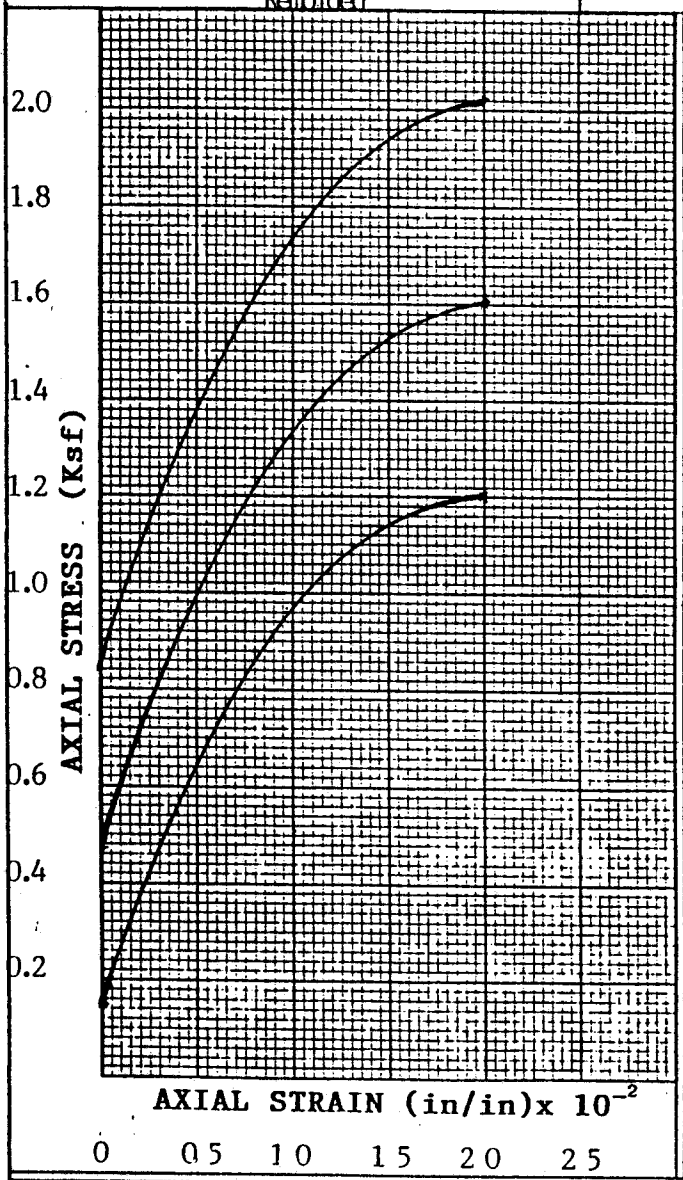
TYPE OF SPECIMEN: Remolded

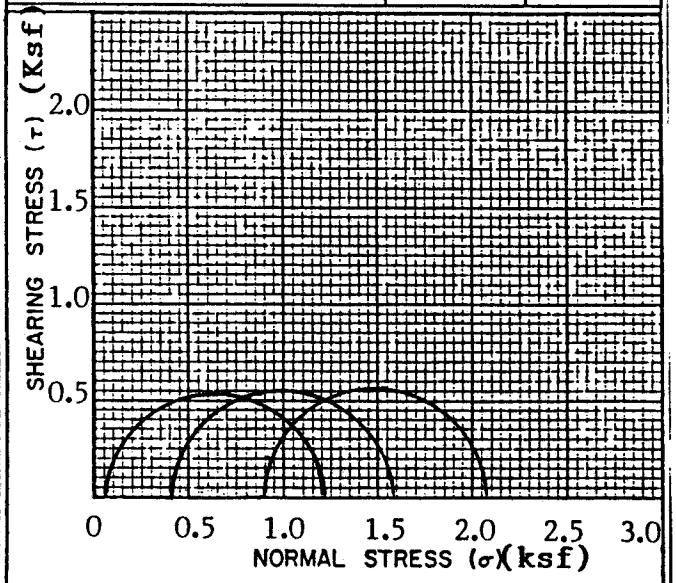
AREA (sq.in): 6.158

HEIGHT (in): 7.0

| TEST NO. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| INIT MOISTURE, % | 161.4 | 158.9 | 160.2 | |
| DRY DENSITY, □ g/cc ■ pcf | 31.8 | 31.8 | 31.2 | |
| INIT. VOID RATIO | – | – | – | |
| | | | | |
| FINAL MOISTURE, % | 160.1 | 159.6 | 157.6 | |
| NORMAL STRESS | 0.68 | 1.0 | 1.5 | |
| MAX. SHEAR STRESS | 0.55 | 0.56 | 0.58 | |

| SHEAR VALUES | ϕ | C |
|---|---|---|
| AT MAXIMUM STRESS | – | 0.55 |




REMARKS

**PROJECT NAME:** Champion International - Canton Mill

**DATE:** 10/9/89

TYPE OF TEST: Unconsolidated - Undrained

**SAMPLE NO.:** Bulk #3

**SAMPLE DESCRIPTION:** Sludge with Fly Ash @ 4:1 mix

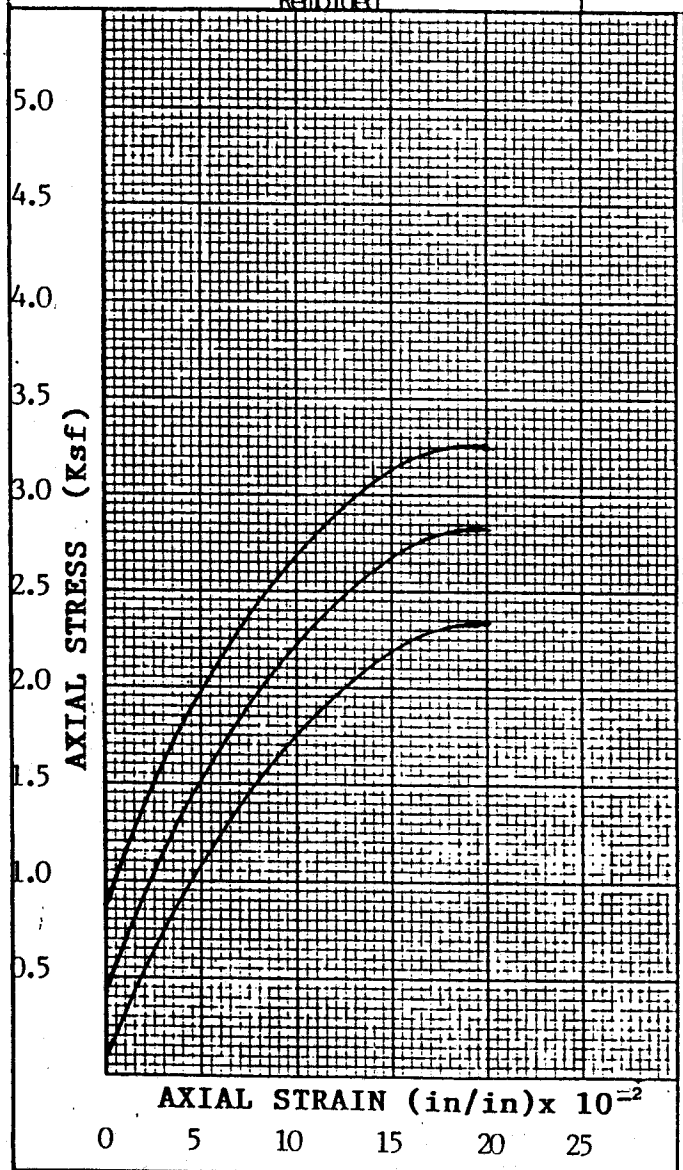
TYPE OF SPECIMEN: Remolded

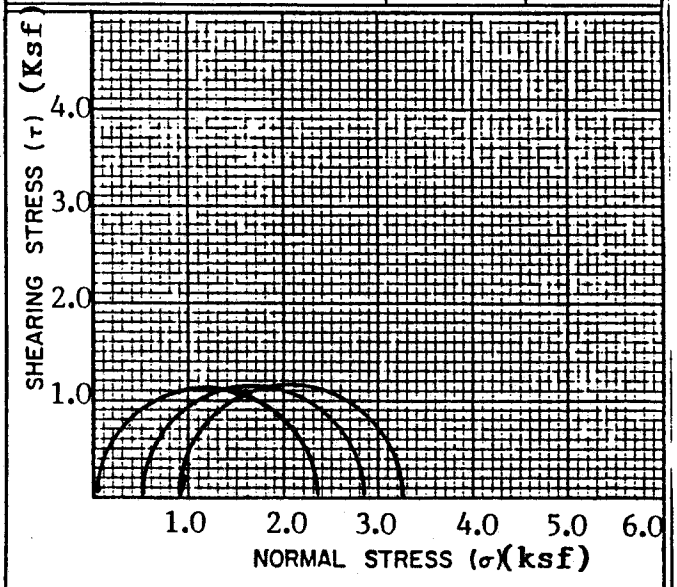
AREA (sq.in.): 6.158

HEIGHT (in): 7.0

| TEST NO. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| INIT MOISTURE, % | 90.0 | 90.0 | 90.0 | |
| DRY DENSITY, □ g/cc ● pcf | 36.4 | 36.0 | 35.6 | |
| INIT. VOID RATIO | - | - | - | |
| | | | | |
| FINAL MOISTURE, % | 88.0 | 86.9 | 86.8 | |
| NORMAL STRESS | 1.10 | 1.70 | 2.10 | |
| MAX. SHEAR STRESS | 1.10 | 1.79 | 1.20 | |
| | | | | |

| SHEAR VALUES | ϕ | C |
|---|---|---|
| AT MAXIMUM STRESS | - | 1.10 |
| | | |




REMARKS

**PROJECT NAME:** Champion International - Canton Mill

**DATE:** 10/17/89

**TYPE OF TEST** Consolidated - Undrained w/o Pore Pressures

**SAMPLE NO.** Bulk# 3

**SAMPLE DESCRIPTION:** Sludge w/ Fly-ash (4:1 mix @ 90% compact)

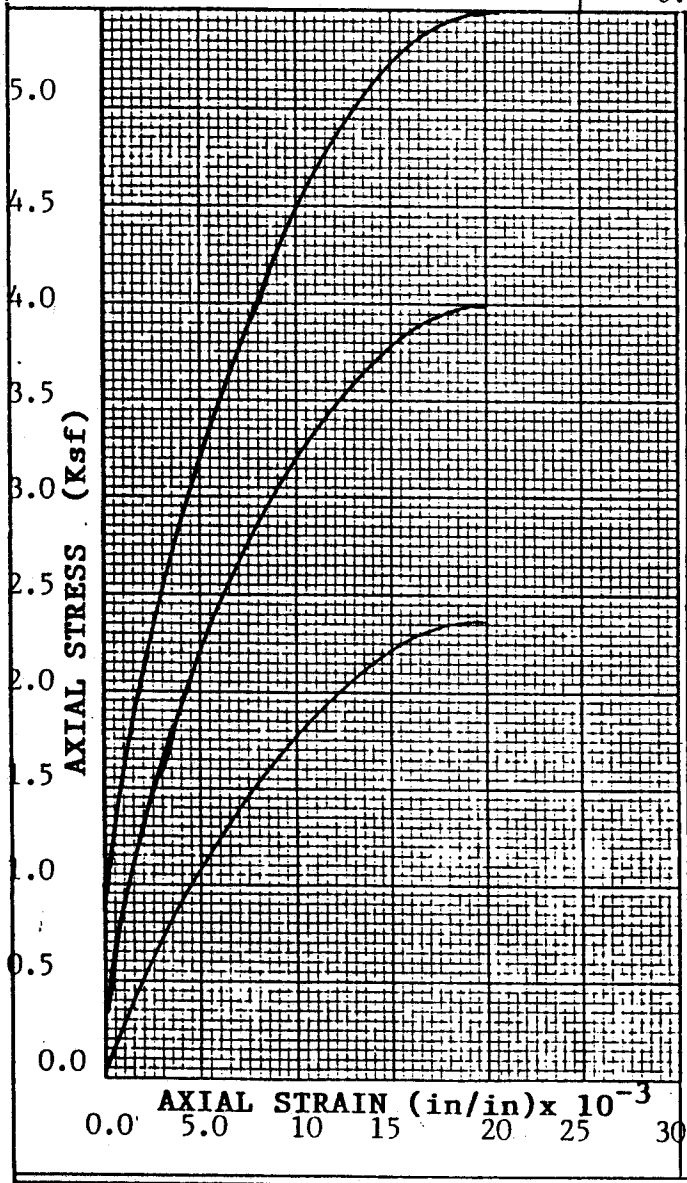
**TYPE OF SPECIMEN** Remolded

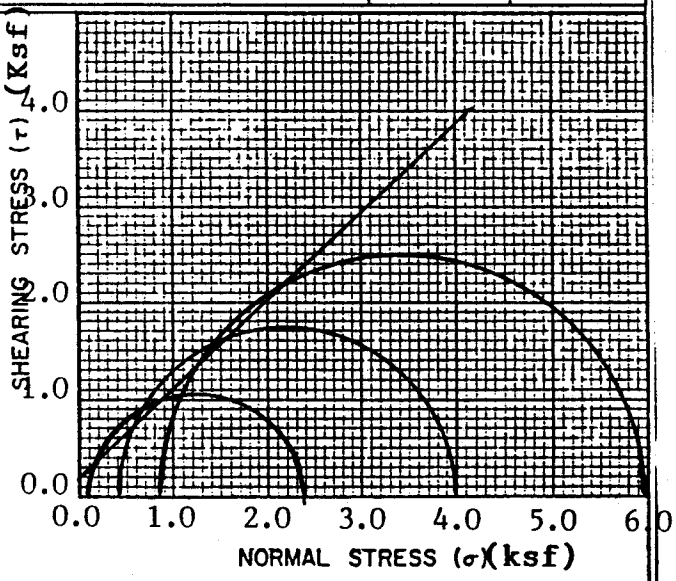
**AREA** (sq in) 6.158

**HEIGHT** (in) 7.0

| TEST NO. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| INIT MOISTURE, % | 89.4 | 88.9 | 89.6 | |
| DRY DENSITY, ☐ g/cc ☐ pcf | 36.1 | 34.4 | 35.2 | |
| INIT VOID RATIO | – | – | – | |
| | | | | |
| FINAL MOISTURE, % | 86.0 | 86.1 | 86.4 | |
| NORMAL STRESS | 1.16 | 2.20 | 3.40 | |
| MAX. SHEAR STRESS | 1.08 | 1.72 | 2.50 | |

| SHEAR VALUES | Ø | C |
|---|---|---|
| AT MAXIMUM STRESS | 40° | 0.20 |

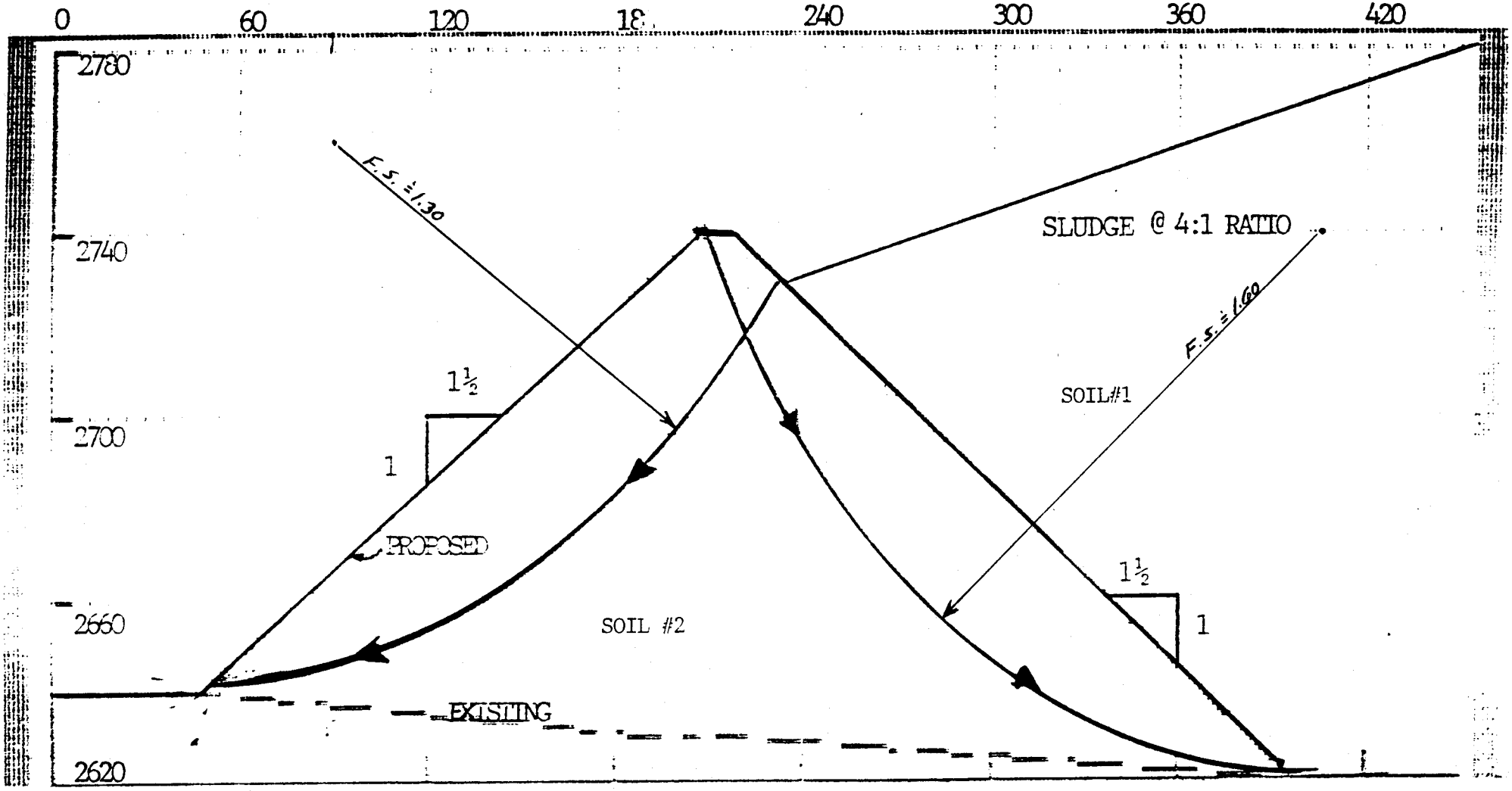



REMARKS

**STABILITY OF INTERIOR DIKE @ 1.5:1 (H:V)**

S:2




SOIL #3

SOIL #4

Program STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

CONTROL DATA

| | |
|---|---|
| NUMBER OF SPECIFIED CENTERS | 0 |
| NUMBER OF DEPTH LIMITING TANGENTS | 1 |
| NUMBER OF VERTICAL SECTIONS | 7 |
| NUMBER OF SOIL LAYER BOUNDARIES | 5 |
| NUMBER OF PORE PRESSURE LINES | 0 |
| NUMBER OF POINTS DEFINING COHESION PROFILE | 0 |

SEISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER ( 400.0, -80.0) WITH FINAL GRID OF 5.0

ALL CIRCLES TANGENT TO DEPTH, 125.0,

GEOMETRY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SECTIONS | .0 | 50.0 | 192.5 | 207.5 | 217.5 | 397.5 | 450.0 |
| T. CRACKS | 104.0 | 104.0 | 10.0 | .0 | .0 | 120.0 | 120.0 |
| W IN CRACK | 104.0 | 104.0 | 10.0 | .0 | .0 | 120.0 | 120.0 |
| BOUNDARY 1 | 104.0 | 104.0 | 10.0 | .0 | .0 | 120.0 | 120.0 |
| BOUNDARY 2 | 105.0 | 105.0 | 10.5 | .0 | .0 | 120.0 | 120.0 |
| BOUNDARY 3 | 105.0 | 105.0 | 110.0 | 110.0 | 110.0 | 120.0 | 120.0 |
| BOUNDARY 4 | 130.0 | 130.0 | 130.0 | 130.0 | 130.0 | 130.0 | 130.0 |
| BOUNDARY 5 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 |

SOIL PROPERTIES

| LAYER | COHESION | FRICTION ANGLE | DENSITY |
|---|---|---|---|
| 1 | .0 | .0 | 1150.0 |
| 2 | 200.0 | 32.0 | 125.0 |
| 3 | 100.0 | 30.0 | 120.0 |
| 4 | 200.0 | 30.0 | 120.0 |

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

| NUMBER | TANGENT | RADIUS | (X) CENTER | (Y) CENTER | FS(BISHOP) | FS(OMS) |
|---|---|---|---|---|---|---|
| 1 | 125.0 | 205.0 | 400.0 | -80.0 | 1.301 | 1.193 |
| 2 | 125.0 | 205.0 | 390.0 | -80.0 | 1.308 | 1.195 |
| 3 | 125.0 | 215.0 | 400.0 | -90.0 | 1.301 | 1.196 |
| 4 | 125.0 | 205.0 | 410.0 | -80.0 | 1.560 | 1.375 |
| 5 | 125.0 | 195.0 | 400.0 | -70.0 | 1.309 | 1.200 |
| 6 | 125.0 | 215.0 | 395.0 | -90.0 | 1.307 | 1.200 |
| 7 | 125.0 | 220.0 | 400.0 | -95.0 | 1.304 | 1.201 |

rogram STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

TABILITY of Earthen Dike w/o Reinforcement (STABR)

CONTROL DATA

| | |
|---|---|
| NUMBER OF SPECIFIED CENTERS | 0 |
| NUMBER OF DEPTH LIMITING TANGENTS | 1 |
| NUMBER OF VERTICAL SECTIONS | 7 |
| NUMBER OF SOIL LAYER BOUNDARIES | 5 |
| NUMBER OF PORE PRESSURE LINES | 0 |
| NUMBER OF POINTS DEFINING COHESION PROFILE | 0 |

ISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

EARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER ( 360.0, -20.0) WITH FINAL GRID OF 20.0

LL CIRCLES TANGENT TO DEPTH, 110.0,

OMETRY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SECTIONS | .0 | 50.0 | 230.0 | 240.0 | 245.0 | 397.5 | 450.0 |
| T. CRACKS | 120.0 | 120.0 | .0 | .0 | 10.0 | 104.0 | 104.0 |
| W IN CRACK | 120.0 | 120.0 | .0 | .0 | 10.0 | 104.0 | 104.0 |
| BOUNDARY 1 | 120.0 | 120.0 | .0 | .0 | 10.0 | 104.0 | 104.0 |
| BOUNDARY 2 | 120.0 | 120.0 | .0 | .0 | 10.5 | 105.0 | 105.0 |
| BOUNDARY 3 | 120.0 | 120.0 | 110.0 | 110.0 | 110.0 | 105.0 | 105.0 |
| BOUNDARY 4 | 130.0 | 130.0 | 130.0 | 130.0 | 130.0 | 130.0 | 130.0 |
| BOUNDARY 5 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 |

SOIL PROPERTIES

| LAYER | COHESION | FRICTION ANGLE | DENSITY |
|---|---|---|---|
| 1 | .0 | .0 | 1150.0 |
| 2 | 200.0 | 32.0 | 125.0 |
| 3 | 100.0 | 30.0 | 120.0 |
| 4 | 200.0 | 30.0 | 120.0 |

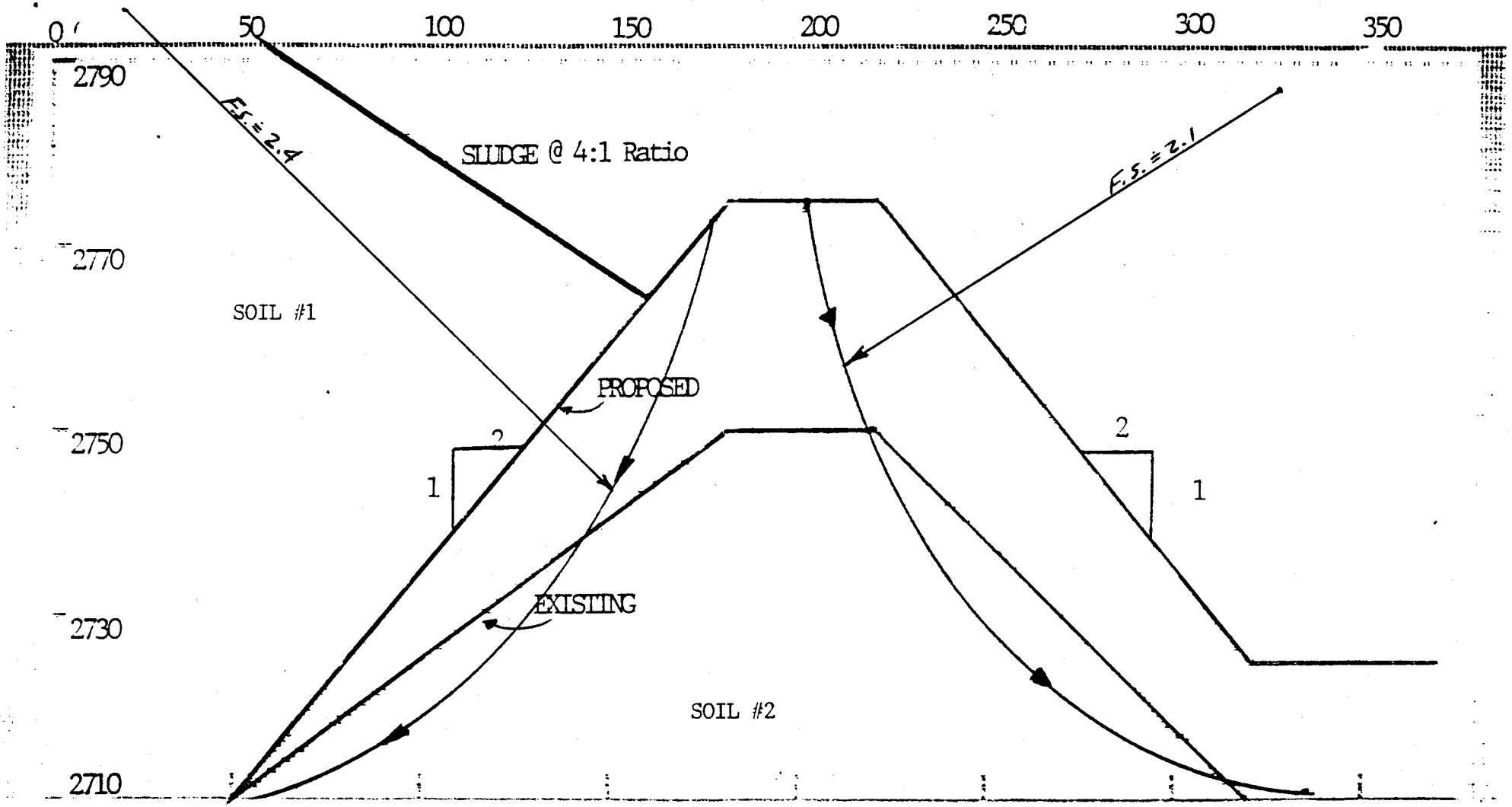
BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

| NUMBER | TANGENT | RADIUS | (X) CENTER | (Y) CENTER | FS(BISHOP) | FS(OMS) |
|---|---|---|---|---|---|---|
| 1 | 110.0 | 130.0 | 360.0 | -20.0 | 1.626 | 1.398 |
| 2 | 110.0 | 130.0 | 320.0 | -20.0 | 2.227 | 1.912 |
| 3 | 110.0 | 170.0 | 360.0 | -60.0 | 1.662 | 1.500 |
| 4 | 110.0 | 130.0 | 400.0 | -20.0 | 1.731 | 1.544 |
| 5 | 110.0 | 90.0 | 360.0 | 20.0 | 1.819 | 1.517 |
| 6 | 110.0 | 130.0 | 340.0 | -20.0 | 1.840 | 1.570 |
| 7 | 110.0 | 150.0 | 360.0 | -40.0 | 1.614 | 1.421 |

**STABILITY OF ANALYSIS OF PROPOSED 2:1 DIKE @ 1-40**

S:1


0
50
100
150
200
250
300
350
2790
2770
2750
2730
2710
F.S. = 2.4
SLUDGE @ 4:1 Ratio
F.S. = 2.1
SOIL #1
PROPOSED
2
1
2
1
EXISTING
SOIL #2
SOIL #3
SOIL #4

Program STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

CONTROL DATA

| | |
|---|---|
| NUMBER OF SPECIFIED CENTERS | 0 |
| NUMBER OF DEPTH LIMITING TANGENTS | 1 |
| NUMBER OF VERTICAL SECTIONS | 8 |
| NUMBER OF SOIL LAYER BOUNDARIES | 5 |
| NUMBER OF PORE PRESSURE LINES | 0 |
| NUMBER OF POINTS DEFINING COHESION PROFILE | 0 |

SEISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER ( 280.0, -20.0) WITH FINAL GRID OF 5.0

ALL CIRCLES TANGENT TO DEPTH, 60.0,

GEOMETRY

| SECTIONS | .0 | 50.0 | 150.0 | 187.0 | 207.0 | 208.0 | 297.0 | 347.0 |
|---|---|---|---|---|---|---|---|---|
| T. CRACKS | 50.0 | 50.0 | .0 | .0 | 10.0 | 10.0 | 54.0 | 54.0 |
| W IN CRACK | 50.0 | 50.0 | .0 | .0 | 10.0 | 10.0 | 54.0 | 54.0 |
| BOUNDARY 1 | 50.0 | 50.0 | .0 | .0 | 10.0 | 10.0 | 54.0 | 54.0 |
| BOUNDARY 2 | 50.0 | 50.0 | .0 | .0 | 10.0 | 10.5 | 55.0 | 55.0 |
| BOUNDARY 3 | 50.0 | 50.0 | 52.5 | 52.5 | 52.5 | 52.5 | 55.0 | 55.0 |
| BOUNDARY 4 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| BOUNDARY 5 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |

SOIL PROPERTIES

| LAYER | COHESION | FRICTION ANGLE | DENSITY |
|---|---|---|---|
| 1 | .0 | .0 | 4500.0 |
| 2 | 200.0 | 32.0 | 130.0 |
| 3 | 100.0 | 30.0 | 120.0 |
| 4 | 200.0 | 30.0 | 120.0 |

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

| NUMBER | TANGENT | RADIUS | (X) CENTER | (Y) CENTER | FS(BISHOP) | FS(OMS) |
|---|---|---|---|---|---|---|
| 1 | 60.0 | 80.0 | 280.0 | -20.0 | 2.492 | 2.140 |
| 2 | 60.0 | 80.0 | 270.0 | -20.0 | 2.624 | 2.291 |
| 3 | 60.0 | 90.0 | 280.0 | -30.0 | 2.613 | 2.305 |
| 4 | 60.0 | 80.0 | 290.0 | -20.0 | 2.593 | 2.236 |
| 5 | 60.0 | 70.0 | 280.0 | -10.0 | 2.497 | 2.101 |
| 6 | 60.0 | 80.0 | 275.0 | -20.0 | 2.567 | 2.230 |
| 7 | 60.0 | 85.0 | 280.0 | -25.0 | 2.557 | 2.230 |
| 8 | 60.0 | 80.0 | 285.0 | -20.0 | 2.509 | 2.151 |

Program STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

CONTROL DATA

| | |
|---|---|
| NUMBER OF SPECIFIED CENTERS | 0 |
| NUMBER OF DEPTH LIMITING TANGENTS | 1 |
| NUMBER OF VERTICAL SECTIONS | 8 |
| NUMBER OF SOIL LAYER BOUNDARIES | 5 |
| NUMBER OF PORE PRESSURE LINES | 0 |
| NUMBER OF POINTS DEFINING COHESION PROFILE | 0 |

SEISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER ( 240.0, -20.0) WITH FINAL GRID OF 5.0

ALL CIRCLES TANGENT TO DEPTH, 65.0,

GEOMETRY

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SECTIONS | .0 | 50.0 | 140.0 | 160.0 | 197.0 | 297.0 | 297.0 | 347.0 |
| T. CRACKS | -15.0 | -15.0 | 10.0 | .0 | .0 | 50.0 | 50.0 | 50.0 |
| W IN CRACK | -15.0 | -15.0 | 10.0 | .0 | .0 | 50.0 | 50.0 | 50.0 |
| BOUNDARY 1 | -15.0 | -15.0 | 10.0 | .0 | .0 | 50.0 | 50.0 | 50.0 |
| BOUNDARY 2 | 55.0 | 55.0 | 10.0 | .0 | .0 | 50.0 | 50.0 | 50.0 |
| BOUNDARY 3 | 55.0 | 55.0 | 55.0 | 52.5 | 52.5 | 50.0 | 50.0 | 50.0 |
| BOUNDARY 4 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| BOUNDARY 5 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |

SOIL PROPERTIES

| LAYER | COHESION | FRICTION ANGLE | DENSITY |
|---|---|---|---|
| 1 | .0 | .0 | 70.0 |
| 2 | 200.0 | 32.0 | 130.0 |
| 3 | 100.0 | 30.0 | 120.0 |
| 4 | 200.0 | 30.0 | 120.0 |

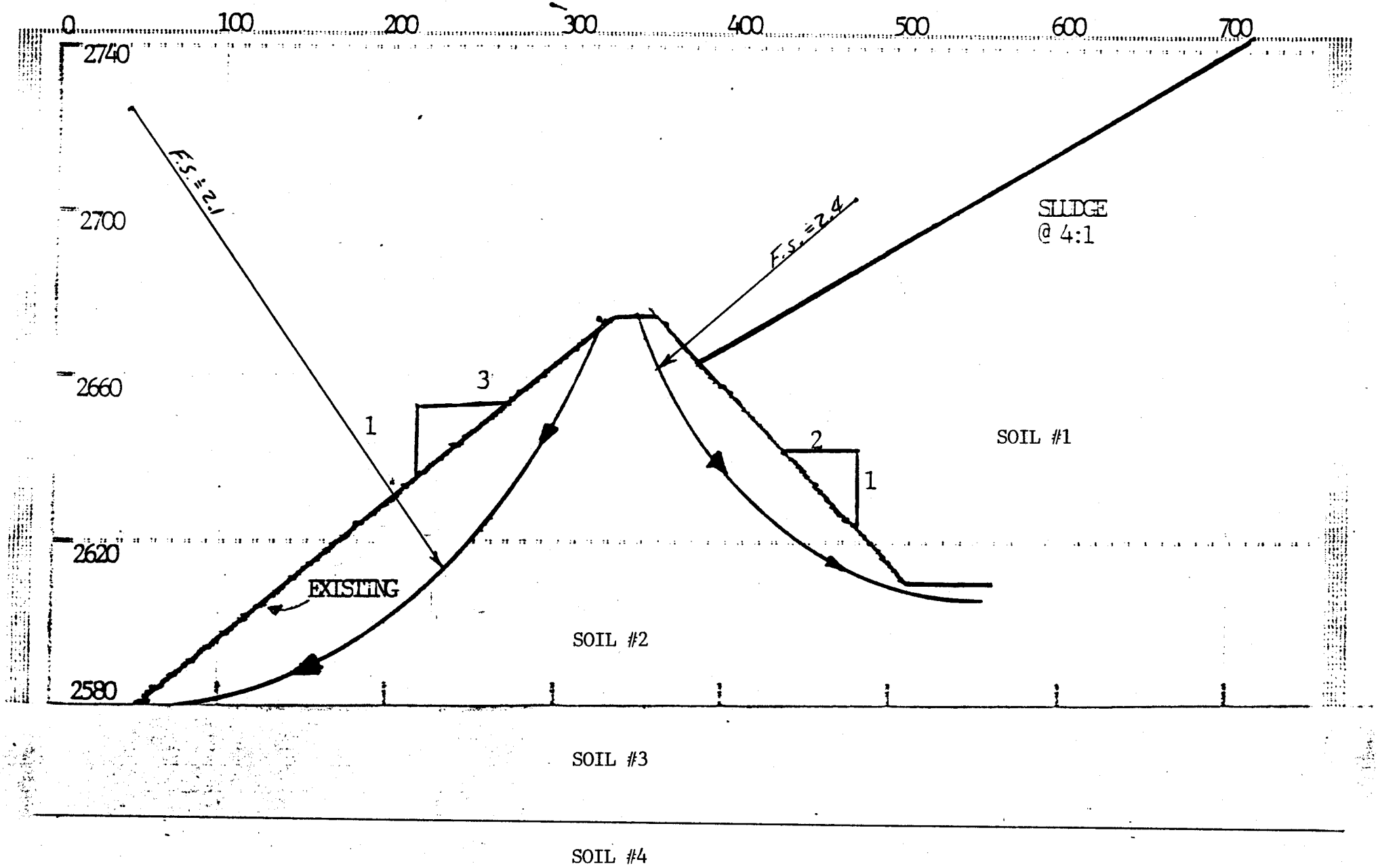
BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

| NUMBER | TANGENT | RADIUS | (X) CENTER | (Y) CENTER | FS(BISHOP) | FS(OMS) |
|---|---|---|---|---|---|---|
| 1 | 65.0 | 85.0 | 240.0 | -20.0 | 2.604 | 2.188 |
| 2 | 65.0 | 85.0 | 230.0 | -20.0 | 3.030 | 2.542 |
| 3 | 65.0 | 95.0 | 240.0 | -30.0 | 2.598 | 2.238 |
| 4 | 65.0 | 85.0 | 250.0 | -20.0 | 2.307 | 1.952 |
| 5 | 65.0 | 75.0 | 240.0 | -10.0 | 2.663 | 2.178 |
| 6 | 65.0 | 85.0 | 245.0 | -20.0 | 2.446 | 2.063 |
| 7 | 65.0 | 90.0 | 250.0 | -25.0 | 2.299 | 1.967 |

# STABILITY ANALYSIS OF EXISTING DIKE

S:0


0
100
200
300
400
500
600
700
2740
2700
2660
2620
2580
F.S. = 2.1
F.S. = 2.4
SLUDGE
@ 4:1
3
1
2
1
SOIL #1
EXISTING
SOIL #2
SOIL #3
SOIL #4

Program STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

CONTROL DATA

| | |
|---|---|
| NUMBER OF SPECIFIED CENTERS | 0 |
| NUMBER OF DEPTH LIMITING TANGENTS | 1 |
| NUMBER OF VERTICAL SECTIONS | 8 |
| NUMBER OF SOIL LAYER BOUNDARIES | 5 |
| NUMBER OF PORE PRESSURE LINES | 0 |
| NUMBER OF POINTS DEFINING COHESION PROFILE | 0 |

SEISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER ( 475.0, -50.0) WITH FINAL GRID OF 5.0

ALL CIRCLES TANGENT TO DEPTH, 70.0,

GEOMETRY

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SECTIONS | .0 | 50.0 | 335.0 | 360.0 | 380.0 | 381.0 | 490.0 | 600.0 |
| T. CRACKS | 95.0 | 95.0 | .0 | .0 | 10.0 | 10.0 | 64.0 | 64.0 |
| W IN CRACK | 95.0 | 95.0 | .0 | .0 | 10.0 | 10.0 | 64.0 | 64.0 |
| BOUNDARY 1 | 95.0 | 95.0 | .0 | .0 | 10.0 | 10.0 | 64.0 | 64.0 |
| BOUNDARY 2 | 95.0 | 95.0 | .0 | .0 | 10.0 | 10.5 | 65.0 | 65.0 |
| BOUNDARY 3 | 95.0 | 95.0 | 75.6 | 73.9 | 70.0 | 70.0 | 65.0 | 65.0 |
| BOUNDARY 4 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 |
| BOUNDARY 5 | 125.0 | 125.0 | 125.0 | 125.0 | 125.0 | 125.0 | 125.0 | 125.0 |

SOIL PROPERTIES

| LAYER | COHESION | FRICTION ANGLE | DENSITY |
|---|---|---|---|
| 1 | .0 | .0 | 5700.0 |
| 2 | 200.0 | 32.0 | 125.0 |
| 3 | 100.0 | 30.0 | 120.0 |
| 4 | 200.0 | 30.0 | 120.0 |

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

| NUMBER | TANGENT | RADIUS | (X) CENTER | (Y) CENTER | FS(BISHOP) | FS(OMS) |
|---|---|---|---|---|---|---|
| 1 | 70.0 | 120.0 | 475.0 | -50.0 | 2.568 | 2.298 |
| 2 | 70.0 | 120.0 | 465.0 | -50.0 | 2.642 | 2.374 |
| 3 | 70.0 | 130.0 | 475.0 | -60.0 | 2.649 | 2.396 |
| 4 | 70.0 | 120.0 | 485.0 | -50.0 | 2.479 | 2.191 |
| 5 | 70.0 | 110.0 | 475.0 | -40.0 | 2.464 | 2.169 |
| 6 | 70.0 | 110.0 | 470.0 | -40.0 | 2.520 | 2.234 |
| 7 | 70.0 | 115.0 | 475.0 | -45.0 | 2.519 | 2.238 |

Program STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

CONTROL DATA

| | |
|---|---|
| NUMBER OF SPECIFIED CENTERS | 0 |
| NUMBER OF DEPTH LIMITING TANGENTS | 1 |
| NUMBER OF VERTICAL SECTIONS | 7 |
| NUMBER OF SOIL LAYER BOUNDARIES | 5 |
| NUMBER OF PORE PRESSURE LINES | 0 |
| NUMBER OF POINTS DEFINING COHESION PROFILE | 0 |

SEISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER ( 445.0,-225.0) WITH FINAL GRID OF 5.0

ALL CIRCLES TANGENT TO DEPTH, 105.0,

GEOMETRY

| SECTIONS | .0 | 50.0 | 160.0 | 180.0 | 205.0 | 490.0 | 540.0 |
|---|---|---|---|---|---|---|---|
| T. CRACKS | -55.0 | -55.0 | 10.0 | .0 | .0 | 95.0 | 95.0 |
| W IN CRACK | -55.0 | -55.0 | 10.0 | .0 | .0 | 95.0 | 95.0 |
| BOUNDARY 1 | -55.0 | -55.0 | 10.0 | .0 | .0 | 95.0 | 95.0 |
| BOUNDARY 2 | 65.0 | 65.0 | 10.0 | .0 | .0 | 95.0 | 95.0 |
| BOUNDARY 3 | 65.0 | 65.0 | 70.0 | 73.9 | 75.6 | 95.0 | 95.0 |
| BOUNDARY 4 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 |
| BOUNDARY 5 | 125.0 | 125.0 | 125.0 | 125.0 | 125.0 | 125.0 | 125.0 |

SOIL PROPERTIES

| LAYER | COHESION | FRICTION ANGLE | DENSITY |
|---|---|---|---|
| 1 | .0 | .0 | 70.0 |
| 2 | 200.0 | 32.0 | 125.0 |
| 3 | 100.0 | 30.0 | 120.0 |
| 4 | 200.0 | 30.0 | 120.0 |

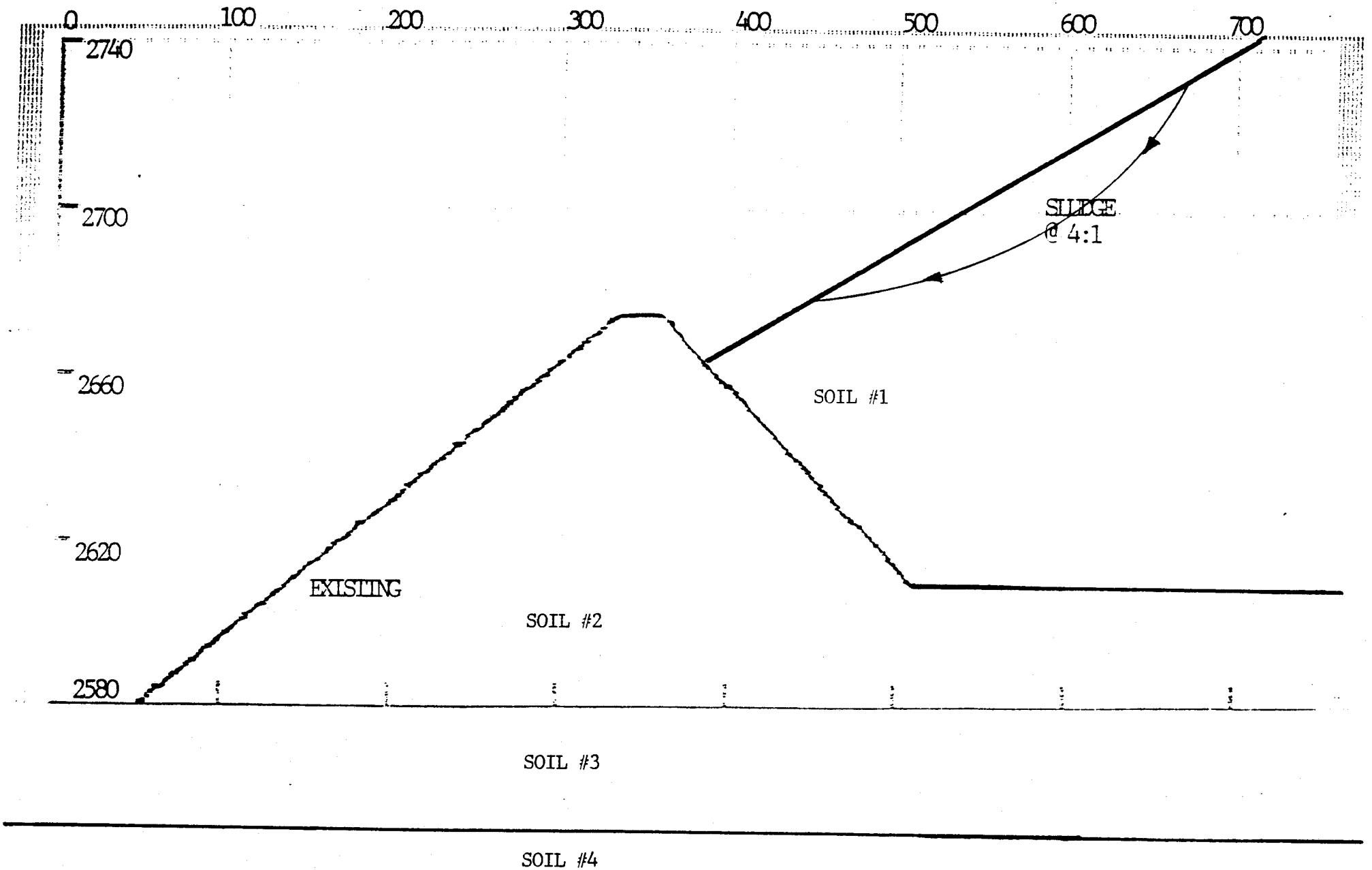
BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

| NUMBER | TANGENT | RADIUS | (X) CENTER | (Y) CENTER | FS(BISHOP) | FS(OMS) |
|---|---|---|---|---|---|---|
| 1 | 105.0 | 330.0 | 445.0 | -225.0 | 2.177 | 2.071 |
| 2 | 105.0 | 330.0 | 435.0 | -225.0 | 2.169 | 2.057 |
| 3 | 105.0 | 340.0 | 445.0 | -235.0 | 2.175 | 2.070 |
| 4 | 105.0 | 330.0 | 455.0 | -225.0 | 2.205 | 2.103 |
| 5 | 105.0 | 320.0 | 445.0 | -215.0 | 2.182 | 2.073 |
| 6 | 105.0 | 330.0 | 430.0 | -225.0 | 2.174 | 2.060 |
| 7 | 105.0 | 335.0 | 435.0 | -230.0 | 2.171 | 2.060 |

# STABILITY OF SLUDGE EMBANKMENT

CUT THRU SLUDGE



Program STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

CONTROL DATA

| | |
|---|---|
| NUMBER OF SPECIFIED CENTERS | 0 |
| NUMBER OF DEPTH LIMITING TANGENTS | 1 |
| NUMBER OF VERTICAL SECTIONS | 2 |
| NUMBER OF SOIL LAYER BOUNDARIES | 5 |
| NUMBER OF PORE PRESSURE LINES | 0 |
| NUMBER OF POINTS DEFINING COHESION PROFILE | 0 |

SEISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER ( 200.0, -70.0) WITH FINAL GRID OF 20.0

ALL CIRCLES TANGENT TO DEPTH, 60.0,

GEOMETRY

| | | |
|---|---|---|
| SECTIONS | .0 | 400.0 |
| T. CRACKS | .0 | 100.0 |
| W IN CRACK | .0 | 100.0 |
| BOUNDARY 1 | .0 | 100.0 |
| BOUNDARY 2 | 100.0 | 100.0 |
| BOUNDARY 3 | 100.0 | 110.0 |
| BOUNDARY 4 | 130.0 | 130.0 |
| BOUNDARY 5 | 150.0 | 150.0 |

SOIL PROPERTIES

| LAYER | COHESION | FRICTION ANGLE | DENSITY |
|---|---|---|---|
| 1 | .0 | 40.0 | 70.0 |
| 2 | 200.0 | 32.0 | 125.0 |
| 3 | 100.0 | 30.0 | 120.0 |
| 4 | 200.0 | 30.0 | 120.0 |

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

STABILITY of Earthen Dike w/o Reinforcement (STABR)

| NUMBER | TANGENT | RADIUS | (X) CENTER | (Y) CENTER | FS(BISHOP) | FS(OMS) |
|---|---|---|---|---|---|---|
| 1 | 60.0 | 130.0 | 200.0 | -70.0 | 3.675 | 3.516 |
| 2 | 60.0 | 130.0 | 160.0 | -70.0 | 3.931 | 3.644 |
| 3 | 60.0 | 170.0 | 200.0 | -110.0 | 3.618 | 3.487 |
| 4 | 60.0 | 130.0 | 240.0 | -70.0 | 3.442 | 3.399 |
| 5 | 60.0 | 90.0 | 200.0 | -30.0 | 3.785 | 3.571 |
| 6 | 60.0 | 130.0 | 220.0 | -70.0 | 3.556 | 3.456 |
| 7 | 60.0 | 150.0 | 240.0 | -90.0 | 3.442 | 3.399 |
| 8 | 60.0 | 130.0 | 260.0 | -70.0 | CIRCLE OUTSIDE SLOPE | |